PIANC Smart Rivers Conference / LYON 2019 /

/ September 30 - October 3, 2019
Cité Internationale / Centre de Congrès
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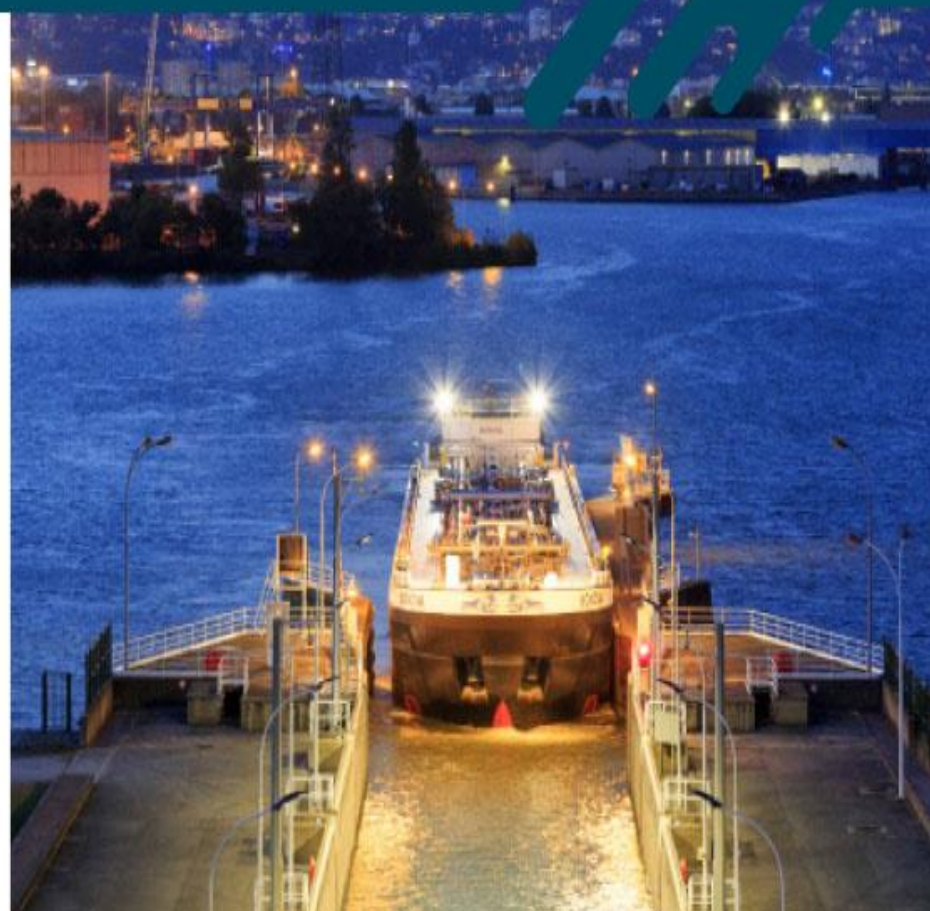
Incorporating Ecological and Social Benefits into Land Planning and Development through Integration of Engineering With Nature® (EWN®) and Landscape Architectural Practices



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Engineering With Nature®

U.S. ARMY

…the intentional alignment of natural and engineering processes to efficiently and sustainably deliver economic, environmental and social benefits through collaborative processes.

EWN®

Key Elements:

- Science and engineering that produces operational efficiencies
- Using natural process to maximum benefit
- Broaden and extend the benefits provided by projects
- Science-based collaborative processes to organize and focus interests, stakeholders, and partners

The Nature Conservancy

And Many More!

www.engineeringwithnature.org

EWN® Across USACE Mission Space

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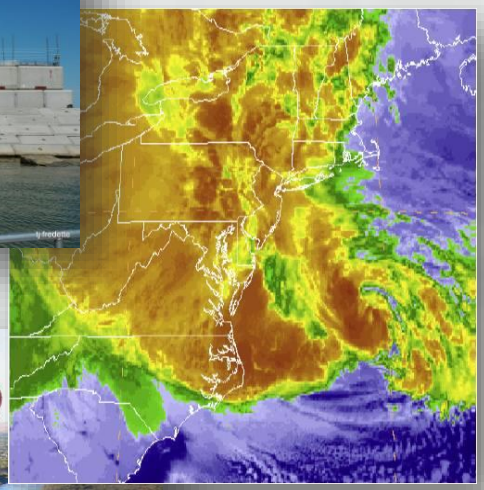
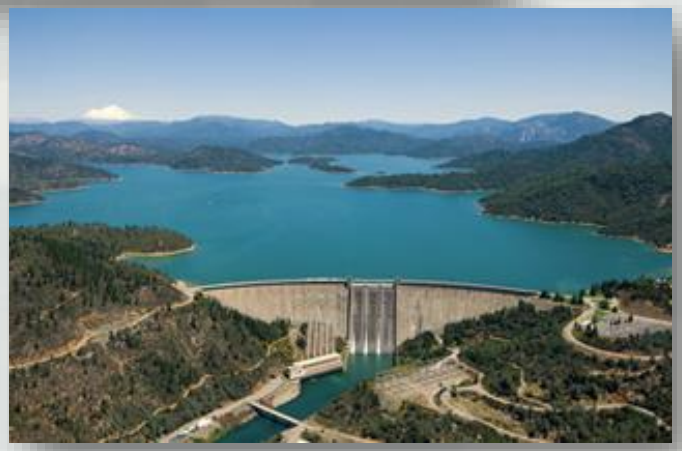
- Navigation
  - Strategic placement of dredged material supporting habitat development
  - Habitat integrated into structures
  - Enhanced Natural Recovery
- Flood Risk Management
  - Natural and Nature-Based Features to support FRM
  - Levee setbacks
- Ecosystem Restoration
  - Ecosystem services supporting engineering function
  - “Natural” development of designed features
- Water Operations
  - Shoreline stabilization using native plants
  - Environmental flows and connectivity





USACE Existing Infrastructure

'*The Corps maintains and periodically rehabilitates the key features of its water resources infrastructure so as to manage and reduce risks associated with this infrastructure*' – USACE Civil Works Strategic Plan 2014 - 2018

- 12,000 miles of commercial inland waterways
- 13,000 miles of coastal channels
- 197 lock sites / 241 associated chambers
- 929 navigation structures

- 707 dams (minimize flooding & provide water supply storage)
- 14,500 miles of levee systems (flood risk reduction)
- 75 hydroelectric power facilities - 353 generating units
- 54,879 miles of lake shoreline and recreation areas supporting 370 million annual visitors

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Incorporating EWN into USACE Infrastructure

Strategic Approach

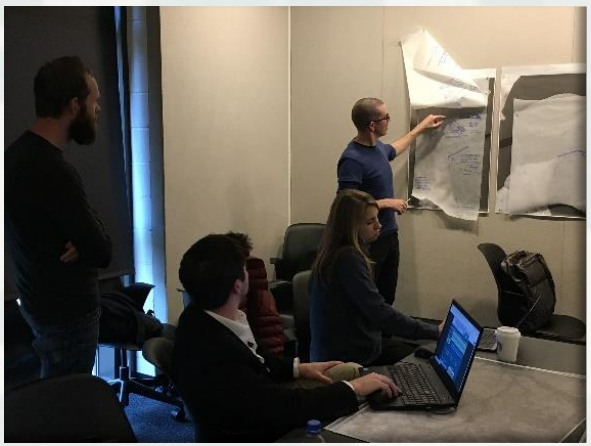
- Establish R&D Task that Supports USACE Districts
- Leverage Ongoing/Proposed USACE O&M Activities
- Develop EWN Products that Expand Understanding
  - ✓ Identify new methods for conveying information
  - ✓ Spend time with staff in USACE Districts
  - ✓ Collaboratively pursue project development
  - ✓ Deliver products for USACE Districts that inform sponsors and stakeholders
- Leverage Success of this R&D Work Unit*

* USACE Supplemental Funding for Investigations and Construction of Water Resources Infrastructure

Examples: 2018 Supplemental Appropriations for Disasters – Sabine to Galveston Project ~ $3.9B
2019 Work Plan Investigations – New Jersey Back Bays Project ~ $1.3M

Collaboration and Projects

- EWN Scientists and Engineers Partnered with Landscape Architects Affiliated with Dredge Research Collaborative (DRC)
- Extended Invitation to USACE Districts
- Initial Projects Included:
  - Moses Lake Tide Gate Area (SWG)
  - Comite Canal Project (MVN)
  - Franklin Lock/Dam Recreation Area (SAJ)
  - Morehaven West Campground Site (SAJ)
  - Back Creek and Fishing Creek Jetties (NAB)
  - Sabine to Galveston CSRM Project (SWG)
  - New Jersey Back Bay Study (NAP)
- Team Visits Project Sites and Collects Data
- EWN/LA Team Collaboratively Work on Initial Renderings
- Final Report/Renderings Delivered to Districts

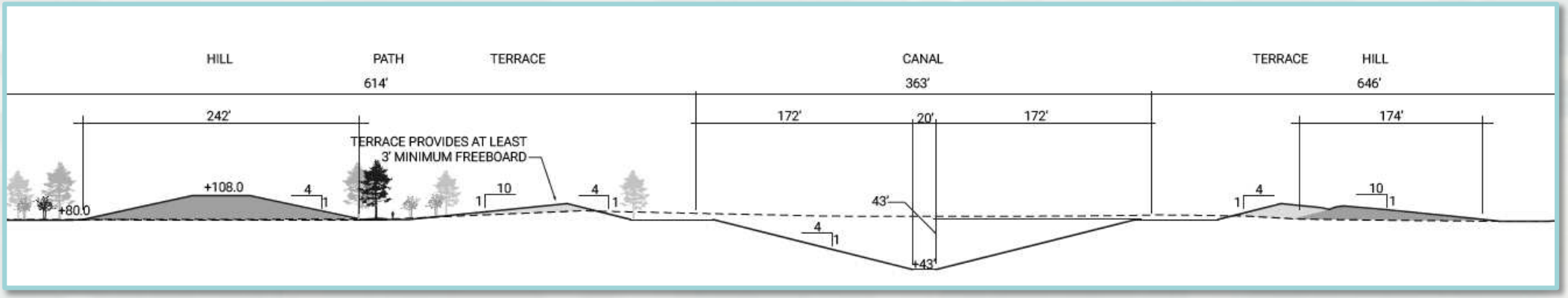


Comite Canal Project

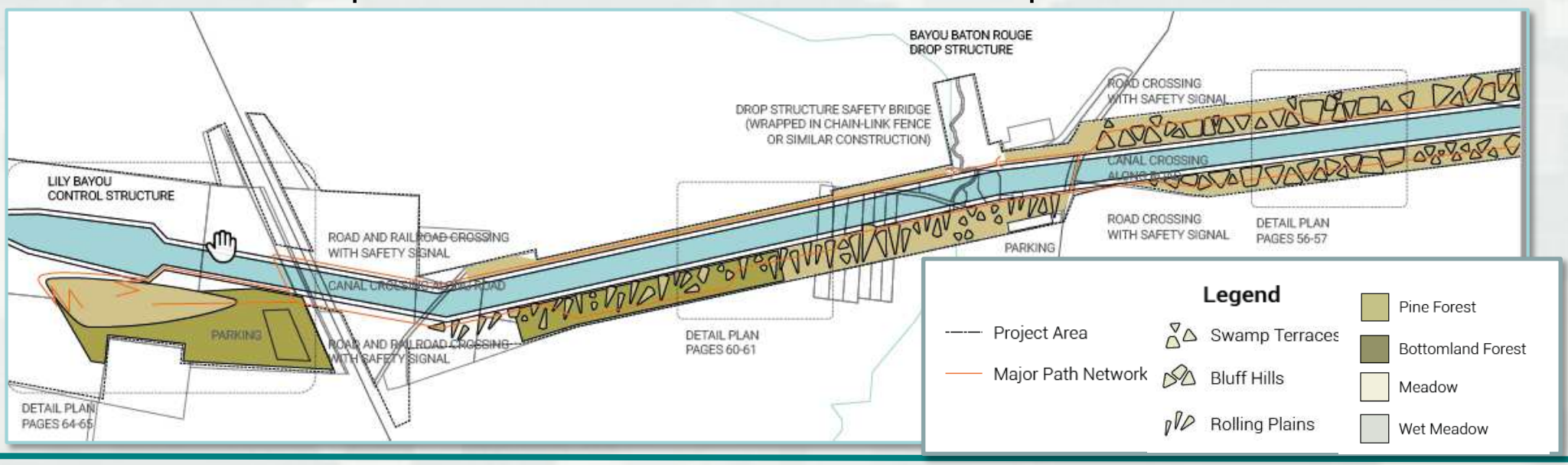
- Construct 12-mile long diversion canal
- Diversion channel must convey 30,000 cfs (100-yr event)
- As proposed, 20’ base width / 4:1 side slopes
- 15’ of permanent pool and additional 25’+ of freeboard
- Excavation of 5 million cubic yards
- Project authorized/funded at $259M
- EWN/LA team initiated effort
  - January 2019
- Report provided to USACE District
  - August 2019

Comite Canal Project

- Site characterization and alignment
- Side cast variations, recommended habitats/features

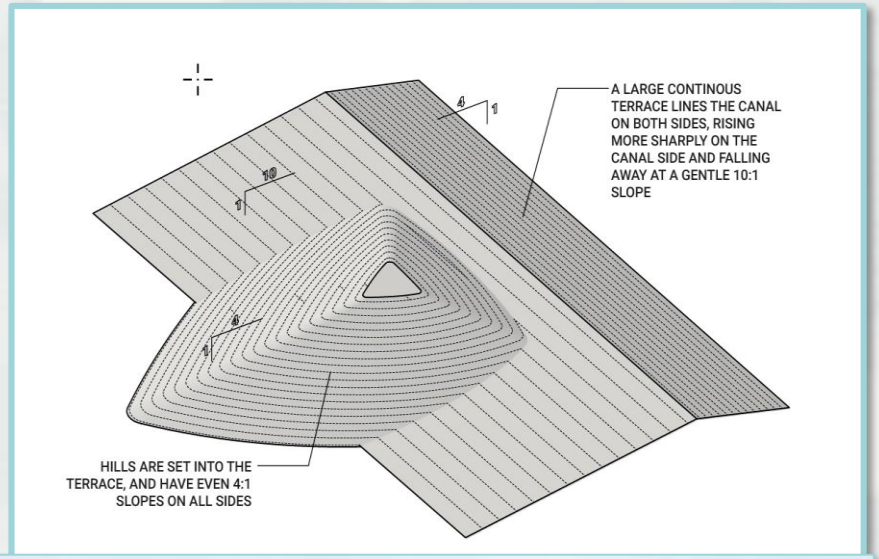


- Limited long-term maintenance
- Ensure public can interact with feature and experience nature



Comite Canal Project

- EWN ideas well received by the District
- Report will be used to inform local sponsors and other stakeholders
- EWN/LA team positioned to support District with implementation
- Work has started on Comite Canal Project
  - Projected completion in 2021



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Sabine to Galveston (S2G) CSRM Study

Orange County

- 15.6 miles of levees
- 10.7 miles of flood wall
- 2 navigation gate structures
- 7 pump station structures

Sabine to Galveston CSRM Study

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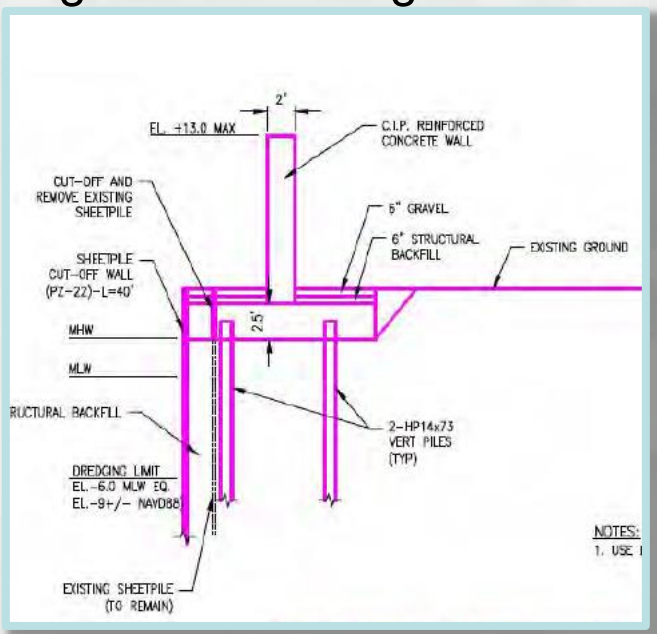
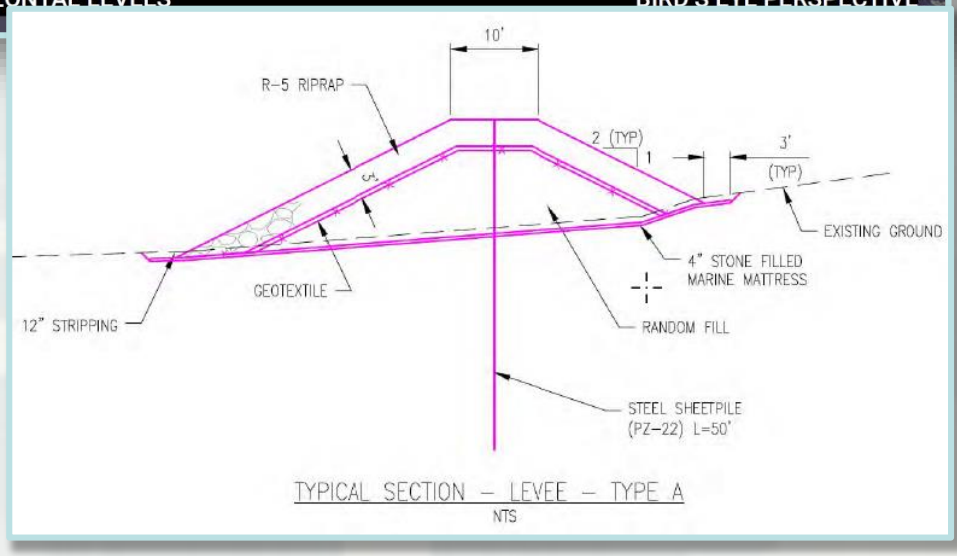
- Originally designed only with traditional levees and floodwalls
- June 2019 – EWN/LA Team toured project area and participated in weeklong EWN workshop
- Identify innovative EWN strategies that will integrate into design



Concrete Wall



Traditional Levee

Integration of Horizontal Levees into S2G

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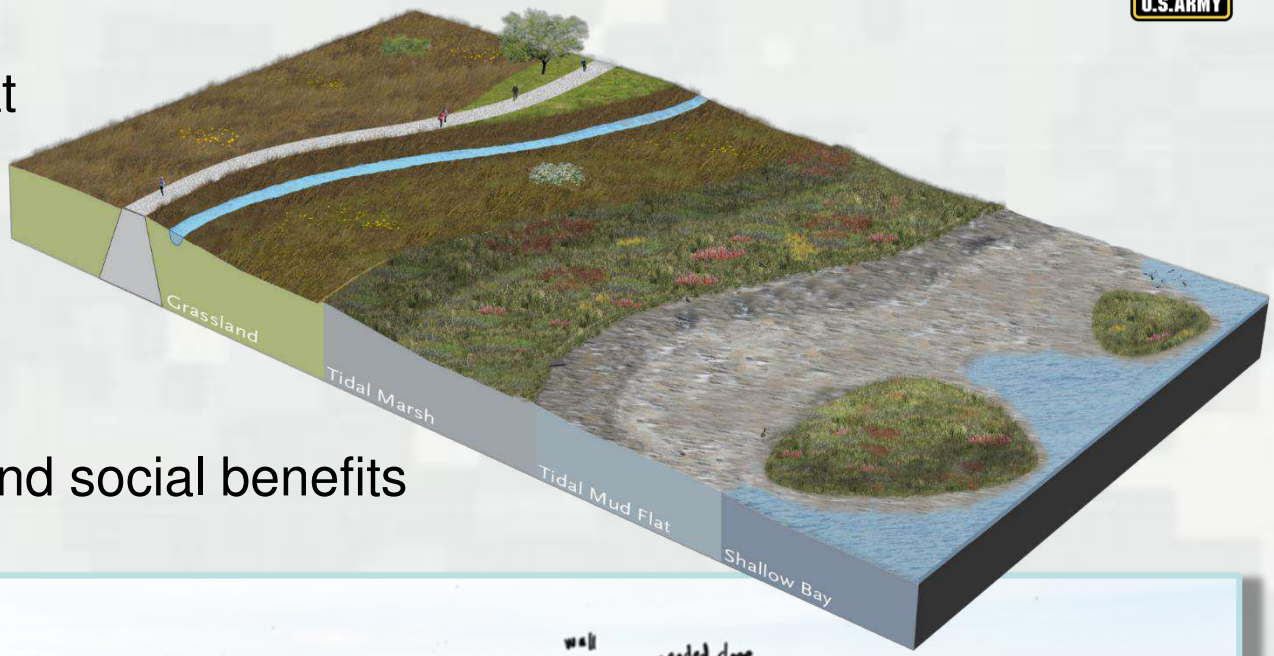
- Propose horizontal levees that abut traditional levee
- Consider possible designs (30:1; 50:1 or 200:1 slopes)
- Characterize environmental and social benefits
- Other benefits?



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Sediment Source(s)

Proximity to Project Site

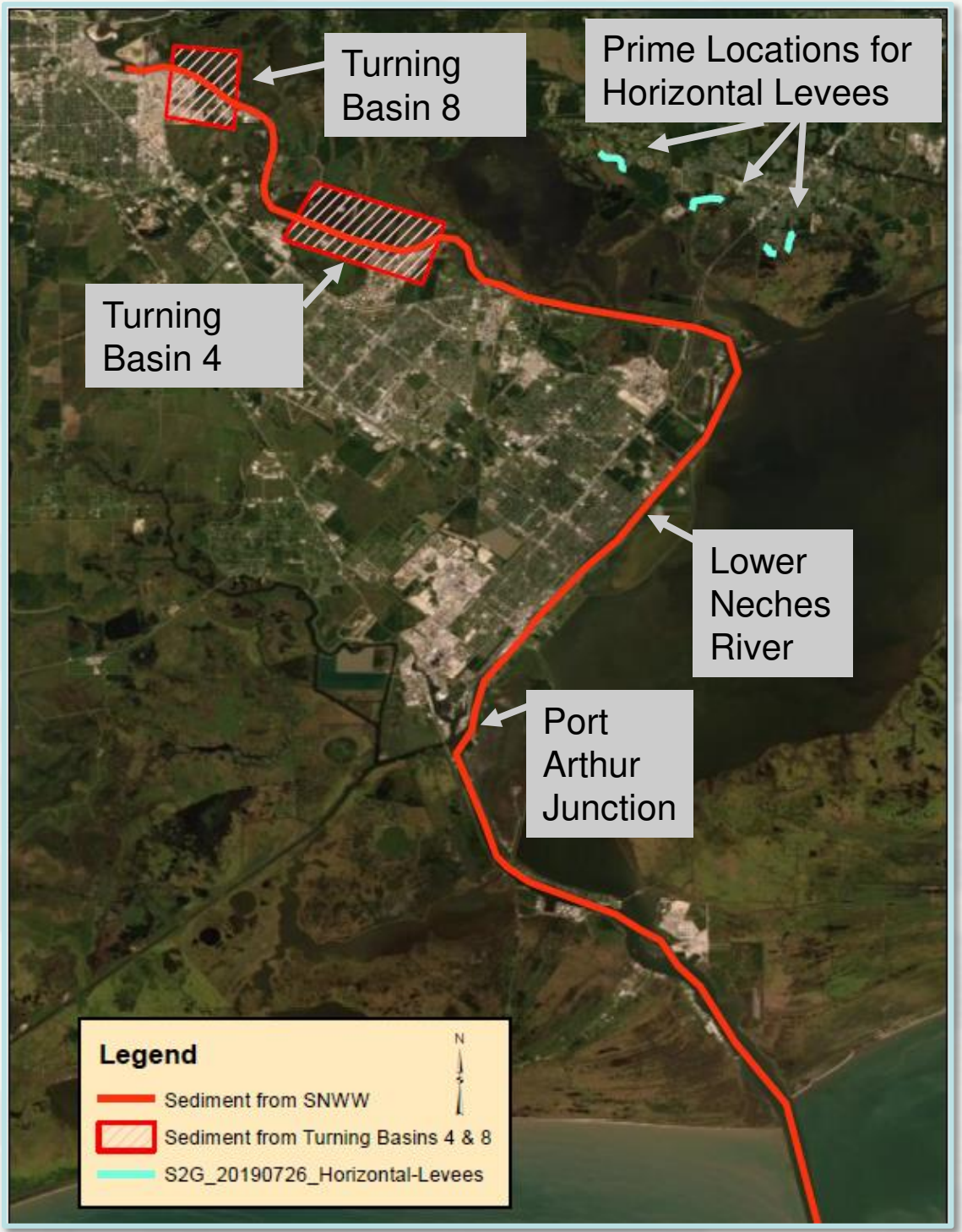
Turning Basins 4 & 8
- Unknown available volume
- Unknown material type (new work)

Lower Neches River
- 1.5 MCYD every 3 years

Port Arthur Junction
- 2.5 MCYD every 18 months

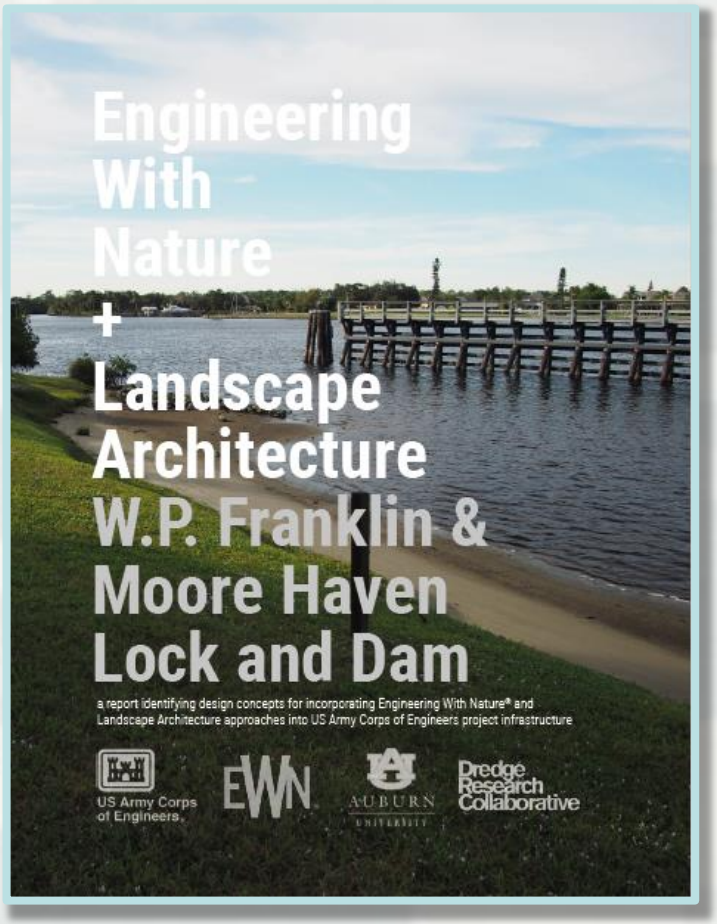
Widening/Deepening of SNWW
- Unknown available volume
- Unknown material type (new work)

*(Updated Shapefiles Pending)



Conclusions and Next Steps

- Integration of EWN science/engineering with LA has increased visibility and understanding
- EWN/LA reports have helped to convey complex information
- Completion of reports for Tide Gate (SWG) and Jetties (NAB) anticipated by OCT 2019
- Update EWN Website to Include EWN/LA pages
- Timing is critical to integrating EWN/LA approach
- Preliminary EWN/LA results are promising for New Jersey Back Bay Study
- EWN/LA R&D work unit funded in FY20 to support additional Corps Districts.
  - Increase Project Diversity



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THANK YOU

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www.engineeringwithnature.org

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