

# Levee Inspection Program & Status Update of the East Coast Protective Levee

**Lucine Dadrian, P.E.**  
**Engineering & Construction Bureau**

**Governing Board**  
**October 13, 2011**



# Levee Updates

- FEMA Flood Map Modernization
  - Current effort by FEMA
  - Requirements include structural certification by levee owners
  - East Coast Protective Levee – Broward County
    - Design Activities
    - Maintenance Activities
- USACE Maintenance Inspections
  - National levee inventory
  - Rehabilitation & Inspection Program

# FEMA Mapping

- FEMA requires levee owners to certify that the levee system can withstand a 100-Year Storm Event plus a Category 1 hurricane
- If the structures cannot be certified for 100-yr storm, then the mapping analysis will consider the levee's protection level to prorate insurance costs
  - This would result in an increase in flood insurance rates for existing policy owners and
  - Would require flood insurance for property owners within the expanded flood plain

# FEMA Mapping – Sequence of Events

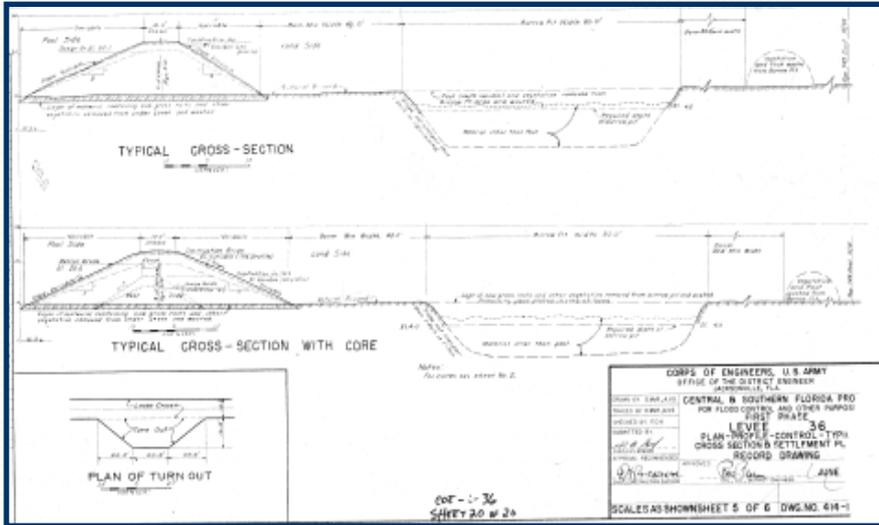
- Participating County requests levee certification from the levee owner
- If the levee owner believes that the structure is certifiable, then they can obtain a Provisional Accreditation from FEMA
- Allows up to 2 years for the levee owner to provide a certification to FEMA
- During this period, no changes occur to existing flood insurance rates or flood plain extent
- Preliminary flood maps for Broward County have been issued and show the levees with full protection

# East Coast Protective Level - Broward County

- L-36
- L-35A
- L-35
- L-37
- L-33



# FEMA Levee Evaluation Objectives

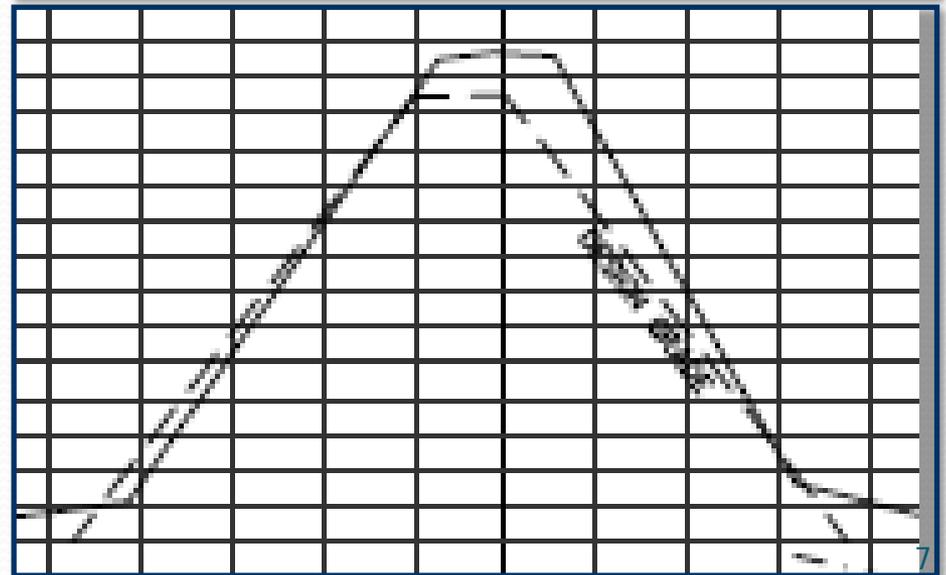
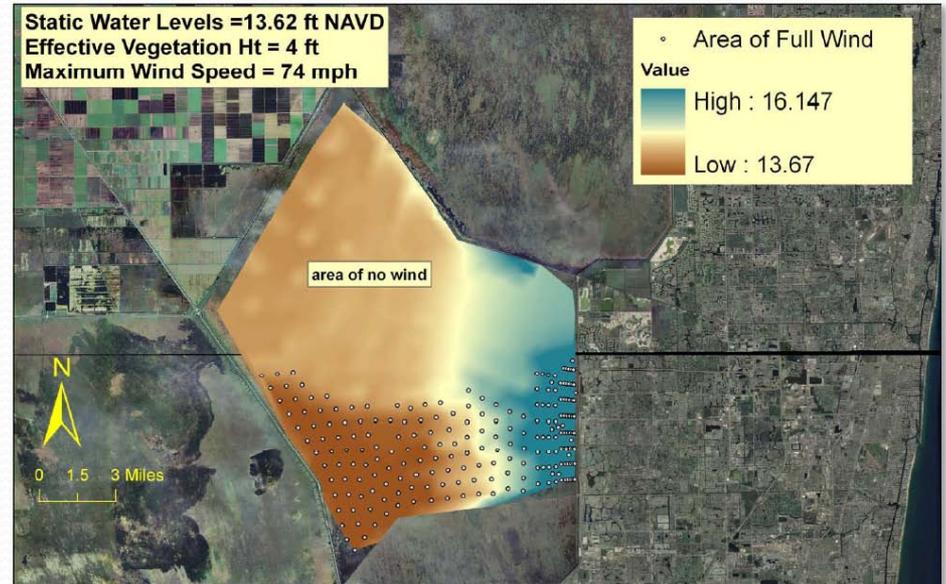


- Review Existing Records
- Determine Current Condition
- Complete Engineering Analyses using Current Design Standards
- Confirm FEMA Requirements
- If found, Note Deficiencies and Possible Remediation
- Provide Certification per 44 CFR 65.10



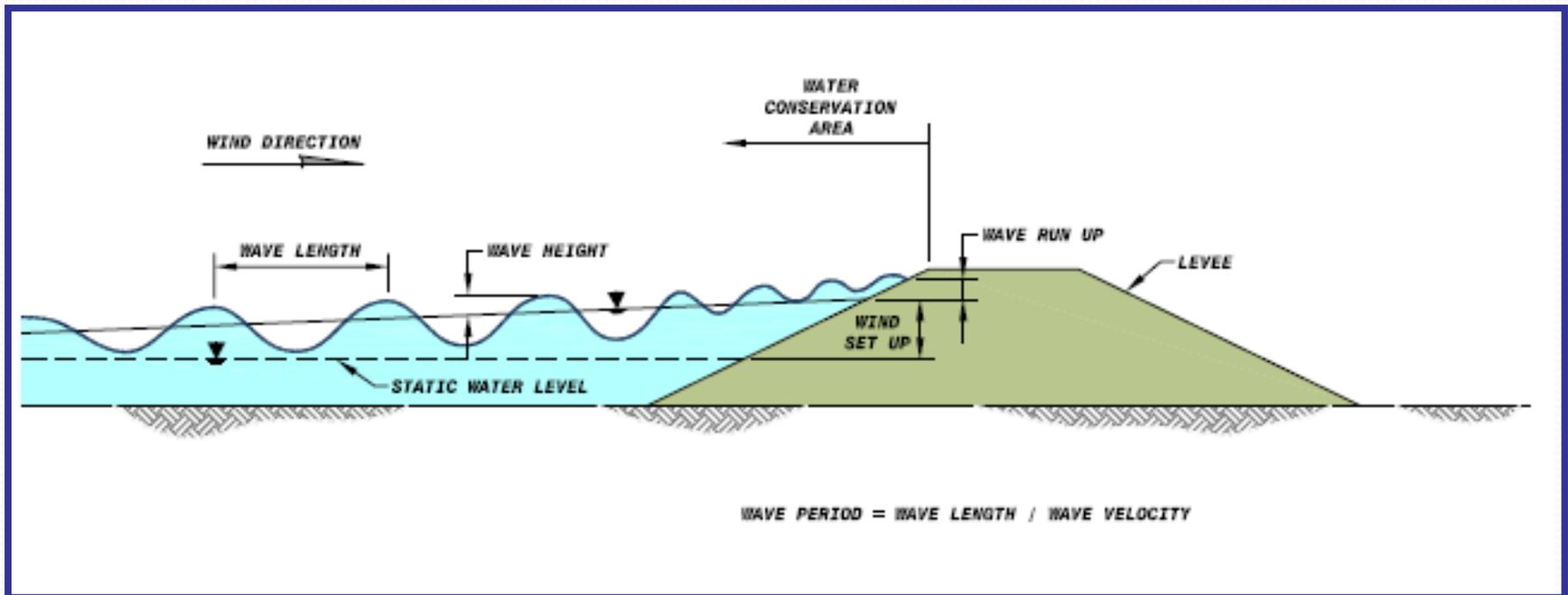
# SFWMD Levee Assessment – Broward County

- Freeboard
- Structures
- Levee Embankment
  - Seepage
  - Stability
  - Settlement
- Interior Drainage
- Adjacent Drainage Systems



# Criteria for Freeboard Assessment

A levee crest will be deemed to meet the freeboard criteria described in CFR 44 Ch.1 §65.10 if its elevation is at least a foot higher than the height of maximum wave run-up associated with the computed 100-year static water level.



# Engineering Conclusions

- Raise crest of about 2000 feet of L-36
- Recommend Construction of Downstream Toe Berm along Levee Alignments
  - Reduce exit gradients near levee toe
  - Provide positive cutoff through peat layer for piping control
  - Improve levee stability
  - Protect against internal erosion
- Engineering design will determine:
  - Most appropriate areas for remediation and their priority
  - Cost & Schedule
- Flatten Upstream Slope for parts of L-36
- Perform additional geo-tech analysis in specific areas

# Maintenance Activities To-Date

- Wave action repair
- Addition of fill to raise levee elevation to design
- Undesirable vegetation removal
- Herbicide treatment
- Monitoring stations installed
- Installation of temporary seepage measures – ring dikes

# Wave Action Repair



# Raise Levee Elevation



# Vegetation Clearing

**BEFORE**



**AFTER**



# Herbicide Treatment



# Permanent Monitoring Installed



# Installing Ring Dikes on L-36



# Design Progress To-Date

- Completed engineering design and construction documents
  - Funding is in place
- Submitted permit applications
  - Environmental permits
    - U.S. Army Corps of Engineers
    - Florida Department of Environmental Protection
    - Local governments
  - Facility modification permit
    - U.S. Army Corps of Engineers



# Next Steps

- Receive permit approvals
- Solicit construction bids
- Execute three (3) construction contracts
- Continue close coordination with:
  - Participating communities
  - USACE
  - FEMA
- Provide certification to FEMA in 2013
- Current Preliminary FEMA Maps show the levee system providing protection from the 100-yr storm

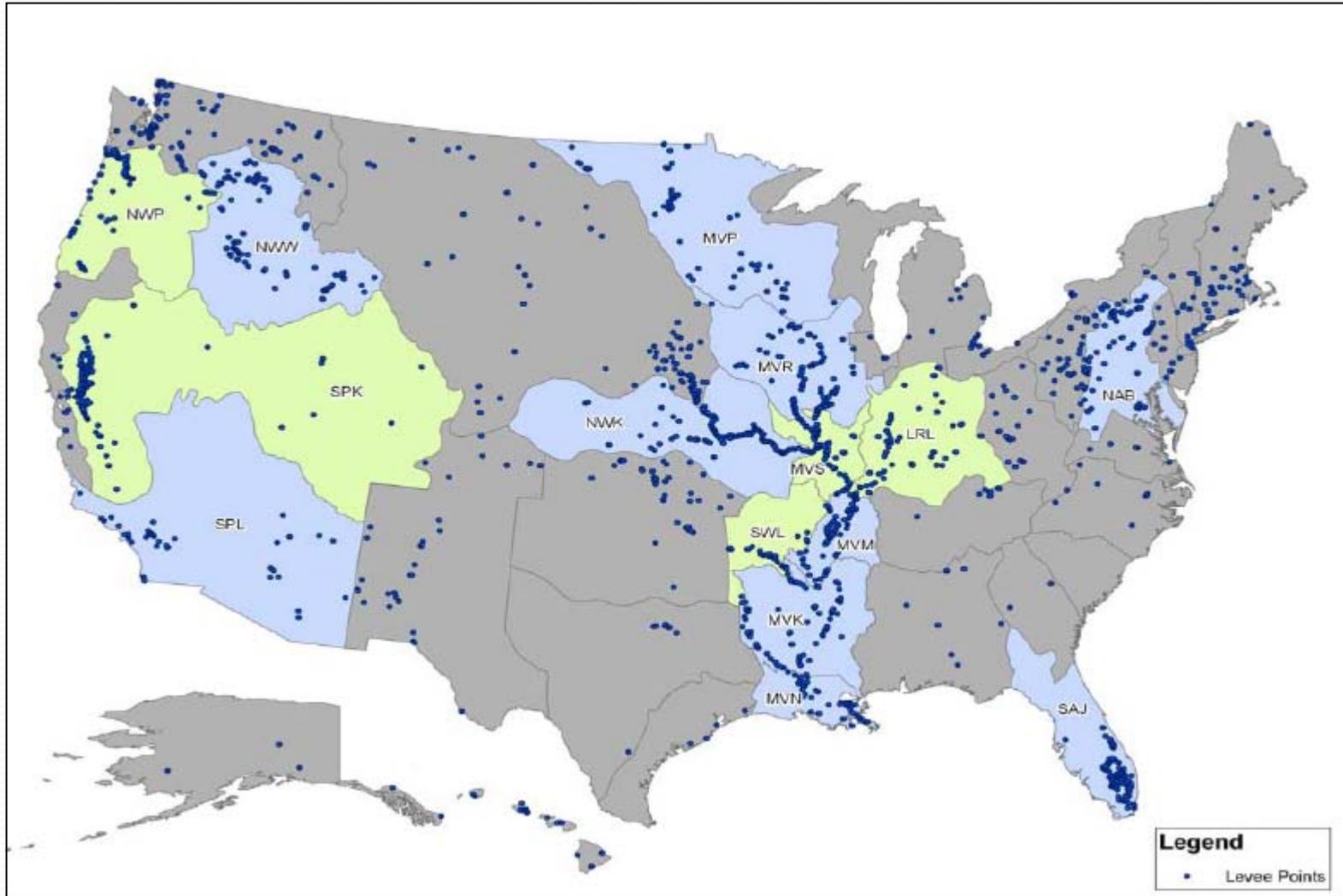
# Levee Updates

- FEMA Flood Map Modernization
  - Current effort by FEMA
  - Requirements include structural certification by levee owners
  - East Coast Protective Levee – Broward County
    - Design Activities
    - Maintenance Activities
- USACE Maintenance Inspections
  - National levee inventory
  - Rehabilitation & Inspection Program

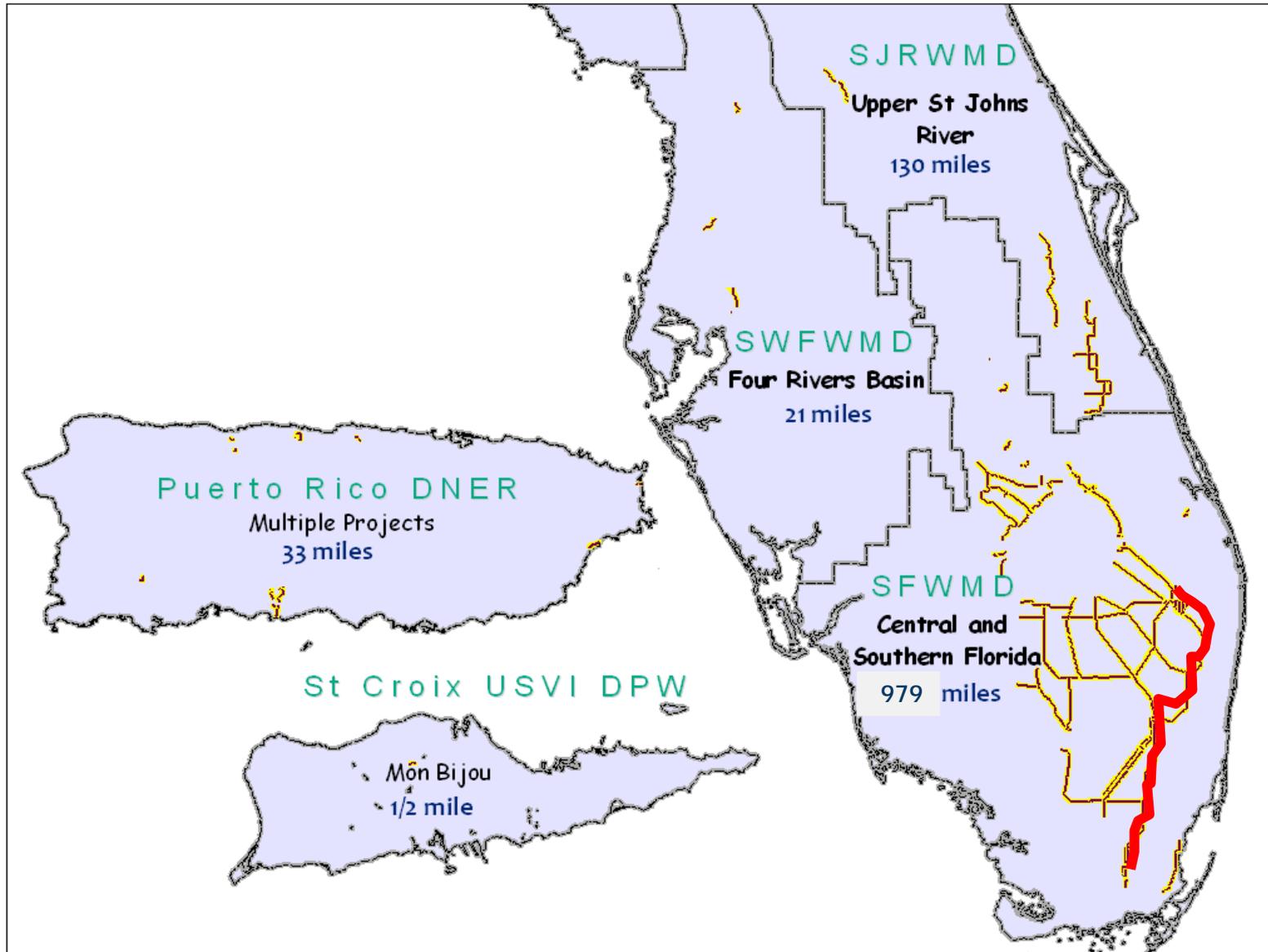
# Historical Perspective

- Levee inspection program – SFWMD bi-annual Inspections State and Federal levees as part of the Central & Southern Flood Control Project
- Hurricanes Katrina and Rita (2005) hit the Gulf Coast and changed the way that the USACE viewed levees
- National Levee Safety Act passed in 2007 directed the USACE to inventory and inspect existing Federal levees
- USACE Jacksonville District began inspections of SFWMD Federal levees in 2009

# National Levee Database



# USACE Jacksonville District Levee Inventory



# SFWMD Levee Program

- Minimize the potential for levee failure while achieving requirements for:
  - Federal Emergency Management Agency (FEMA) Federal Guidelines for Dam Safety, April 2004
  - US Army Corps of Engineers (USACE) Levee Owner's Manual for Non-Federal Flood Control Works, March 2006
- Perform annual inspections of the levees (979 miles) identified in the National Levee Database (Field Station)
- Perform 5-year inspections of a more rigorous nature

# Rehabilitation & Inspection Program

- District levee systems are currently active in RIP
- Active status for flood control projects in the RIP must meet USACE criteria and continue to meet ongoing criteria for continued eligibility
- Only Active projects may receive PL 84-99 rehabilitation assistance to repair damage caused by a flood event or coastal storm
- USACE Maintenance Inspection Rating System
  - Acceptable/Marginally Acceptable Rating = Active Status
  - Unacceptable Rating = Inactive Status

# Levee Inspection Program - Objectives

- Prevent failures
- Prioritize and implement cost-effective preventative measures
- Detect and correct deficiencies
- Implement appropriate risk-reduction measures
- Protect public and property
- Comply with regulatory requirements and legal obligations
- Ensure disaster preparedness

# Levee Inspection Findings

- Unwanted vegetation growth  
– trees and shrubs on levee side slope



# Levee Inspection Findings

- Depressions / Rutting – rut in excess of 6 inches deep



# Levee Inspection Findings

- Slope Stability  
– slope material sloughing off



# Levee Inspection Findings

- Animal Control – animal burrow in side slope



# Levee Inspection Findings

- Seepage –  
seepage at toe  
of slope





Questions?