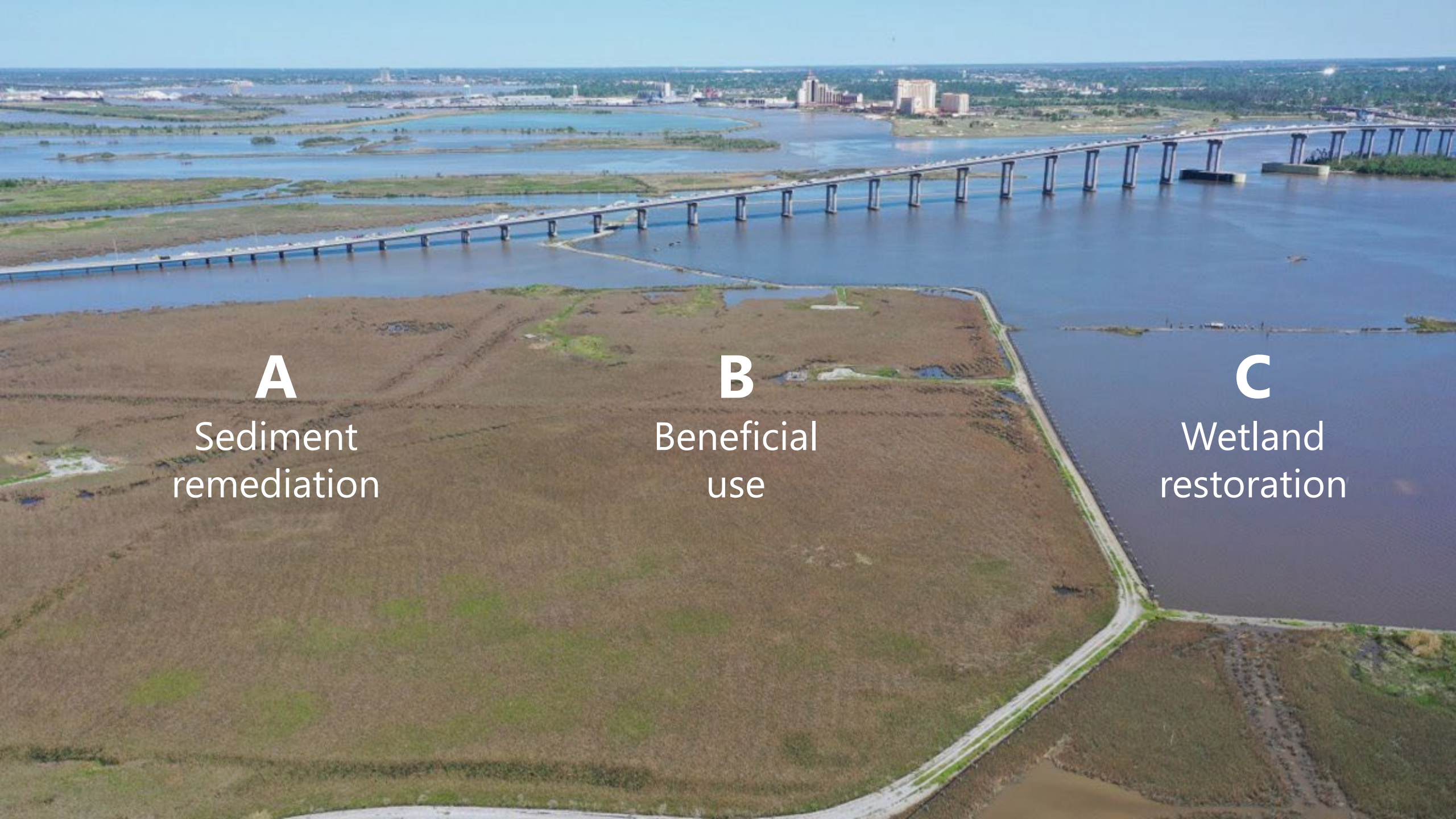


BATTELLE 2023 SEDIMENTS CONFERENCE

Integrating Resiliency into Contaminated Site Remedies

Presented by Rebecca Desrosiers, PE, Anchor QEA





A

Sediment
remediation

B

Beneficial
use

C

Wetland
restoration

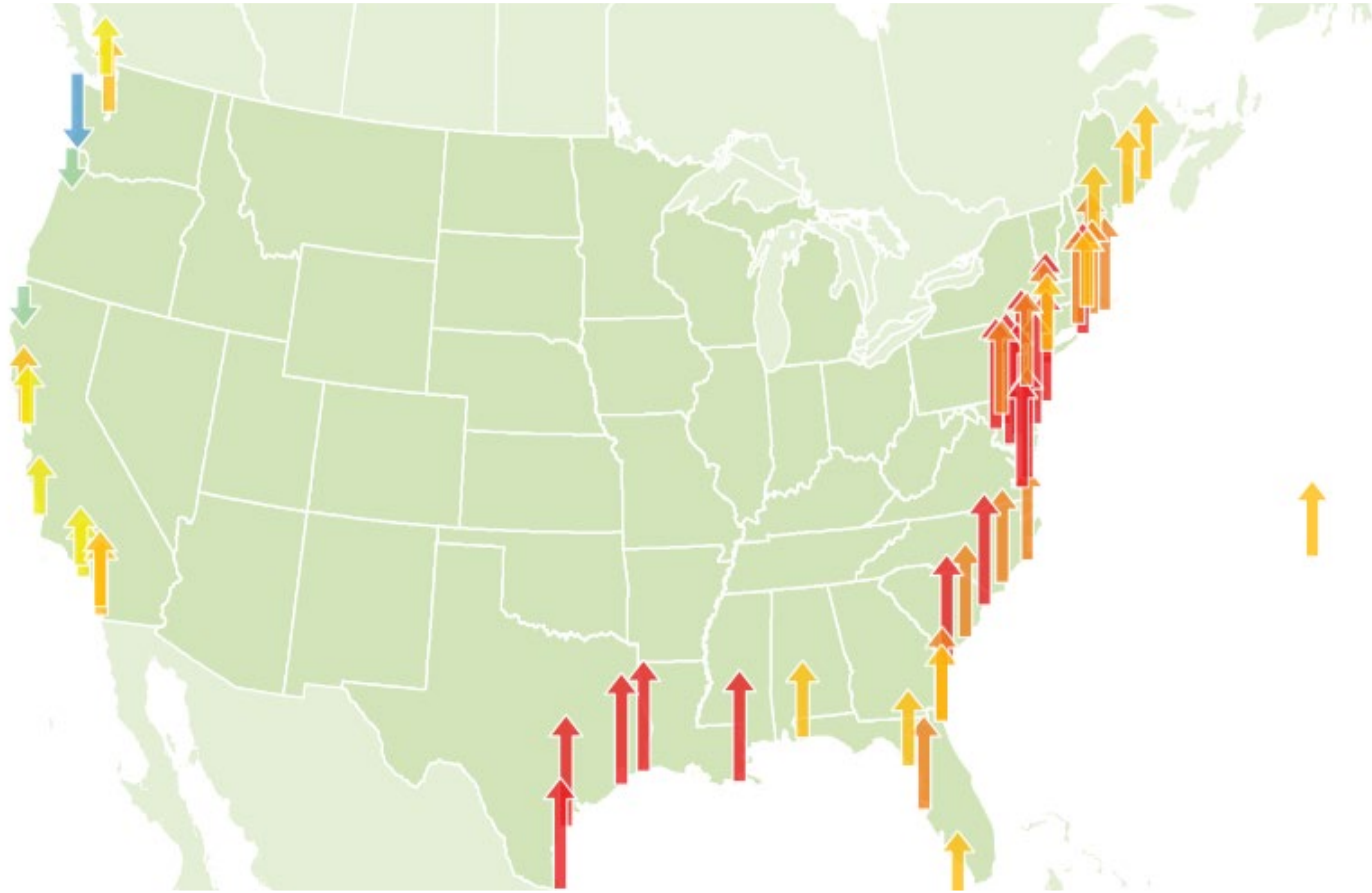
In addition to remedy
resilience, can we improve
surrounding areas?

Resiliency Needs and Challenges

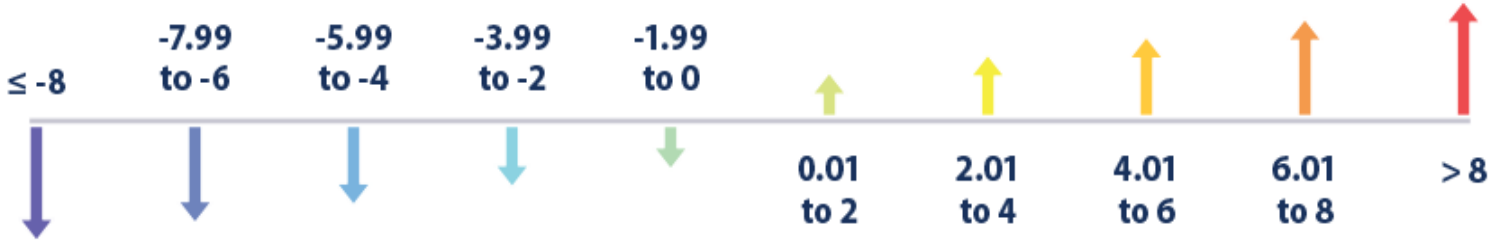


Relative Sea Level Change Along U.S. Coasts, 1960–2020

Relative Sea Level Change

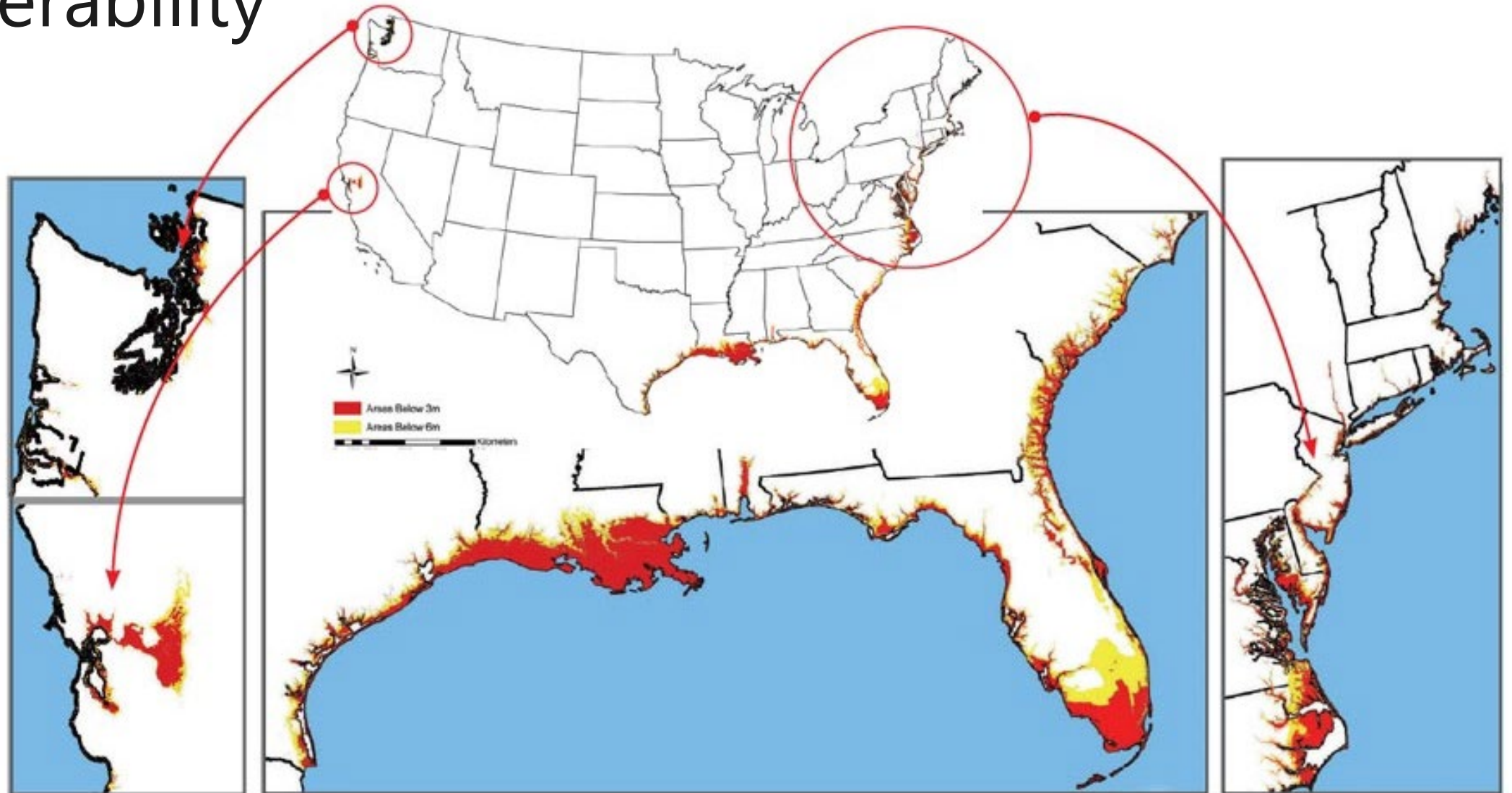


Relative sea level change (inches):



Sources: NOAA (2021) and EPA (2022)

Vulnerability



Regulations, Policies, and Guidance



15

Green and sustainable
remediation



37

Climate
resiliency

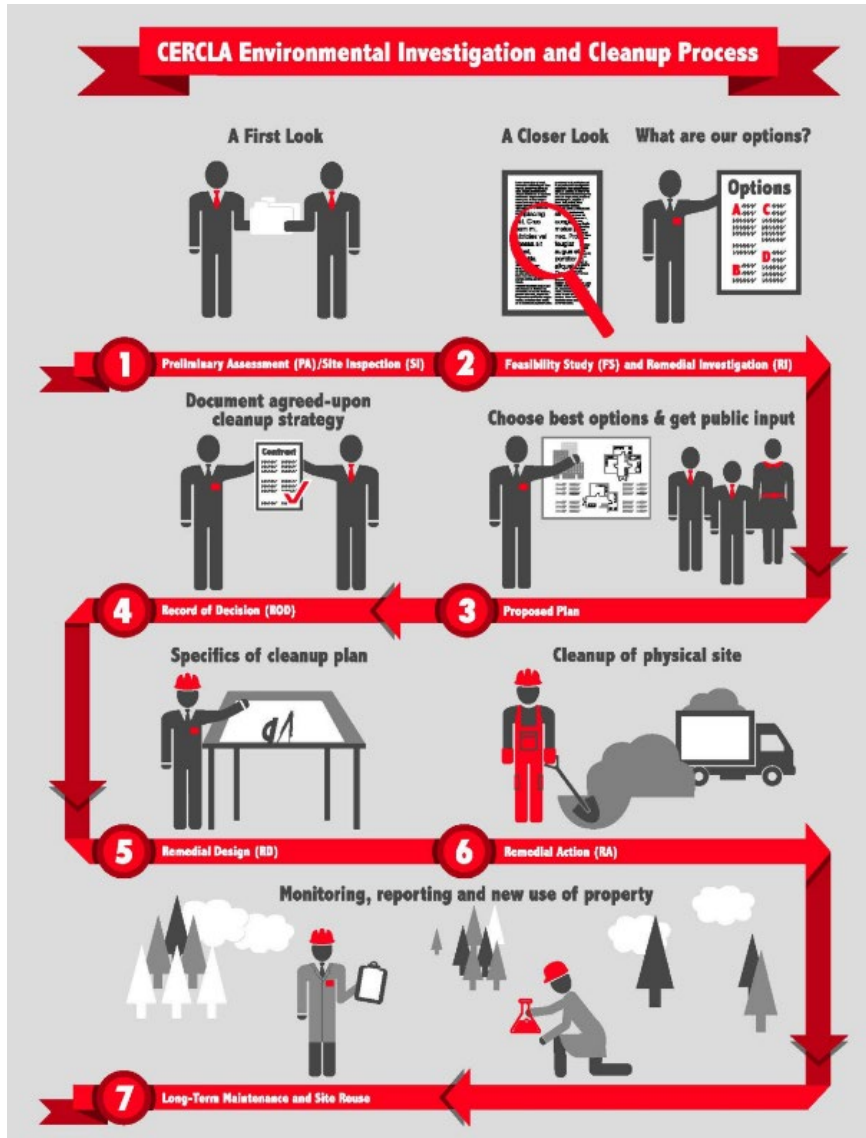


3

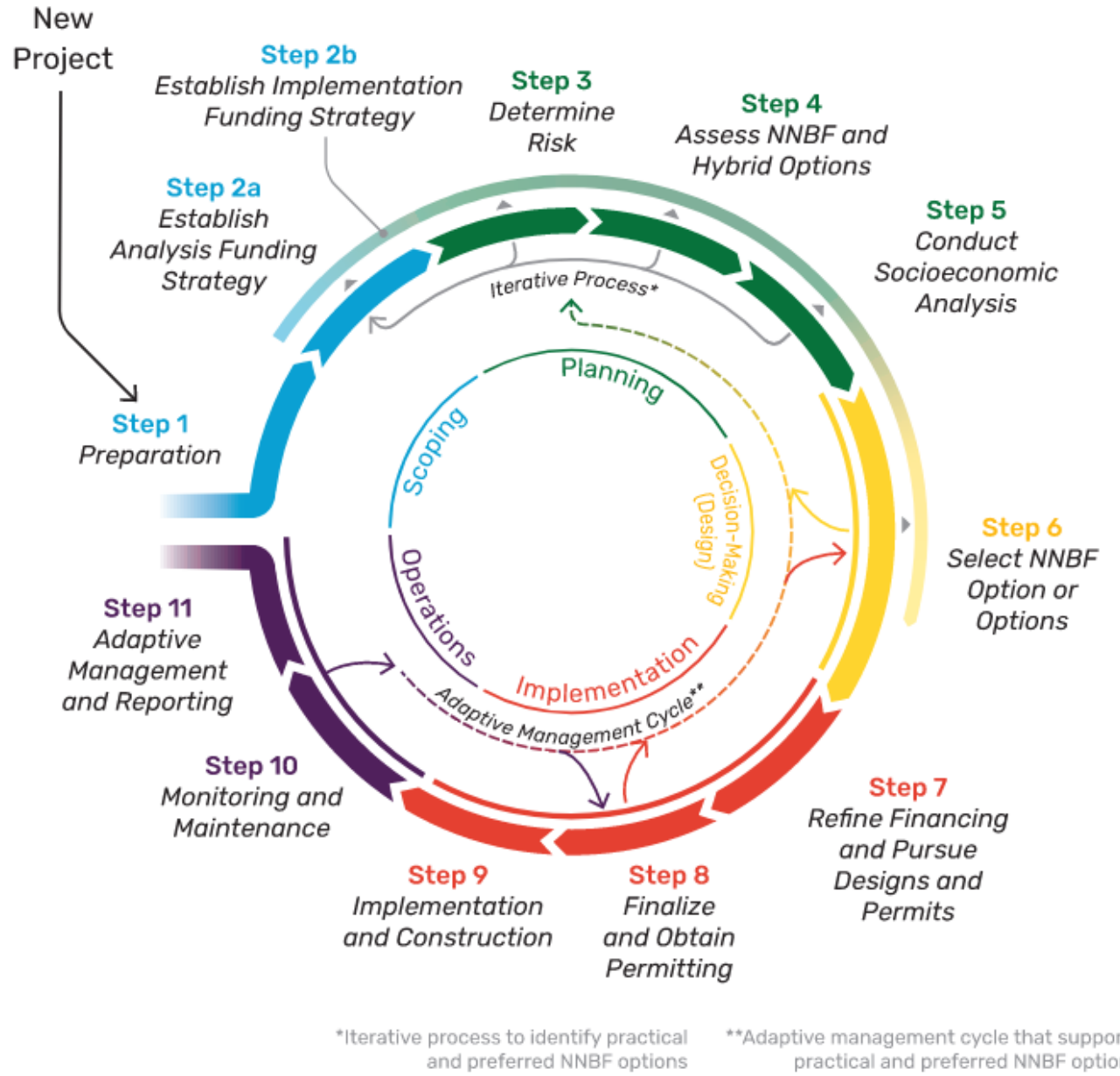
Resilient
remediation

What are the current frameworks?

APPROACH + METHODS



CERLA environmental investigation and cleanup process

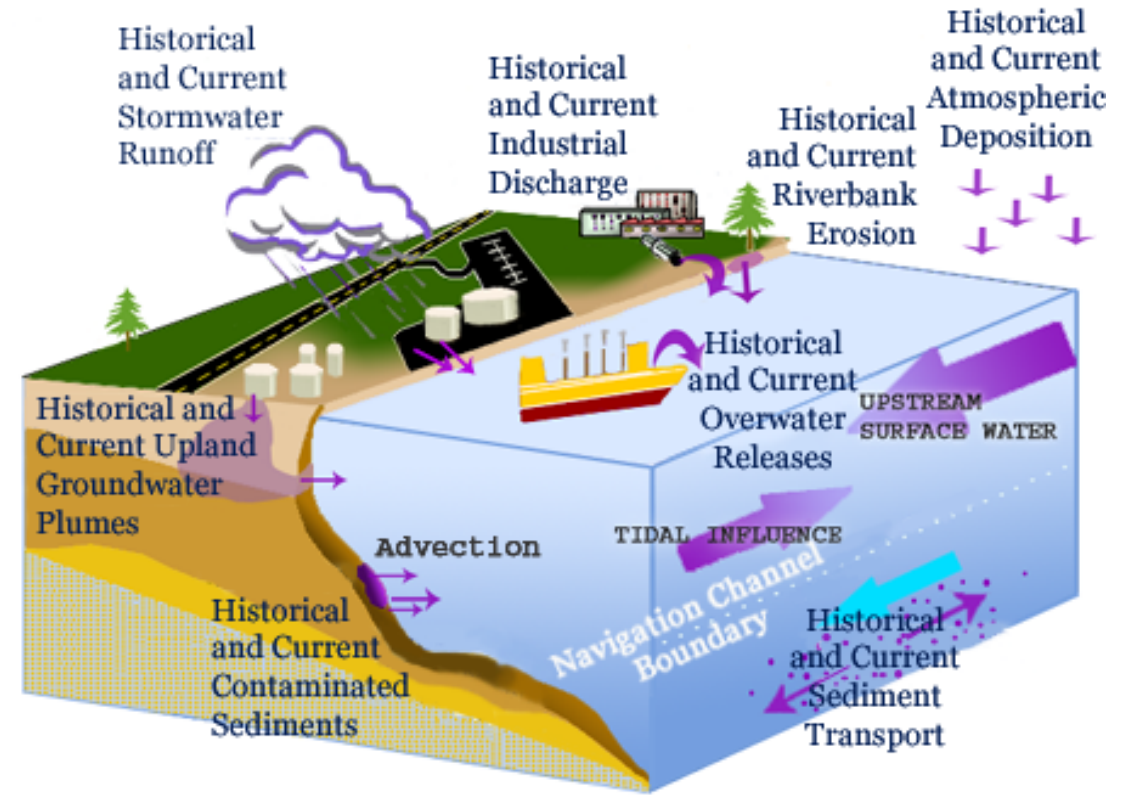
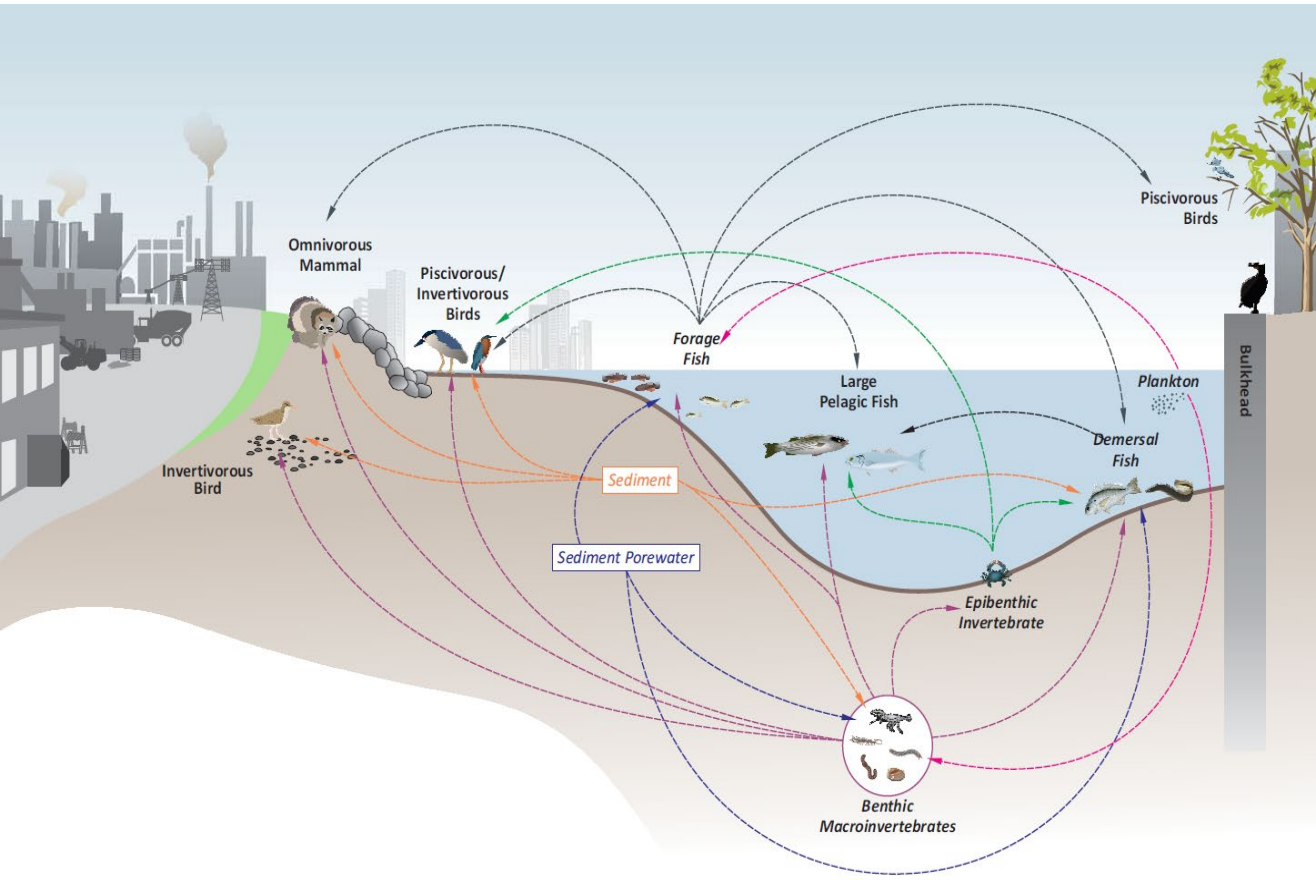


Framework phases and corresponding steps in undertaking NNBF projects

Project Life Cycle and Conceptual Site Model

General Environmental Cleanup Steps	CSM Life Cycle	Best Management Practices		CERCLA - Superfund	RCRA	Brownfields	UST	VCUP Varies by State	IRP/ERP	MMRP	
		SPP	DWS/RTMT								
SITE ASSESSMENT	Preliminary CSM	Conceptual	↓	Preliminary Assessment (PA)	Facility Assessment (RFA)	Phase I Environmental Site Assessment (ESA)	Initial Site Characterization	PA	PA	PA	
	Baseline CSM			Site Inspection (SI)		Initial Response	SI	SI	SI	MR Site Prioritization Protocol (MRSP)	
SITE INVESTIGATION AND ALTERNATIVES EVALUATION	Characterization CSM Stage			Remedial Investigation/ Feasibility Study (RI/FS)	Facility Investigation (RFI)	Phase II ESA	SI	RI/FS	RI/FS	RI/FS	RI/FS
	REMEDY SELECTION			Design CSM Stage	Removal Actions - Emergency/ Time Critical/Non-Time-Critical	Corrective Measures Study (CMS)		Corrective Action Plan (CAP)			
Proposed Plan					Statement of Basis (SB)	Remedial Action Plan (RAP)	Cleanup Selection	ROD	Proposed Plan	Remedy Selection	ROD
REMEDY IMPLEMENTATION	Remediation/ Mitigation CSM Stage			↓	Remedial Design (RD)	Corrective Measure Implementation (CMI)	Cleanup and Development	Corrective Action	RD	RD	RD
		Remedial Action (RA) - Interim and Final				- Low-impact site cleanup	RA	RA - Interim and Final	Time Critical Removal Action (TCRA)	RA	
POST-CONSTRUCTION ACTIVITIES	Post-Remedy CSM Stage	↓	Operational & Functional Period	O&M	Property Management	LTM	O&M	Shakedown period	Shakedown period		
			Operation & Maintenance (O&M)	On-site inspections and oversight	Long-term O&M		LTM	Operating Properly and Successfully	Long Term Management		
SITE COMPLETION	↓	Quantitative	Long term monitoring (LTM)		Redevelopment Activities (Private- and Public-led)			O&M			
			Optimization				LTM				
SITE COMPLETION	↓	↓	Long Term Response Action (Fund-lead groundwater/surface water restoration)								
			Construction Complete (CC)	Certification of Completion	CC	No Further Action (NFA)	CC	Response Complete (RC)	RC		
			Preliminary or Final Close Out Report (PCOR/FCOR)	Corrective Action Complete with Controls or without Controls	Property Management			NFA	NFA		
			Site Completion - FCOR								
			Site Deletion								
			O&M as appropriate								

Typical Conceptual Site Models



Applying the Approach

- Remedial investigation/site characterization
- Feasibility study/remedy selection
- Design
- Adaptive management

Six Stages of the Project Life Cycle CSM

Key Points in the Development of a CSM

- (1) **Preliminary CSM Stage** – Project milestone or deliverable based on existing data; developed prior to systematic planning to provide fundamental basis for planning effort.
- (2) **Baseline CSM Stage** – Project milestone or deliverable used to document stakeholder consensus/divergence, identify data gaps, uncertainties, and needs; an outcome of systematic planning.

Key Points in the Evolution and Refinement of a CSM

- (3) **Characterization CSM Stage** – Iterative improvement of CSM as new data become available during investigation efforts; supports technology selection and remedy decision making.
- (4) **Design CSM Stage** – Iterative improvement of CSM during design of the remedy; supports development of remedy design basis and technical detail.
- (5) **Remediation / Mitigation CSM Stage** – Iterative improvement of CSM during remedy implementation; supports remedy implementation and optimization efforts, provides documentation for attainment of cleanup objectives.
- (6) **Post Remedy CSM Stage** – Comprehensive site physical, chemical, geologic, and hydrogeologic information of CSM supports reuse planning; documents institutional controls and waste left on site; and other key site attributes.

Urban Restoration Example



During remedial construction



Post-remedial construction

Integrated Wetland Restoration Example

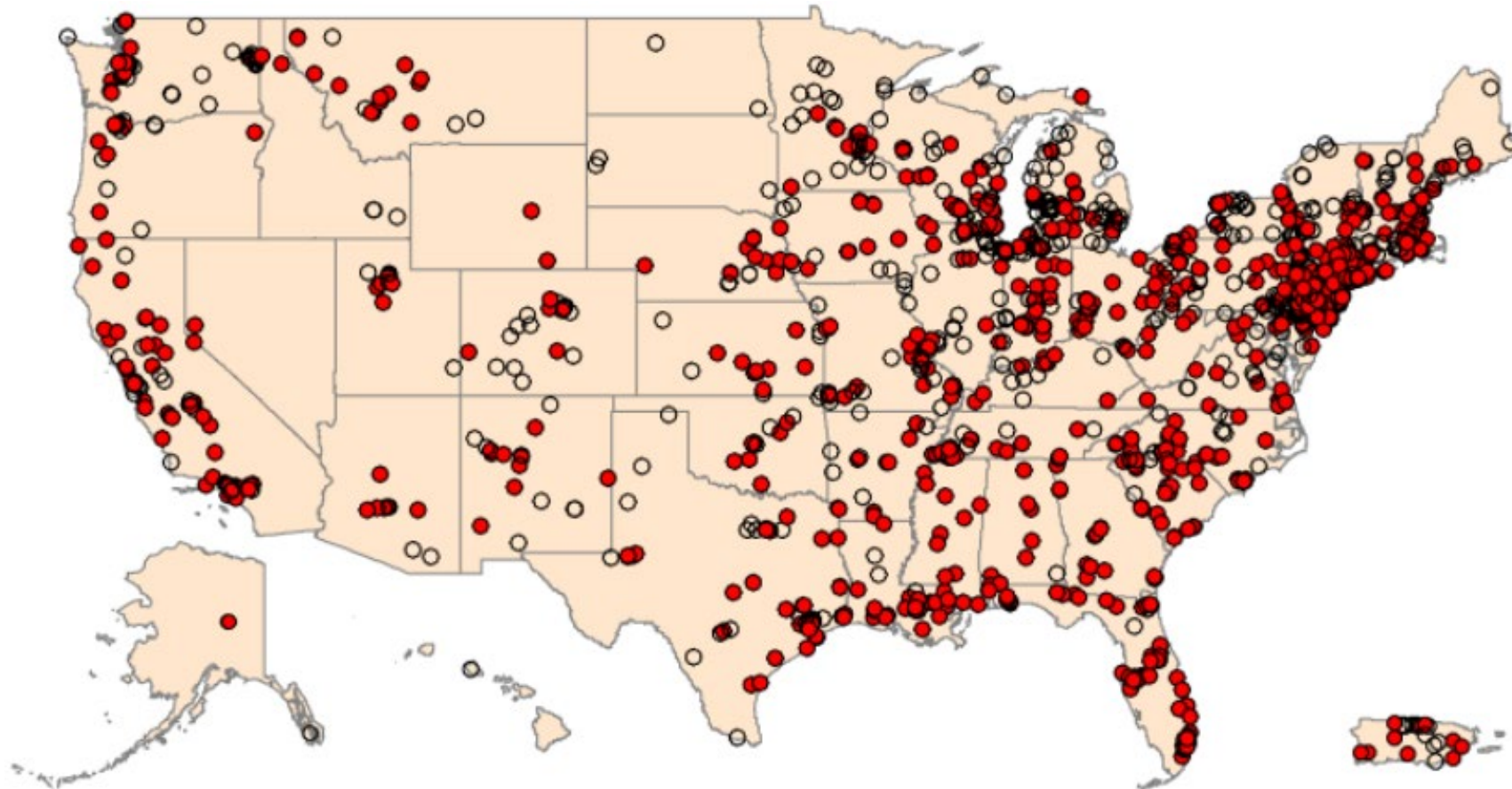


Pre-remedial construction



Post-remedial construction

Future Opportunities



Number of National Priorities List (NPL) sites in potentially impacted areas

- Potentially impacted sites (945)
- No impact identified (626)

Sources: GAO analysis of Environmental Protection Agency, Federal Emergency Management Agency, National Oceanic and Atmospheric Administration, and U.S. Forest Service data; MapInfo (map). | GAO-20-73

THANK YOU



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