

Operational Model of the Belle Fourche Irrigation District



BELLE FOURCHE
RIVER WATERSHED
PARTNERSHIP

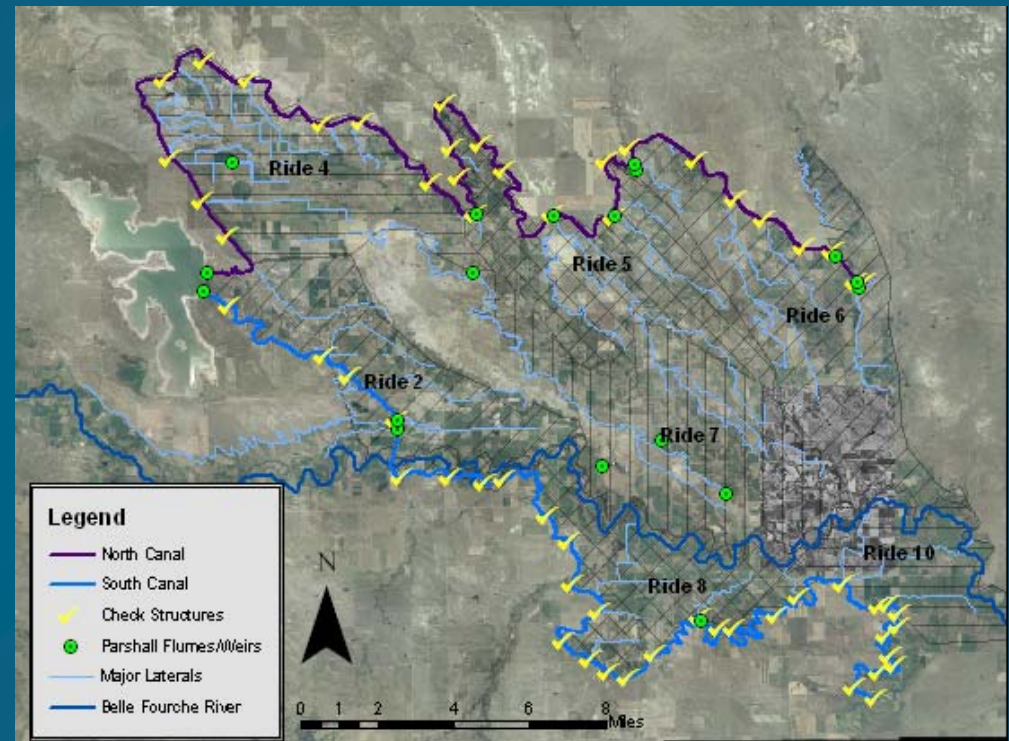
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Project Background

❖ Belle Fourche Irrigation District

- ➔ Operated for US BOR
- ➔ 57,400 Irrigable Acres
- ➔ 94 Miles of Major Canal, 450 Miles of Laterals
- ➔ North/South Canals
- ➔ Check Structures/Flumes





Problem Statement

- ❖ Total Maximum Daily Load (TMDL) Report Complete and Approved by Environmental Protection Agency (EPA) for Total Suspended Solids (TSS)
- ❖ Sources of TSS
 - *Natural Bank Sloughing*
 - *Riparian Habitat Impairment*
 - *Non-Used Irrigation Water Discharged Into Natural Waterways*
- ❖ Recommendations
 - *34,000 Acres of Managed Riparian Grazing*
 - *Reduce Nonused Irrigation Return Flows by 12,000 Acre-Feet Through Improved Efficiencies*



Objectives

- ❖ **Flow Automation Units**
- ❖ **Operational Model**
 - *Focus Area*
 - *Operational Plan*
 - *Delivery Lag Time*
 - *Water Card Operational Database*
 - *Check Structure Operation and Control*
- ❖ **Summer 2006-2007 Recommendations**

Flow Automation Units

- ❖ **Maintain Pool Level**
- ❖ **Accurate Deliveries**
 - ➔ *Adjusts to System Fluctuations*
 - ➔ *Realtime Data*

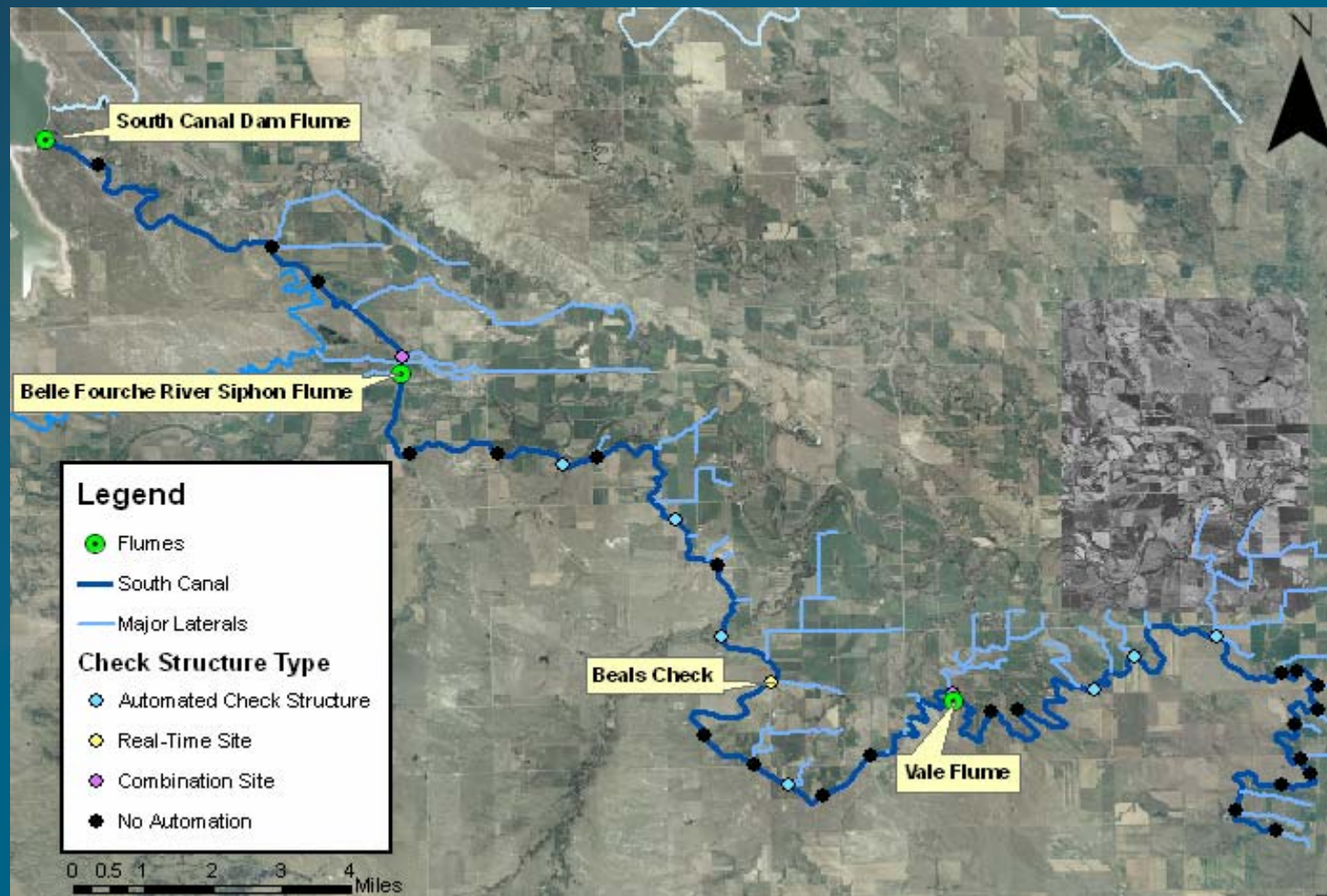


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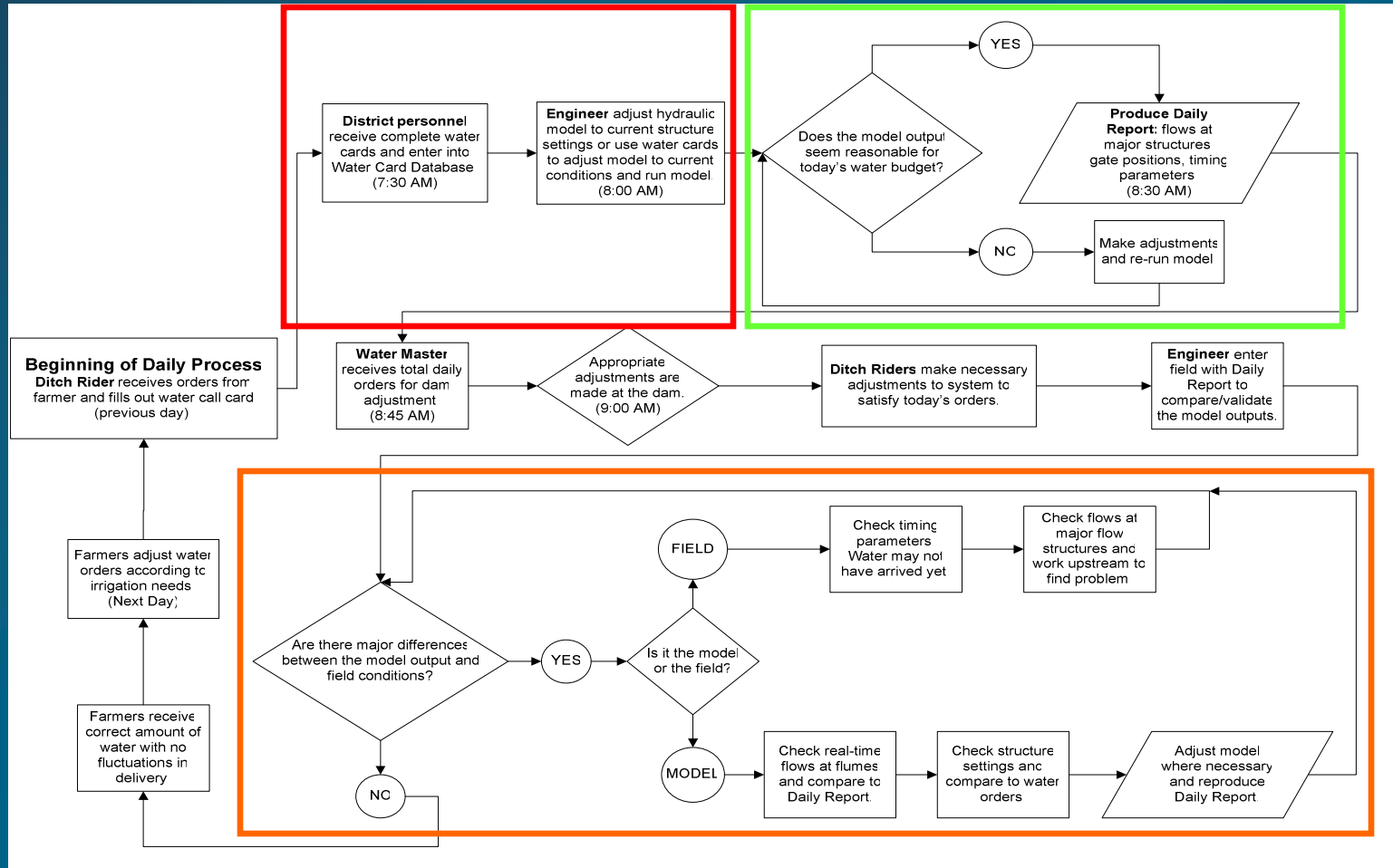
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Focus Area



Operational Plan



Delivery Lag Time

❖ Def: Time to Deliver 90% of an Order to a Head Gate Structure Upon Release From the Dam

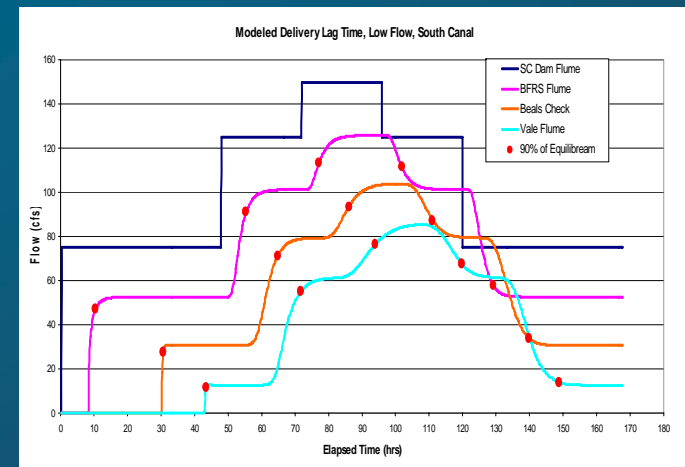
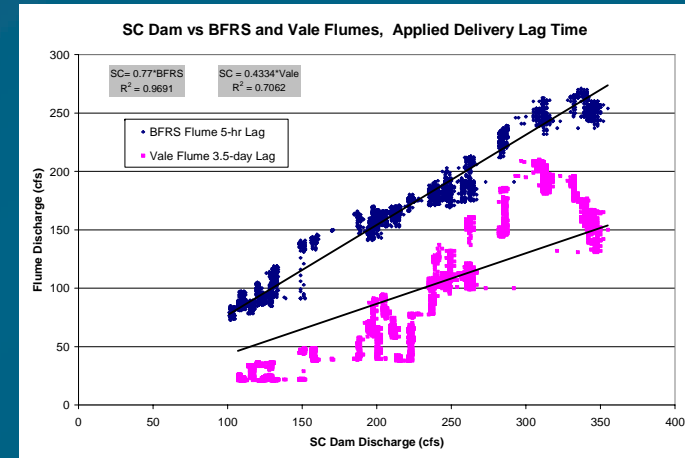
❖ Three Methods:

- *Water Master Sheets*
- *Correlation Using Continuous Stage Data*
- *Hydraulic Model Simulations (Low and High Flow)*

❖ SC Dam to BFRS Flume = 8 hrs

❖ SC Dam to Beals Check = 47 hrs

❖ SC Dam to Vale Flume = 84 hrs



Water Card Operational Database

❖ Water Ordering System Upgrades

- ➔ *Water Call Cards*
- ➔ *Water Master Sheets*
- ➔ *Water Billing Cards*

❖ Data Collection Macro

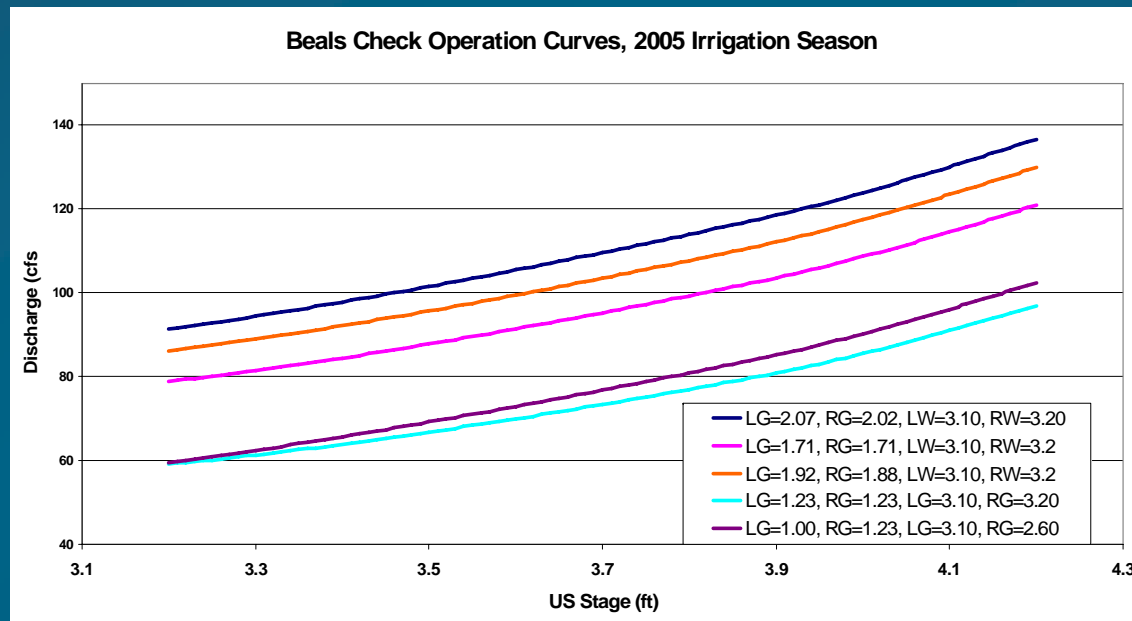
❖ Dynamic Check Structure Demands

❖ Link to Hydraulic Model

Call Card	DATE															Total	Billed Total	Total2
Strong Clay																		
Philamer, B																2.0	2.0	0.0
Philamer, R																	0	0.0
Philippen	2.0																2	0.0
Pittman	2.0	4.0															6	0.0
Pitts				4.0													4	0.0
Rathbun																	0	0.0
Rader																	0	0.0
Reeds																	0	0.0
Ronkin																	0	0.0
Rose																	0	0.0
Ruff, D																	0	0.0
Ruff, R																	0	0.0
Saverson																2.0	2	0.0
Skajlett, G																	0	0.0
Sheeler																2.0	2.0	0.0
Sheeler, E																	0	0.0
Sheeler, S																	0	0.0
Shook																2.0	2	0.0
Trokkimoinen																8.0	8	0.0
Trokkimoinen, B																	0	0.0
Urban																	0	0.0
Vale San																	0	0.0
Vale Town																	0	0.0
Vang, J																	0	0.0
Vells																	0	0.0
Delivered	24.0	4.0	2.0	3.5	4.0	1.5	4.0	37.0	8.0	2.0	1.0	2.0	20.0	113.0			0.0	
Operational						0.5					1.0	1.0					2.5	
Total	24.0	4.0	2.0	3.5	4.0	2.0	4.0	37.0	8.0	2.0	2.0	2.0	21.0	115.5	0.0		2.5	
Ditchrider Total															108.5			

Check Structure Operation

- ❖ Hydraulically Unique
- ❖ Operation Curves
- ❖ Simulating Settings and Discharge



Summer 2006~2007 Recommendations

- ❖ **New Automation**
 - *14 Additional Units*
 - *Locations*
- ❖ **Field Monitoring**
- ❖ **Mobile Transducers**
- ❖ **North Canal Monitoring**
- ❖ **Automating Water Card Changes**

Question?

