

Hydrologic Mass Balance Analysis for Stormwater Treatment Area 1 West Inflow Basin and Flow Data Estimation for G301 Spillway (November 2, 1999 to September 30, 2004)

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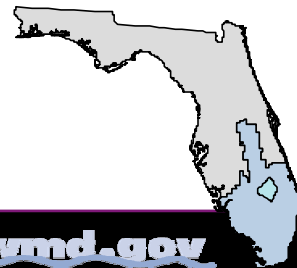
Water Quality Assessment Division
Environmental Resource Assessment Department
South Florida Water Management District

*For presentation at the Quarterly Meeting of the Technical Oversight Committee,
February 24, 2005*

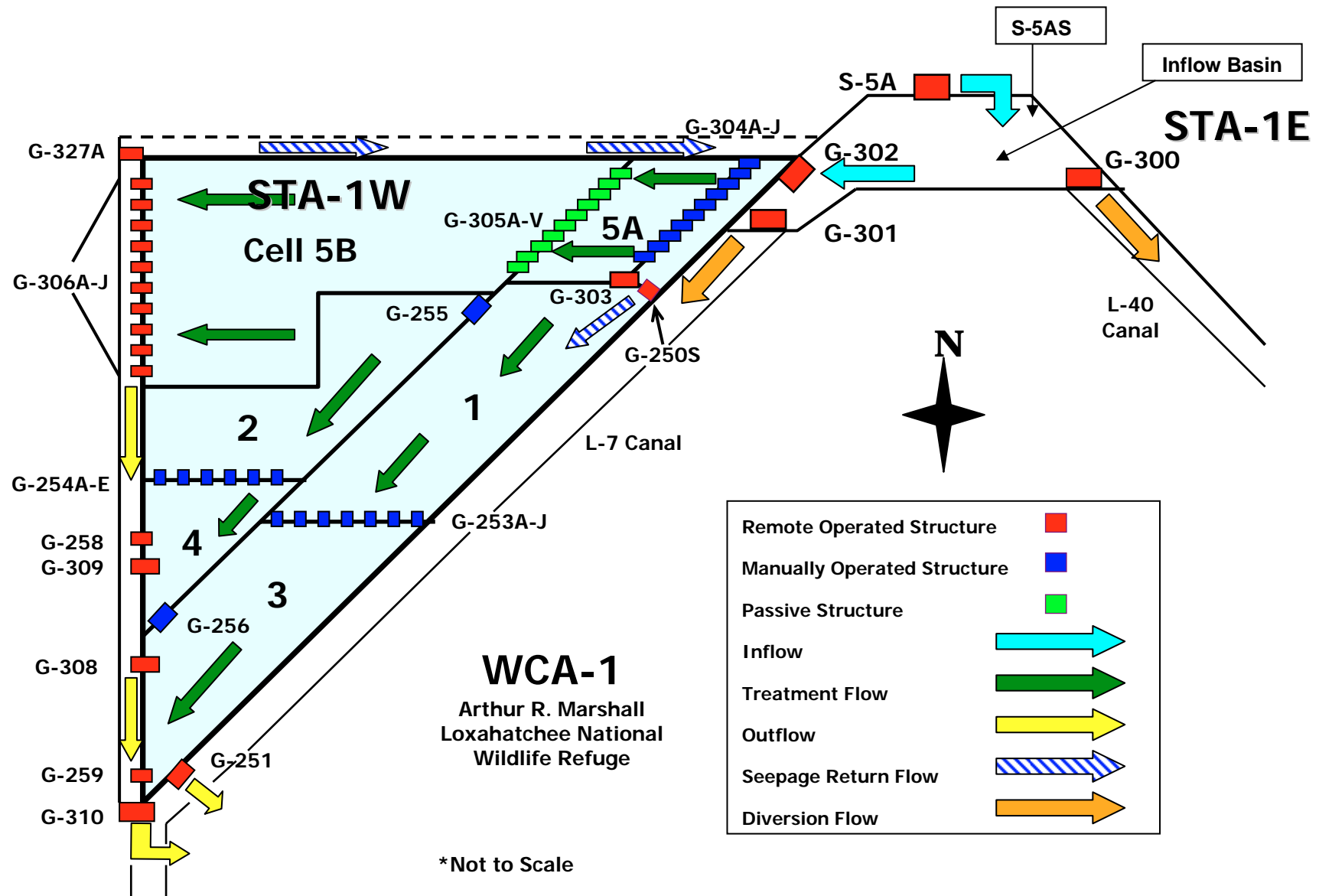


Issue

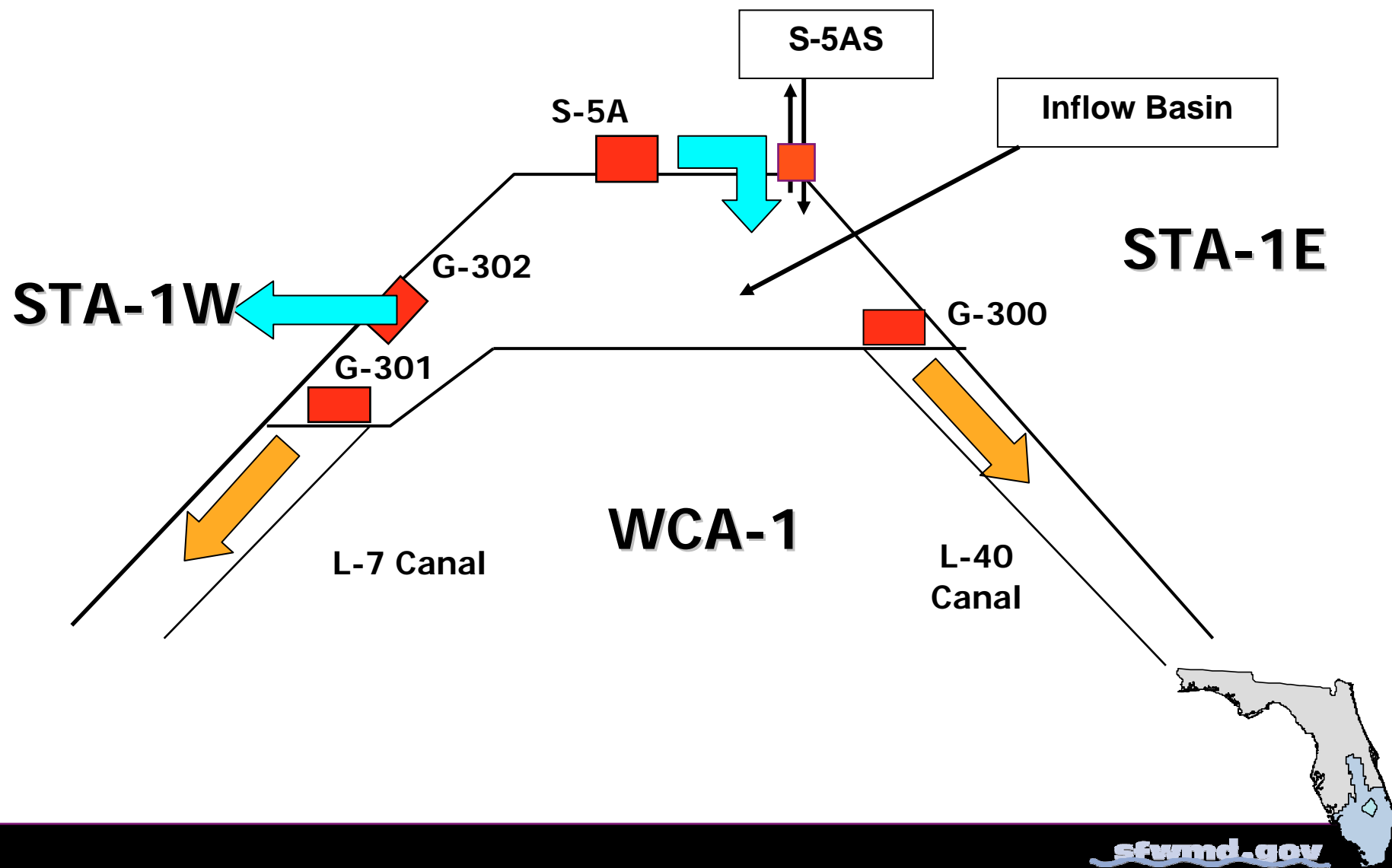
- **Questions were raised on the uncertainty of STA-1W Inflow Basin by-pass flows to the Refuge**
- **A team of District staff evaluated the issue and it was agreed to conduct a quick mass balance analysis**



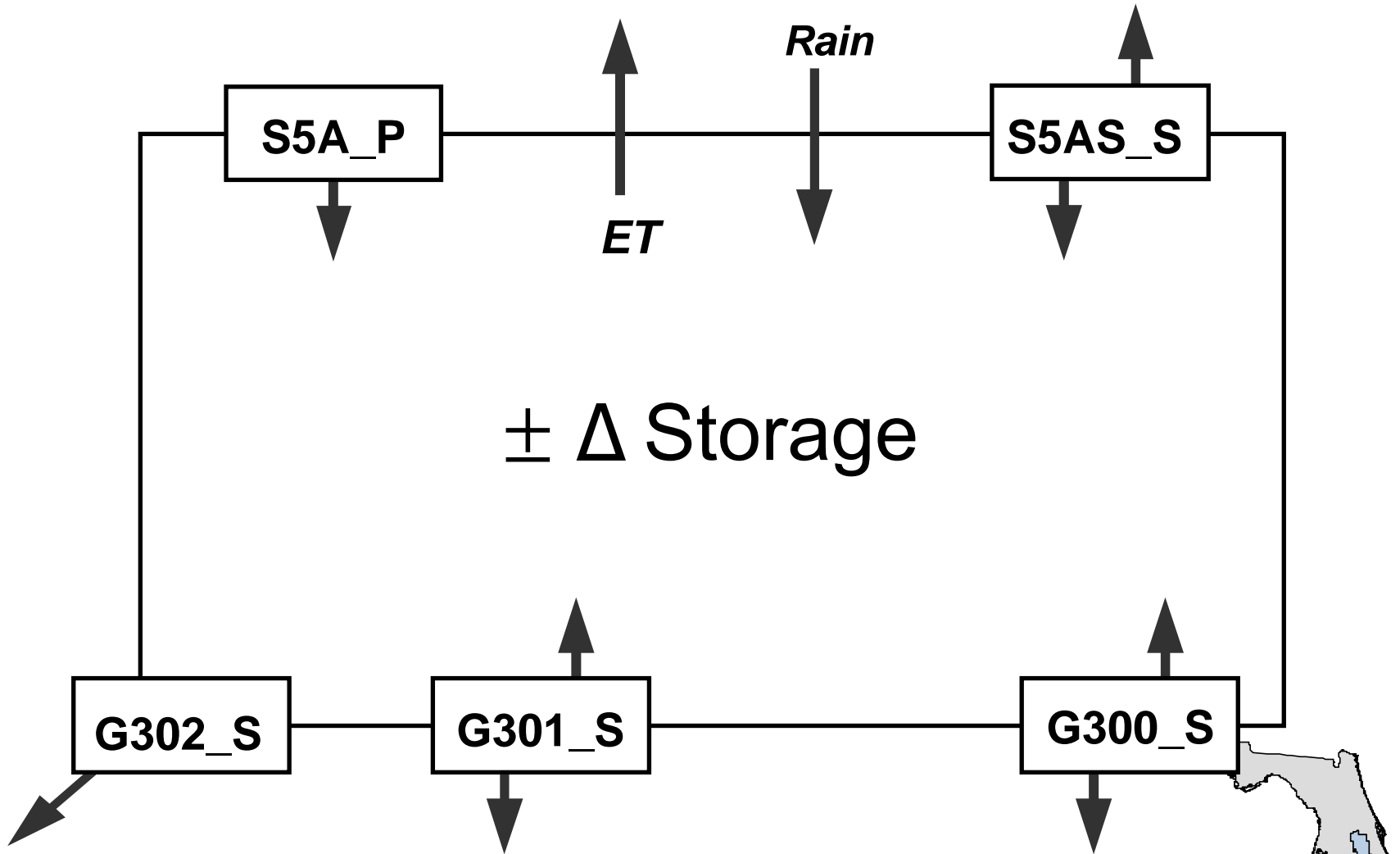
STA-1W and the Inflow Basin



Inflow Basin



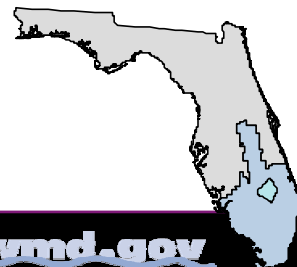
Schematic Hydrologic Model for STA-1W Inflow Basin



Hydrologic Mass Balance Equations

$$\text{Balance} = \text{Inflow} - \text{Outflow} - \Delta\text{Storage}$$

$$\begin{aligned} \text{Balance} = & S5A + S5AS + \text{RAIN} \\ & - G300 - G301 - G302 - \text{ET} \\ & - \Delta\text{Storage} \end{aligned}$$

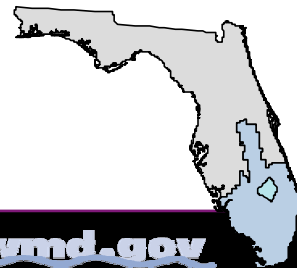


G301 and G300

Data Sets in this Analysis

- **G301 Three sets of data**
 - Pre-December 6, 2004 DBHydro data
 - December 6 to current DBHydro data
 - Data derived from mass balance analysis (not in DBHydro)

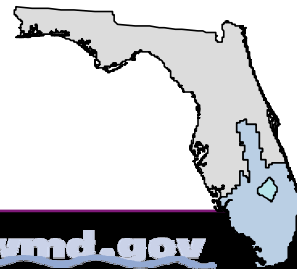
- **G300 Two sets of data**
 - Pre-December 6, 2004 DBHydro data
 - December 6 to current DBHydro data



Initial Mass Balance with Pre-December 6, 2004 DBHydro Flow Data for G301 and G300

Structure	1999 to August 2004		September 2004	
	Inflow	Outflow	Inflow	Outflow
	ac-ft	ac-ft	ac-ft	ac-ft
S5A	1,686,181		152,987	
S5AS	61,901	278,635	2,266	587
G300	105,502	94,196	-----	16,601
G301	61,721	82,940	24,206	622
G302		1,465,972		109,913
Balance		6,438	51,736	

0.3% 29%

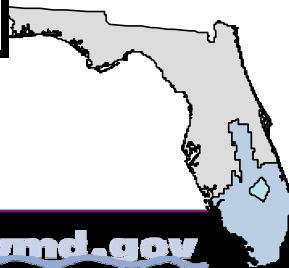


Complete Mass Balance with December 6, DBHydro flow data for G301 and G300

Structure/ Parameter	Nov. 1999 to Aug. 2004		September 2004	
	Inflow	Outflow	Inflow	Outflow
	ac-ft	ac-ft	ac-ft	ac-ft
S5A	1,686,181		152,987	
S5AS	61,901	278,635	2,266	587
G300	117,524	104,433	-----	18,474
G301	68,767	82,253	17,135	706
G302		1,465,972		109,913
Rainfall	5,055		396	
ET		5,796		90
ΔS	1,401			1,447
Balance	3,740		41,567	

0.2%

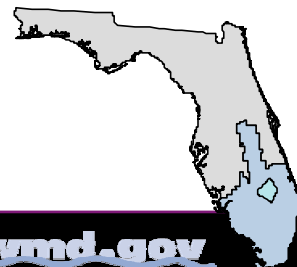
24%



G301 Flow Data Estimation

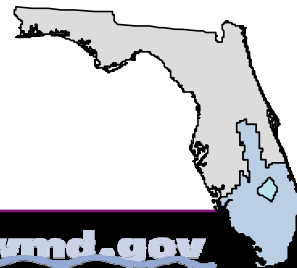
$$\begin{aligned} G301(\text{est}) = & S5A + S5AS + \text{RAIN} - \\ & G300 - G302 - \text{ET} \\ & - \Delta\text{Storage} \end{aligned}$$

(for $|\Delta h| \leq 0.2$ ft and Gates open)

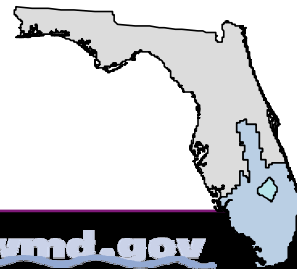
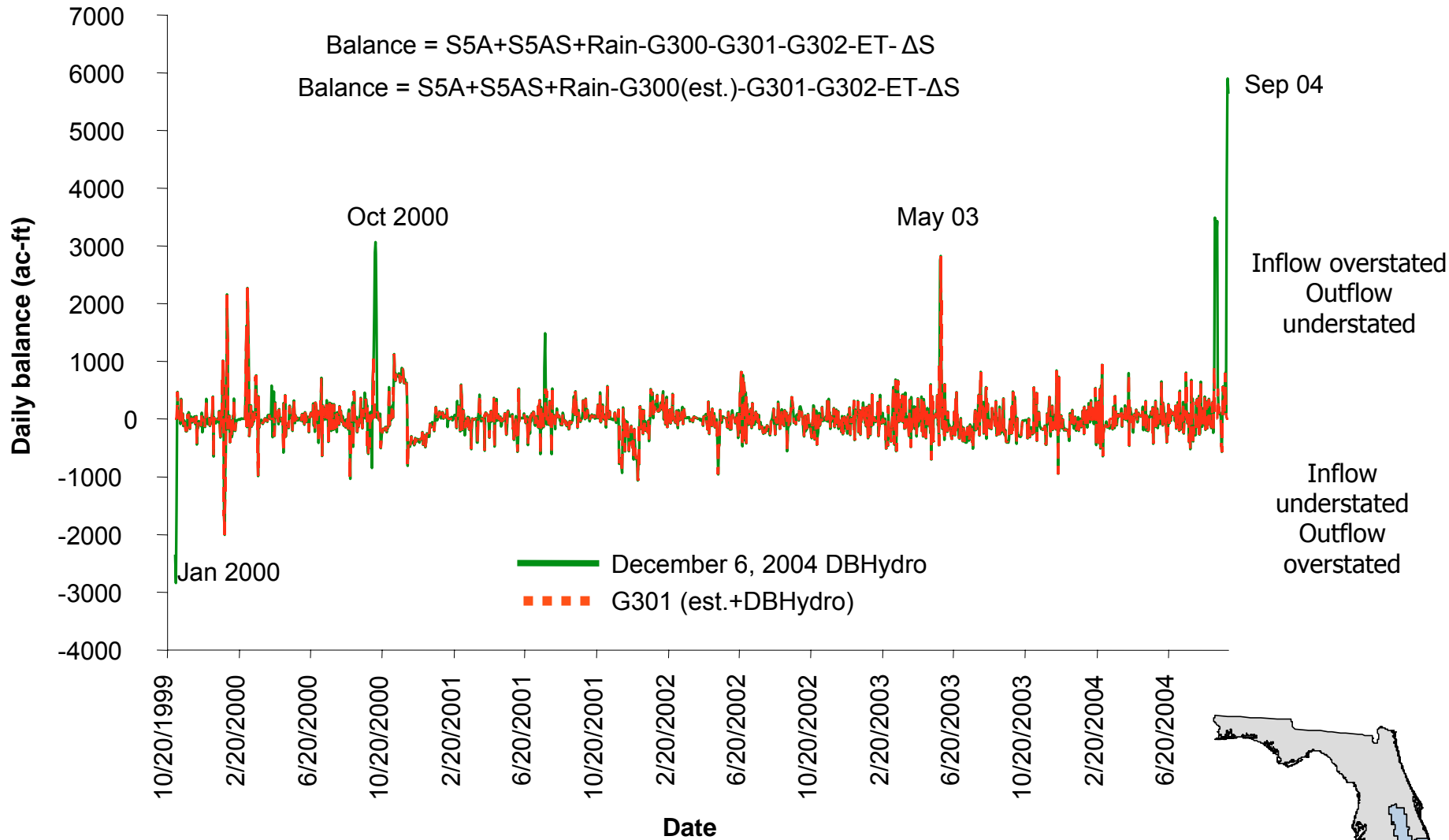


Complete Mass Balance with Estimated Flow Data for G301

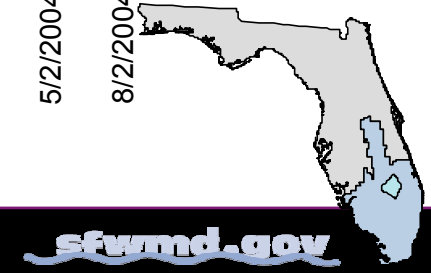
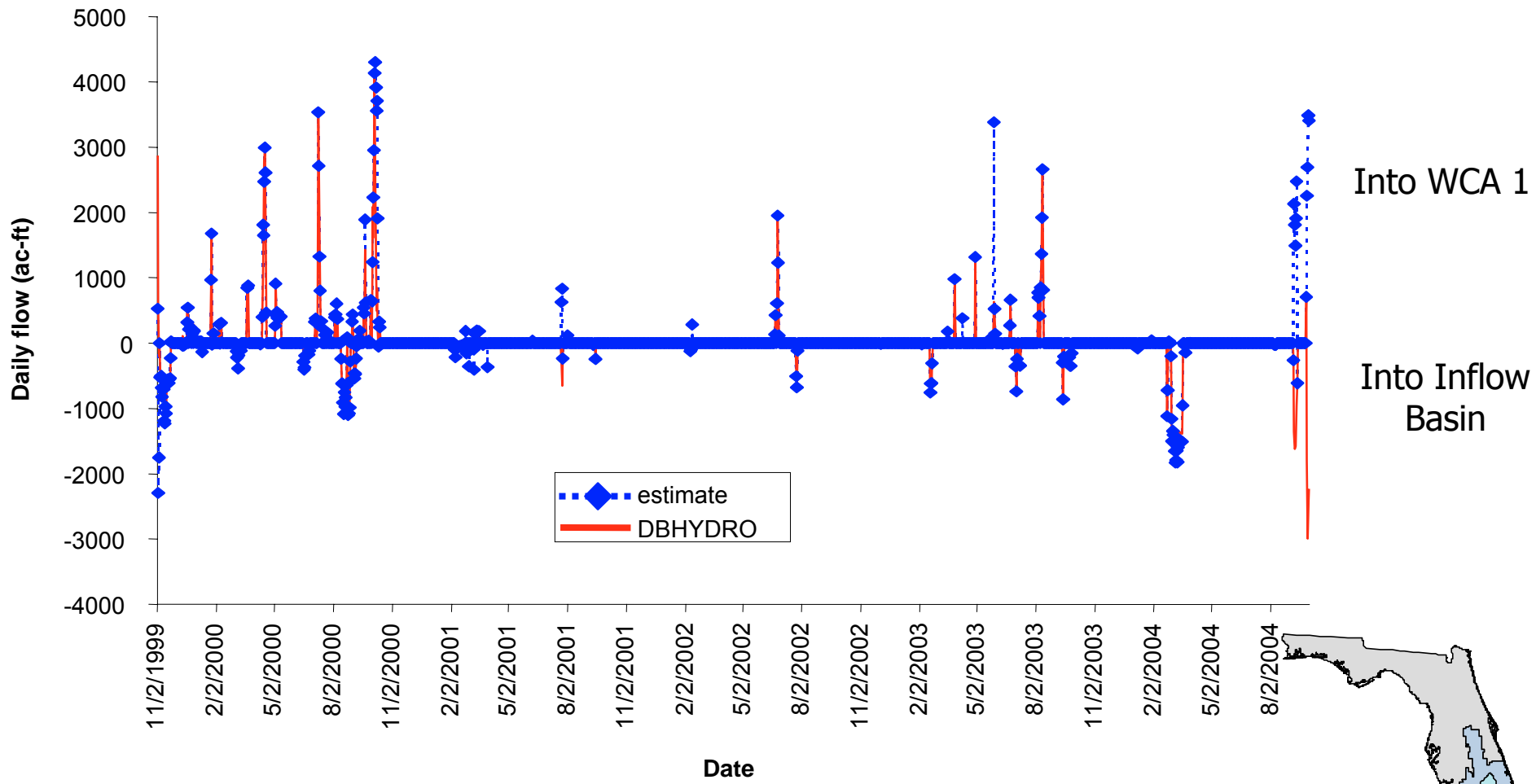
Structure/ Parameter	Nov. 2, 1999 to Aug. 31, 2004		September 2004	
	Inflow	Outflow	Inflow	Outflow
	ac-ft	Ac-ft	ac-ft	ac-ft
S5A	1,686,181		152,987	
S5AS	61,901	278,635	2,266	587
G300	117,524	104,433	-----	18,474
G301	72,982	97,178	879	22,366
G302		1,465,972		109,913
Rainfall	5,055		396	
ET		5,796		90
ΔS	1,401			1,447
Balance		6,970 (0.4 %)	3,651 (2.3 %)	



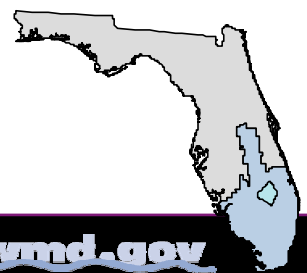
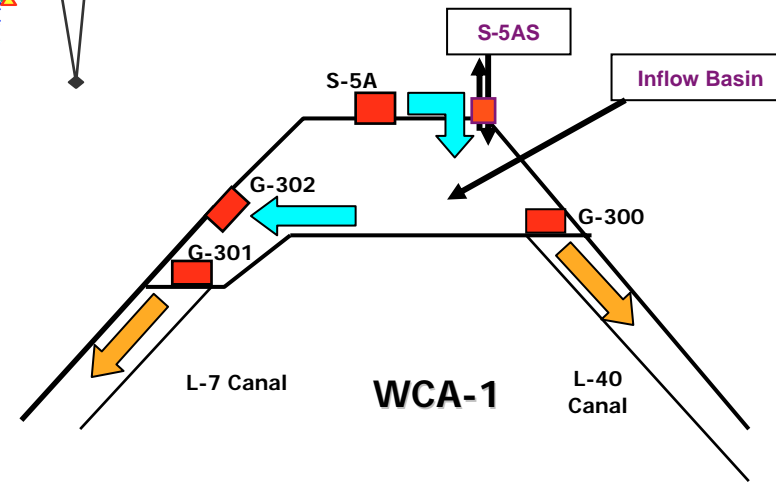
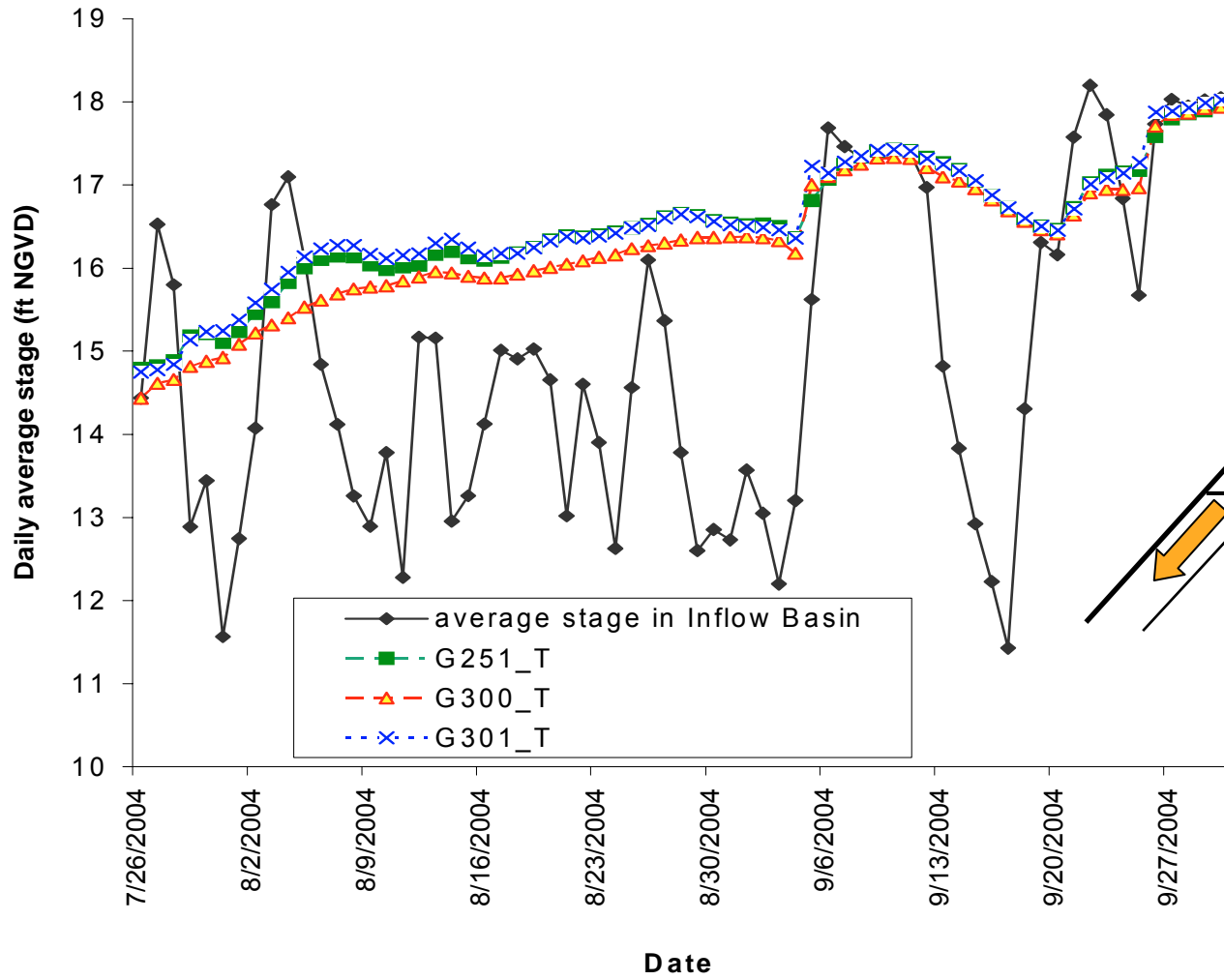
Comparison of Mass Balance Errors using Estimated and DBHydro G301 Flow Data



Comparison Between DBHydro and Estimated G301 Flows



Daily Water Level at STA-1W Inflow Basin and at Related Structures (Jul. 26, 2004 to Sep. 30, 2004)



CONCLUSION

- **Conduct field investigations of flow monitoring in the Inflow Basin**
- **Improve data by evaluating and estimating spikes of errors**
- **Store data in a Preferred Dbkey in DBHydro database and be available for use.**

