Flood Protection Level of Service Assessment for C7 Basin

Sponsored by: FEMA & SFWMD

Conducted by: SFWMD, ADA Consulting, Deltares and Rand

With Support from: Miami-Dade County and Municipalities in the C7 Basin

March 24 2017 presentation to stakeholders in the C7 Basin

Flood Protection Level of Service Program

- Purpose of Flood Protection Level of Service program is to identify and prioritize long-term District infrastructure needs.

- Level of Service projects provide a process to establish flood protection thresholds for each basin. These thresholds initiate retrofit and other adaptation efforts.

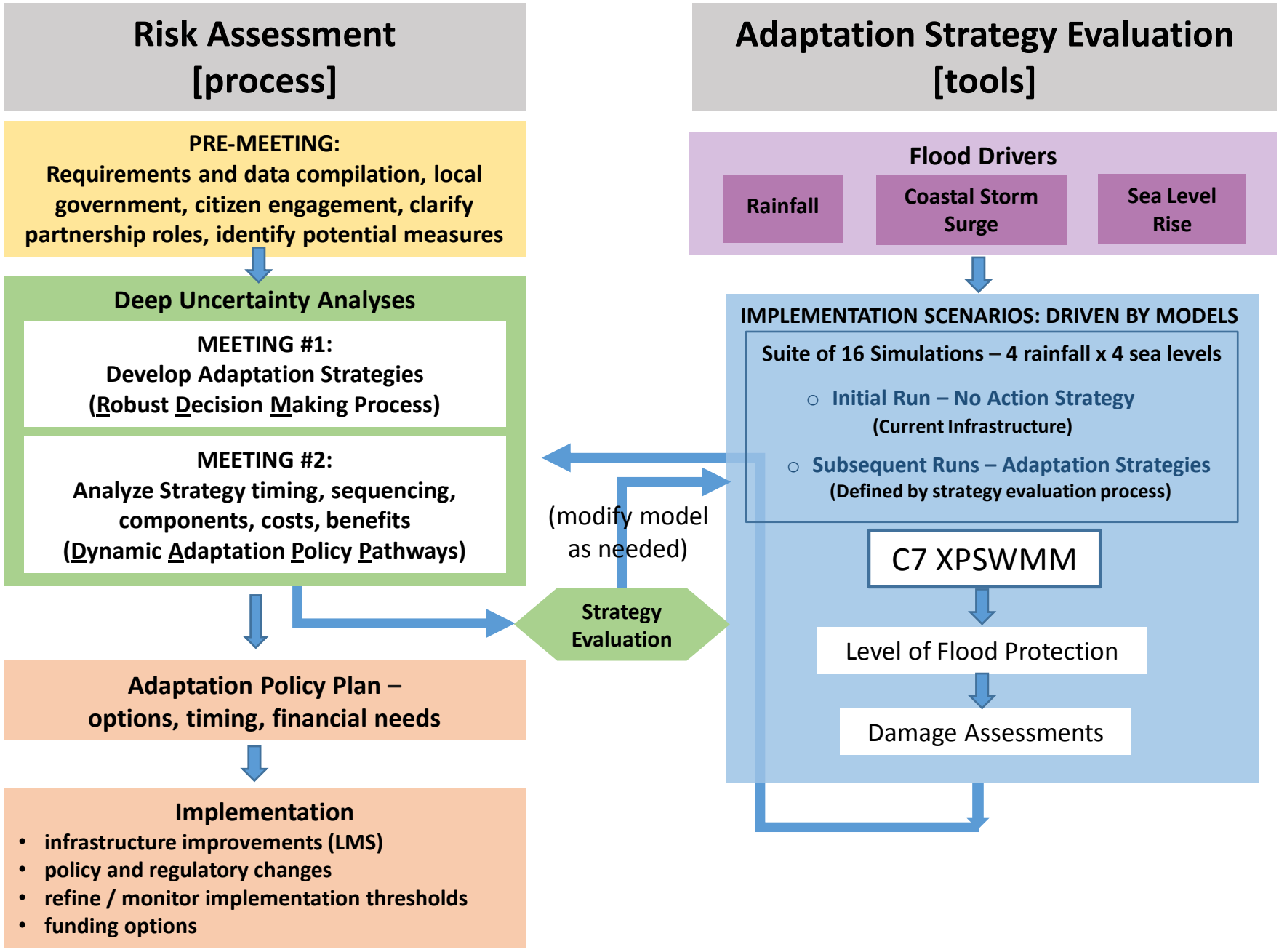
- Adaptation will be coordinated with the annual structure maintenance program

Flood Protection Level of Service: C-7, C-8 and C-9 basins

- Purpose
  - Determine the existing Flood Protection Level of Service for C-7, C-8 and C-9 basins
  - Determine the future Flood Protection Level of Service for three sea level rise scenarios
  - Develop flood protection strategies with Miami-Dade County and develop FEMA Local Mitigation Strategy (LMS)
    - Project Cost (Fiscal year 2016-2017)
      - $300,000 FEMA
      - $150,000 SFWMD cost share

Project Milestones

- SFWMD Structure Operations Atlas
- Assessment of existing level of flood protection
- Assessment of 2065 level of flood protection assuming no infrastructure changes
- Identification and assessment of alternate flood protection mitigation strategies
- Development of Local Mitigation Strategy document



WORK PROCESS

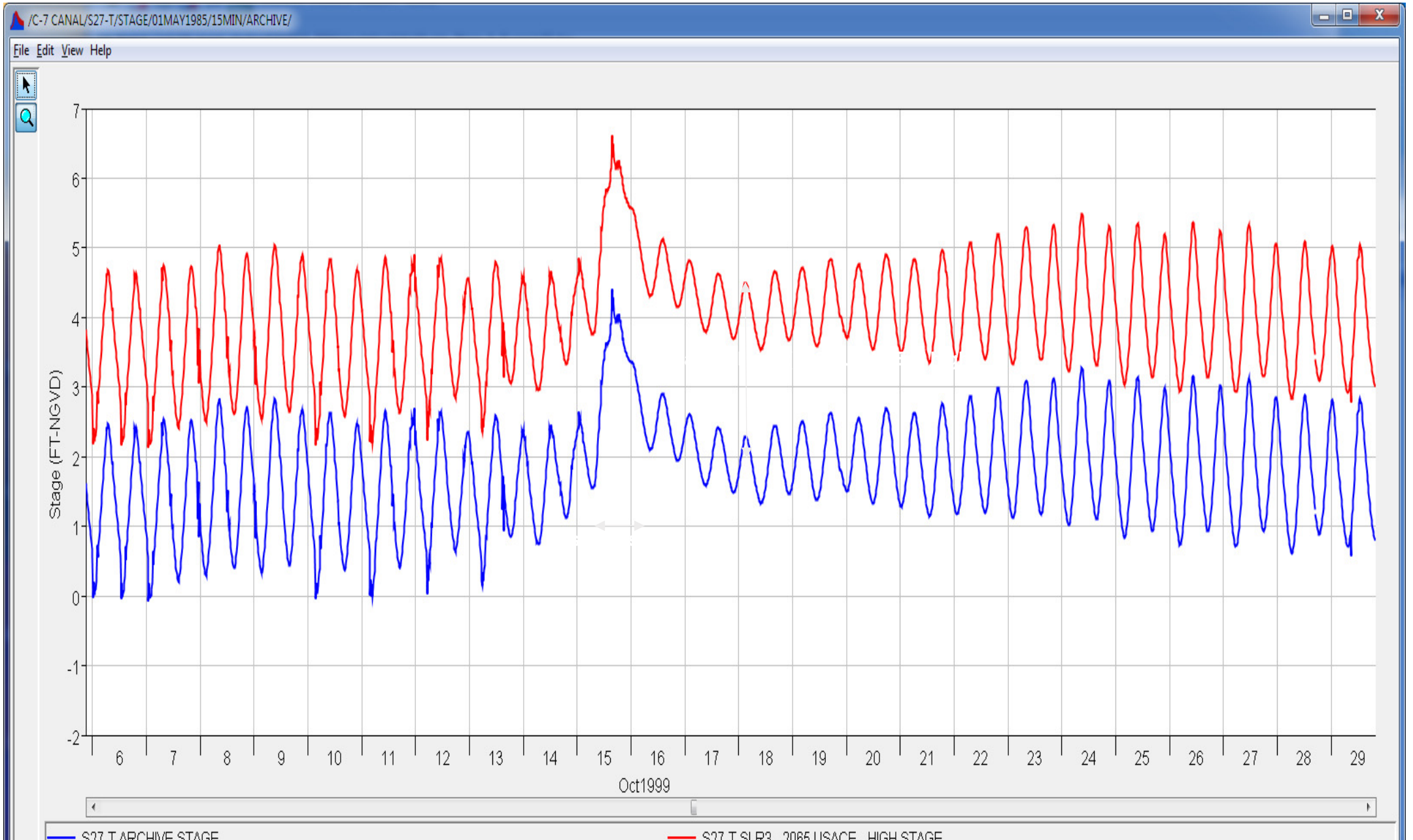
Preliminary Results of Sea Level Rise Flood Modeling

March 24 2017 presentation to stakeholders in the C7 Basin

Why does Sea Level Rise cause flooding upstream of S-27?

10-year Storm Surge at S27 Tailwater:

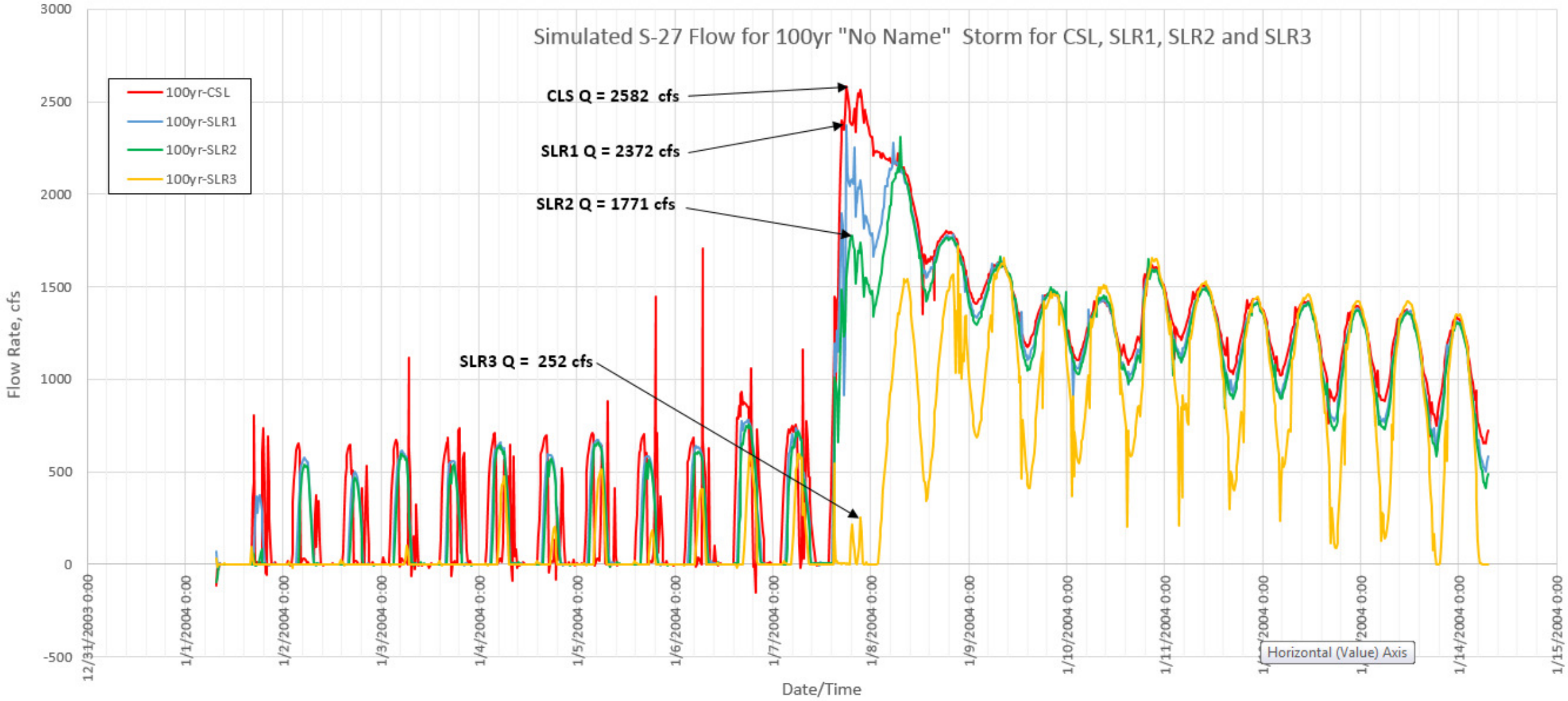
CSL and SLR3



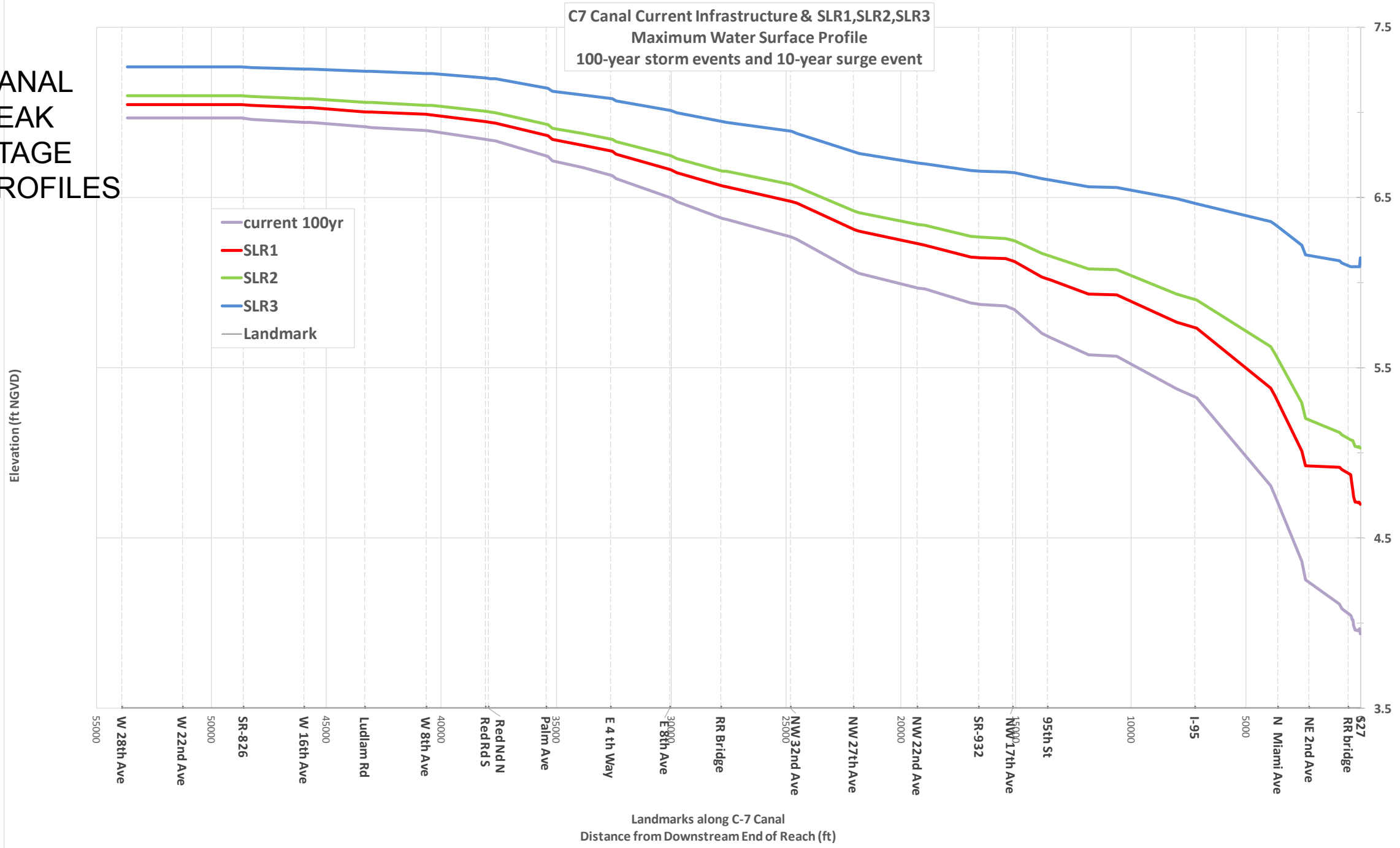
Preliminary Modeling Assumptions:

- 5-year, 10-year, 25-year, 100-year Rainfall volumes
  [only 100-year rainfall events presented today]
- Rainfall Pattern of the Oct 2000 No-Name Event
- No-Name Storm Surge (10-year return period)
- October Average Groundwater (no effect of sea level rise on groundwater in these preliminary results)
- Four Sea Level Thresholds:
  - Current Sea Level (CSL)
  - SLR1 (+0.76 ft)
  - SLR2 (+1.09 ft)
  - SLR3 (+2.21 ft)
- NO BACKFLOW FROM OCEAN TO BASIN

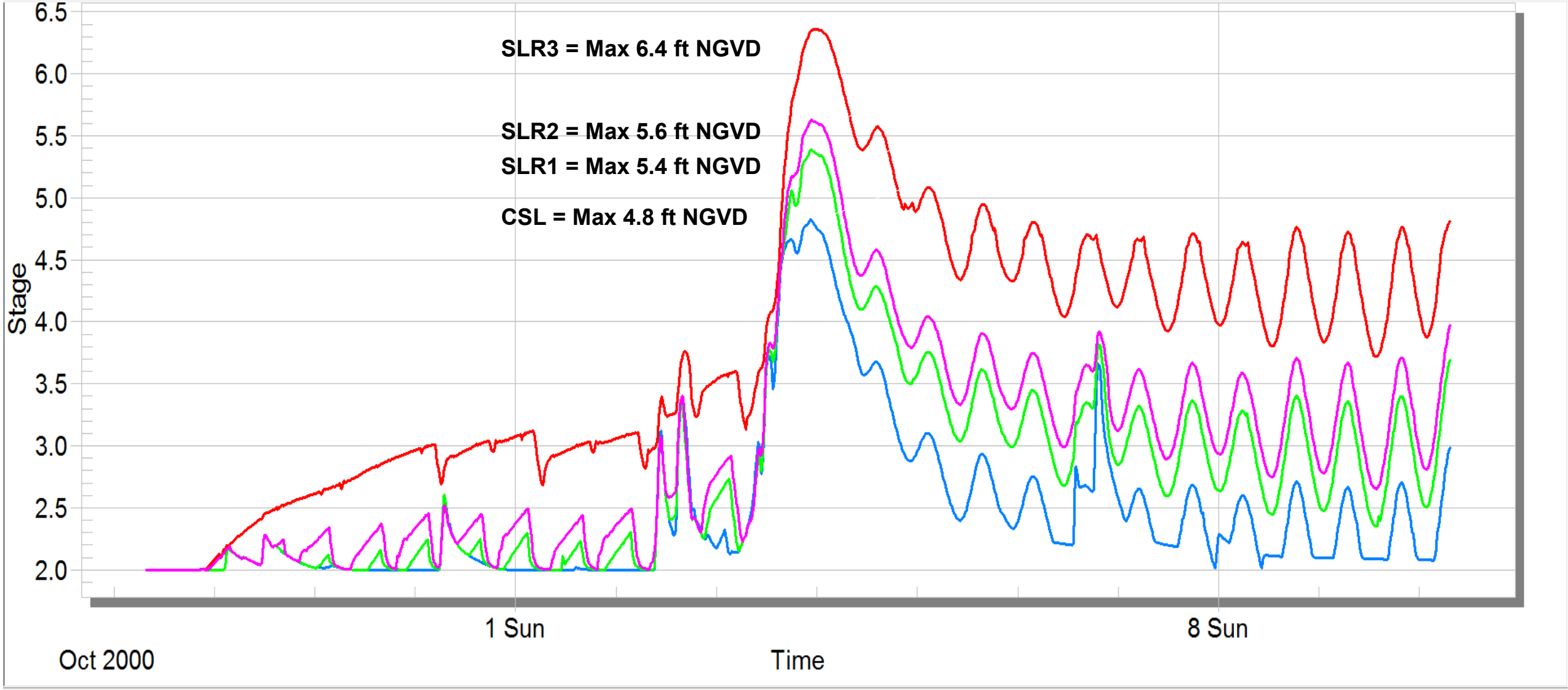
Flows at S27


Simulated S-27 Flow for 100yr "No Name" Storm for CSL, SLR1, SLR2 and SLR3
100yr-CSL
100yr-SLR1
100yr-SLR2
100yr-SLR3
CLS Q = 2582 cfs
SLR1 Q = 2372 cfs
SLR2 Q = 1771 cfs
SLR3 Q = 252 cfs
Flow Rate, cfs
3000
2500
2000
1500
1000
500
0
-500
12/31/2003 0:00
1/1/2004 0:00
1/2/2004 0:00
1/3/2004 0:00
1/4/2004 0:00
1/5/2004 0:00
1/6/2004 0:00
1/7/2004 0:00
1/8/2004 0:00
1/9/2004 0:00
1/10/2004 0:00
1/11/2004 0:00
1/14/2004 0:00
1/15/2004 0:00
Horizontal (Value) Axis
Date/Time

CANAL PEAK STAGE PROFILES

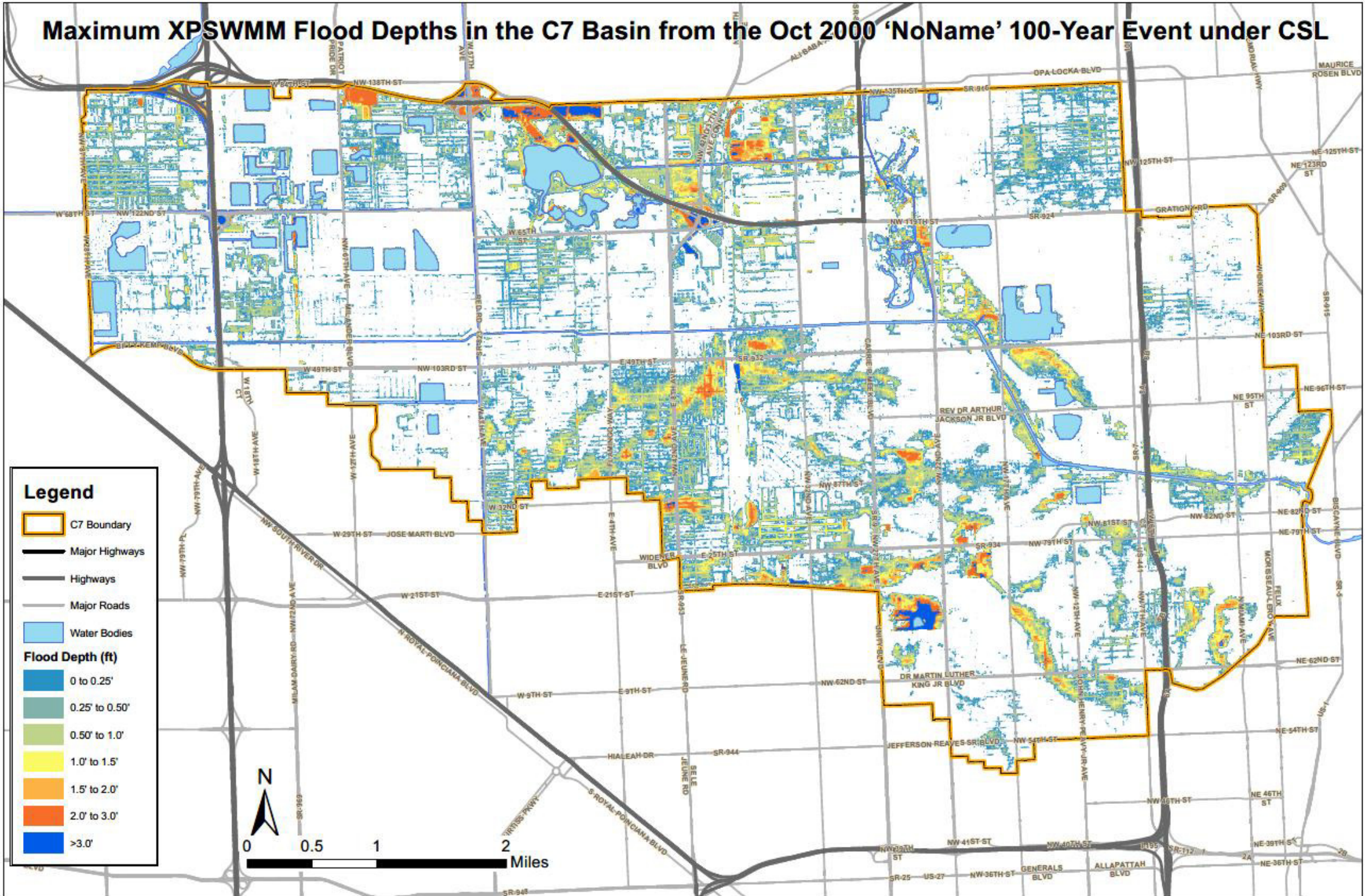


Computed peak stages
for the 100-y Rainfall with 10-yr Surge for CSL, SLR1, SLR2 and SLR3
Sub-basin C7-S-16

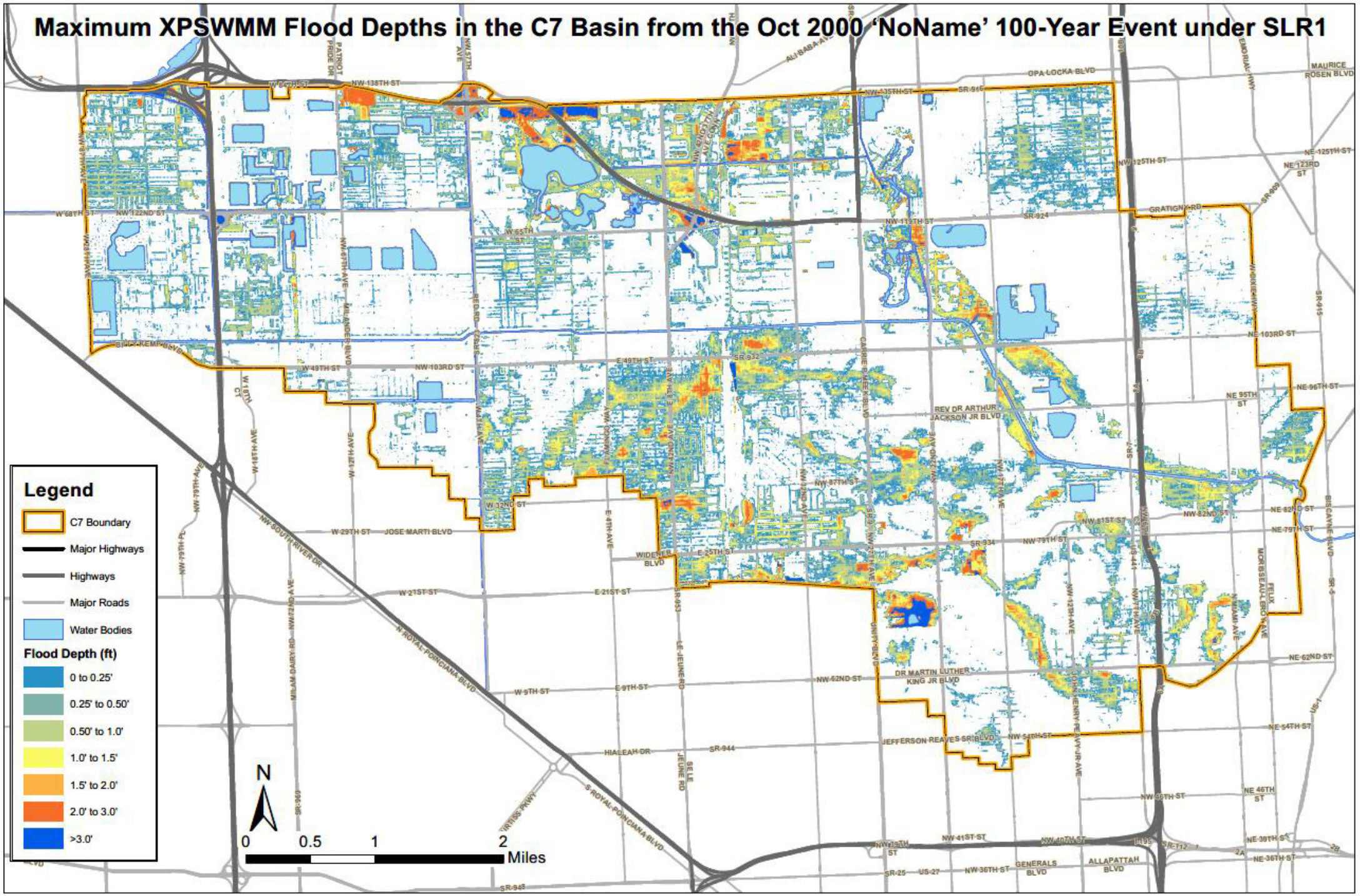


For Help, press F1

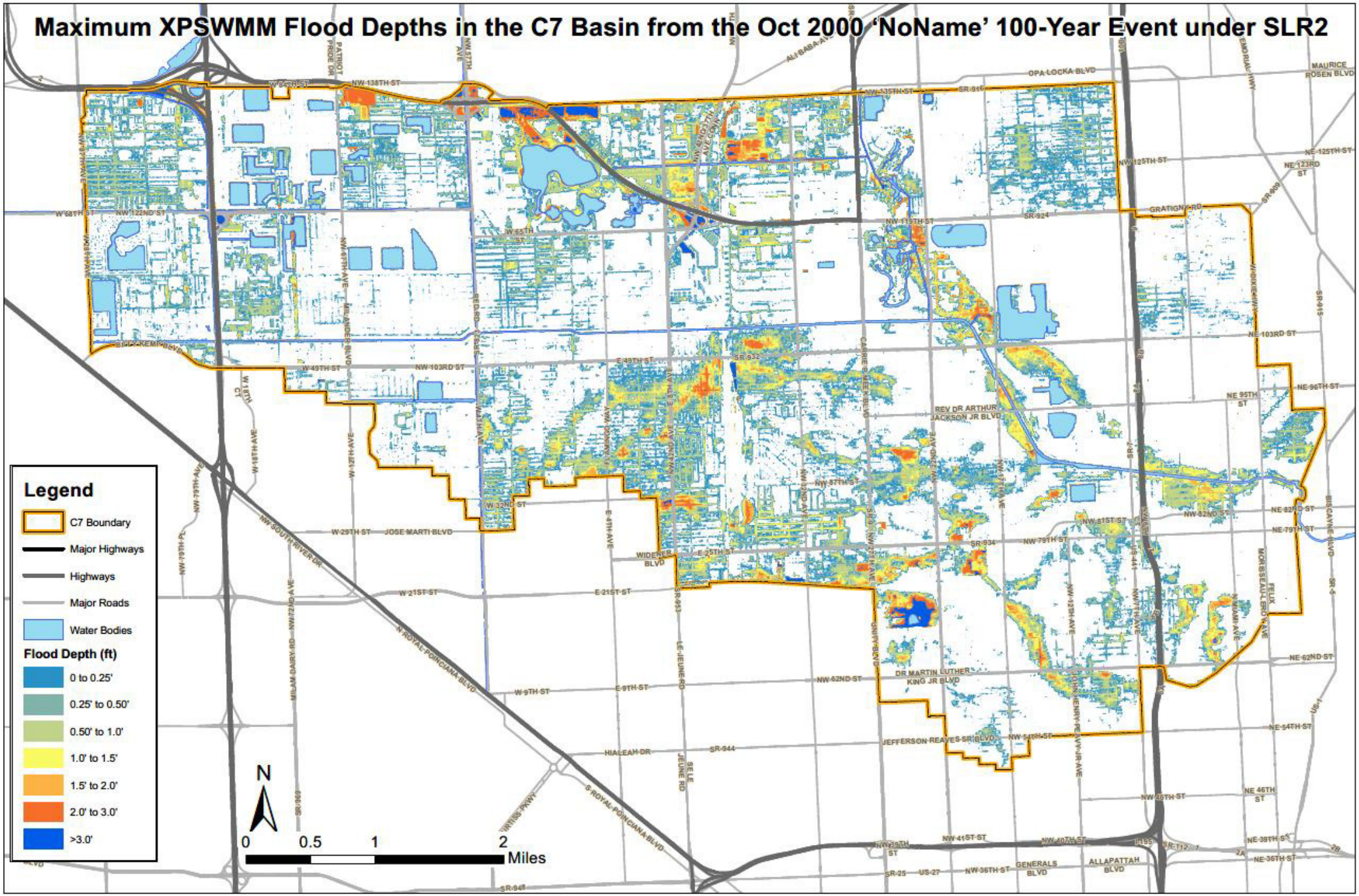
Current Sea Level



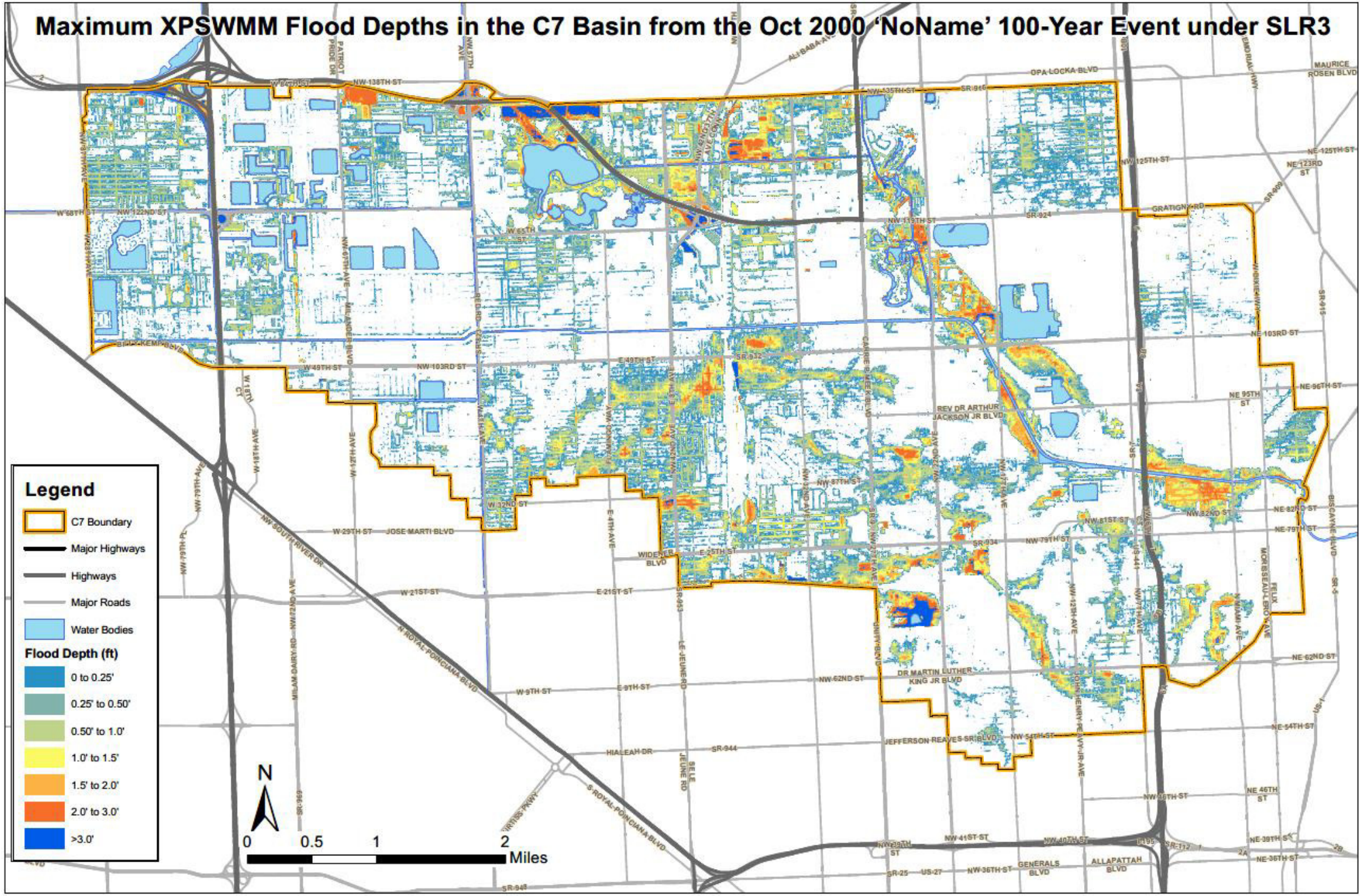
SLR1
=
CSL
+
0.76 feet



SLR2
=
CSL
+
1.09 feet



SLR3
=
CSL
+
2.21 feet



FLOOD MITIGATION STRATEGIES FOR CONSIDERATION

- Improve Storm Surge Protection
- Maintain basin discharge while sea levels rise
- Land-use Change
- Implement operational strategies at S27 structure to maintain flood protection as sea levels rise
- Maintain canal conveyance while sea levels rise
- Increase basin storage

STRATEGY: Improve Storm Surge Protection

- Raise elevation of tie-back levees (bypass elevation now 4 ft) and also raise overflow elevation of S27 structure (now at 5 ft?)

STRATEGY: Maintain basin discharge while sea levels rise

- Add pumps at S27:
  - Full-service pumps (replace S27 spillway) OR
  - Booster pumps (like the pumps at S25b and S26 structures)
- Redesign structures to operate with lower head differential (current differential is 0.5 ft)
- Deep well injection of flood waters
- Divert portion of flood waters to adjoining C6 and C8 Canals. Discharge to WCA1 via the C6 canal might be possible but would require treatment and back-pumping.

STRATEGY: Land-use Change

- Bring in dirt to raise ground elevations in high-risk flood prone areas (need to consider the potential loss of conveyance if area is in flow way)
- convert high-risk flood prone areas to different land-use (parks, marsh, …) to limit flood damage
- reduce impervious surface areas
- increase on-site infiltration & ET

STRATEGY: Implement operational strategies at S27 structure to maintain flood protection as sea levels rise

- Implement pre-storm drawdown to increase groundwater storage:
  - using gravity drained local drainage systems (slow, probably would require a change in the wet-season water control level for the basin to provide significant increase in storage)
  - using municipal pumping facilities (faster, but may require pump at S27 to provide significant increase in groundwater storage)

STRATEGY: Maintain canal conveyance while sea levels rise

- Raise water levels in canal so that runoff still occurs even though sea levels are raised
  - Add flood levees along critical sections of C7 canals
  - Add municipal pumps to provide local drainage behind the levees (efficiency of pumps should consider return flow from C7 canal back into local drainage system)
- Widen canal and remove constrictions
- Add a new water control structure in the C7 canal to protect vulnerable downstream areas

STRATEGY: Increase basin storage

- Interconnect and actively manage water levels in larger lakes
- Add stormwater reservoir (like the C4 stormwater reservoir)