

DAM SAFETY AND HERBERT HOOVER DIKE

Almur Whiting
Dam Safety Program Manager

U.S. Army Corps of Engineers (USACE)
Jacksonville District
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US Army Corps
of Engineers®



LOSOM WEBINARS



- Webinar 1 – Overview of the Central & Southern Florida Project – 20 May
- Webinar 2 – Lake Okeechobee Ecology – 22 May
- **Webinar 3 – Dam Safety and Herbert Hoover Dike – 24 May**
- Webinar 4 – Estuary Ecology – 28 May
- Webinar 5 – Water Management and the 2008 LORS – 30 May
- Webinar 6 – Kissimmee River Restoration – 4 June



WHAT YOU WILL LEARN



- The primary focus of the USACE Dam Safety Program is managing risk with life safety the highest priority.
- Herbert Hoover Dike (HHD) is a dam that is managed to minimize risk to the surrounding communities.
- Problems with Herbert Hoover Dike center around how it was constructed.
- Managing Lake Okeechobee water levels is one of the keys to maintaining the integrity of Herbert Hoover Dike.
- Operating, maintaining and rehabilitating the Herbert Hoover Dike structure helps to minimize the risk of a failure.



WHAT WE WILL COVER

- **USACE Dam Safety Program**
- **Kissimmee Okeechobee Everglades System**
- **Herbert Hoover Dike (HHD)**
 - HHD Authorization
 - HHD Construction
 - HHD Current Status
 - HHD Problems
 - HHD Rehabilitation
 - HHD Studies
 - HHD Dam Safety Risk Analysis
 - HHD Dam Safety Modification Report
 - HHD Implementation Progress
- **Key Takeaways**
- **Questions**



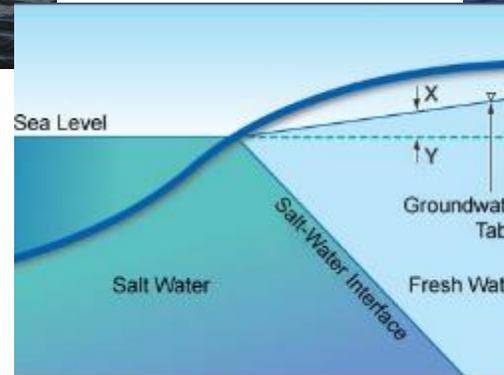
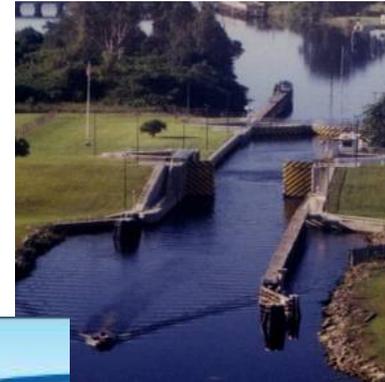
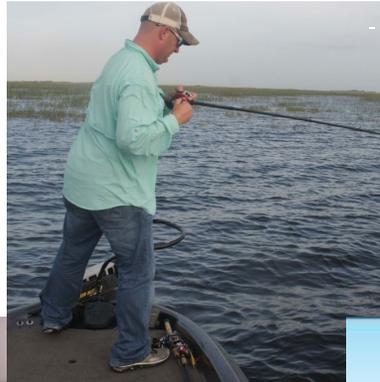


USACE DAM SAFETY PROGRAM



Why does the Corps have a Dam Safety Program?

The Corps' dams are part of our nation's landscape, integral to many communities and critical to watershed management. The dam safety program makes sure these projects deliver their intended benefits while reducing risks to people, property and the environment through continuous assessment, communication and management.





USACE DAM SAFETY PROGRAM



The dam safety program principles are as follows:

1. Public safety is the primary focus.
2. Dam safety is a component of a broader flood risk management approach.
3. An effective safety program requires continuous and periodic project inspections and assessments.
4. The sustainable, systems and collaborative approach is the most effective way to manage and assess dams.
5. Dam safety information and risk communication must be accurate, timely and clear so individuals can understand risks to make informed decisions about their safety.



USACE DAM SAFETY PROGRAM



The USACE Dam Safety Program is risk informed.

Risk is a function of HAZARD, PERFORMANCE and CONSEQUENCES.

- **HAZARD** = frequency and magnitude of a lake stage or loading event
- **PERFORMANCE** = probability of failure or breach for a given hazard (loading event)
- **CONSEQUENCES** = the effect of a failure on people, property, economy and the environment

We cannot completely eliminate risk, but we can reduce and manage risk.





KISSIMMEE OKEECHOBEE EVERGLADES SYSTEM



- Lake Okeechobee is approximately 730 square miles.
- Lake Okeechobee drainage basin is over 5,600 square miles.
- Average water depth within the lake is 9 feet.
- One foot of rainfall runoff from the basin can result in a three to four foot rise of the lake.
- During large flood events, water can flow into the lake much faster than it can be released.



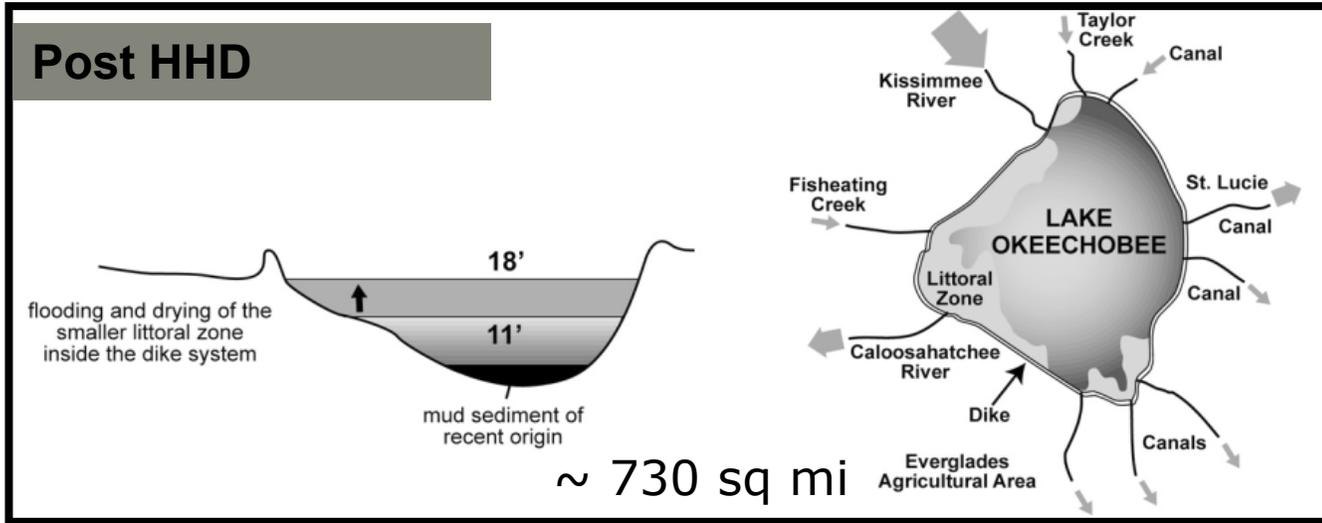
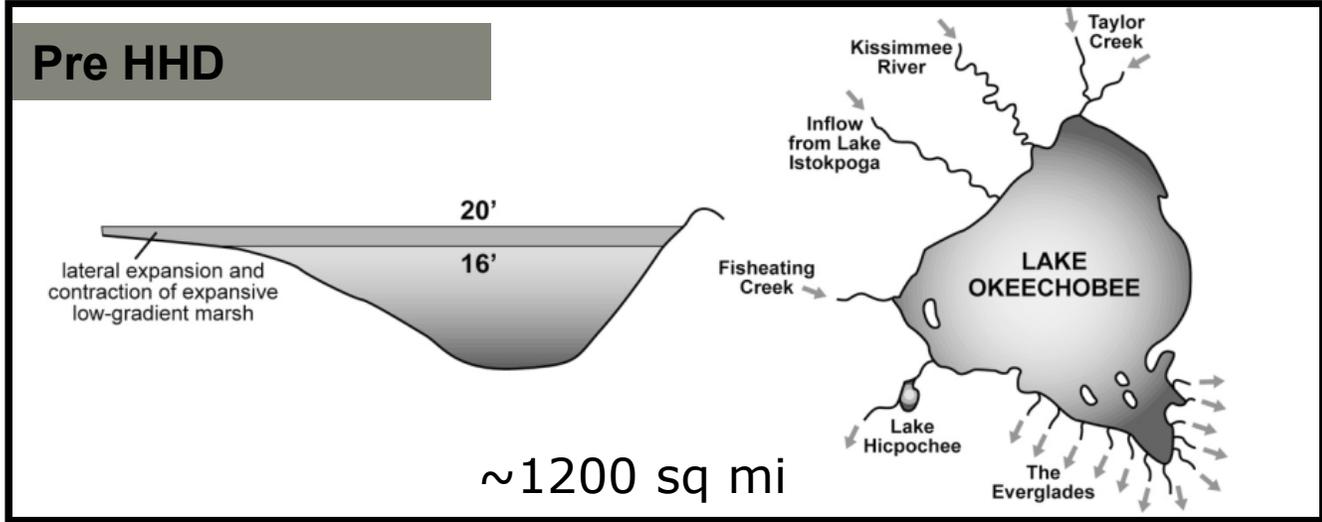
HERBERT HOOVER DIKE AUTHORIZATION



- 3,000+ lives lost in the 1926 and 1928 hurricanes
- Significant economic impacts
- HHD first authorized in 1930
- Multiple project authorizations

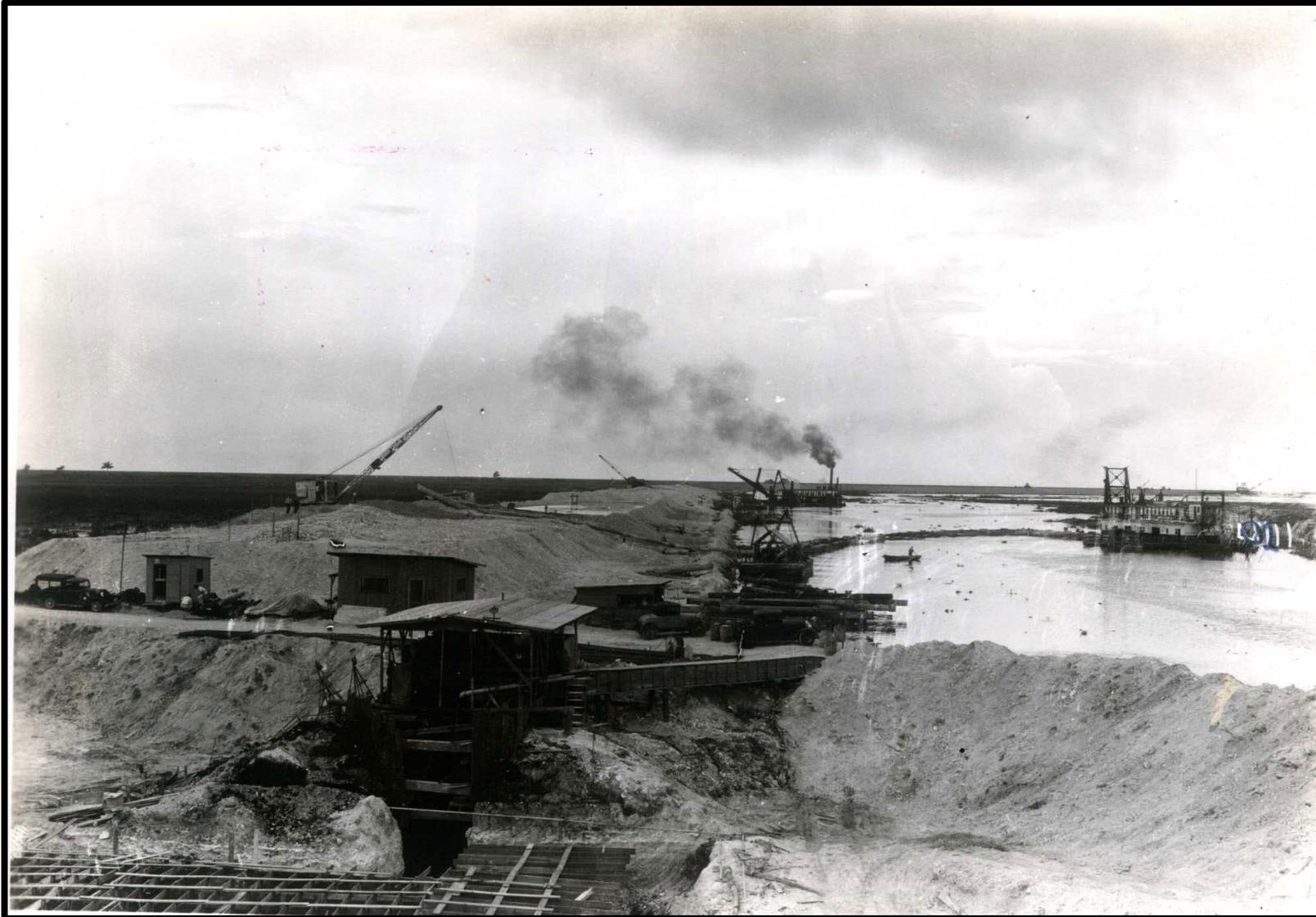


HERBERT HOOVER DIKE CONSTRUCTION





HERBERT HOOVER DIKE COMPOSITION



- Material used to build HHD came from the adjacent marsh.
- The material was basically piled up between two containment dikes with little compaction, as was the practice at the time.
- Construction materials and methods led to problems with leaking water through the dike.



HERBERT HOOVER DIKE CURRENT STATUS



143 miles of earthen embankment around Lake Okeechobee

- 32 Federal culverts
- 5 spillway inlets
- 5 spillway outlets
- 9 navigation locks
- 9 pump stations

No emergency overflow capability

Built by hydraulic dredge and fill methods

- Not acceptable to today's construction standards

Dam Safety Action Classification (DSAC) 1 assigned in 2006



HHD PROBLEMS



Internal erosion

(seepage and piping)

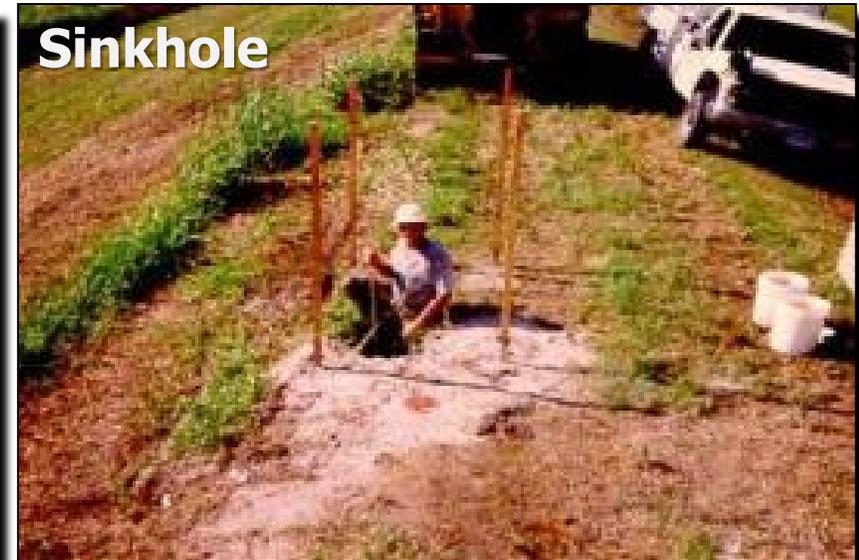
- Through embankment
- Through foundation

Culvert structures

- Soil erosion into conduit
- Erosion/Piping around conduit

Overwash/Overtopping

- Erosion of downstream slope





HERBERT HOOVER DIKE REHABILITATION



PROJECT GOAL

Safeguarding human life while reducing the intolerable risk of social, economic and environmental impacts to areas around Lake Okeechobee and impacts to the nationally and internationally significant Everglades ecosystem.



HERBERT HOOVER DIKE STUDIES



Major Rehabilitation and Evaluation Report (MRR) 2000

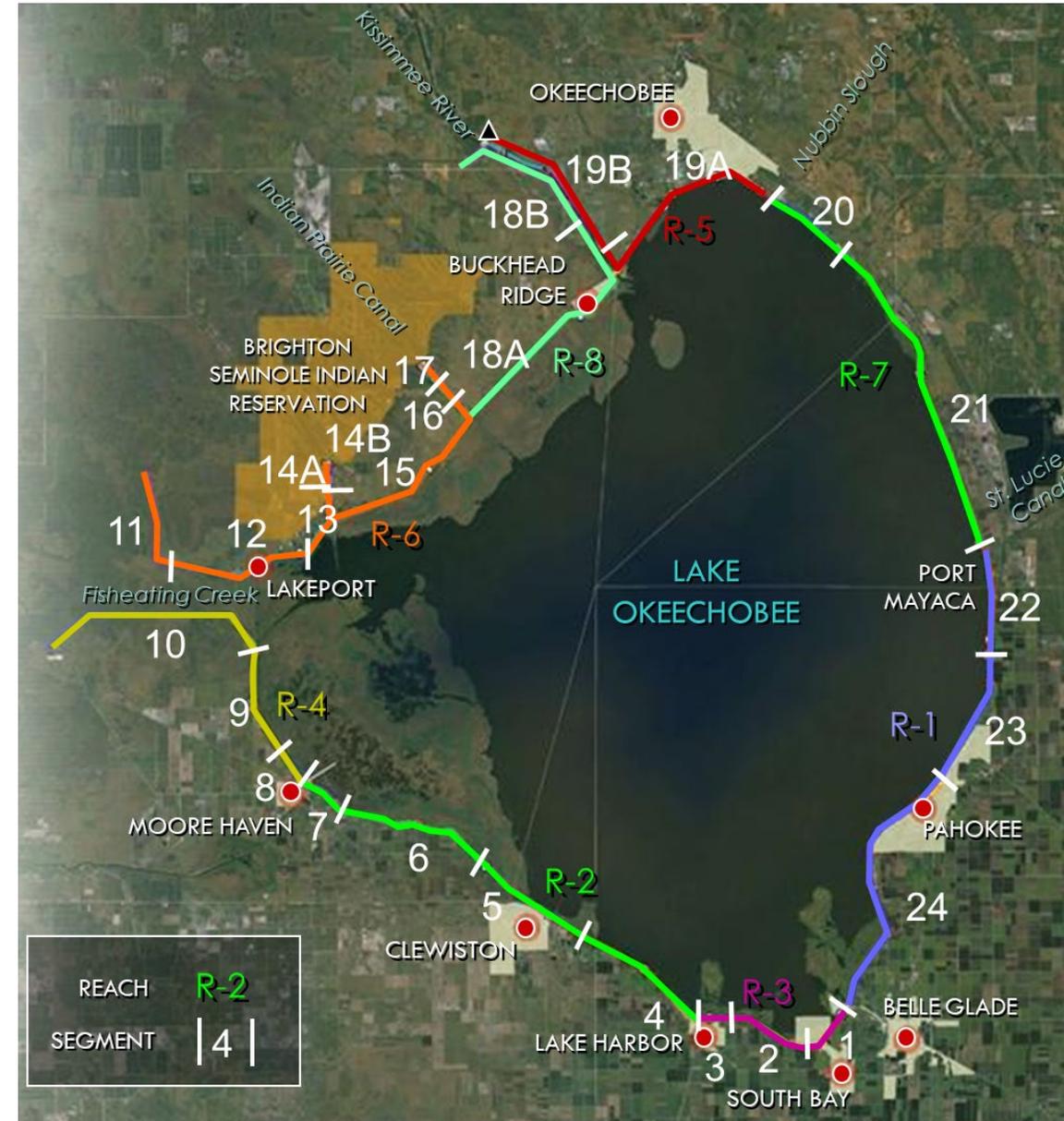
- Prioritized HHD rehabilitation into 8 reaches
- Rehabilitation begins in Reach 1 (~22 miles)
- Advocates a seepage berm and relief trench
- Partial seepage cutoff wall installed

Culvert Letter Report 2011

- Approved replacement or removal of 32 gated culverts

Dam Safety Modification Report (DSMR) 2016

- System-wide approach
- Risk reduction measures below tolerable guidelines
- Prioritize implementation to minimize risk
- Organized HHD into 7 Common Inundation Zones based on consequences.





HHD DAM SAFETY RISK ANALYSIS

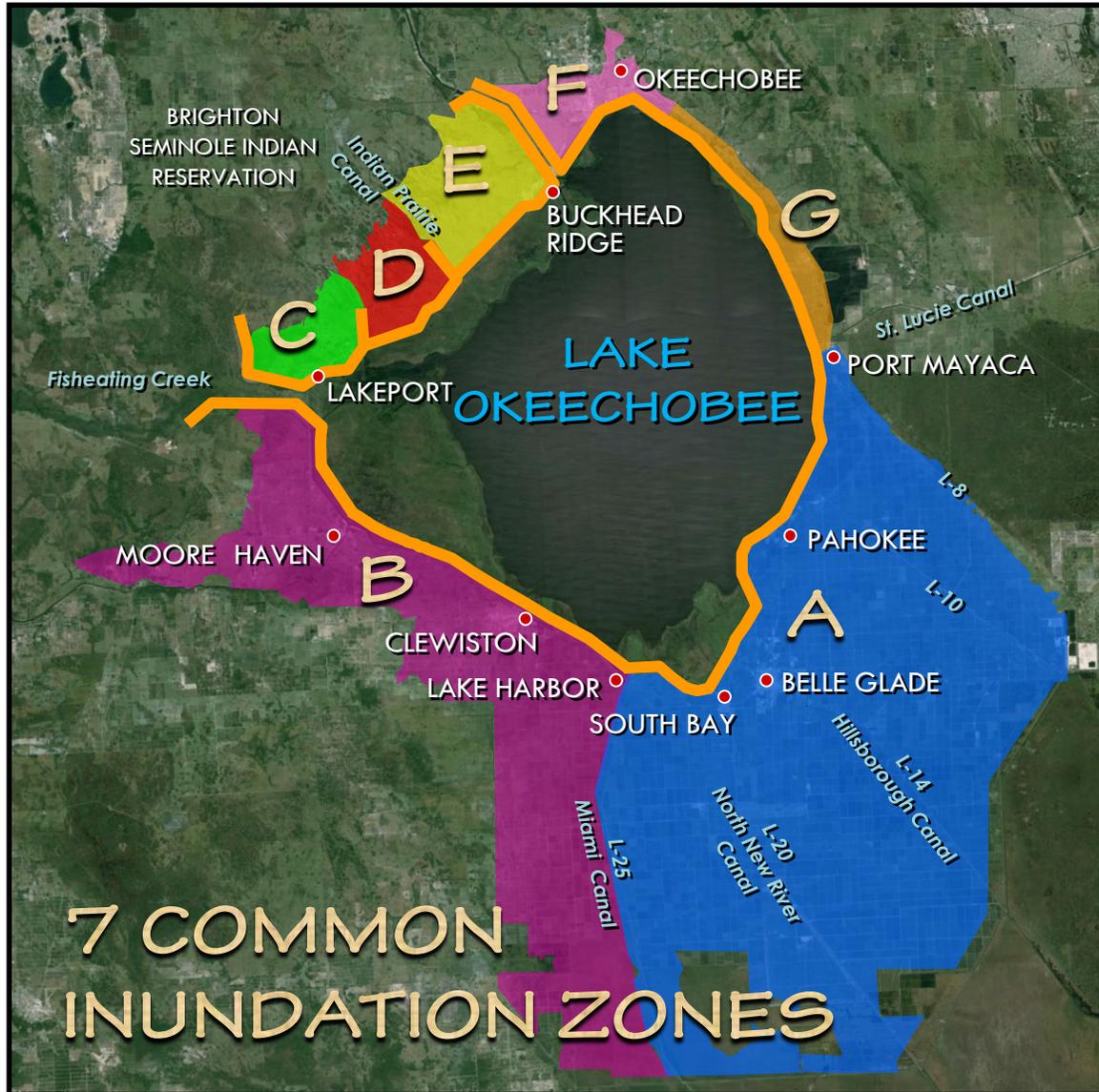


System-Wide Risk Reduction Approach

- Goal is to reduce the risk of failure improving Dam Safety Action Classification (DSAC) status.
- Identify and address the highest risks first through Dam Safety Modification Study.
- Reach 1 cut-off wall and culvert replacements and removals are risk reduction measures.



HERBERT HOOVER DIKE DSMR



Existing Condition Risk Assessment

- Established 7 common inundation zones (SPF breach containment)
- Analysis performed on 32 dam segments within inundation zones to identify and prioritize remediation

Dam Safety Modification Report (DSMR)

- Recommends final HHD system repairs to reduce risks to within tolerable levels
- DSMR was approved 30 Aug 2016

Path Forward

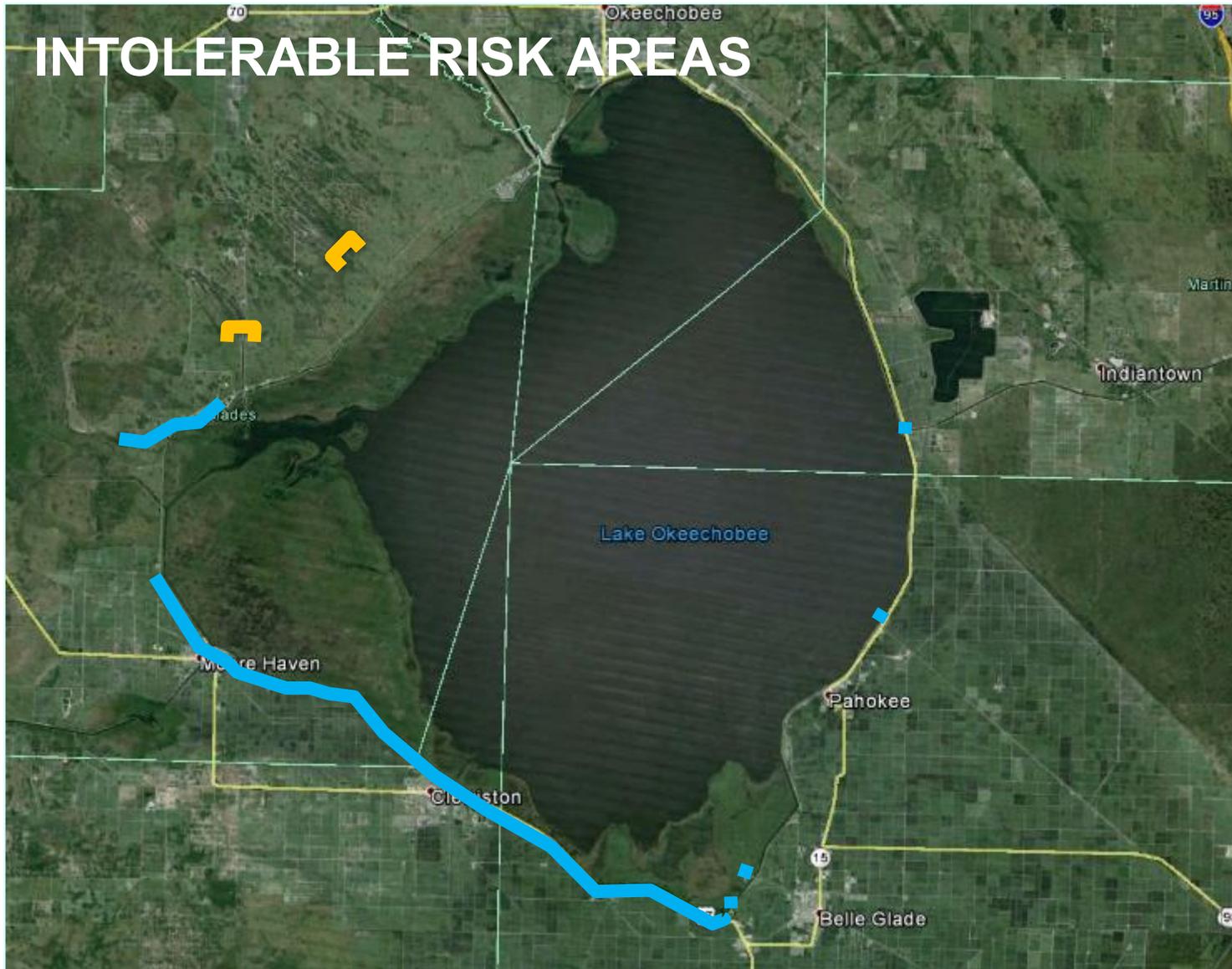
- Construction project implementation planned from 2019 through 2022
- Recommendation for FEMA accreditation by inundation zone began in 2016 with zones C-F
- Lake Okeechobee System Operating Manual (LOSOM) regulation schedule study underway



HERBERT HOOVER DIKE DSMR



INTOLERABLE RISK AREAS



-  Requires Remediation for Internal Erosion Risk
-  Requires Remediation for Overtopping Risk



HERBERT HOOVER DIKE IMPLEMENTATION PROGRESS

COMPLETED WORK

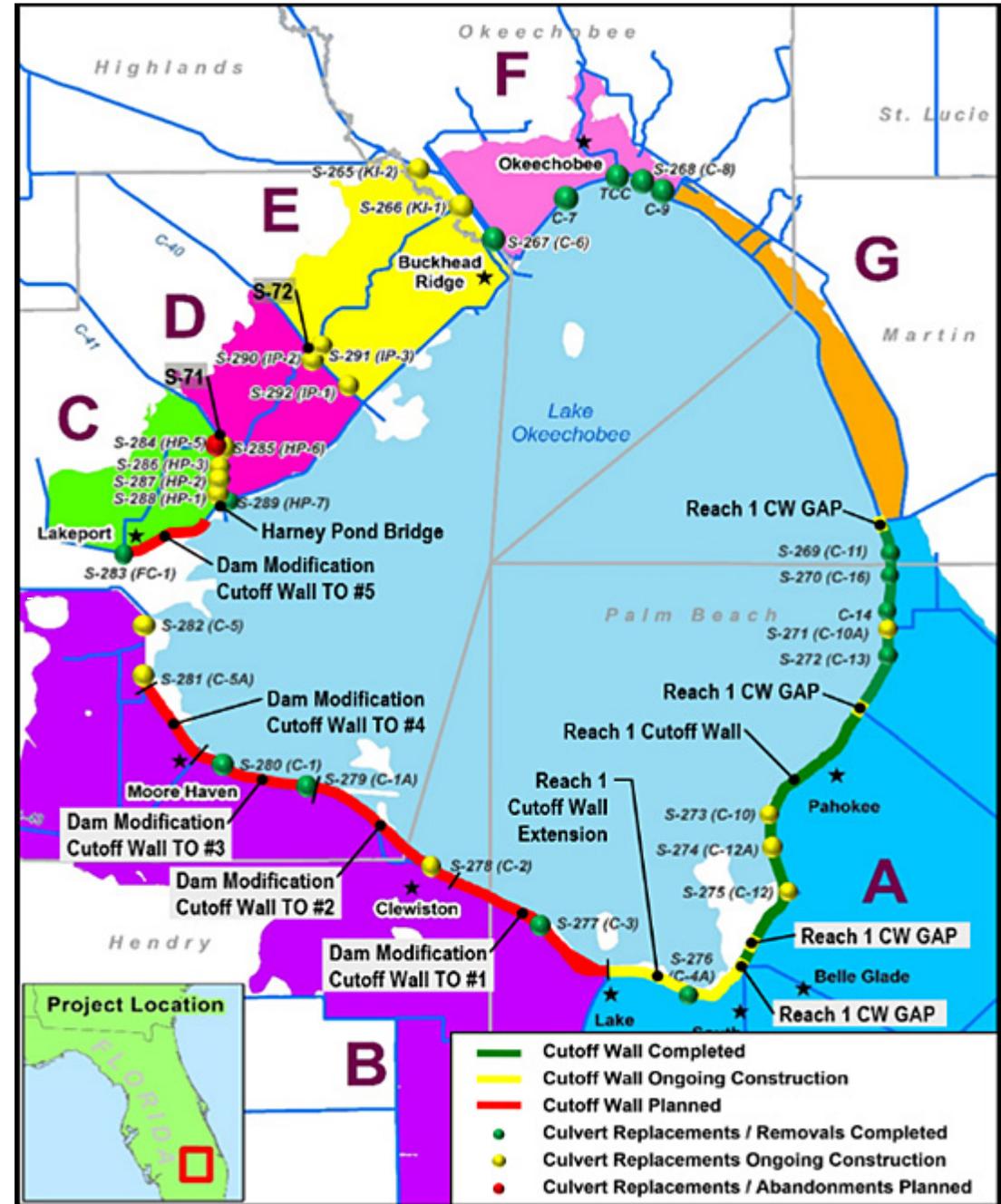
- 21.4 miles of cutoff wall in Reach 1
- 11 culvert replacements
- 4 culvert removal / abandonments

ONGOING WORK

- 16 culvert replacements
- Reach 1 Cutoff Wall Gap Closures
- 6.6 mile Reach 1 Cutoff Wall Extension

PLANNED WORK

- 28.6 mile Dam Modification Cutoff Wall MATOC Task Orders
- 1 culvert replacement
- Harney Pond Bridge Armoring
- S-71 and S-72 Embankment Raising





KEY TAKEAWAYS



- Herbert Hoover Dike is a dam that was built around Lake Okeechobee to prevent flooding of adjacent lands.
- The Herbert Hoover Dike helps to protect the communities around Lake Okeechobee.
- Problems with the dike center around how it was constructed.
- High lake stages increase the risk of dike failure.
- The Corps operates and maintains the dike to minimize the risk of failure.
- Rehabilitation of the dike decreases the risk of failure.
- As with all man-made structures, the HHD is not failure-proof.
- HHD rehabilitation is scheduled to be complete in 2022.



QUESTIONS

TYPE A QUESTION INTO THE WEBINAR CHAT
OR EMAIL
LAKEOCOMMENTS@USACE.ARMY.MIL

LOSOM website
www.saj.usace.army.mil/LOSOM

USACE Water Management Page
www.saj.usace.army.mil/WaterManagement/