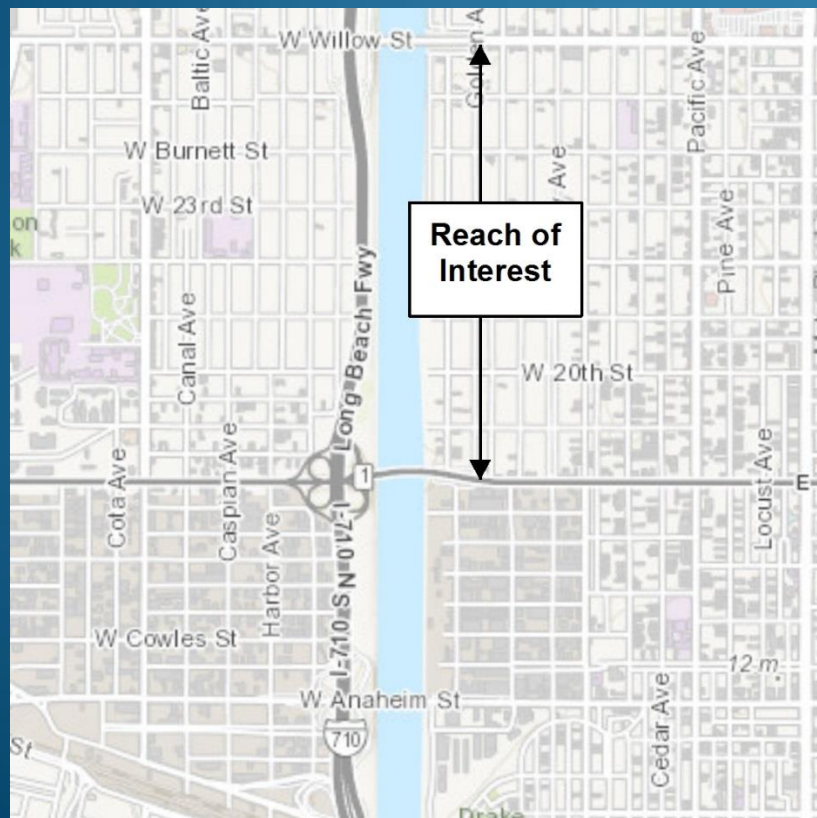


# Risk and Uncertainty Analysis Reach 25 of Los Angeles River



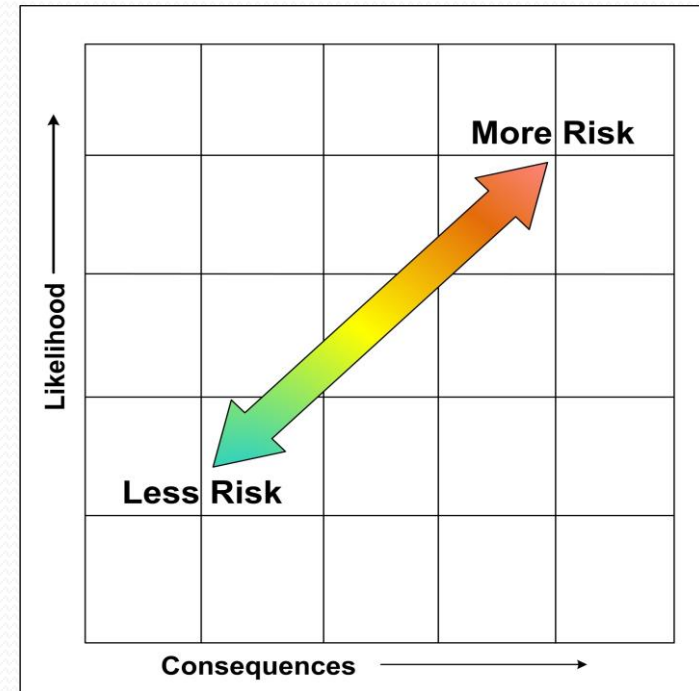
Chris Bahner, P.E., D.WRE  
WEST Consultants, Inc.

# Outline

- **Risk and Uncertainty Analysis**
- **Sea Level Change**
- **Risk and Uncertainty Input**
- **Risk and Uncertainty Results**

# Risk and Uncertainty Analysis

- **Risk** is the measure of the probability of occurrence and severity of undesirable consequences
- **Risk and Uncertainty (R&U) Analysis (Risk-based Analysis)**  
Statistical analysis that takes into account the uncertainty of the hydrology, hydraulics, and consequence
- Referred to as R&U Analysis
- Consequences not considered in this analysis

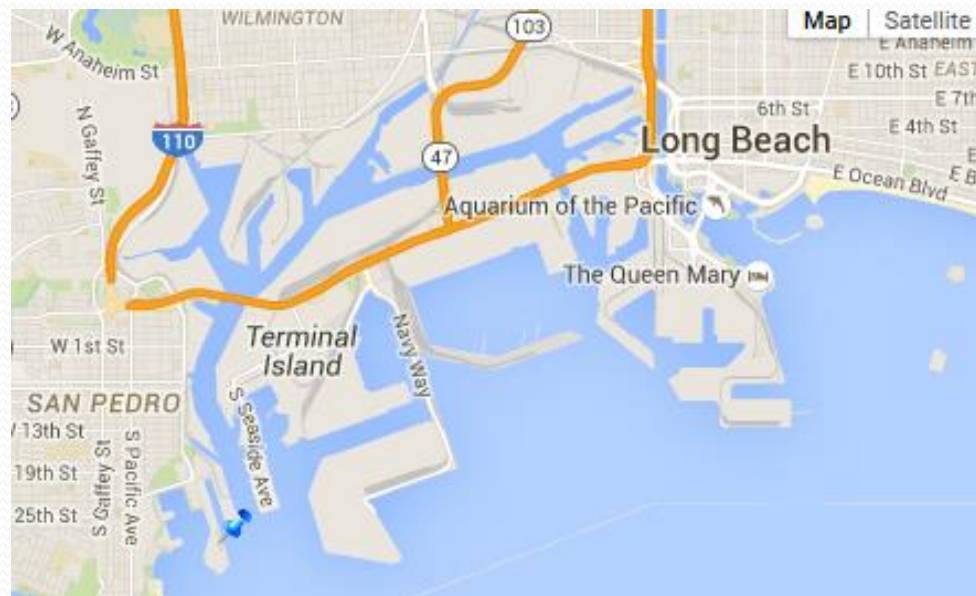


# Outline

- Risk and Uncertainty Analysis
- **Sea Level Change**
- Risk and Uncertainty Input
- Risk and Uncertainty Results

# Sea Level Change (SLC) Analysis

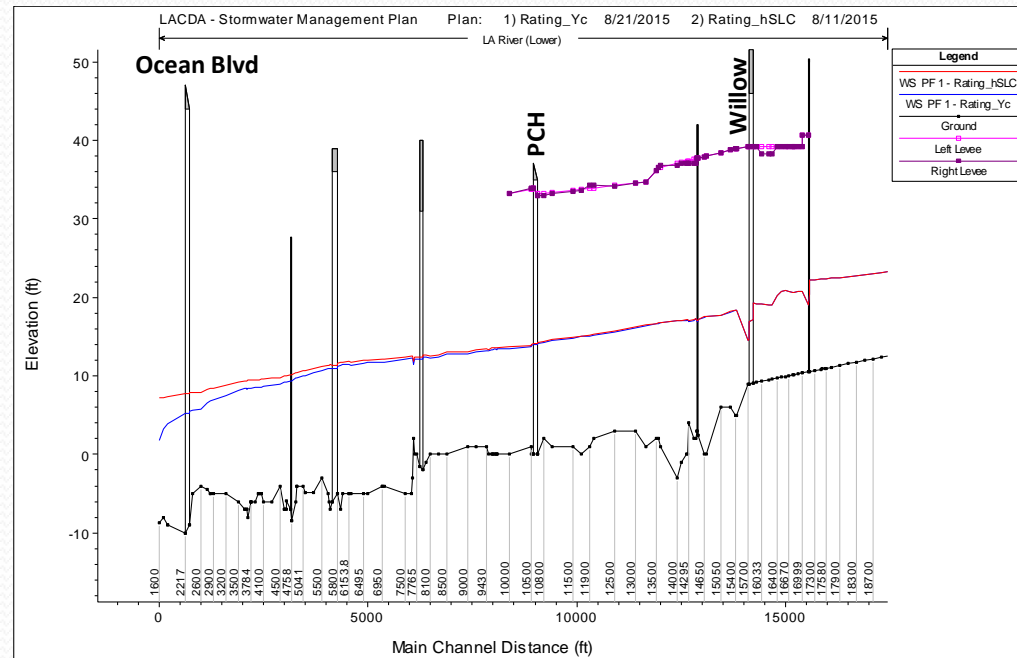
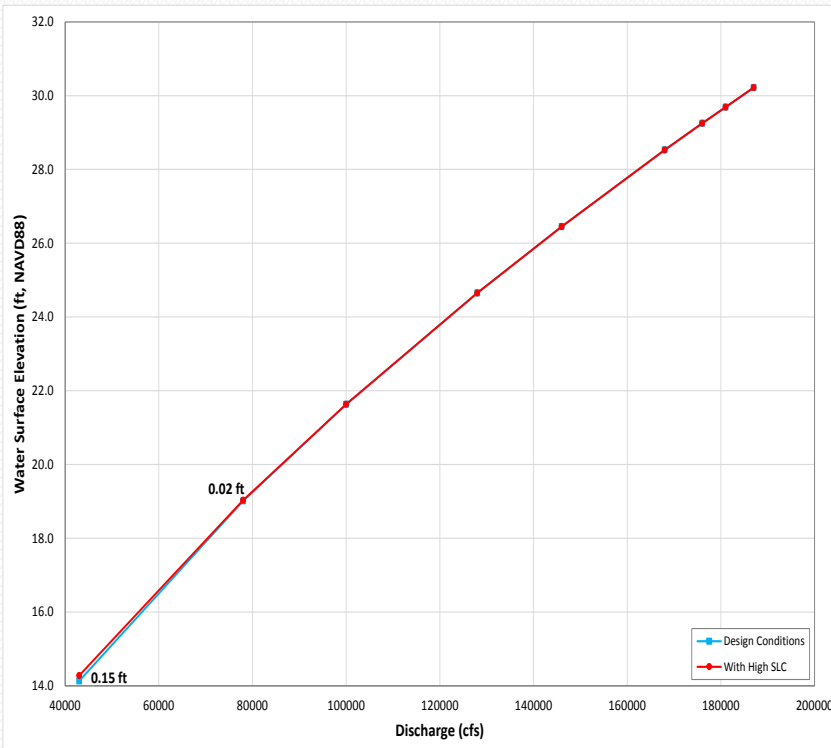
- Completed to assess whether the hydraulics within the study reach would be influenced by SLC anticipated over a 50 year period
- Based on procedures and equations in ETL 1110-2-1 (USACE, 2014)
- **Los Angeles NOAA Gage**
  - Low = 0.14 ft
  - Intermediate = 0.56 ft
  - High = 1.92 ft



# Sea Level Change (SLC) Analysis (Cont.)

## ● Influence at Study Site

### ➤ HEC-RAS Model



# Outline

- Risk and Uncertainty Analysis
- Sea Level Change
- **Risk and Uncertainty Input**
- Risk and Uncertainty Results

# Risk and Uncertainty Input

- Index Locations
- Top of Levee

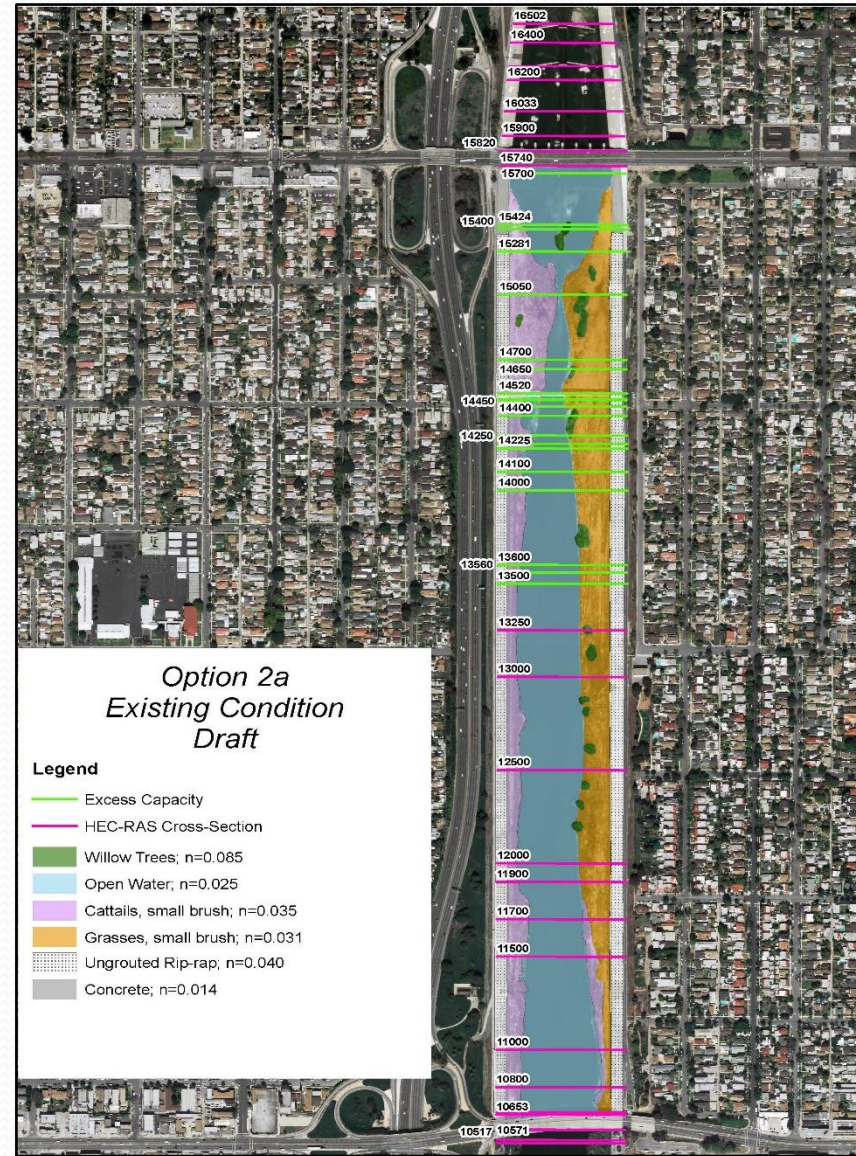




# Risk and Uncertainty Input (Cont.)

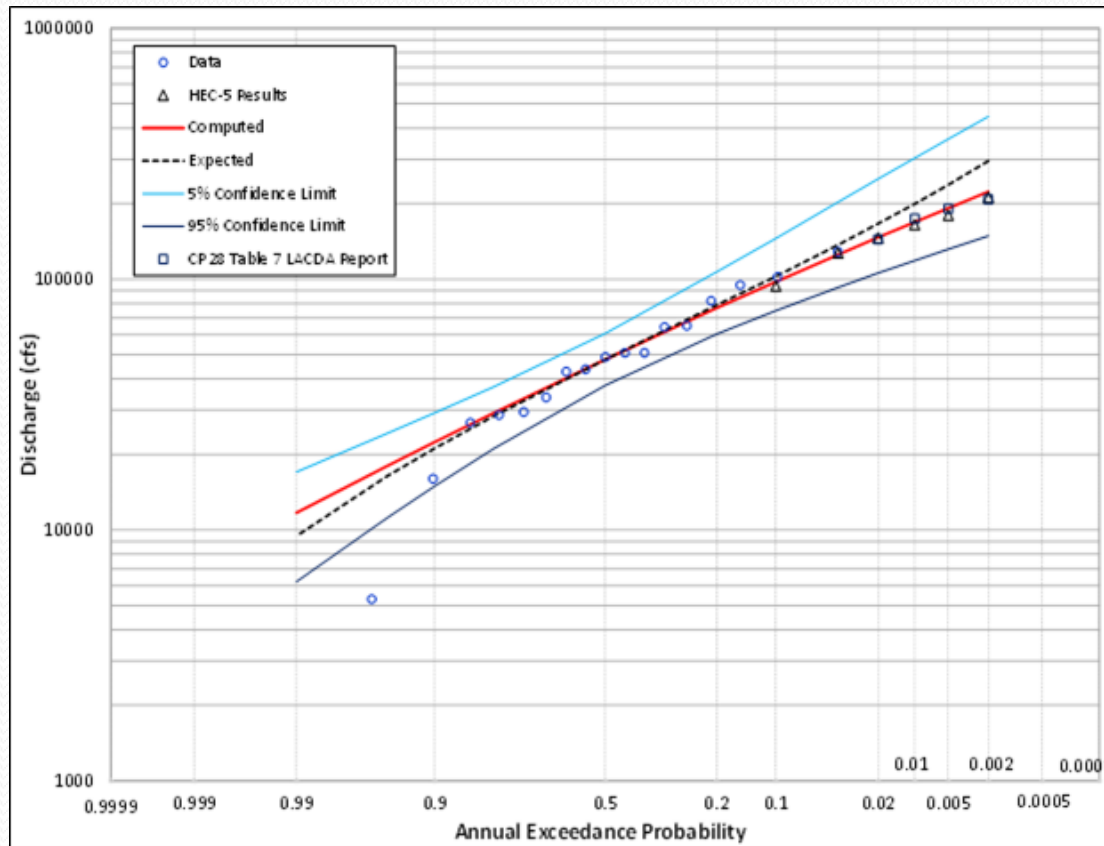
- **Conditions**

- As-Constructed
- Vegetation Maintenance Option 2a



# Risk and Uncertainty Input (Cont.)

- **Discharge vs Probability Relationship**



Wardlow gage discharge frequency relationship for period of record from 1967 to 1983 (USACE 1991 LACDA Study)

# Risk and Uncertainty Input (Cont.)

- **WSEL vs Discharge Relationships**

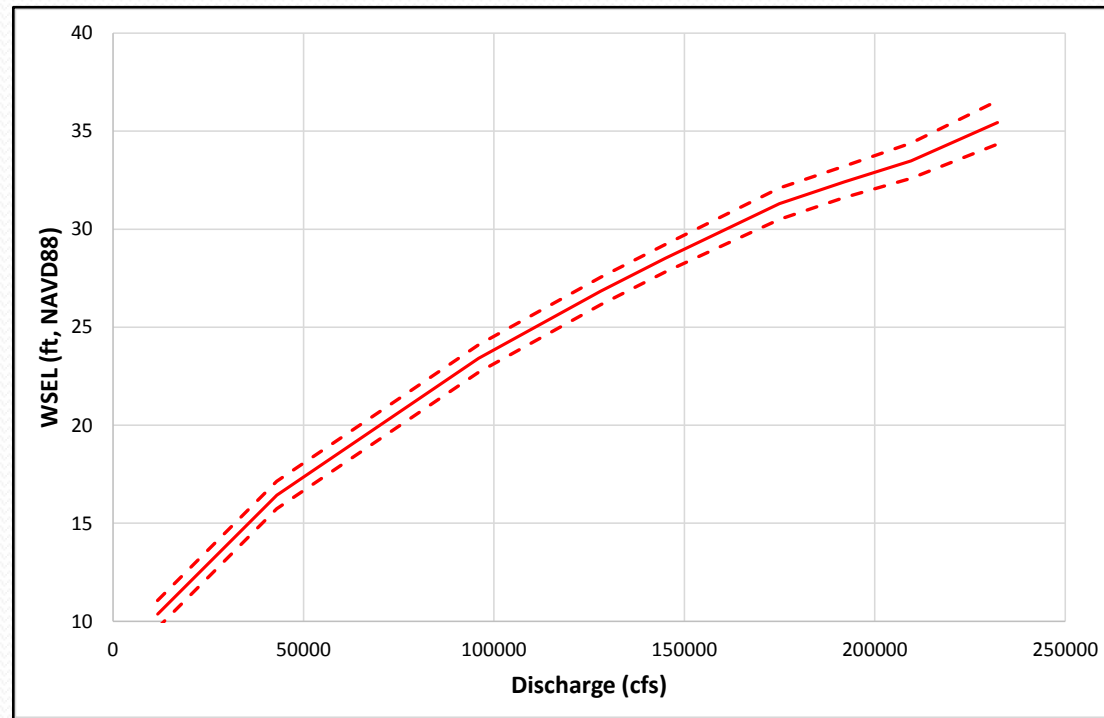
- Each Index Location and Conditions

- HEC-RAS

- Uncertainty

- ❖ Sensitivity Analysis

- ❖ Minimum in  
EM 1110-2-1619



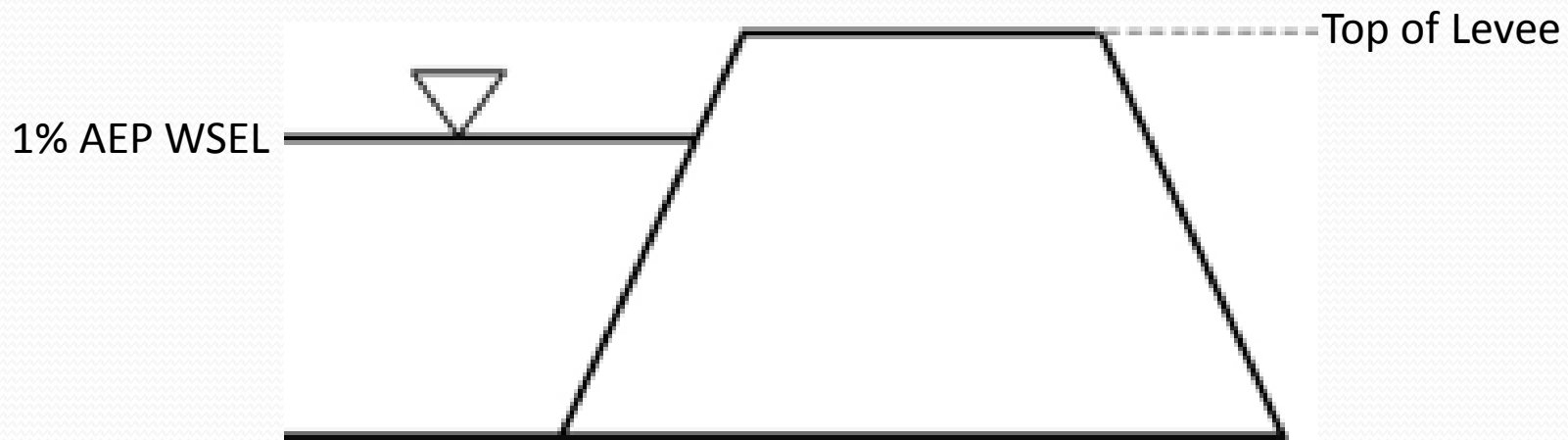
# Outline

- Risk and Uncertainty Analysis
- Sea Level Change
- Risk and Uncertainty Input
- **Risk and Uncertainty Results**

# Risk and Uncertainty Preliminary Results

- **Project Performance (Assurance)**

- Probability of containing a specific annual chance exceedance flood event



**Assurance of 92% for 1% AEP event** - There is a 92% probability that the 1% AEP water surface elevation would be below the top of levee elevation

# Risk and Uncertainty Preliminary Results (Cont)

Condition	Index Location	Hydrology	Assurance
As-Constructed	2	LACDA Study (1967-83)	79.8%
Vegetation Maintenance Option 2a	6	LACDA Study (1967-83)	66.4%

# Risk and Uncertainty Preliminary Results (Cont)

Condition	Index Location	Hydrology	Assurance
As-Constructed	2	Extended Record (1967-2014)	88.8%
Vegetation Maintenance Option 2a	6	Extended Record (1967-2014)	84.0%