GREAT LAKES COASTAL RESILIENCY STUDY (GLCRS)

GLSLCI Webinar

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April 20, 2023

US Army Corps of Engineers®

USACE GREAT LAKES MISSION

Chicago	COL Paul Culberson Steven Fischer, DDE
Detroit	LTC Brett Boyle Kevin McDaniels, DDE
Buffalo	LTC Colby Krug David Romano, DDE

- USACE manages Great Lakes water resources challenges across 3 Districts
  - Workforce ~**1,500** employees
- Key missions:
  - **Navigation**
  - **Flood Risk Management**
  - **Aquatic Ecosystem Restoration**
  - **Emergency Response**
- Great Lake Coastal Resiliency touches **all these missions**

GREAT LAKES FACTS & FIGURES

- **VOLUME: 6.5** quadrillion gallons of fresh water; **1/5th** of world's fresh surface water; **95%** of the U.S. supply
- **AREA:** Water surface is more than **94,000** sq-mi; Drainage area is about **201,000** sq-mi; roughly the size of California and Ohio combined
- **COASTLINE:** U.S./Canada – **10,900** combined miles; **44%** of circumference of Earth; U.S. shoreline is **4,530** miles; nearly equal to Gulf, Atlantic, and Pacific U.S. shorelines combined
- **DEMOGRAPHICS: 37M** people in U.S./Canada; **8** States, **2** Provinces; **35** federally recognized tribes; **75** Congressional Districts; **16** Senators
- **NAVIGATION STRUCTURES: 140** harbors (60 commercial; 80 recreational) in U.S.**, 104** miles of breakwaters and jetties, and over **600** miles of maintained navigation channels

GREAT LAKES COASTAL RESILIENCY STRATEGY

OVERVIEW

Leveraging regional efforts and partnerships funded through various federal and state programs in the pursuit of long-term solutions to reduce coastal risk from future climate change.

National Shoreline Management Study

Regional assessment of the causes and effects of erosion and accretion; social, cultural, economic, and environmental importance; and current and future risks based on existing, available data and information gathered from tribes and regional stakeholders representing federal, state, and local organizations. (USACE)

Foundational Studies

- Lake Level Viewer (NOAA)
- Hardened Shorelines Classification Database (NOAA, USEPA)
- Bluff Sediment Contribution from Tributaries (USGS, USEPA)
- Lake Erie, Ohio, and Michigan Sediment Budgets (USACE, USEPA)
- Lake Michigan Lakeshore Geomorphic Vulnerability Index (USACE, USGS, USEPA)
- State Coastal Management Plans (States)

GLRI Framework

Identify the range of future conditions under various climate change scenarios including water levels, waves, and ice conditions to be used in assessing vulnerabilities and enabling resilient design. (USACE, NOAA, USGS)

EWN NNBF Playbook

Utilizing Engineering With Nature® principles to provide information for the planning, design, engineering, construction, and maintenance of Natural and Nature-Based Features (NNBF) specific to the Great Lakes to support resilience and coastal flood risk reduction along the coast. (USACE)

USACE Section 729 Watershed Assessment Study

Proactive planning to identify vulnerable coastal areas and recommend actions to bolster the coast's ability to withstand, recover, and adapt to future events.

Feasibility

Feasibility Study
Lake Ontario and Chicago Shoreline studies authorized

Additional Feasibility Studies
If a federal interest is identified, a non-federal partner would be needed.

Sec 211, WRDA 2020 authorization allows for "NEW PHASE AUTHORIZATION" enabling spin-off feasibility studies to be conducted without additional congressional authorization needed, but would still require appropriations.

ACTIONS

Leverage resources and capabilities, through a whole of government approach, with many partners in other services - interagency, local/regional/ state leaders, and contractors.

1. Assess vulnerabilities along the shoreline
2. Identify measures to address vulnerabilities and improve resiliency
3. Develop Great Lakes Coastal Resiliency Plan
4. Invest in strategies that foster a robust and resilient shoreline

FRAMEWORK FOR RESILIENT GLRI INVESTMENTS

OVERVIEW

Funded through Great Lakes Restoration Initiative (GLRI) Action Plan 3, Focus Area 5.2 - *conduct comprehensive science programs and projects*

Objective: Federal/State collaboration to identify the expected range of future Great Lakes water levels, wave heights and ice conditions

Deliverables: model output of total water levels under various climate scenarios, design considerations and checklists will be made publicly available through a web-platform to enable the planning, design and implementation of more resilient and sustainable projects along the Great Lakes coast

Study Team:

USACE Engineer Research and Development Center (USACE-ERDC)
- Range of future conditions development
- Ice cover and wave/surge analysis
- Demonstration vulnerability assessments

USGS Woods Hole Coastal and Marine Science Center (USGS-WHCMSC)
- Coastal Change Likelihood

NOAA Great Lakes Environmental Research Laboratory (NOAA-GLERL)
- Range of future conditions development
- Lake level modeling
- Ice cover analysis

USACE Buffalo, Chicago, Detroit Districts (USACE-CELRB, USACE-CELRC, USACE-CELRE)
- Planning and project management
- Lake level modeling
- Design guidance/checklists

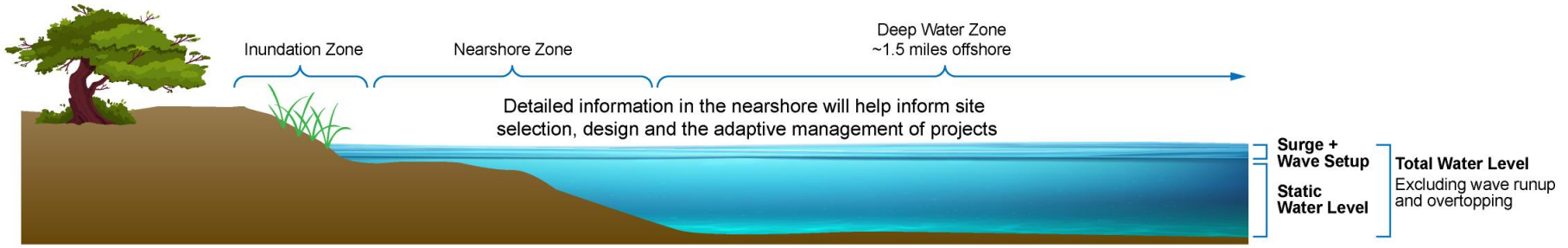
Stakeholder Coordination:

- ***GLRI Regional Working Group (RWG)*** (https://www.glri.us/partners)
- ***State Coastal Zone Management programs***
- ***Designated State GLRI Representatives***

FRAMEWORK FOR RESILIENT GLRI INVESTMENTS

STUDY OUTPUT

Identify the range of future conditions under various climate change scenarios including water levels, waves, and ice conditions to be used in assessing vulnerabilities and enabling resilient design.

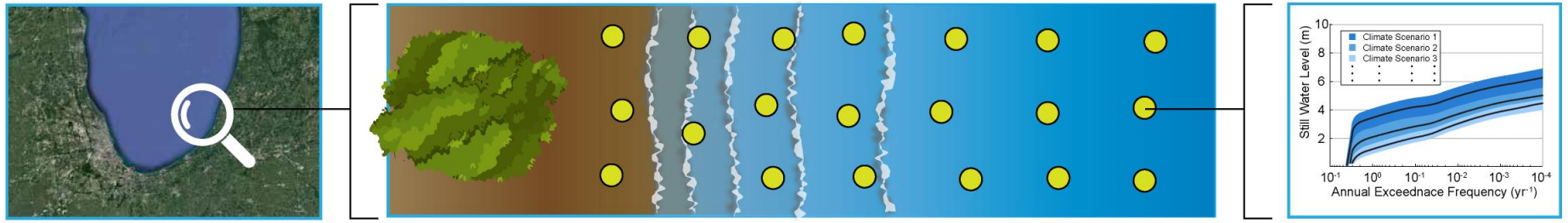


Overall
Information can be used to build in adaptability with budget, risk, climate uncertainty and engineering in mind.

Existing Projects
Evaluate vulnerability:
*Current conditions
*Under range of possible climate scenarios

Proposed Projects
Detailed information in the nearshore will inform:
*Site selection
*Design
*Adaptive management

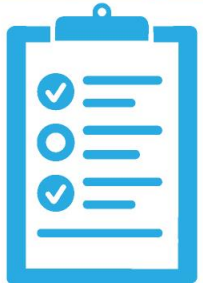
DELIVERABLES



1

USGS Coastal Change Likelihood
Identify areas of coast most likely to change in coming decade.

2



Planning and Design Checklists
Support siting and design of resilient Great Lakes restoration projects

3

Coastal Hazard Systems
Distribution of total water level for each climate scenario in deep water and nearshore with 20,000-40,000 data points

GREAT LAKES EWN® NNBF PLAYBOOK

OVERVIEW

Current understanding of Natural and Nature-Based Features (NNBF), Multiple Lines of Defense (MLD) coastal resiliency measures is mostly **limited to ocean** coasts resulting in **lack of confidence** with these innovative technologies within the Great Lakes region.

Great Lakes specific guide of NNBF and MLD measures to improve future coastal resiliency including their performance, adaptability and costs.

Utilize Engineering with Nature® (EWN) principles to develop **new conceptual designs** specific to the Great Lakes that achieve greater resiliency / adaptability than conventional designs. Estimate adaptive capacity, failure tipping points and planning-level cost/benefit performance outputs of conceptual designs under range of current conditions and future climate scenarios.

https://ewn.erdc.dren.mil/?p=10807

24-25 January 2023 Kickoff Workshop in Chicago, IL

GREAT LAKES COASTAL RESILIENCY STUDY

OVERVIEW

COLLABORATIVE APPROACH

- USACE Chicago (lead), Buffalo and Detroit Districts; ERDC-CHL/EL; PCX-CSRM
- All eight Great Lakes states as non-Federal sponsors
  - States of IL, IN, MI, MN, OH, PA, NY, WI
- Additional Fed partners: NOAA, USGS, USEPA, FEMA

ESTIMATED STUDY COST / SCHEDULE

- ~$14.4M (75%, $10.8M Fed; 25%, $3.6M Non-Fed)
- ~48-month duration (including 6-months for scoping)
- Federal appropriations received
  - FY22 E&W $500k appropriated
  - FY23 E&W $3M appropriated

STATUS

- Nine-party cost-share agreement executed 28SEP2022
- Project Management Plan development underway
  - NFSs & LRD-CG approval anticipated by 28APR2023
  - Per Art II.B.2 of executed agreement, no study activities may proceed until PMP is signed by all NFS

SECTION 729 WATERSHED STUDY GUIDANCE
ENGINEER REGULATION ER 1105-2-102, APRIL 2022

https://www.publications.usace.army.mil/Portals/76/Users/182/86/2486/ER%201105-2-102a.pdf

WATERSHED ASSESSMENT: Develop and document a shared watershed vision, recommendations for actions that can be taken to address identified problems, and strategic roadmap to implement recommendations

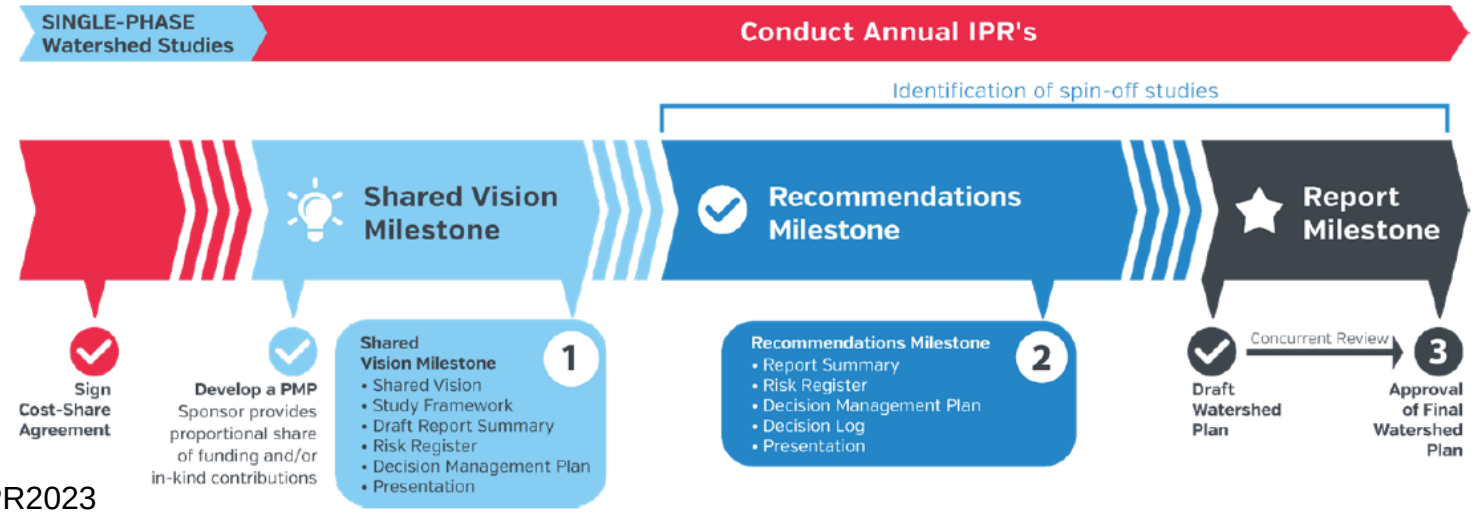
USACE is required to

- *Coordinate* with Secretary of the Interior; the Secretary of Agriculture; the Secretary of Commerce; the Administrator of the Environmental Protection Agency; and the heads of other appropriate agencies
- *Consult* with federal, Tribal, state, interstate, and local governmental entities
- *Complete* District Quality Control (DQC), Agency Technical Review (ATR), public review, and policy/legal compliance review of Draft Watershed Assessment

Required Milestones

1. Shared Vision
2. Recommendations
3. Final Report

Great Lakes and Ohio River Division (LRD) has Milestone decision-making authority



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GENERAL SCOPE

OVERALL OBJECTIVE - To protect the long-term economic, environmental and social value of the Great Lakes coast through proactive planning:

VULNERABILITY ASSESSMENT - Identify coastal areas that are already or likely to become vulnerable to future flooding, erosion, and accretion

RESILIENT MEASURES - Identify measures to address vulnerabilities and improve resilience and adaptability of coastal resources

COASTAL RESILIENCY PLAN - Identify strategic recommendations for action at the federal, state and local levels to inform the identification and prioritization of future investments to improve coastal resilience

GREAT LAKES COASTAL RESILIENCY STUDY

MAJOR TASKS

TRIBAL & STAKEHOLDER ENGAGEMENT - Engage Tribal Nations and stakeholders across the basin to identify problems and opportunities; define the overall shared vision for the coast; and solicit feedback and input to assessment results and recommended actions.

BASINWIDE ANALYSIS - Develop a publicly accessible geospatial portal utilizing basin-wide datasets to identify risk of coastal resources (infrastructure, habitats, communities) vulnerable to a range of possible future storms, flooding, low water elevations, erosion and accretion.

FOCUSED EVALUATIONS - Conduct area-specific risk and vulnerability assessments on a sub-set of identified high-risk areas across different climate change scenarios; identify specific ongoing, planned, near-term, and long-term actions to address vulnerabilities and improve resilience.

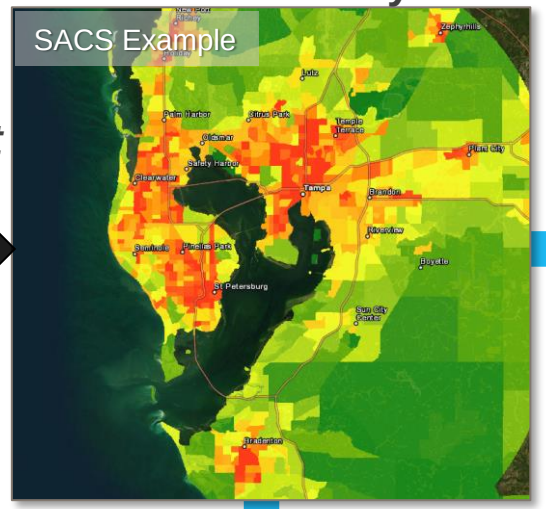
RISK-INFORMED DECISION FRAMEWORK - Develop guidance for stakeholders to use tools to conduct additional area-specific vulnerability assessments and identify actions to improve resilience.

WATERSHED ASSESSMENT - Develop a Great Lakes Coastal Resiliency Plan that outlines strategic recommendations for action by USACE, other federal agencies, and non-federal interests to inform future investment decisions, sequencing of priorities, where federal authorities and appropriations are available, and where new ones are needed.

GREAT LAKES COASTAL RESILIENCY STUDY
ILLUSTRATION OF MAJOR TASKS

Framework for Resilient GLRI Investments
Future Without Project Conditions Modeling

Basin-wide Analysis



States Select Resources Based on Their Unique Priorities

Select High-Risk Coastal Resources

14 State Focus-Area Workshops
(10 coastal resources per workshop)

Workshop Recommendations
- Study for Action
- Study for Action + Monitor
- Monitor

Watershed Assessment Strategic Recommendations
- USACE feasibility studies
- Other Federal programs/authorities
- State & local actions

Table 7-2: Feasibility Study Recommendations Ranking (Regional Priorities in Yellow)

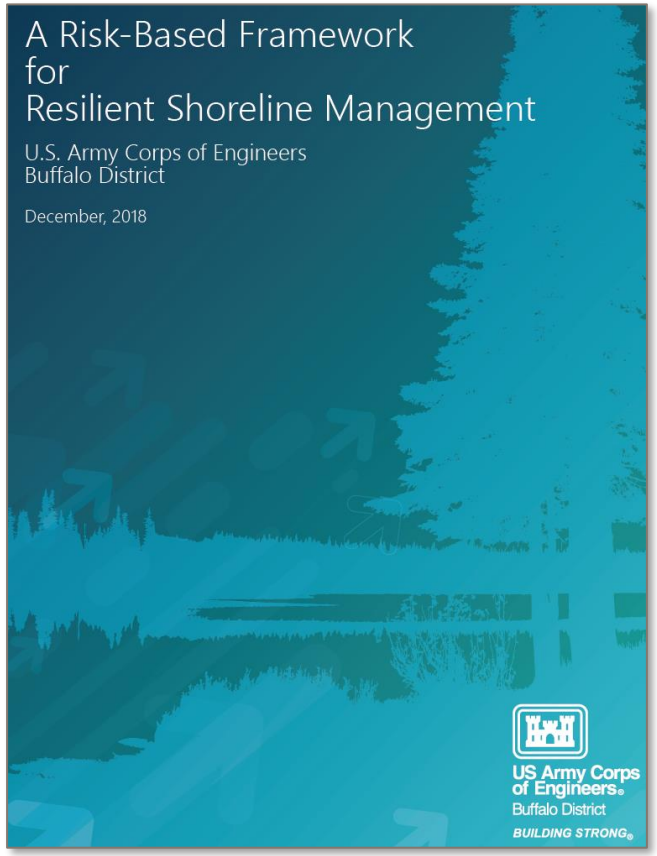
Study Name	State	Economic Rank	Social Vulnerability Ranking	Environmental Rank	Overall Score	Overall Rank
Miami-Dade County Back Bay (Coastal Storm Risk Management [CSRM]) follow-on study for additional high risk areas	Florida	1	9	1		
Collier County Back Bay Feasibility Study (CSRM)	Florida	7	7	8		
Lee County, Florida Back Bay Feasibility Study (CSRM)	Florida	3	32	14		
Long Term High Hazard Area Risk Reduction Program	Mississippi	11	24	2		
Charlotte County, Florida Feasibility Study (CSRM)	Florida	8	8	15		
Pinellas County, Florida Back Bay CSRM Feasibility Study	Florida	4	34	17		
Brevard County, Florida Back Bay Feasibility Study (CSRM)	Florida	10	40	7	12.1	7
Hillsborough County, Florida Feasibility (CSRM)	Florida	9	21	16		
Duval County, Florida Back Bay						

SACS Example

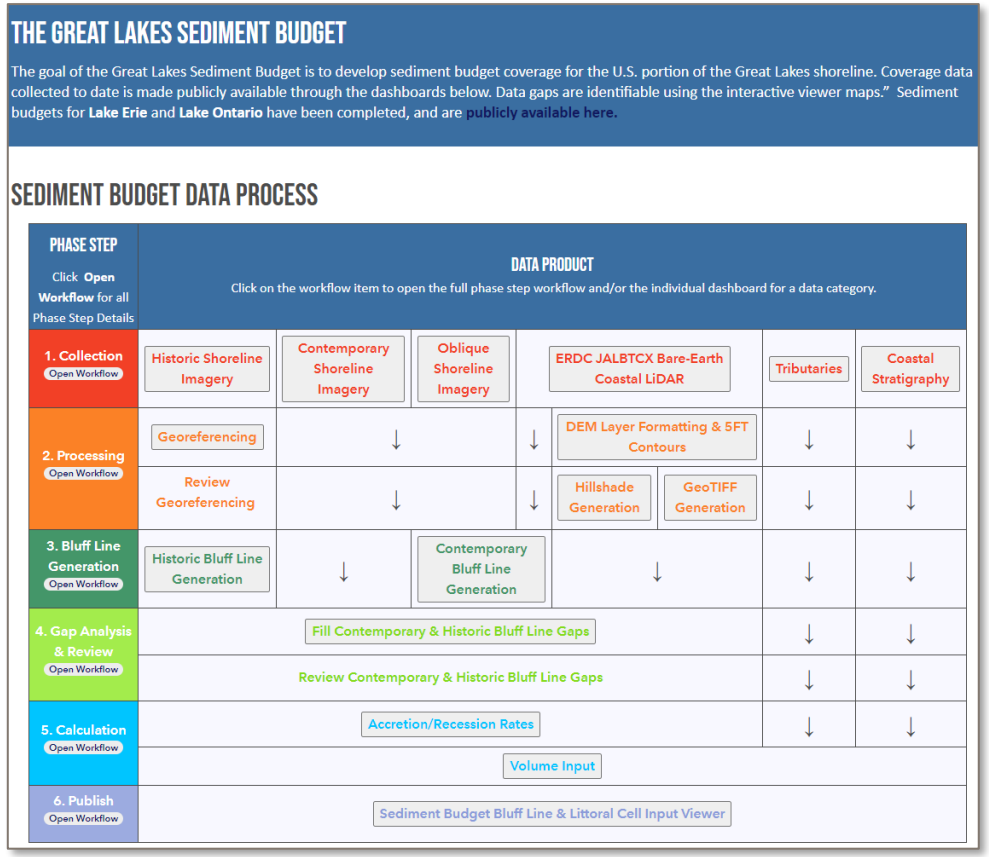
GREAT LAKES COASTAL RESILIENCY STUDY

ILLUSTRATION **OF MAJOR TASKS** TO SHARE METHODOLOGY PUBLICLY

Risk-Informed Decision Framework Document considering possible future climate scenarios



Develop a publicly accessible **Website** to help inform coastal resiliency planning at the state and local levels



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