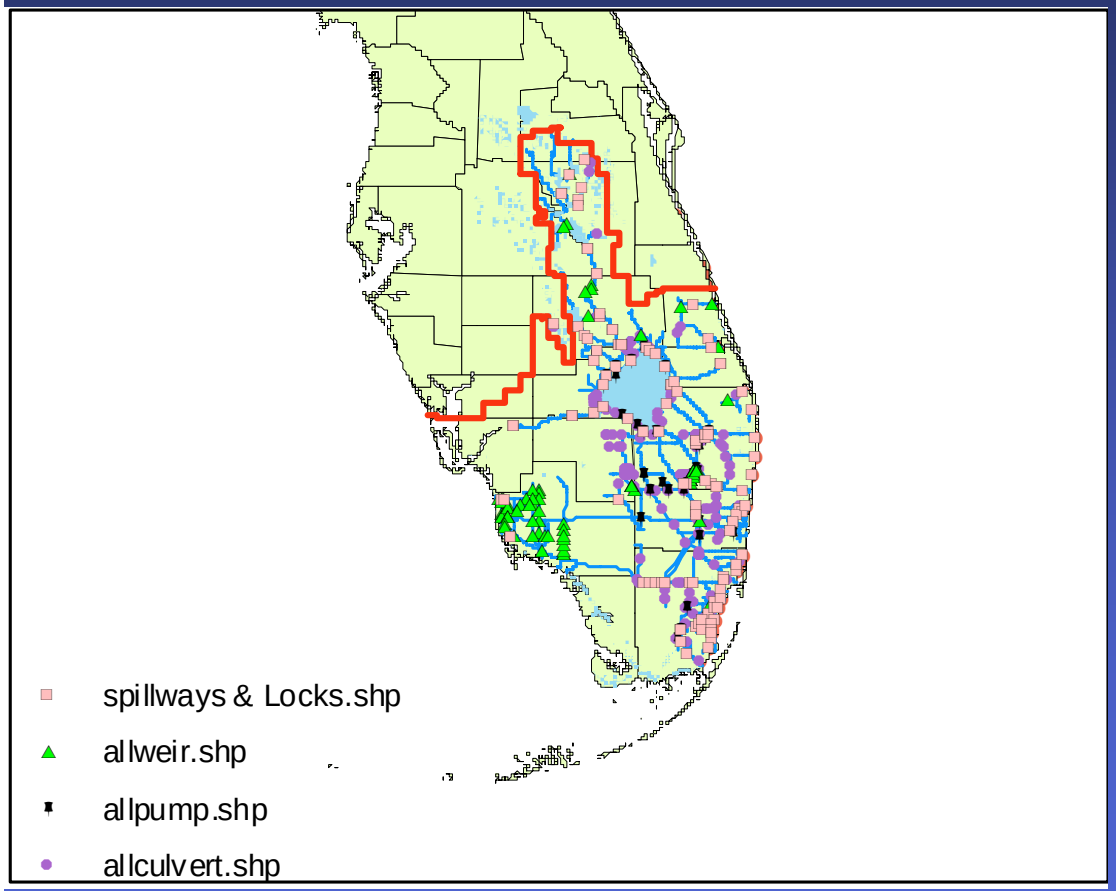
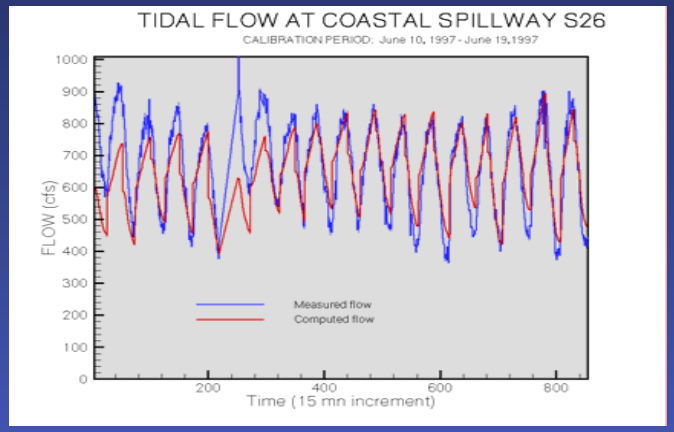
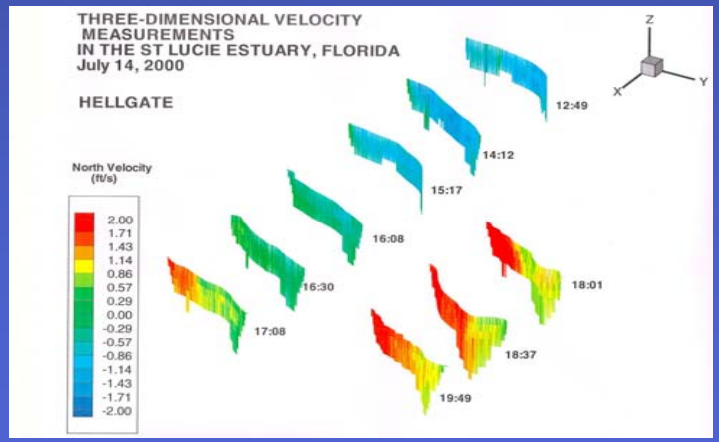
SOUTH FLORIDA WATER MANAGEMENT DISTRICT

FLOW DATA QUALITY IMPROVEMENT

Matahel Ansar, Ph.D., P.E.







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OUTLINE

Introduction

STRIVE

NEXFLOW

XStream

WEB/ATLAS

Conclusions and Summary

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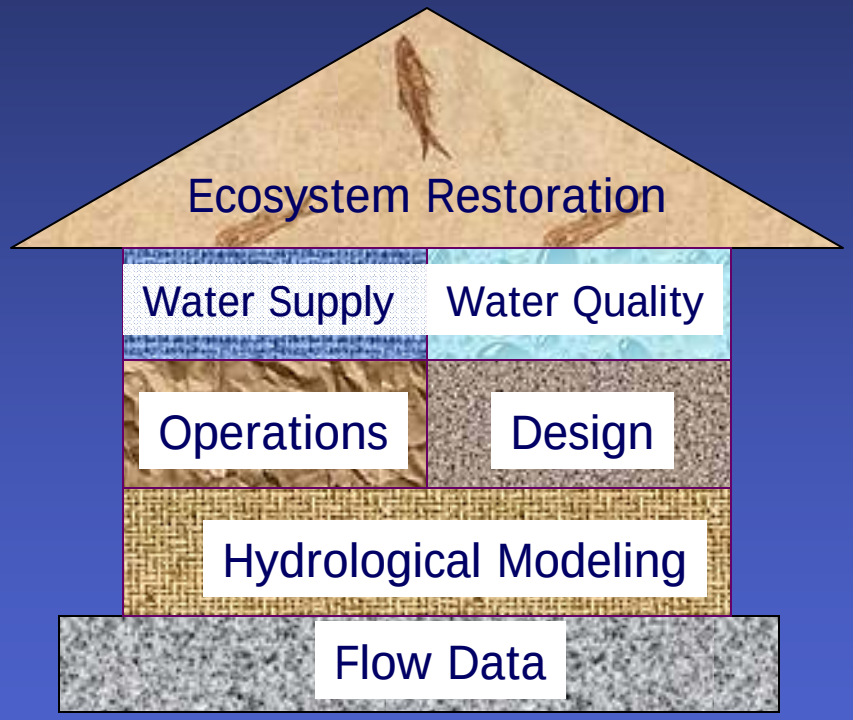
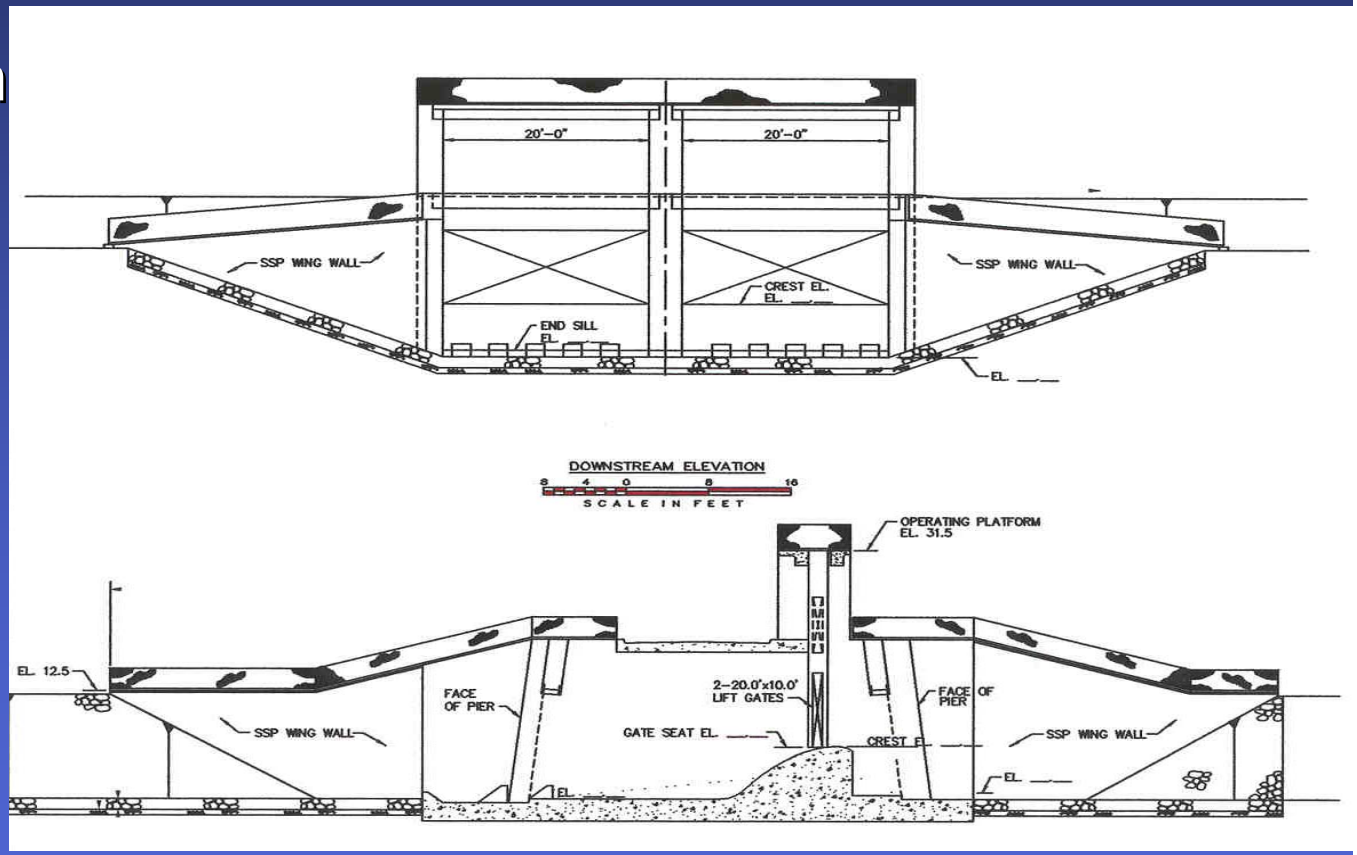
Inaccurate Flow Data are worthless, accurate FLOW data are priceless



STRIVE—STRucture Information VErification has two main objectives

1. Verify static Information through field surveys

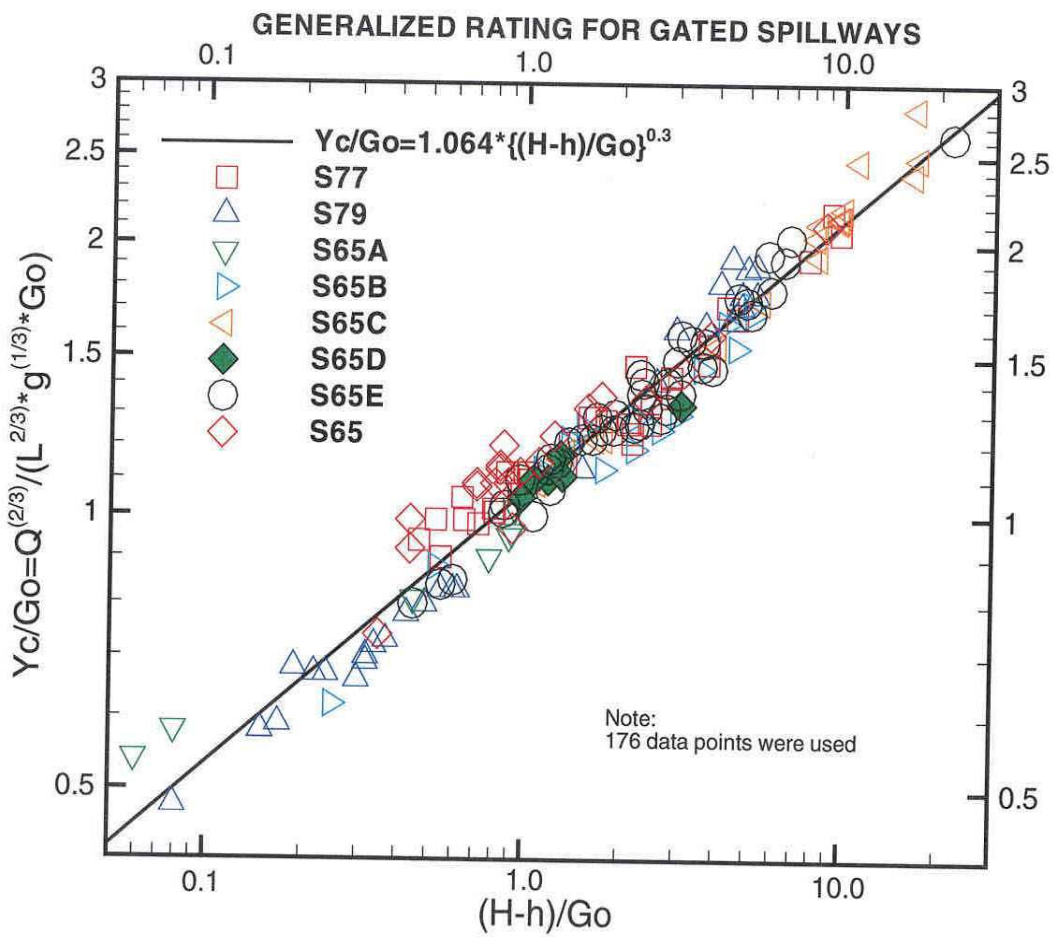
2. Revise flow data series

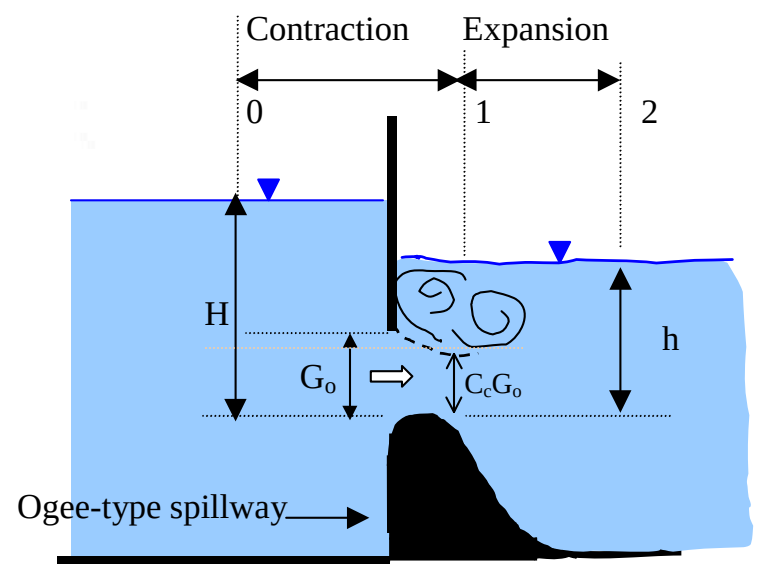


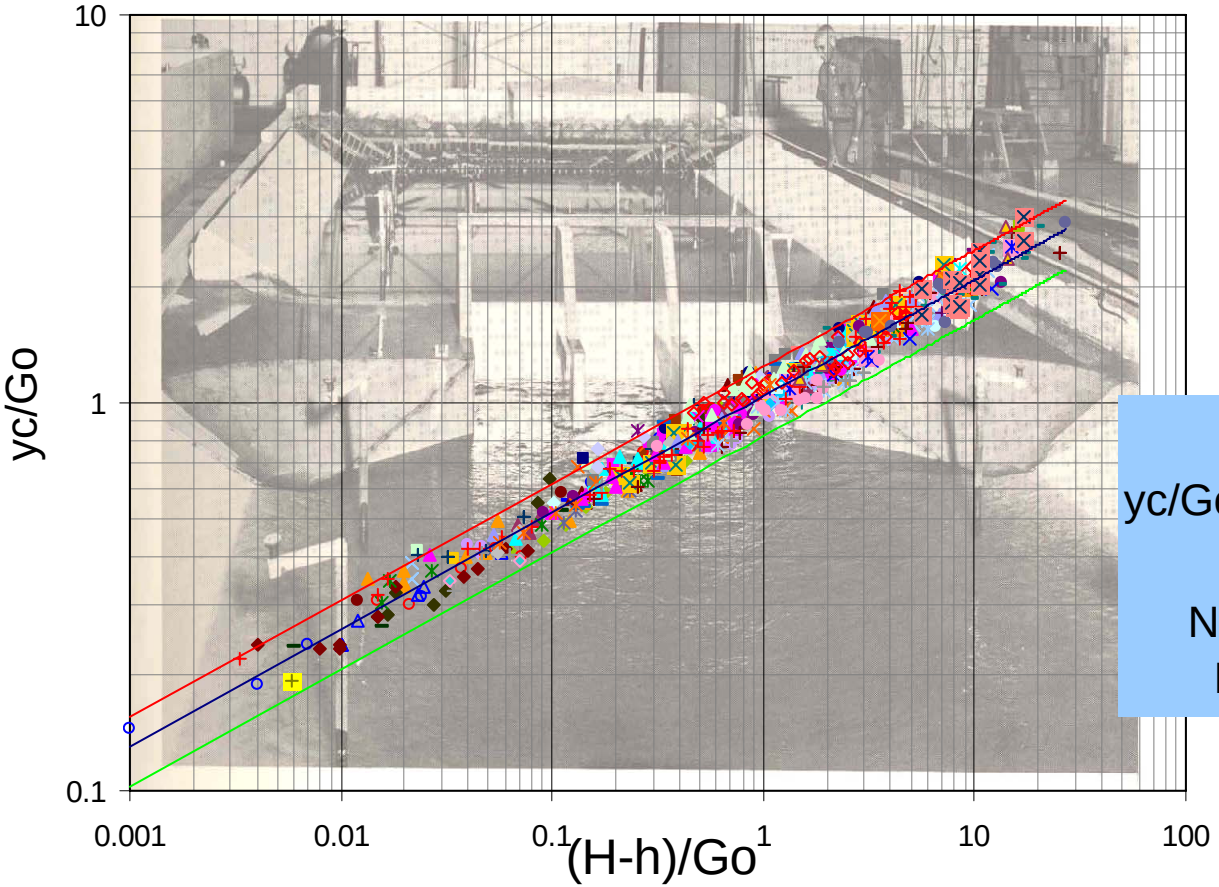
NEXFLOW

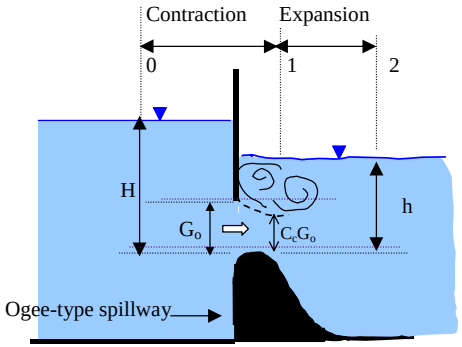
Next Generation Flow Program

Progress towards Generalized Flow Equations at Gated Spillways









Gen. Eq. all

$yc/Go = 1.04\{(H-h)/Go\}^{0.30}$

$R^2 = 0.97$

No. Structures = 76

No. meas. = 935

COCO1	G300	G302	G303	G308	G332	G334	G54
G56	G57	G93	GORDY	S119	S123	S13	S140
S174	S176	S177	S179	S18C	S190	S20F	S20G
S20	S21A	S21	S22	S25B	S26	S27	S28
S29	S308	S333	S334	S335	S33	S340	S351
S352	S354	S36	S37A	S37B	S39	S40	S41
S44	S47D	S59	S60	S61	S62	S63	S65A
S65B	S65C	S65D	S65E	S65NEW	S65	S70	S71
S72	S75	S77	S79	S7	S80	S83	S84
S8	S97	S99	S78	+30%Error in Q	- 30 %Error in Q	Gen. Eq. all	

NEXFLOW

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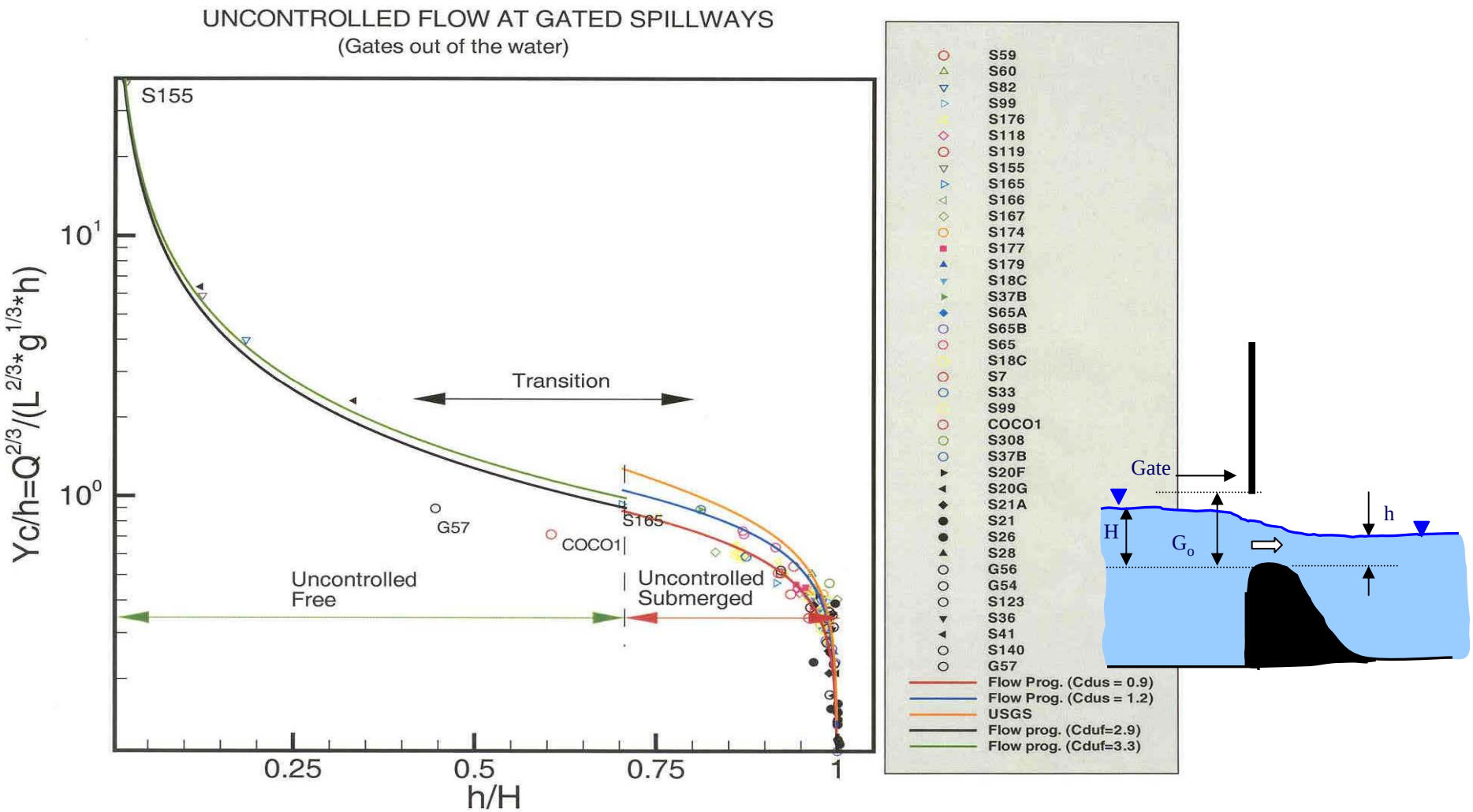
Progress towards Generalized Flow Equations at Gated Spillways

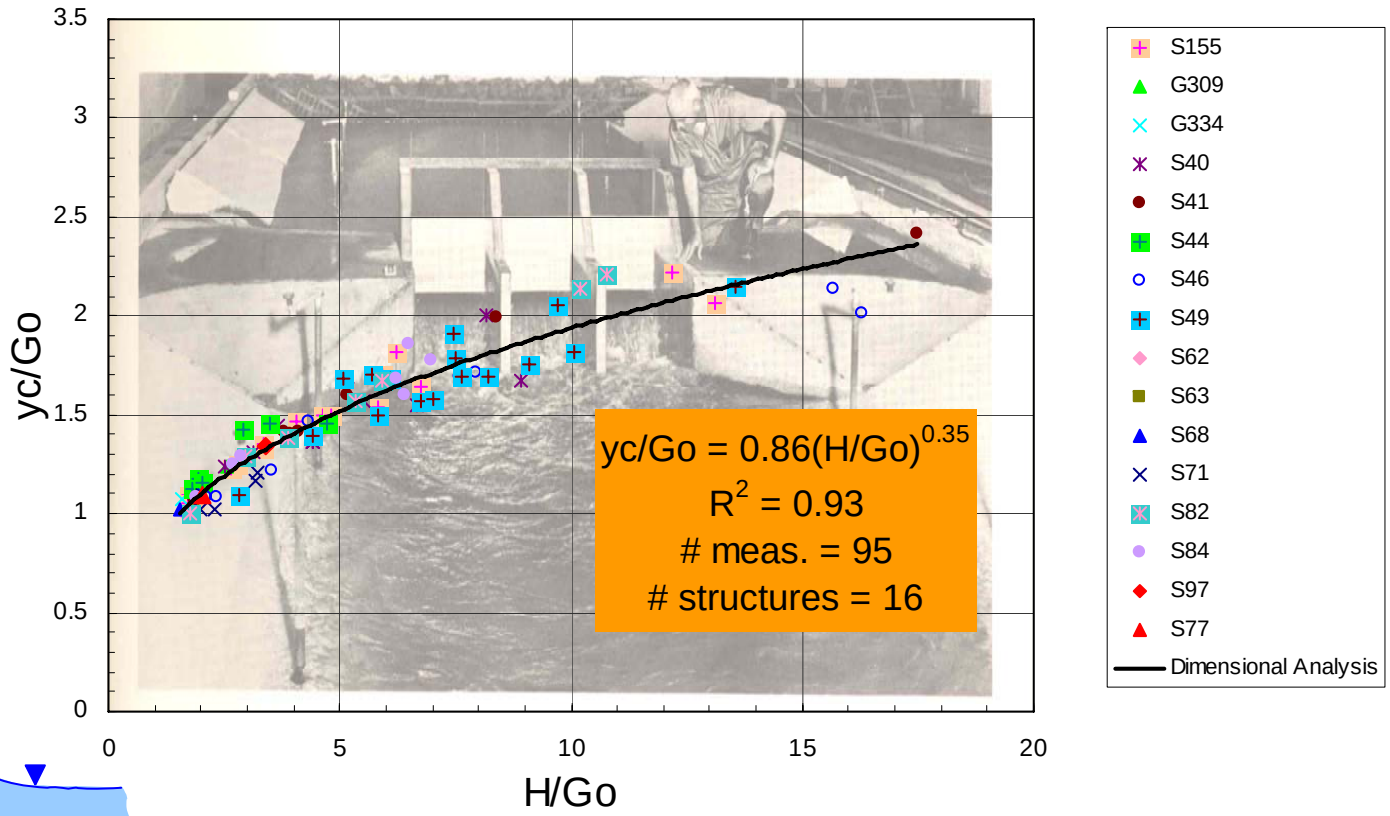


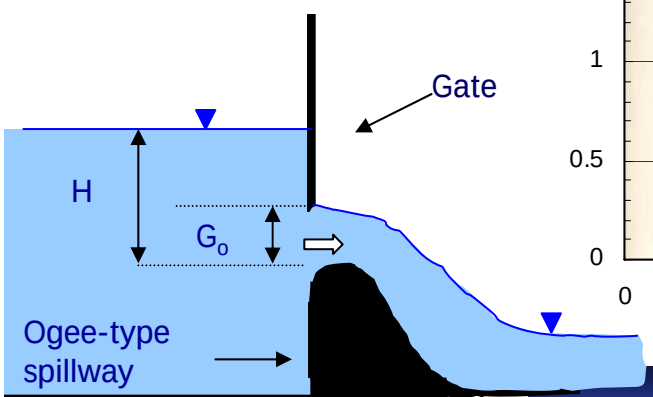
NEXFLOW

Next Generation Flow Program

Progress towards Generalized Flow Equations at Gated Spillways

Free Orifice Flow (Controlled Free) at Prototype Gated Spillways

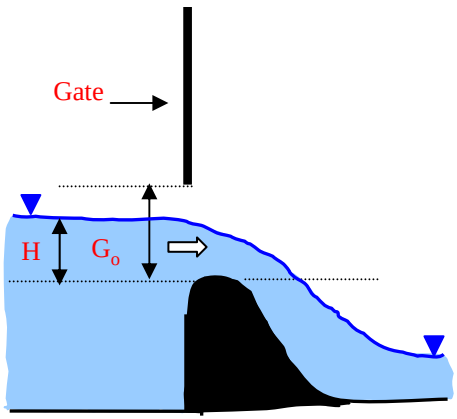


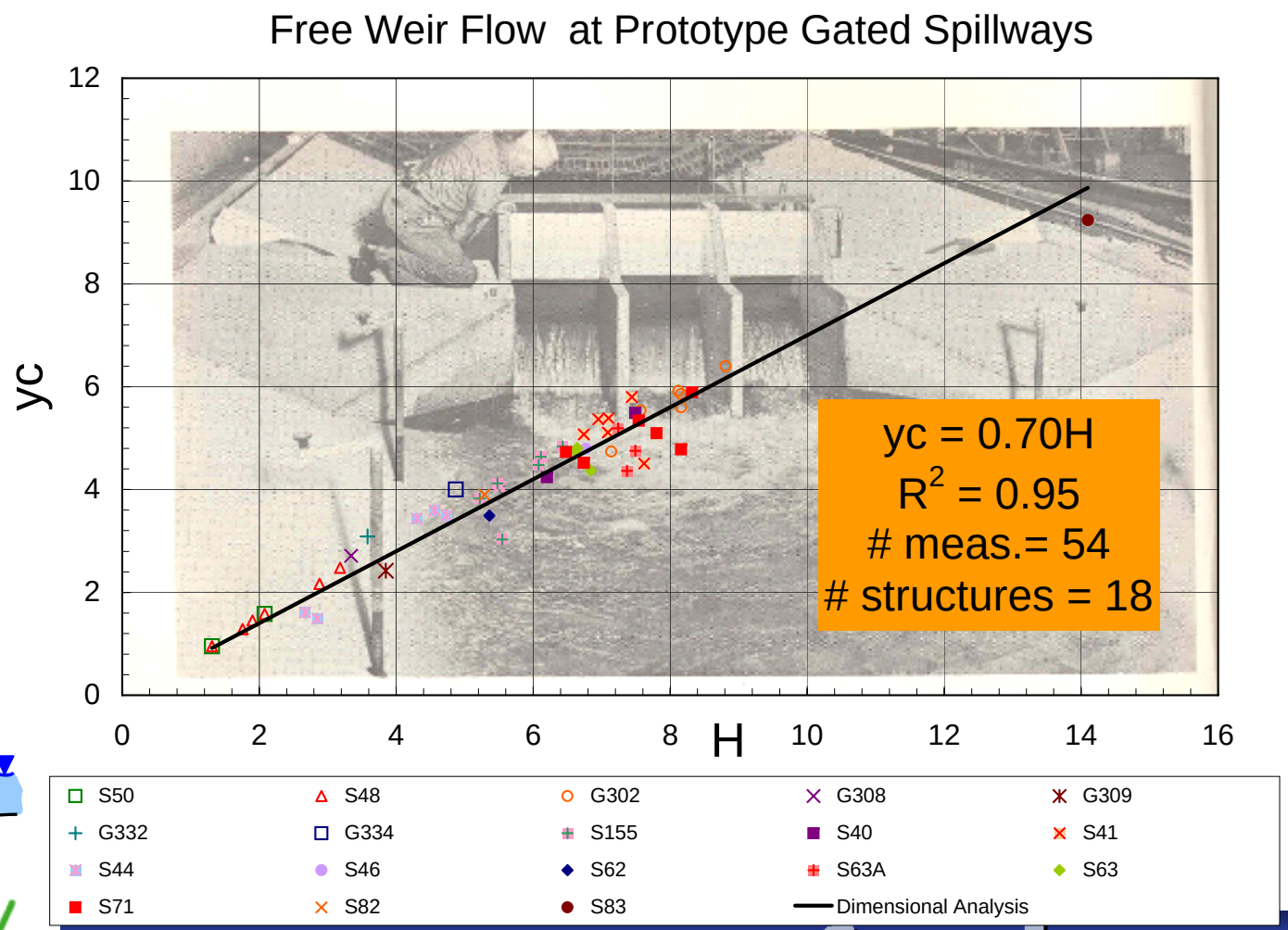


NEXFLOW

Next Generation Flow Program

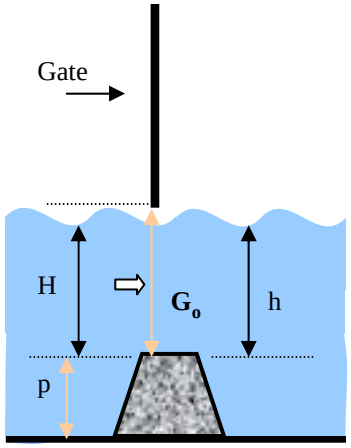
Progress towards Generalized Flow Equations at Gated Spillways



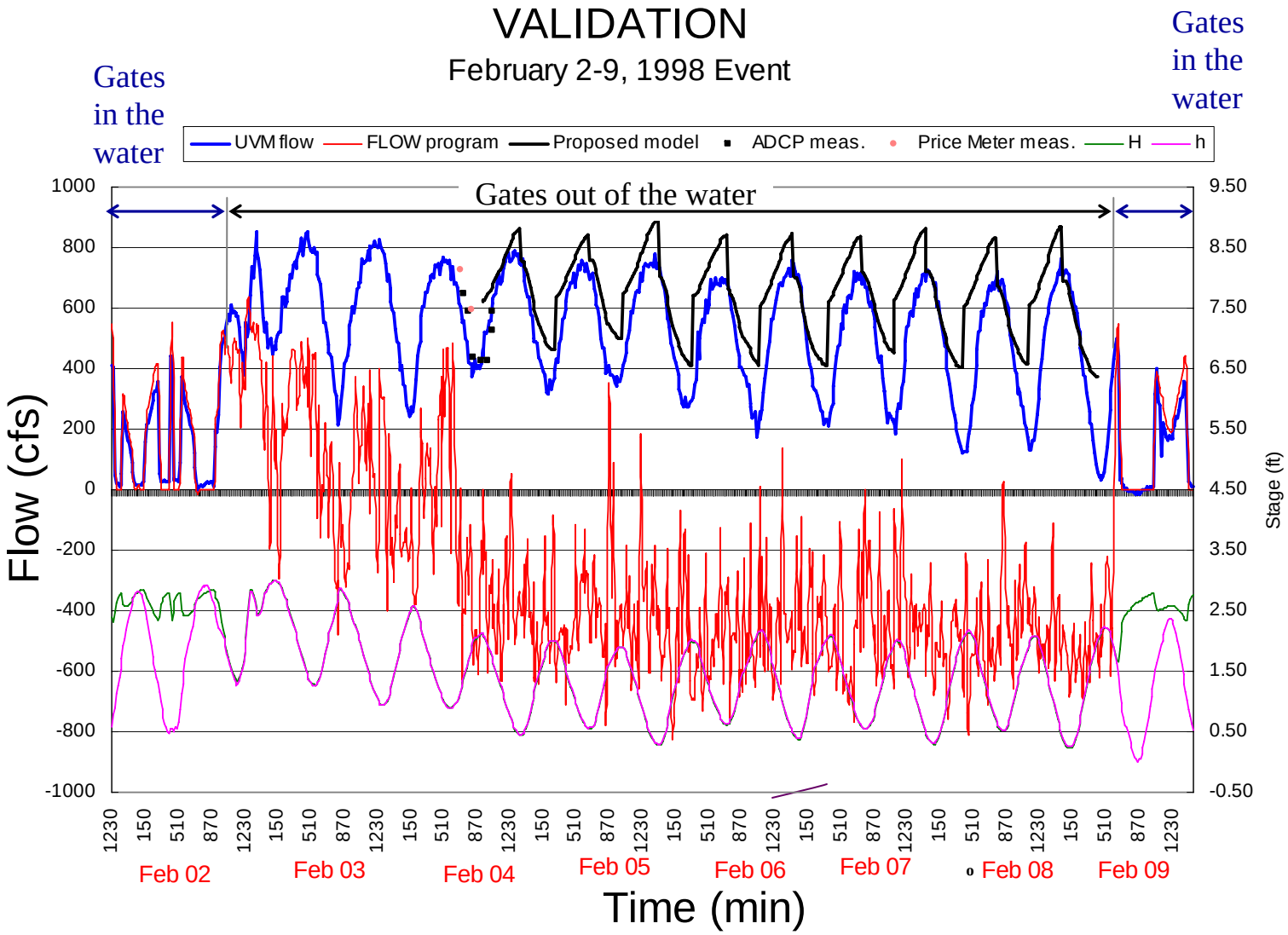


NEXFLOW

Next Generation Flow Program



Tidal Flows

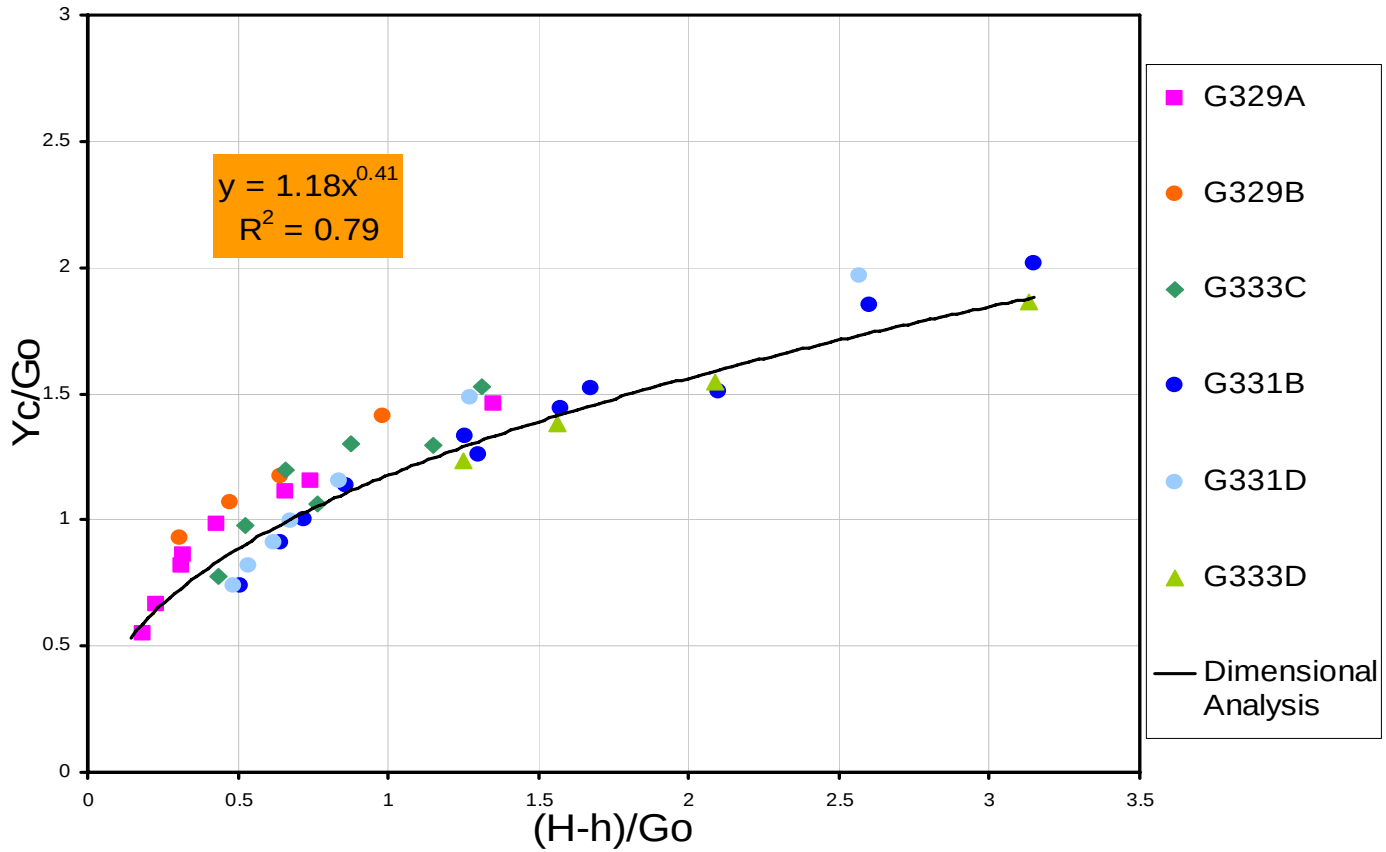


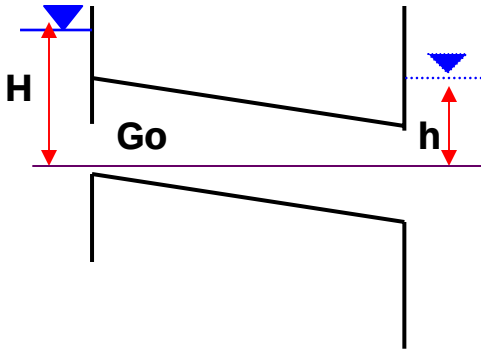
NEXFLOW

Next Generation Flow Program

Progress towards Generalized Flow Equations at Culverts

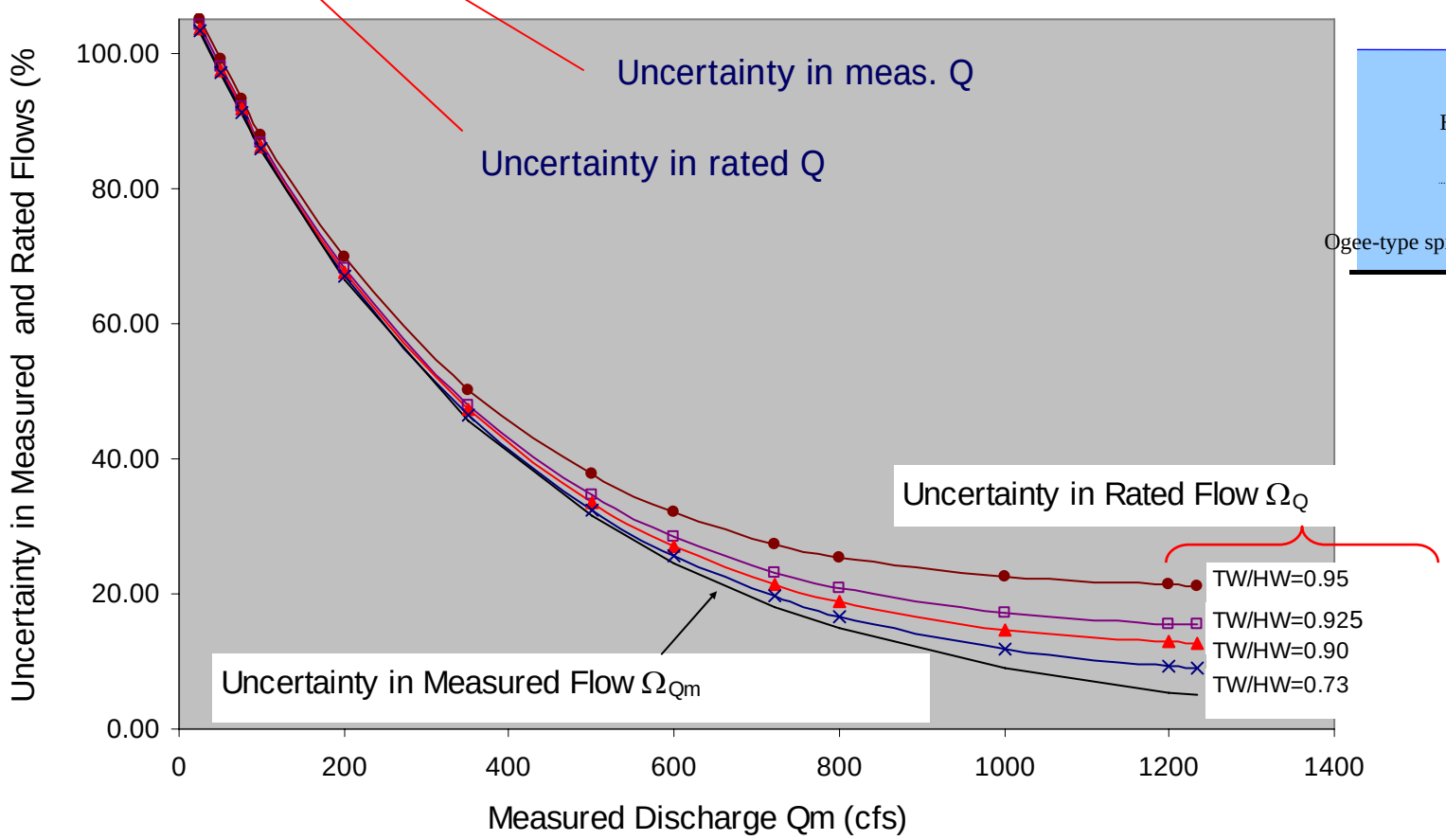
Orifice Flow condition at STA2 Culverts

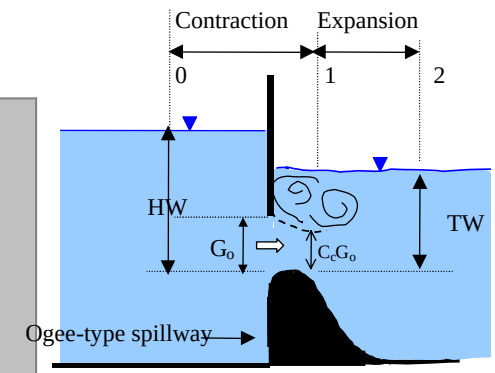




Uncertainty of Rated Flows

$$\Omega_Q^2 = \Omega_{Qm}^2 + 2\Omega_L^2 + 2\Omega_{Go}^2 + \frac{1}{2}\left[K_{HW}\Omega_{HW}^2 + K_{TW}\Omega_{TW}^2 + K_{SE}\Omega_{SE}^2\right]$$





SOUTH FLORIDA WATER MANAGEMENT DISTRICT

XStream

An Excel-based streamgauging planning tool

XStream

SPILLWAY MENU

VIEW FORM

SUMMARY

FLOW CONDITIONS

- CONTROLLED SUBMERGED → TABULAR VIEW → GRAPHICAL VIEW
- CONTROLLED FREE → TABULAR VIEW → GRAPHICAL VIEW
- UNCONTROLLED SUBMERGED → TABULAR VIEW → GRAPHICAL VIEW
- UNCONTROLLED FREE → TABULAR VIEW → GRAPHICAL VIEW

XStream is an Excel/Access Application to assist staff in the Hydraulics and Hydrology Division (H&H) retrieving, sorting, plotting and analyzing data from the Qmeas (Field Flow Measurements--Streamgauging) database before or during a streamgauging operation.

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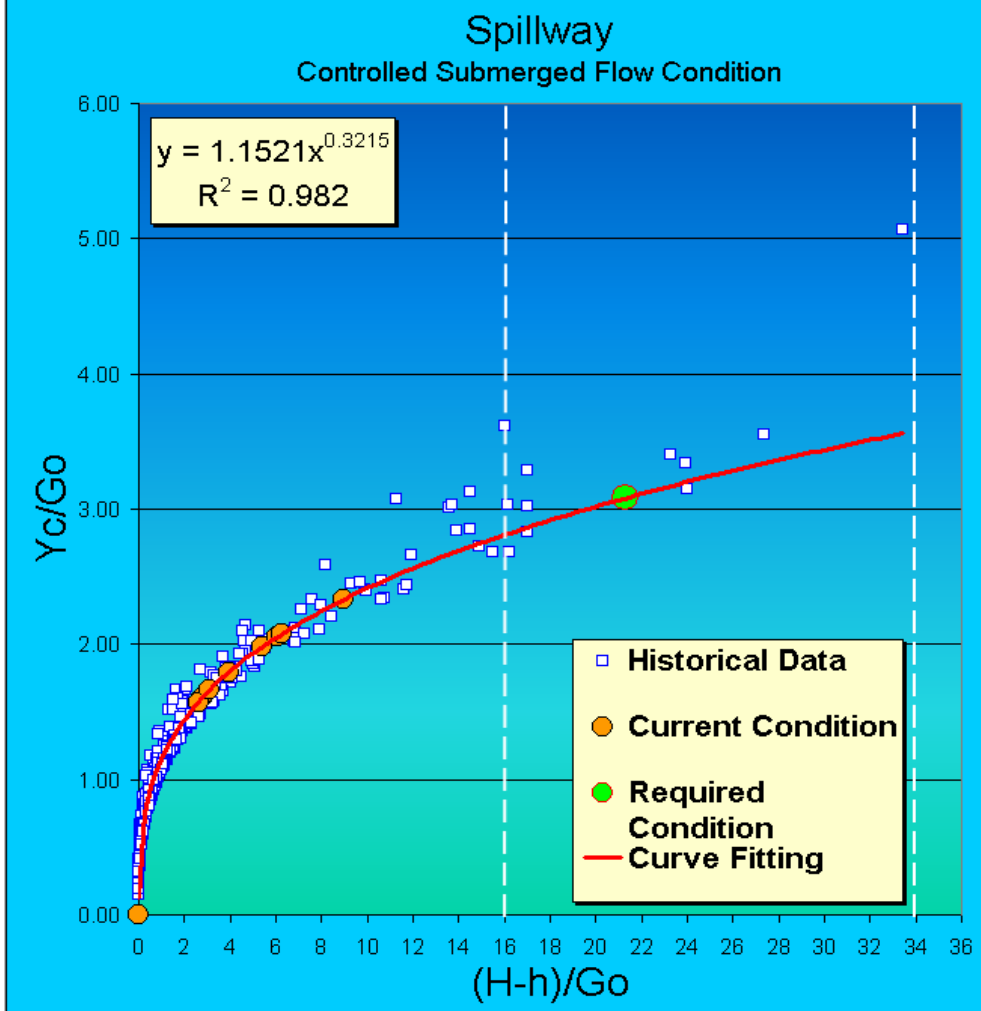
Engineering and Hydraulics Support Unit *January 2004*

XStream

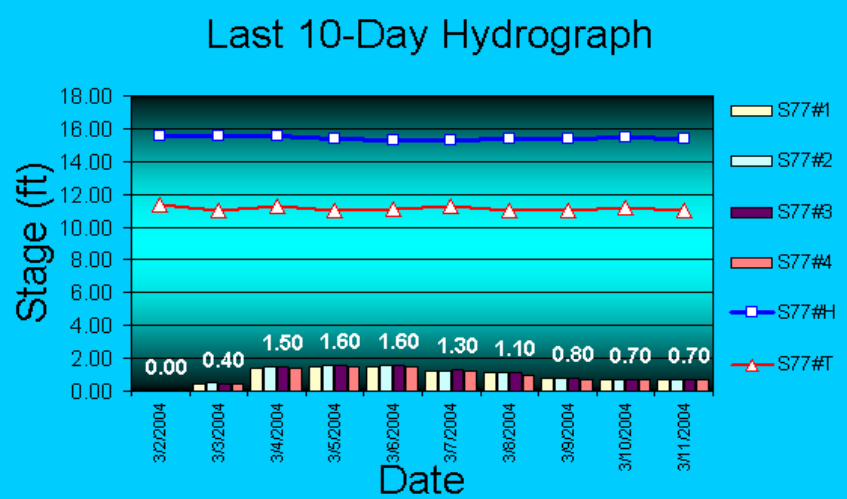
An Excel-based streamgauging planning tool



From IMS Real Time Data

Structure Name:					S77		(H-h)/Go:	Required Operation Condition Minimum 16	Maximum 34
Date	S77#H	S77#T	S77#1	S77#2	S77#3	S77#4	H-h	Gate Min	Gate Max
03/02/04	15.53	11.33	0.00	0.00	0.00	0.00	4.20	0.12	0.26
03/03/04	15.53	11.04	0.40	0.50	0.40	0.40	4.49	0.13	0.28
03/04/04	15.53	11.25	1.40	1.50	1.50	1.40	4.28	0.13	0.27
03/05/04	15.40	10.99	1.50	1.60	1.60	1.50	4.41	0.13	0.28
03/06/04	15.29	11.10	1.50	1.60	1.60	1.50	4.19	0.12	0.26
03/07/04	15.32	11.26	1.20	1.20	1.30	1.20	4.06	0.12	0.25
03/08/04	15.38	11.03	1.10	1.10	1.10	1.00	4.35	0.13	0.27
03/09/04	15.37	11.04	0.80	0.80	0.80	0.70	4.33	0.13	0.27
03/10/04	15.45	11.19	0.70	0.70	0.70	0.70	4.26	0.13	0.27
03/11/04	15.40	11.00	0.70	0.70	0.70	0.70	4.40	0.13	0.28
						Average:	4.30	0.13	0.27

Required Opening to Negotiate: 0.20



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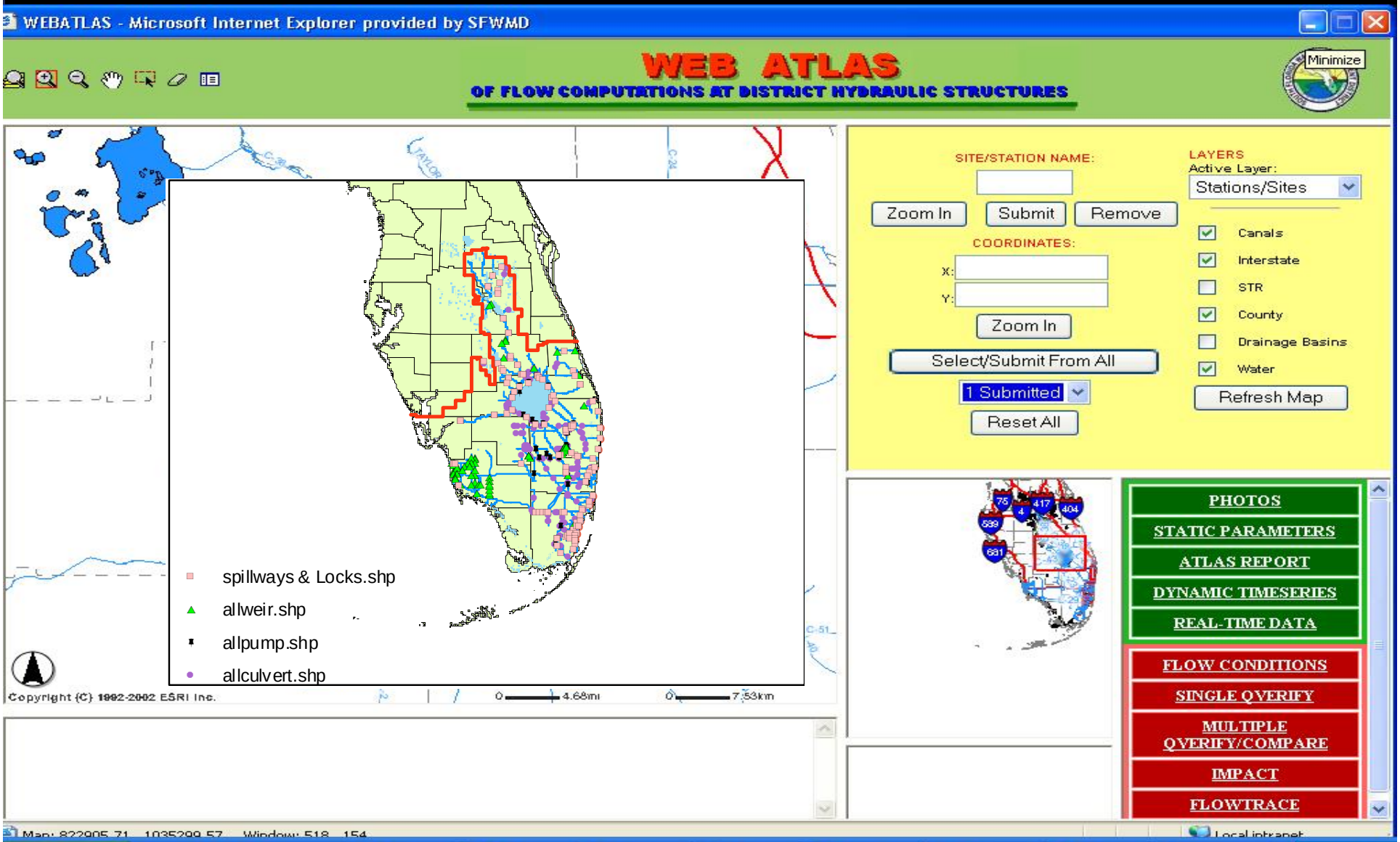

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Summary and Conclusions

- Flow Data Quality Improvement efforts are focused on collecting more accurate structure parameters (STRIVE) and streamgauging data , developing more accurate flow computational algorithms (NEXFLOW), and improving data collection and reporting tools (Xstream and Web/Atlas)

- Significant progress was achieved in developing generalized equations for flow computations at gated spillways

- Similar efforts are under way at other types of structures

QUESTIONS ?