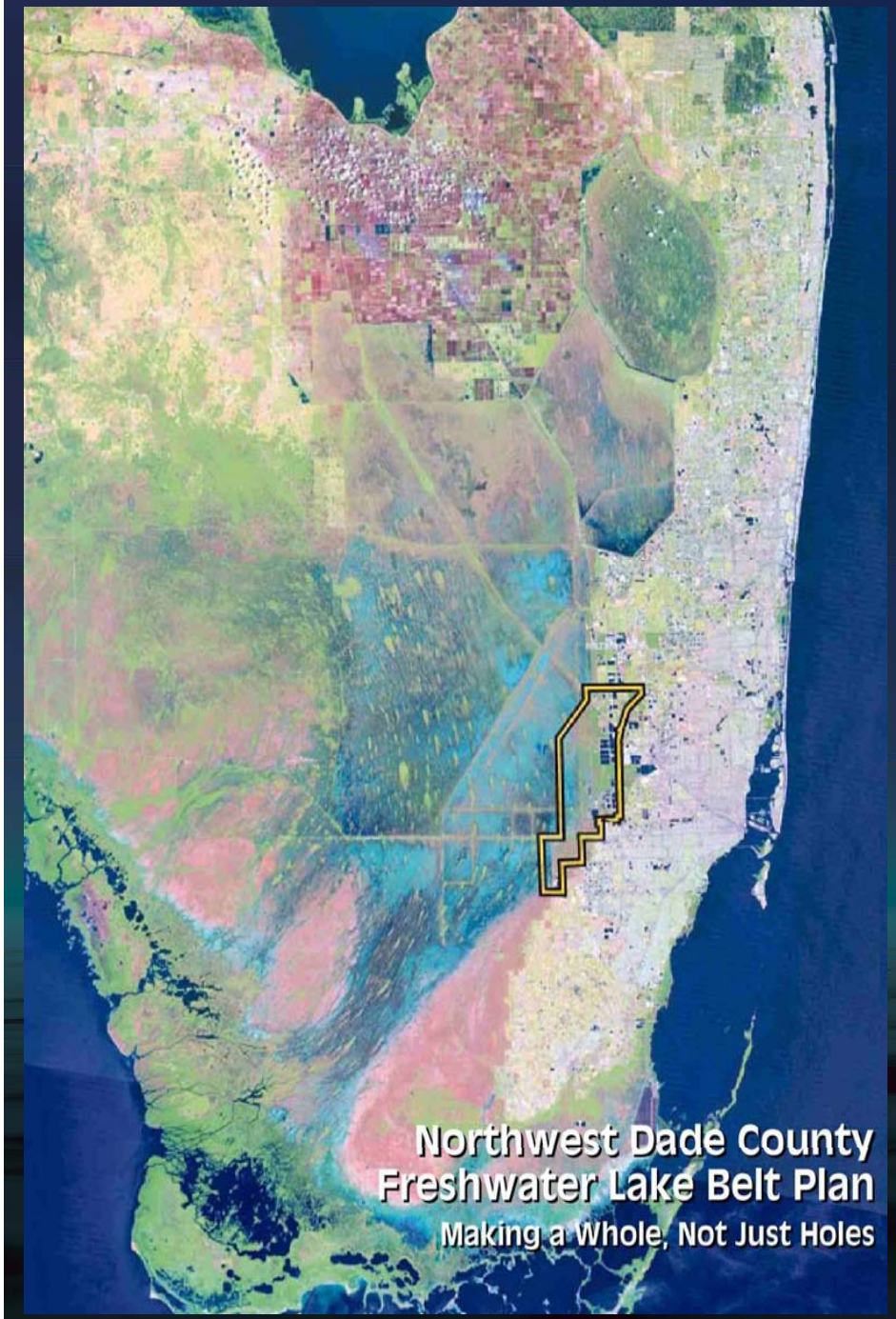
The Status of the L-31N Seepage Management Project

Presented to
A Joint Meeting of the

Working Group
and the
Science Coordination Group

September 21, 2011

On Behalf of
The Miami-Dade Limestone Products Association



Lake Belt Plan - 1999

Many Elements of the Plan

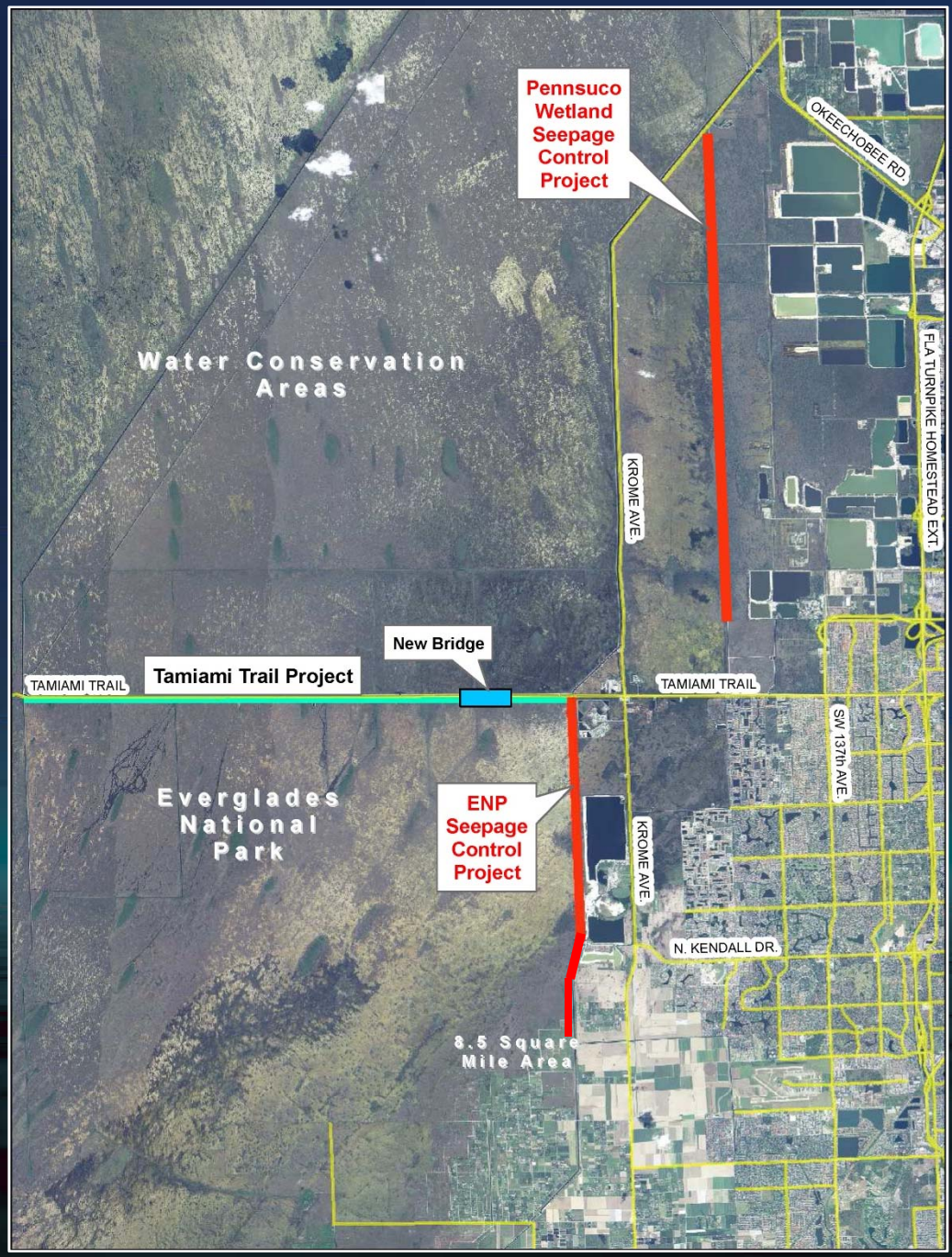
One is Mitigation

- All Wetland Impacts, whether directly caused by mining or caused by changes in groundwater flow must be mitigated.
- A fee on limestone products to be used to pay for mitigation.

Seepage Projects

Dade-Broward Levee Project
- Required to mitigate for groundwater flow changes

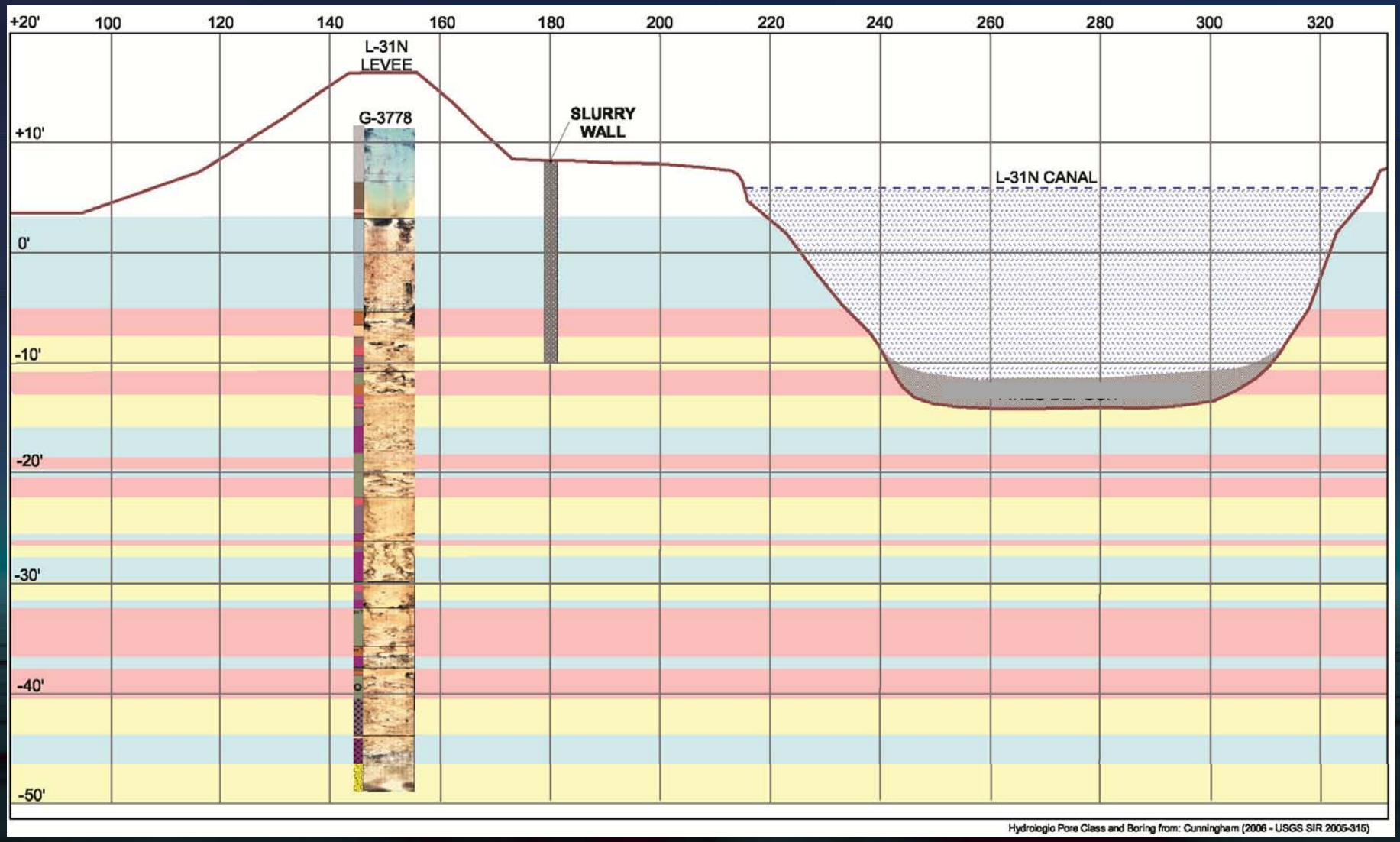
L-31N Project
- Proposed for wetland enhancement within Everglades National Park



In March 2009 the Lake Belt Mitigation Committee approved construction of a seepage management field test along the L-31N Canal.

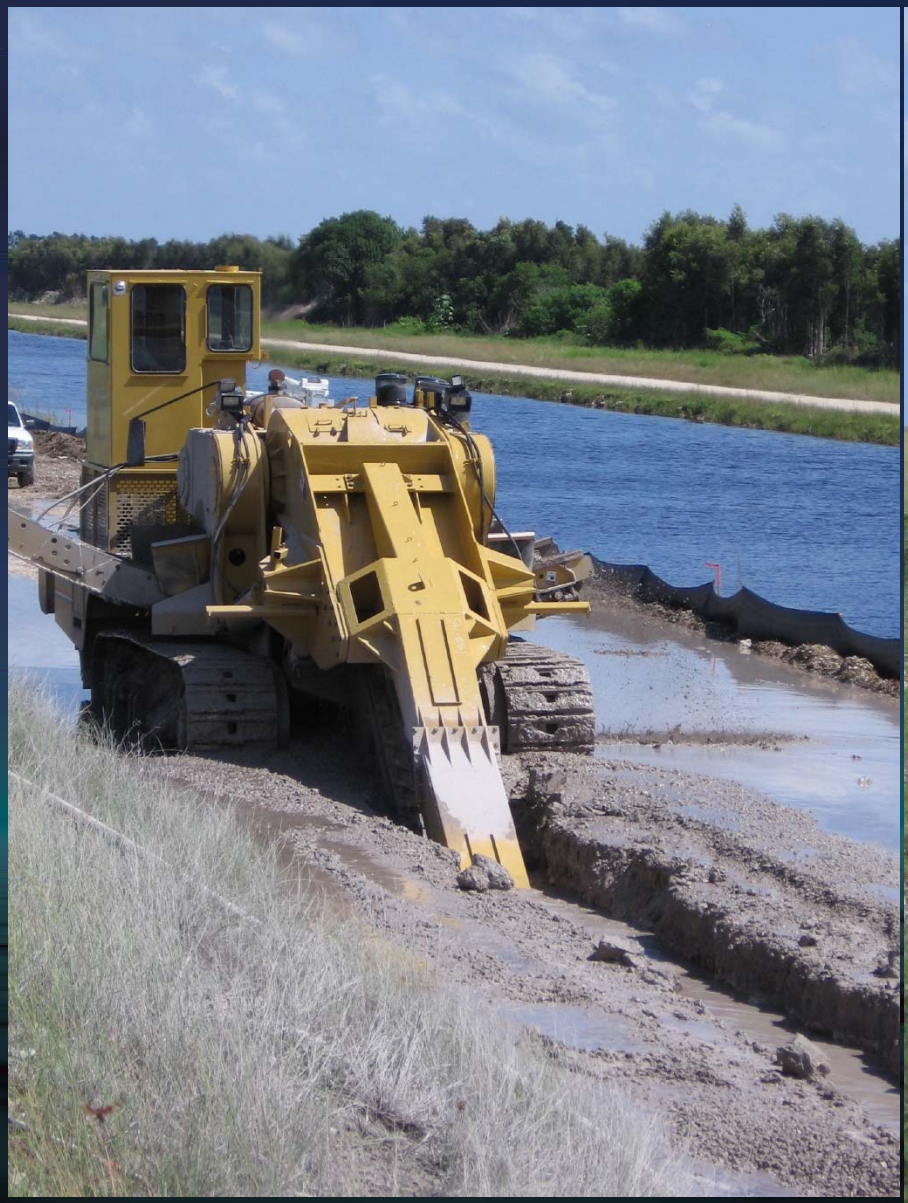
Core From Test Wall Site Showing Hard Layer Approx. 15 feet Below Grade

Tracer Test Layout at L-31N Seepage Barrier Test



Trenching Machine

Trenching Machine



Slurry Mixing Plant

Placing the Slurry

3 Months after Construction

Field Test Analyses

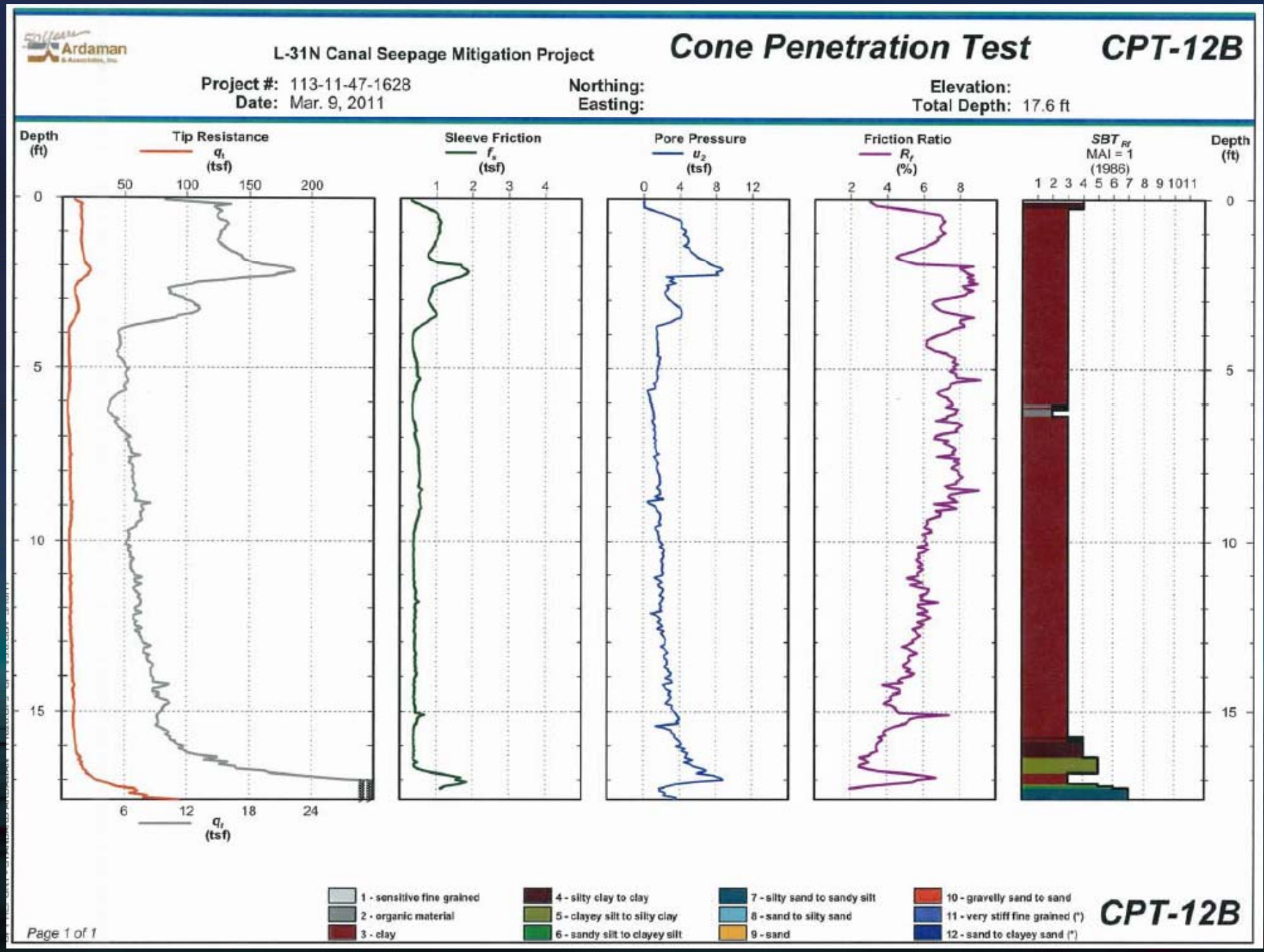
1. Flow velocity and direction
2. Stage change before and after construction
3. Groundwater temperature differences
4. L-31N Flow (AVM) versus stage west of barrier
5. Extensive Tracer Test

All showed that the barrier had affected groundwater flow, but also that performance was not as expected.

Barrier integrity testing conducted in March, 2011

Cone Penetrometer

- 13 vertical penetrations of barrier wall
- Average depth to end of penetration – 16.7’
- Average depth to non-uniform slurry – 13.4’


Ardaman & Associates, Inc.
L-31N Canal Seepage Mitigation Project
Cone Penetration Test
CPT-12B
Project #: 113-11-47-1628
Date: Mar. 9, 2011
Northing:
Easting:
Elevation:
Total Depth: 17.6 ft
Depth (ft)
Tip Resistance q_t (tsf)
Sleeve Friction f_s (tsf)
Pore Pressure u_2 (tsf)
Friction Ratio R_f (%)
SBT_{Rf} MAI = 1 (1986)
Depth (ft)
50 100 150 200
1 2 3 4
0 4 8 12
2 4 6 8
1 2 3 4 5 6 7 8 9 10 11
0
5
10
15
6 12 18 24
q_t (tsf)
1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)
CPT-12B
Page 1 of 1

Ardaman & Associates, Inc.

L-31N Canal Seepage Mitigation Project

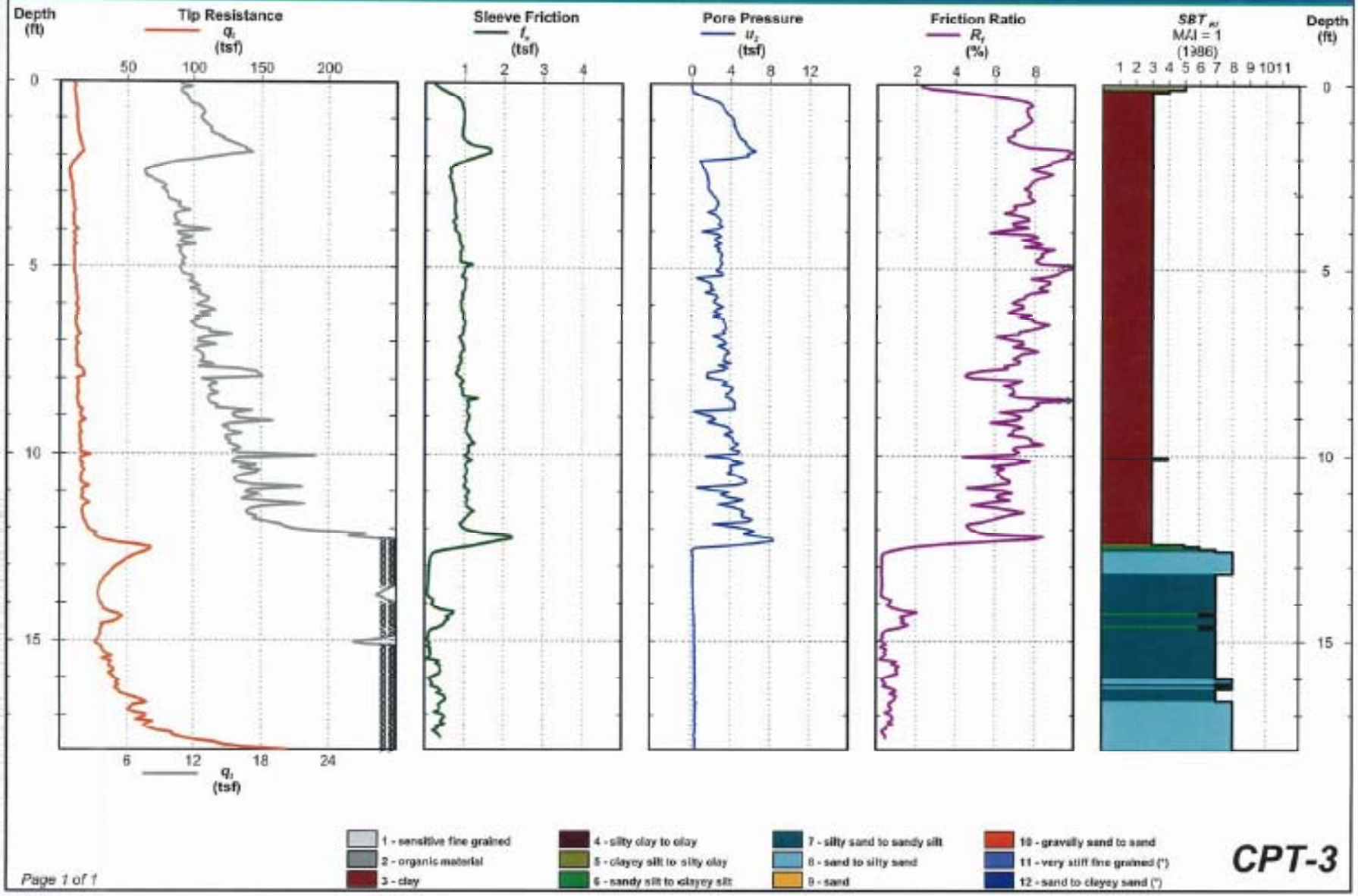
Cone Penetration Test

CPT-3

Project #: 113-11-47-1628
Date: Mar. 9, 2011

Northing:
Easting:

Elevation:
Total Depth: 18.0 ft



CPT-3

Page 1 of 1

CPT 3

0 - 8

8-10

10-12

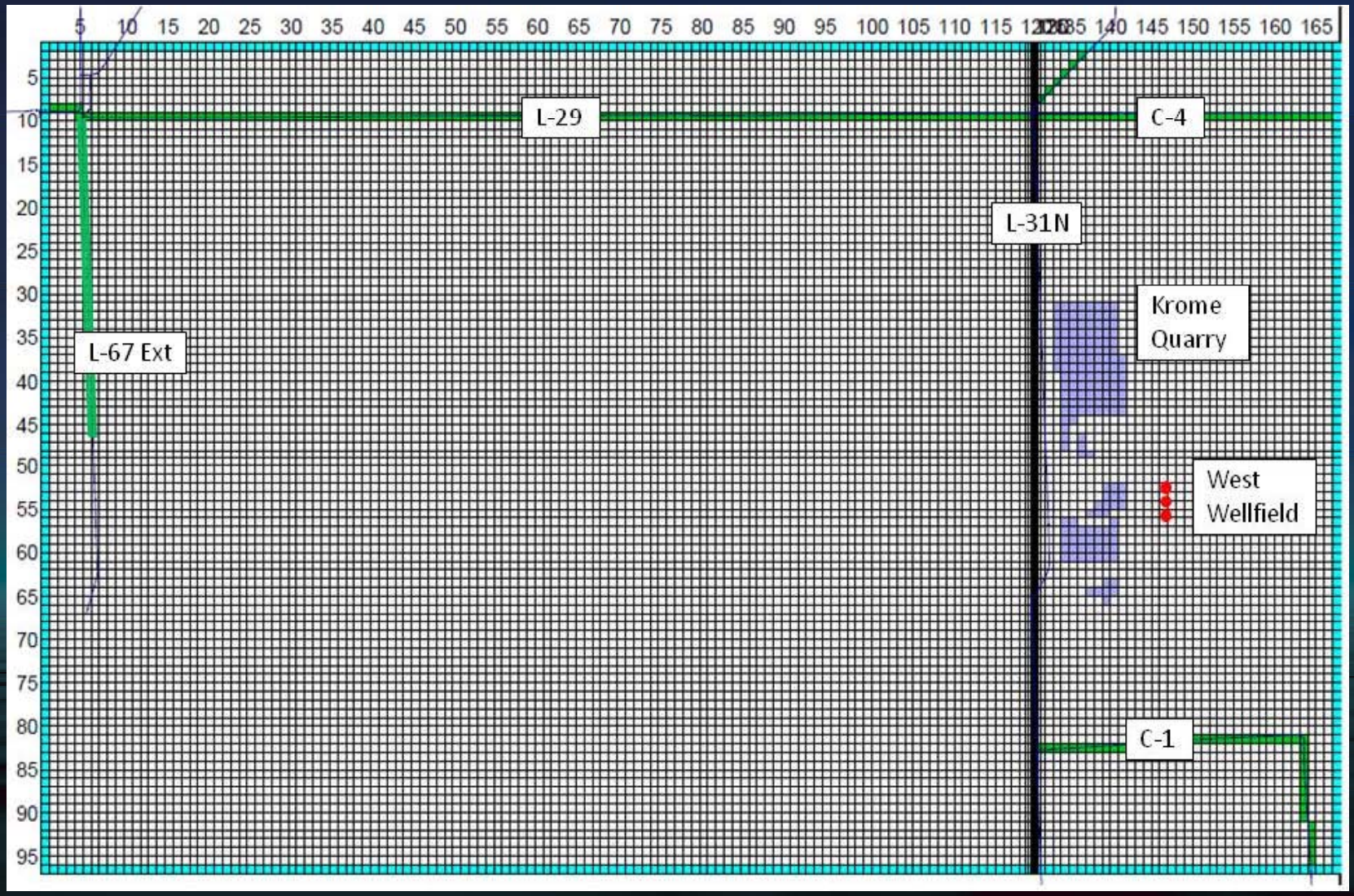
12-15

15-19

The Goal : Bring a Seepage Control Project on Line Concurrent with the Completion of the Tamiami Trail Bridge in 2013

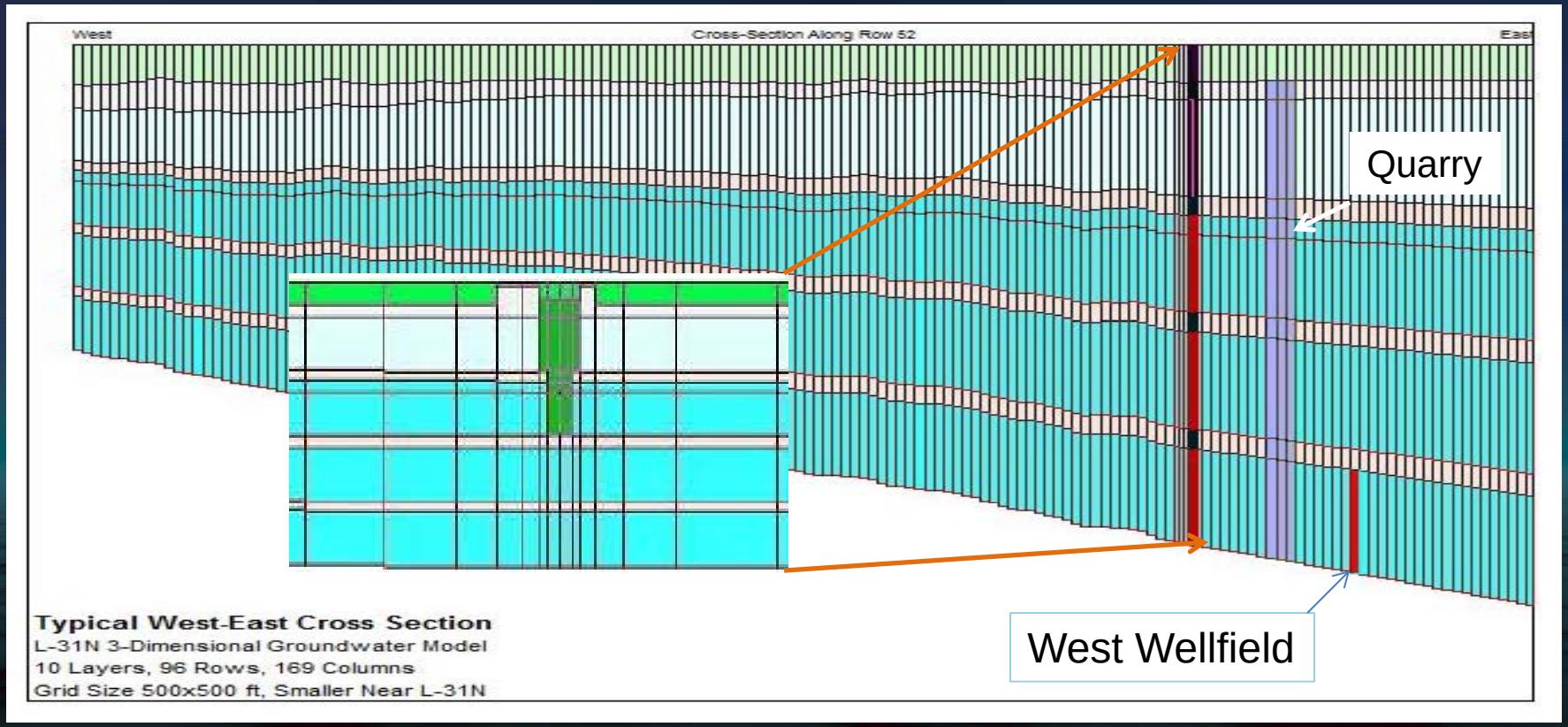
New Modflow Model of ENP and Area East of L-31N

- 500 foot grid spacing
- 22 foot column widths at Canal; 40 foot for Barrier and 120 feet for levee

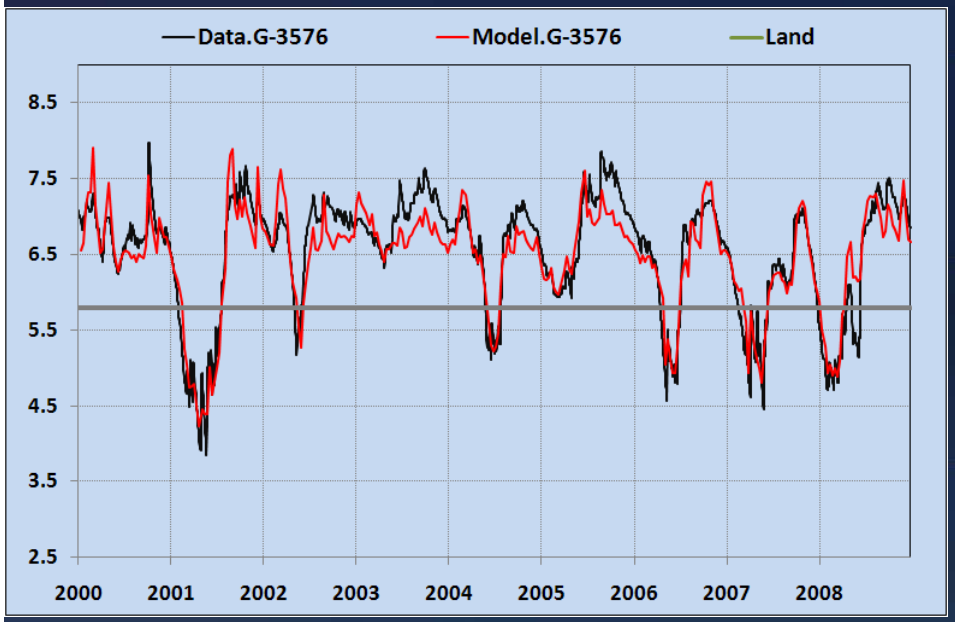


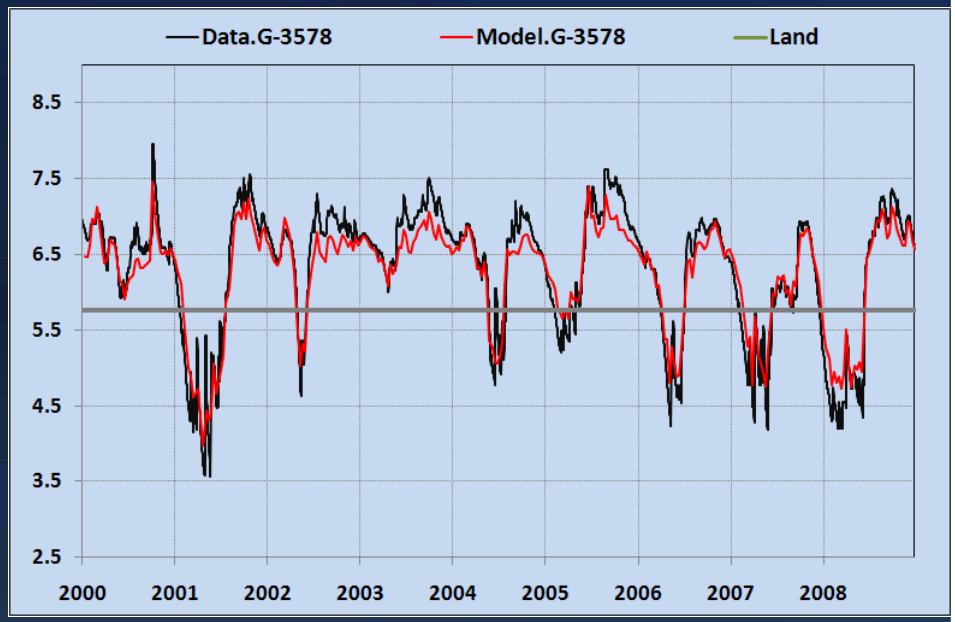
New Modflow Model of ENP and Area East of L-31N

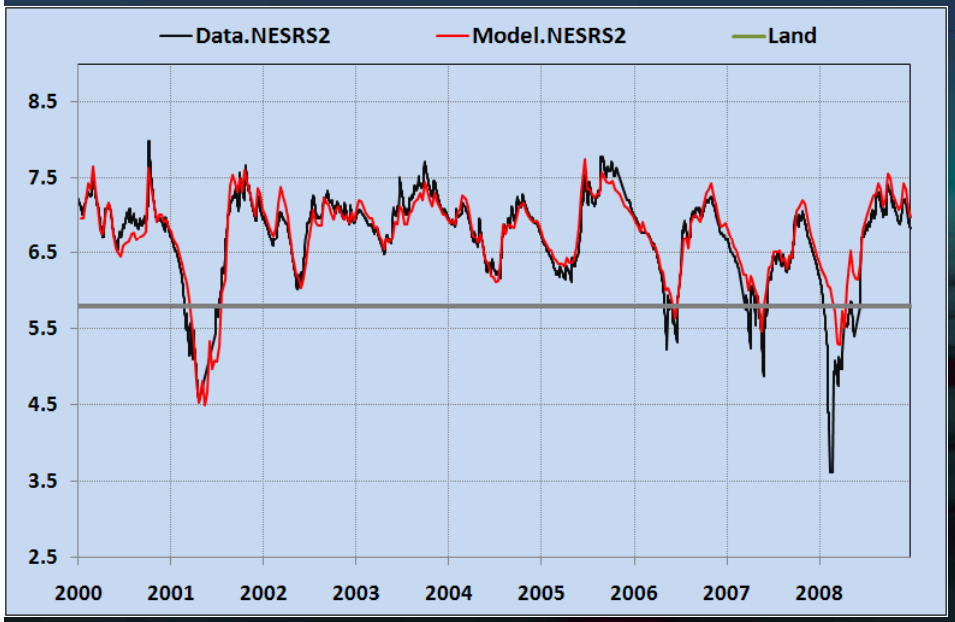
- 10 layers
- Land Elevation from EDEN
- Muck thickness from REMAP Study
- Layering extrapolated from USGS publications

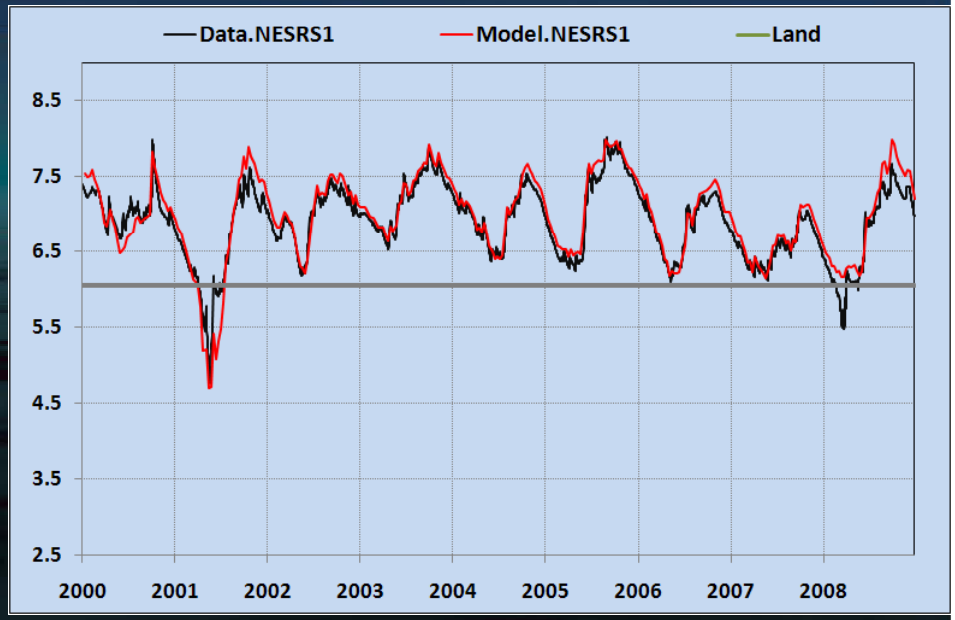


Model Calibration Plots – Northeast Shark River Slough

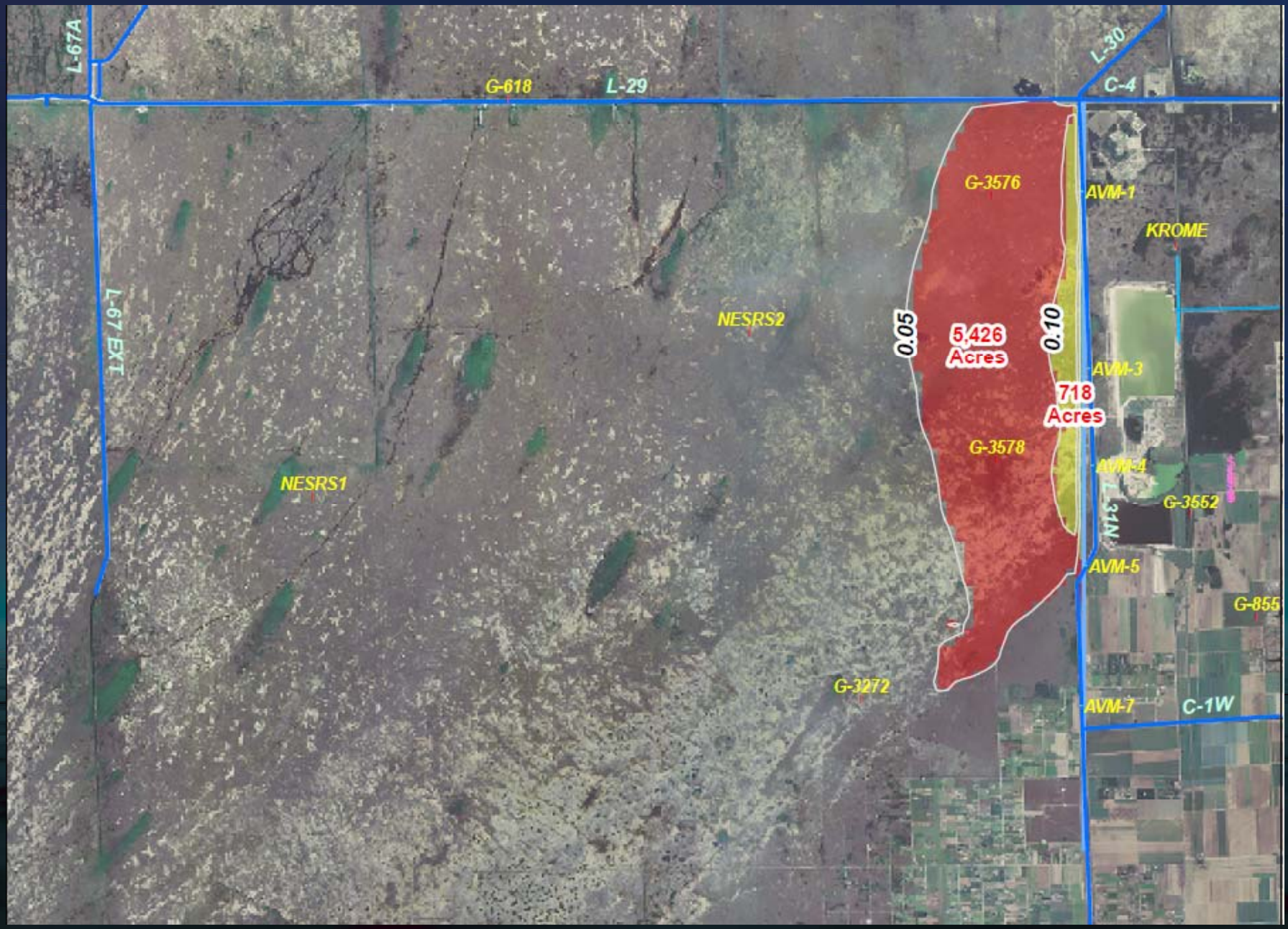




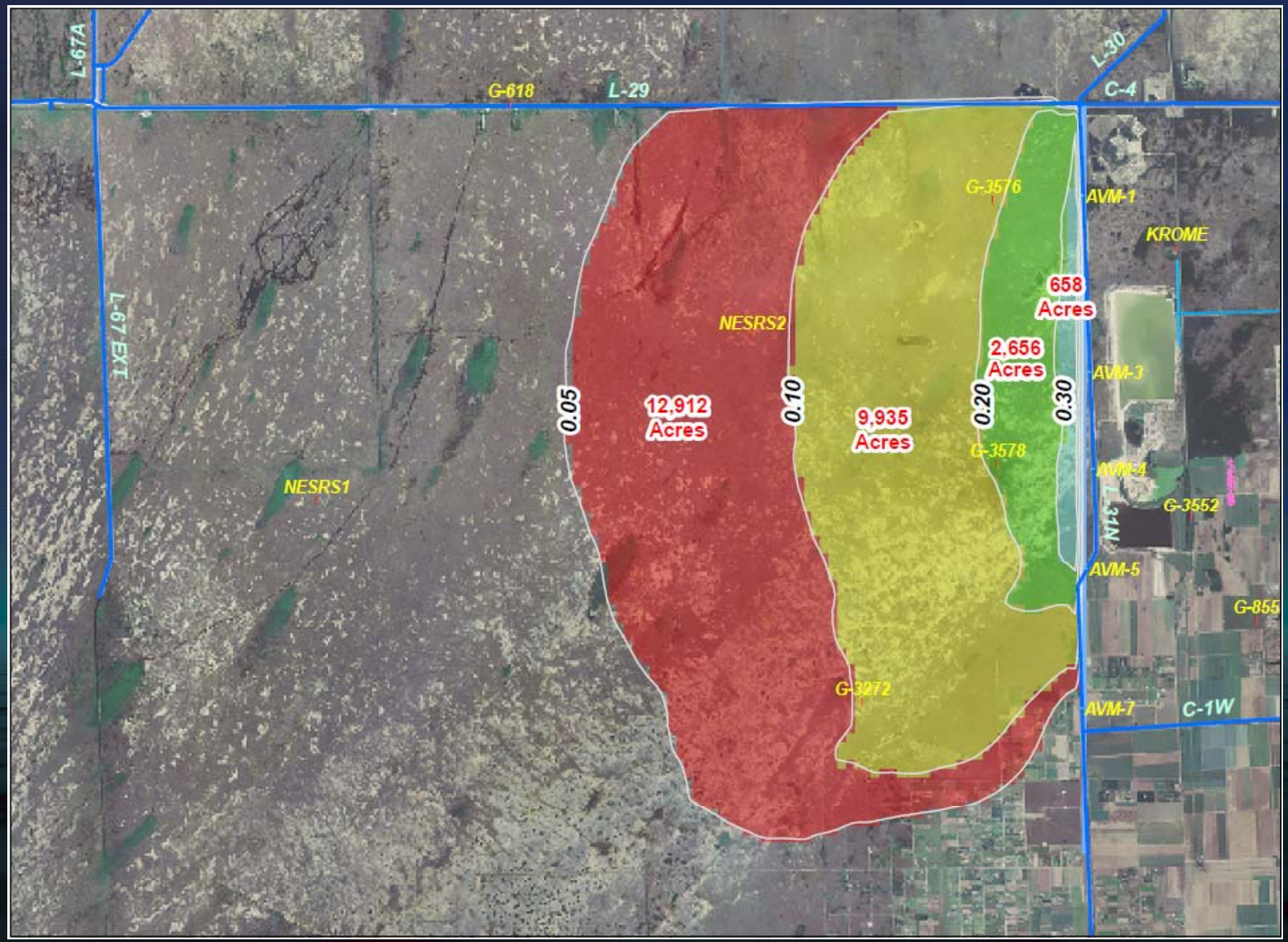




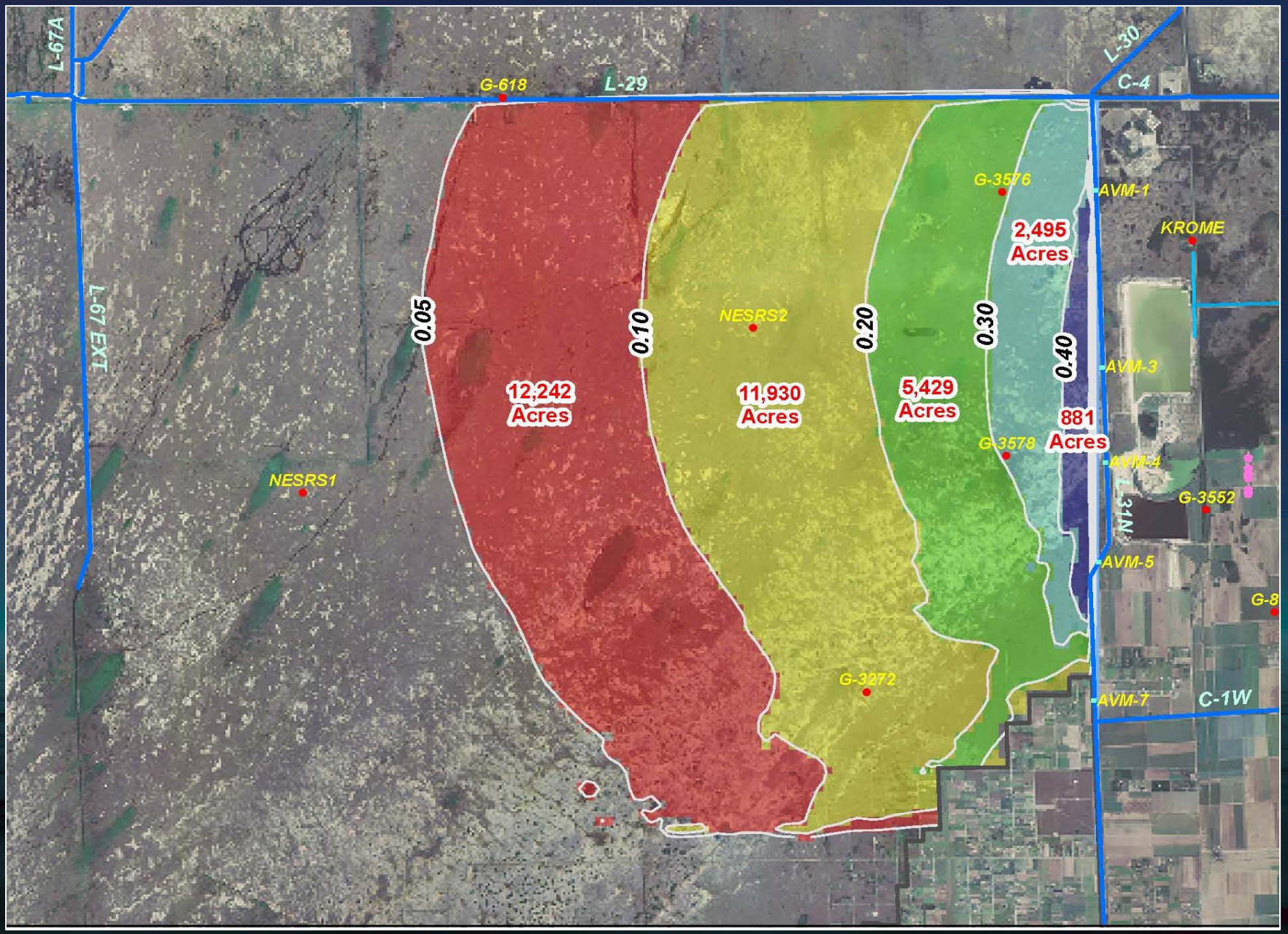
Average Stage Difference: 18 Foot Barrier: Existing Flow at L-29



Average Stage Difference: 30 Foot Barrier: Existing Flow at L-29



Wet Season Stage Difference: 30 Foot Barrier: Existing Flow at L-29



Model Result: Average annual flow diverted south by the L-31N Canal between the Tamiami Trail and G-211.

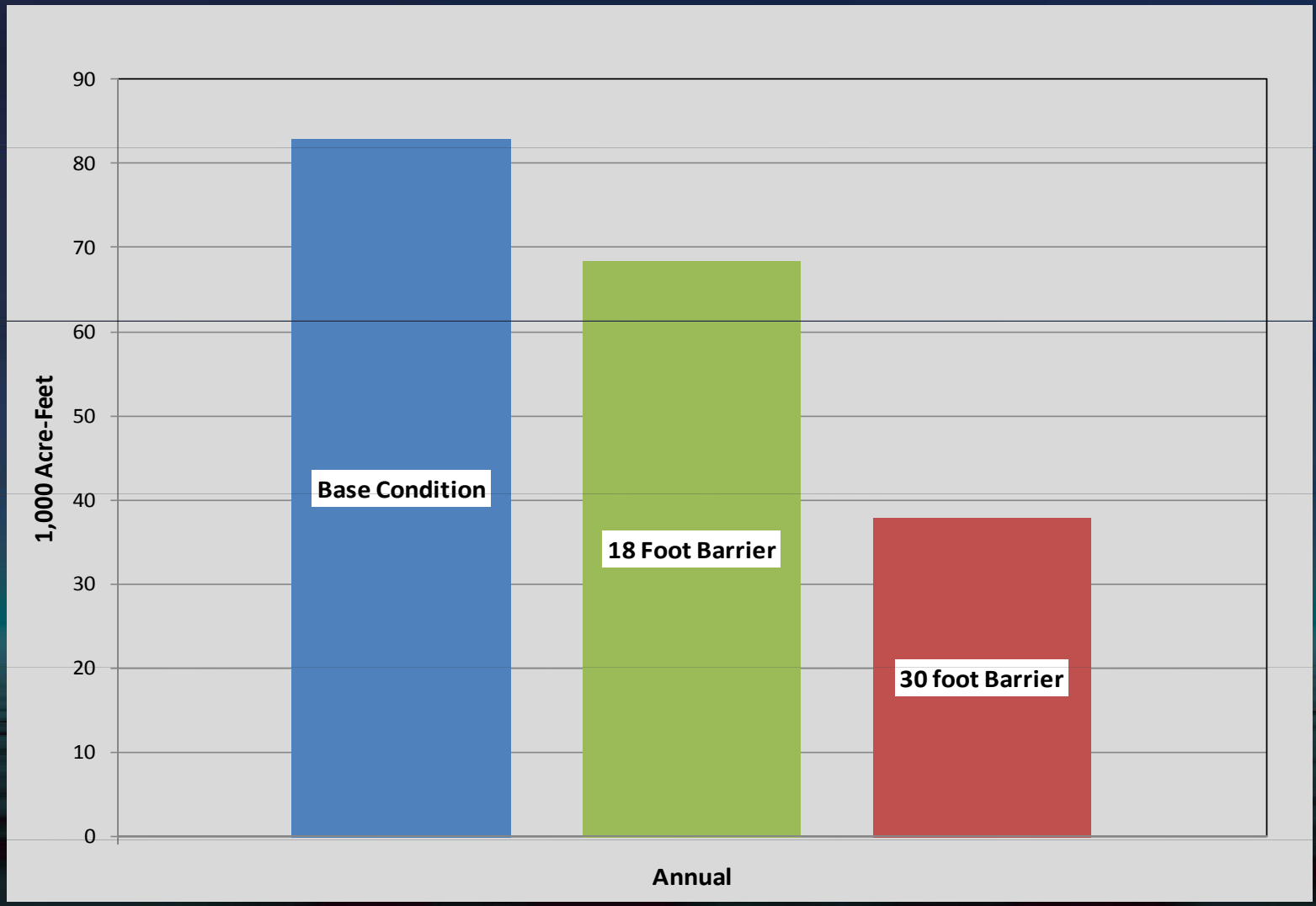


Figure A-9. The flow transect used for estimating change in sheetflow as a result of the seepage barrier are shown in red.

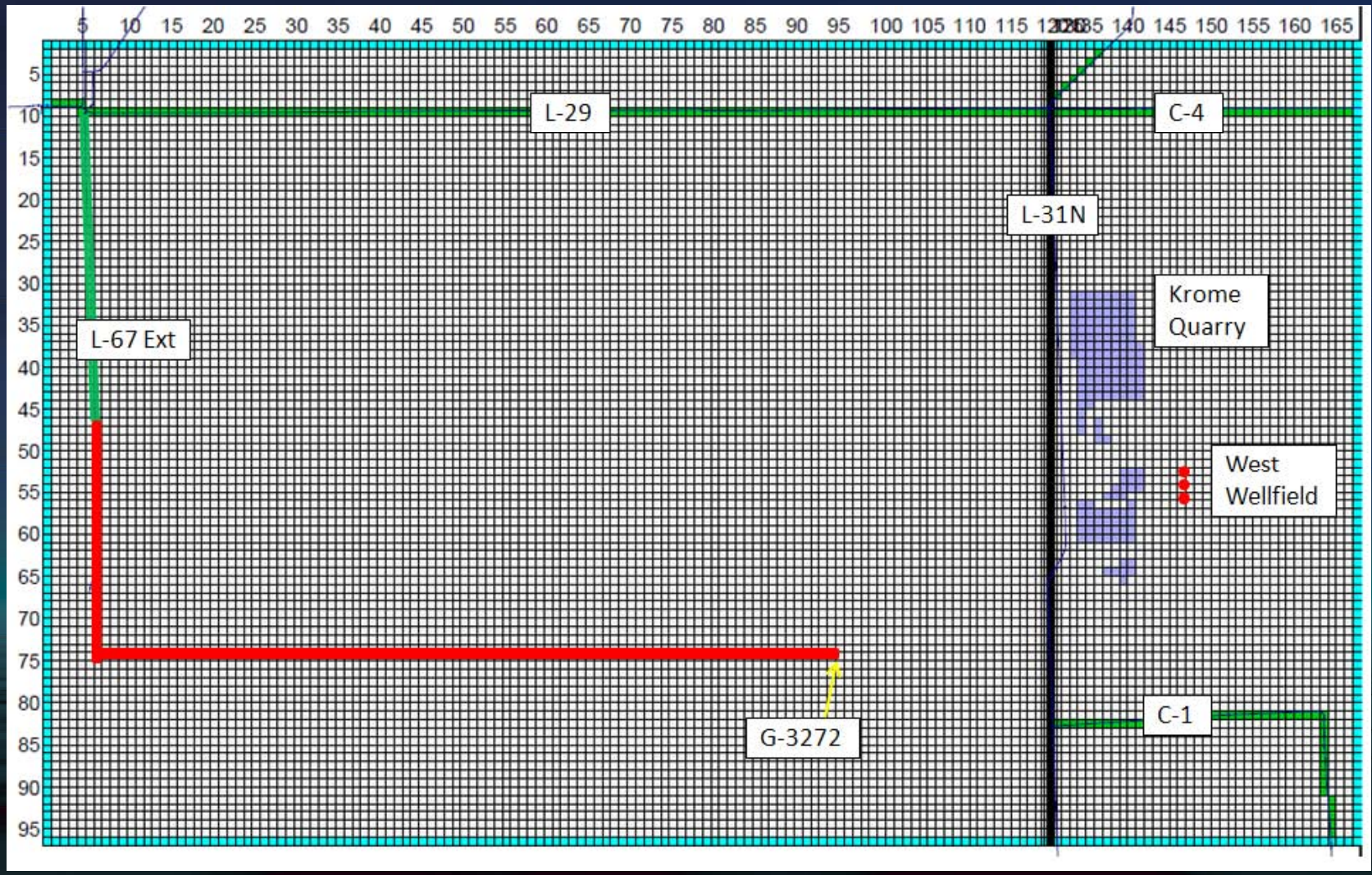
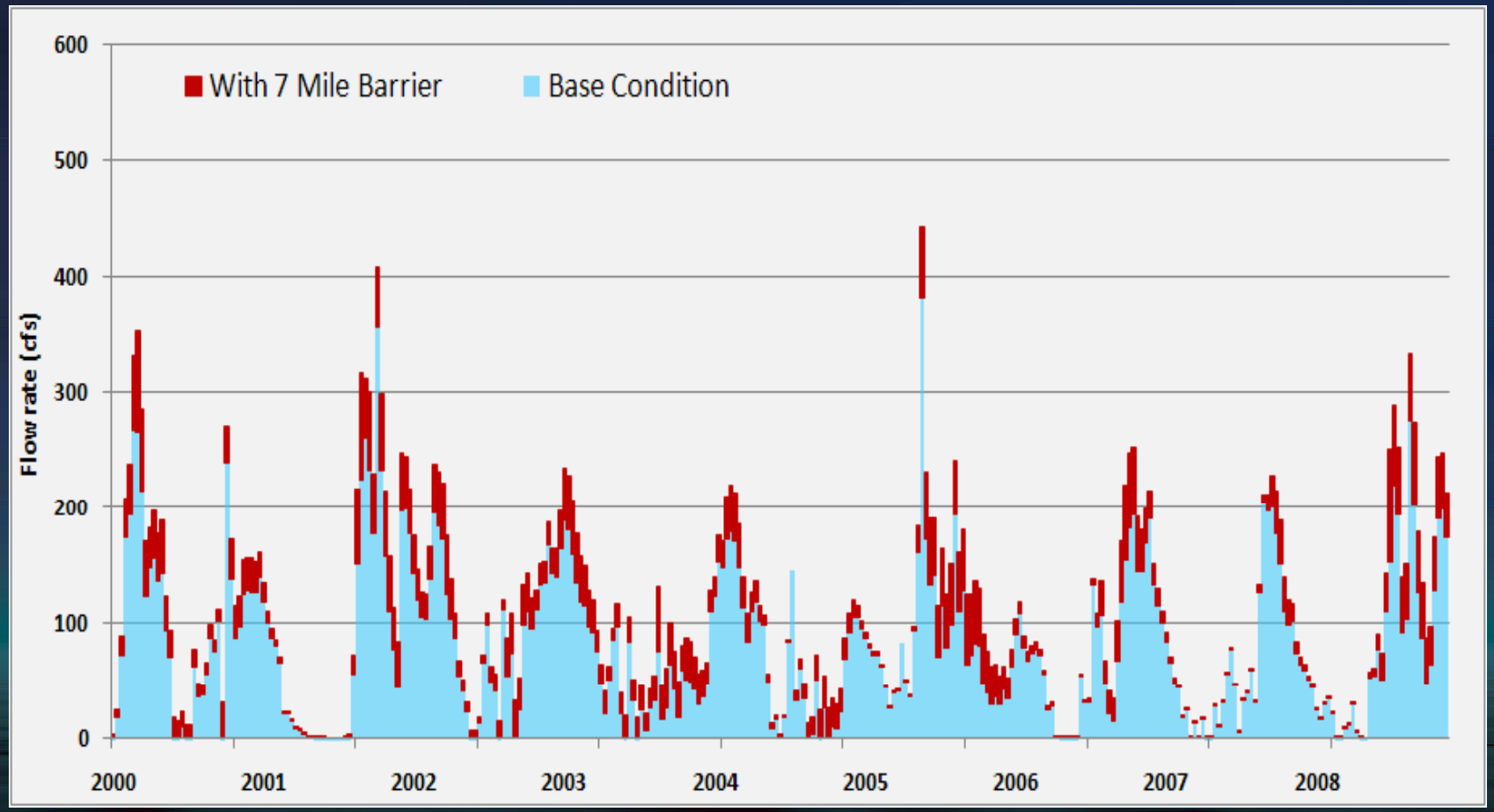


Figure A-10. Estimated net flow across the transect shown in Figure A-9, with and without the 7-mile, 30 foot deep seepage barrier.



Net change in flow through Northeast Shark River Slough at the transect in Figure A-9.

Average Percent Change in Flow for Various Seepage Barrier Configurations							
	Season	Shallow-7	Deep-7	Deep-2	Deep-1.5	Deep-1	Deep-7 (40 MGD)
Net Change for NESRS	Annual	8.7%	27.8%	8.2%	5.8%	3.2%	27.0%
	Wet	12.2%	37.5%	11.0%	7.7%	4.4%	36.1%
	Dry	5.6%	19.3%	5.6%	4.0%	2.1%	19.0%
Change at North-South Transect	Annual	1.9%	5.9%	1.9%	1.5%	0.9%	5.8%
	Wet	2.5%	7.5%	2.4%	2.1%	1.3%	7.4%
	Dry	1.3%	4.4%	1.4%	1.0%	0.5%	4.3%
Change at East-West Transect	Annual	6.8%	21.9%	6.3%	4.2%	2.3%	21.2%
	Wet	9.7%	29.9%	8.6%	5.6%	3.1%	28.7%
	Dry	4.3%	14.9%	4.3%	3.0%	1.6%	14.6%

Next Steps

1. Wetland technical group meets Friday to try to apply WRAP to the Seepage Barrier Model Results.
2. Lake Belt Mitigation Committee meets Sept. 30th to consider approval for the 2-mile, 30 ft deep barrier.
   - Construction Plan responding to flaws of earlier wall
   - Quality Assurance Plan to confirm wall integrity in the field
   - Benefit Assessment to justify use of fee
   - Monitoring plan to confirm performance
3. Build the 2-mile barrier in the 2012 dry season