

National Academies of Sciences, Engineering and Medicine. 2016. *Effective Monitoring to Evaluate Ecological Restoration in the Gulf of Mexico*.

How Do You Assess Cumulative Effects of Regional Restoration Efforts and Evaluate Success?

Moderator: Greg Steyer, U.S. Geological Survey

Panelists:

Heida Diefenderfer, Pacific Northwest National Lab

Matt Harwell, Environmental Protection Agency

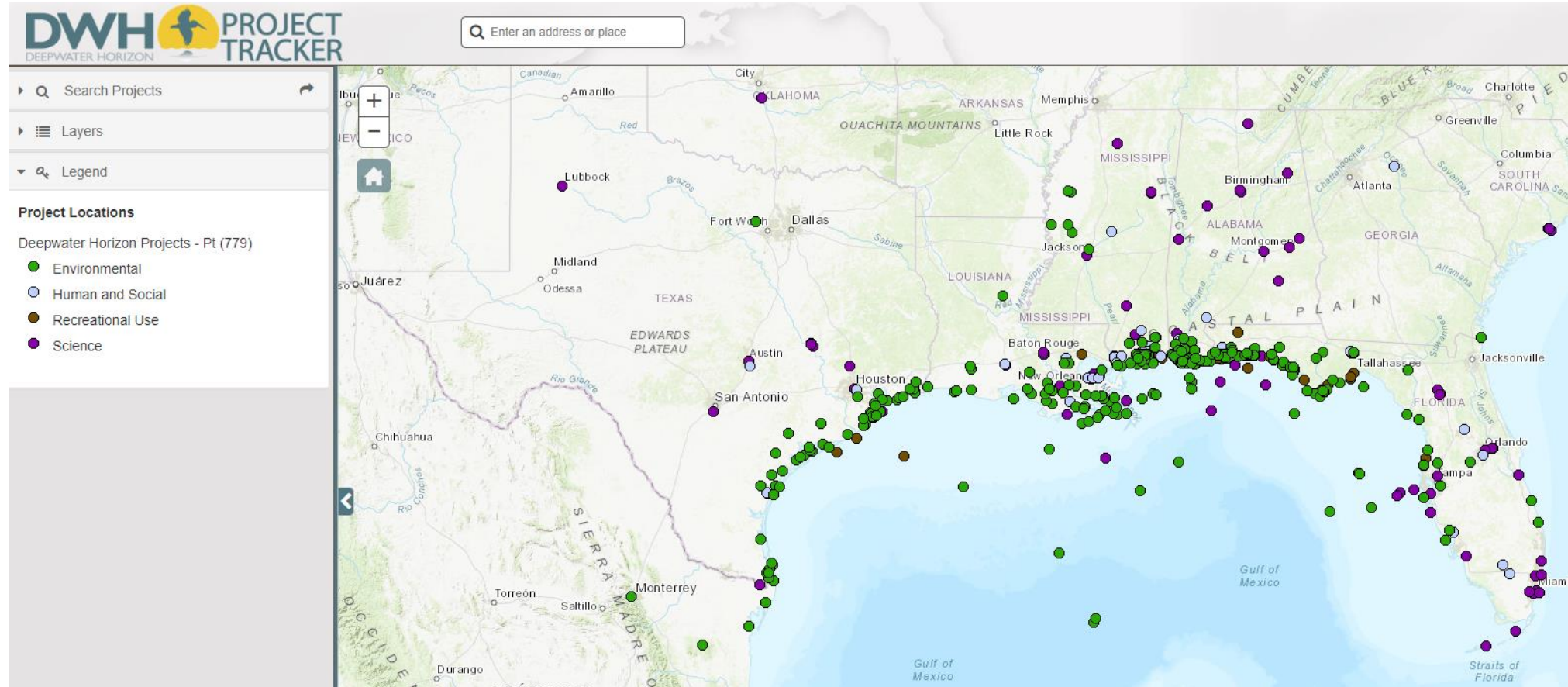
Neil Ganju, U.S. Geological Survey

John Callaway, Delta Stewardship Council

10:45-12:00 PM, Monday, August 27, 2018

National Conference on Ecosystem Restoration

DWH Investments in Gulf Restoration



Restoration Types: Structural Protection, Bank Stabilization, Land Acquisition, Ridge Restoration, Shoreline Protection, Barrier Island Restoration, Marsh Creation, Sediment Diversion, Hydrologic Restoration, Nutrient Reduction, Water Quality, Sturgeon, Sea Turtles, Marine Mammals, Birds, SAV, Fish & Water Column Invertebrates, Mesophotic & Deep Benthic Communities

Restoration Assessment Complexity

- Federal, State and Local agencies and NGOs implementing restoration
- Ecosystem, Habitat, Species and Human Use Goals
- Numerous Restoration Techniques
- Various Spatial and Temporal Scales & Sequencing of Projects

Cumulative Effects Definition

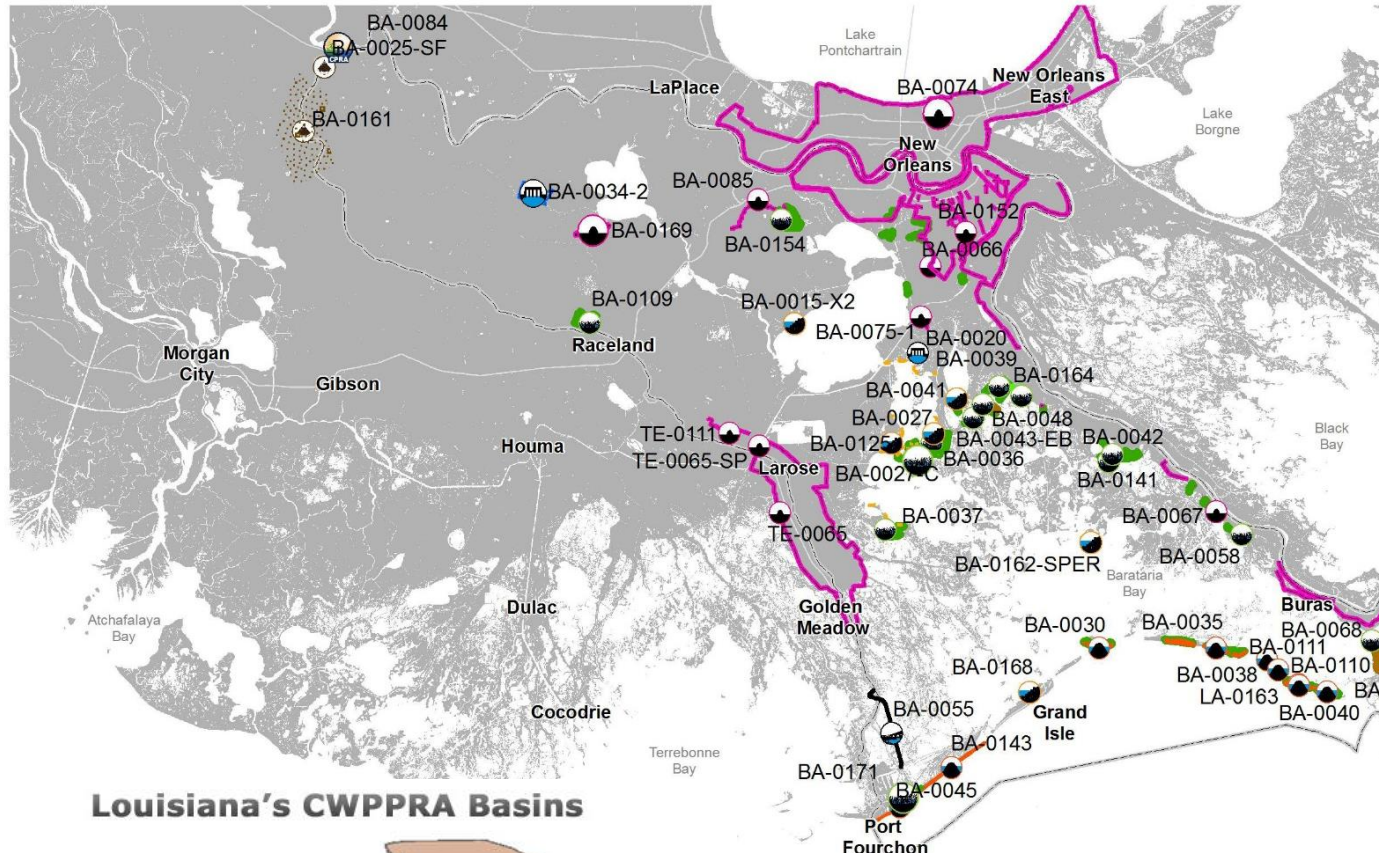
- “The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions” (40 CFR § 1508.7)
- With restoration, focusing on cumulative effects (i.e., reversing impacts)

Categories of Cumulative Effects

- Frequent and repetitive effects on an environmental system (time crowding)
- Delayed effects (time lags)
- High spatial density of effects on an environmental system (space crowding)
- Effects occur away from the source (cross-boundary)
- Change in landscape pattern (fragmentation / aggregation)
- Effects arising from multiple sources or pathways (compounding)
- Secondary effects (indirect effects)
- Fundamental changes in system behavior or structure (triggers & thresholds)

Louisiana Regional Assessment

PROJECTS COMPLETED OR FUNDED FOR CONSTRUCTION (BARATARIA BASIN)



Louisiana's CWPPRA Basins



River Diversion via Siphons



Barrier Island Restoration



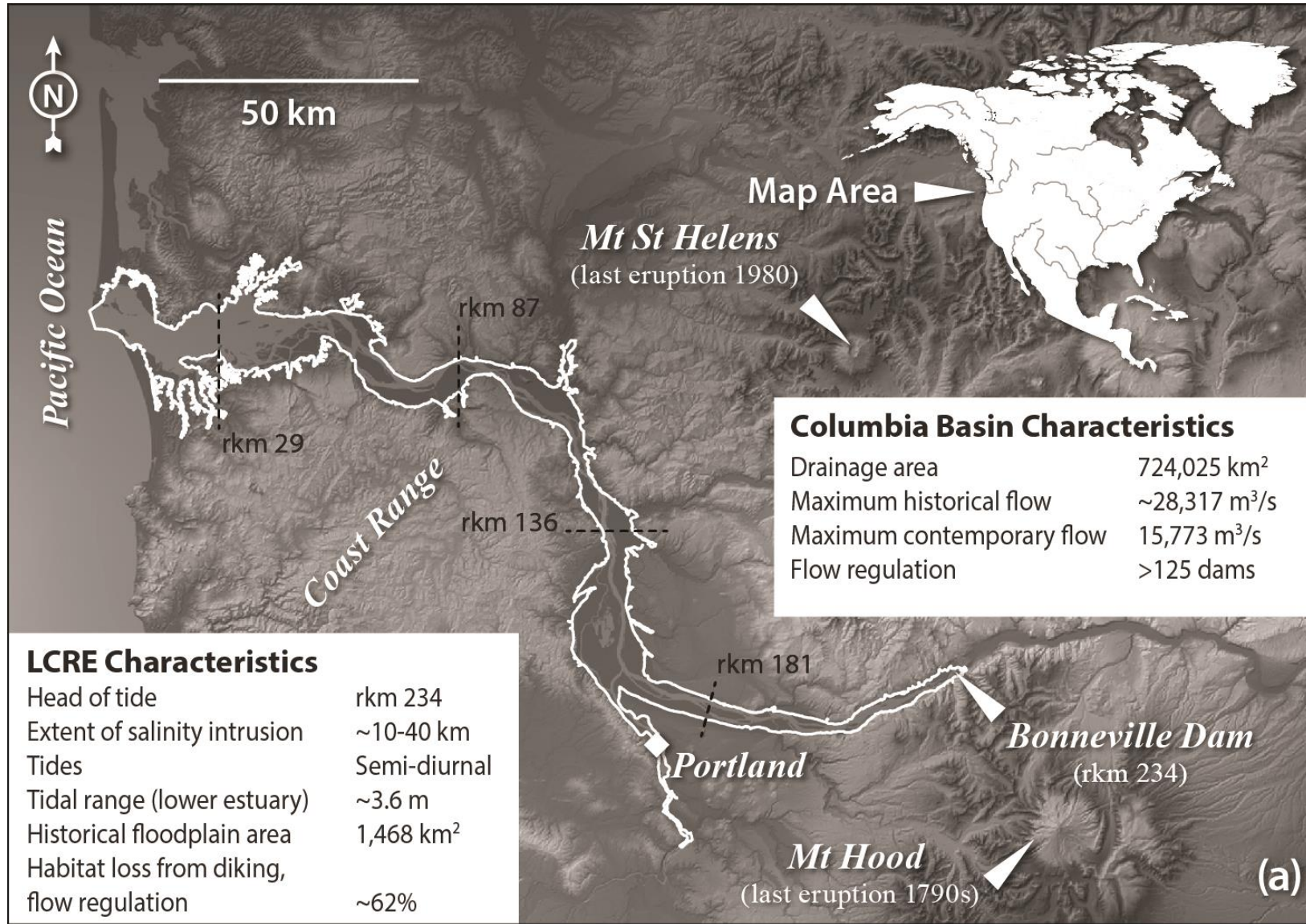
Shoreline Protection

-  Protective Levee
-  Barrier Island Restoration
-  Hydrologic Restoration
-  Marsh Creation
-  Ridge Restoration
-  Sediment Diversion
-  Shoreline Protection
-  Infrastructure
-  CPRA
-  Other

Introduction

- What is the utility of assessing cumulative effects in regards to region-scale ecosystem restoration? What does it inform/allows us to do or not do. Why does it matter? When is it not important/not meaningful?

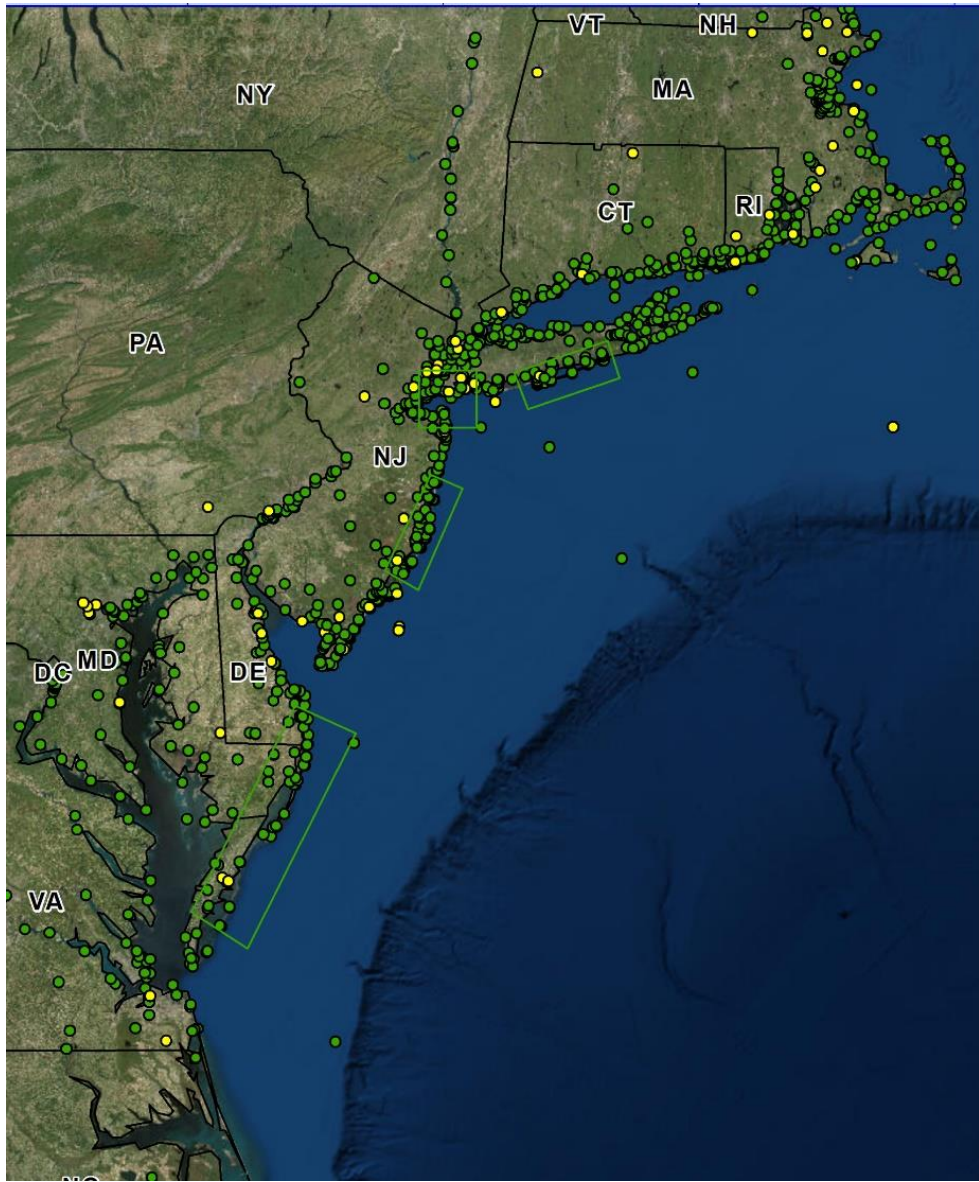
Columbia River



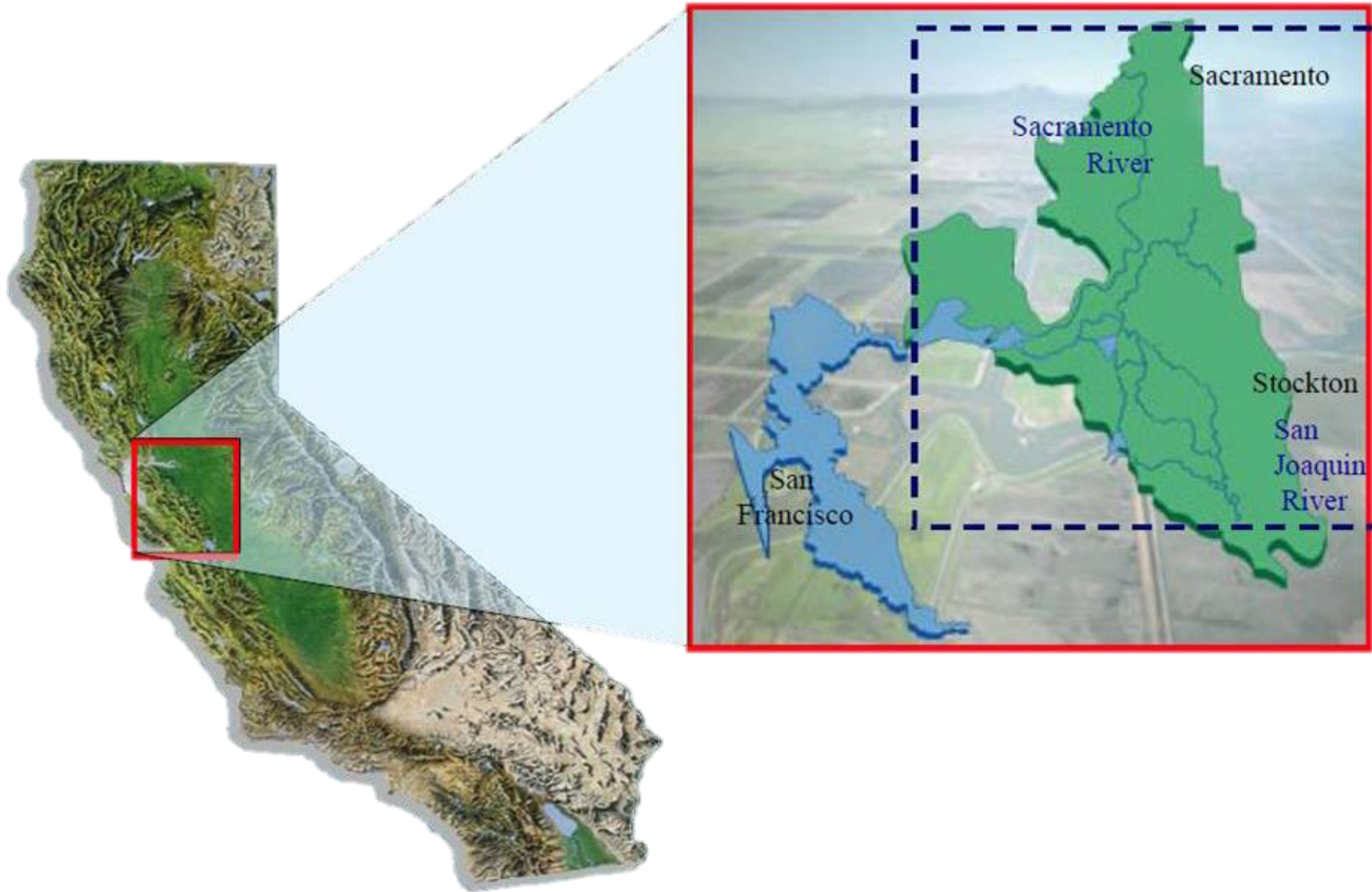
Everglades



Northeast U.S.



San Francisco Bay Delta



Success Criteria

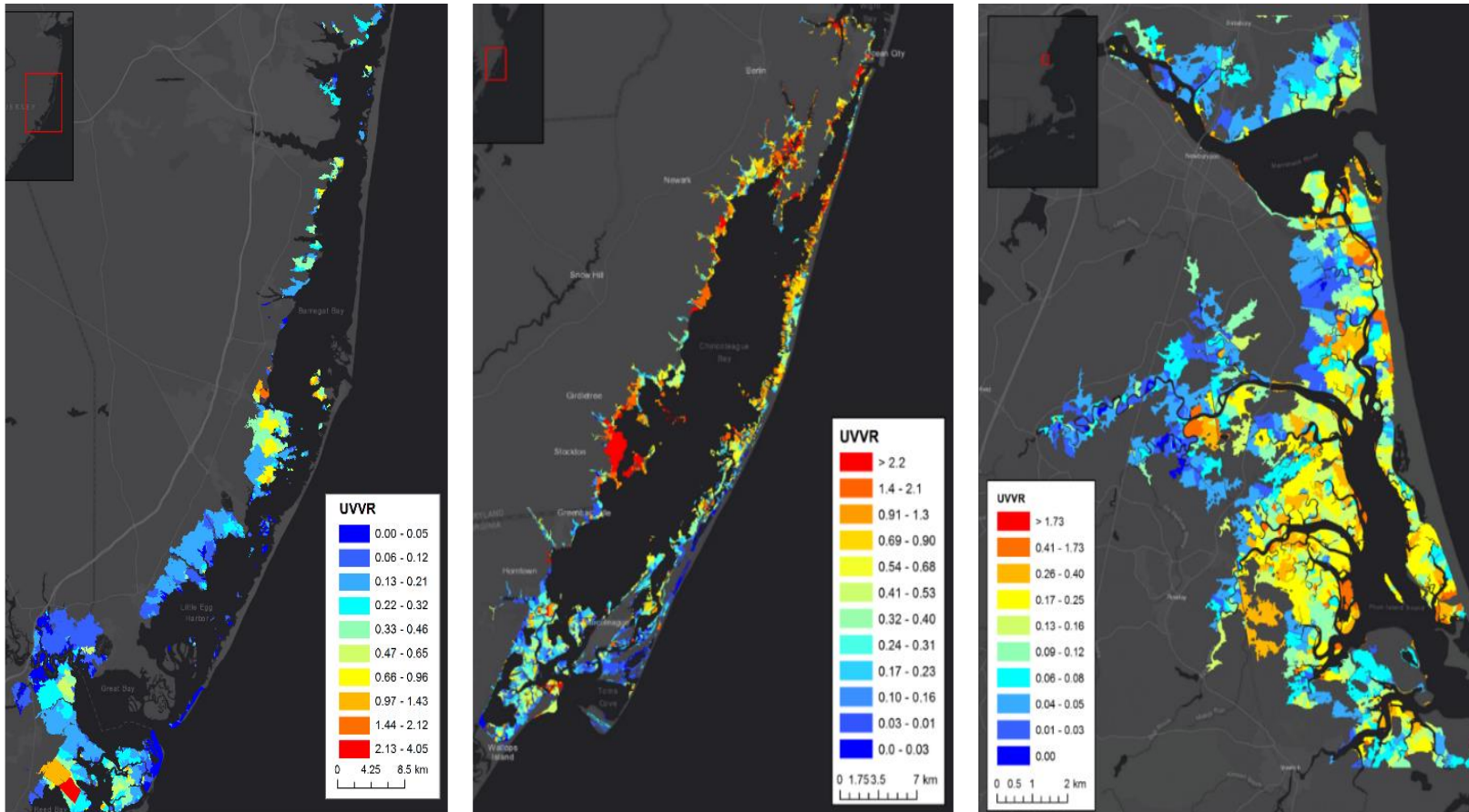
- Establishing regional success criteria?
- Integrating ecological and socio-economic criteria?
- Stakeholder role?

WATER	BAY		DELTA	
	STATUS	TREND	STATUS	TREND
 SAFE FOR SWIMMING	GOOD	➔		
ESTUARY - WIDE				
 SAFE FOR AQUATIC LIFE		FAIR	⬆	
ESTUARY - WIDE				
 FISH SAFE TO EAT		FAIR	➔	
ESTUARY - WIDE				
 FRESHWATER INFLOW		POOR	⊘	
HABITAT	BAY		DELTA	
 OPEN WATER HABITAT	POOR	⊘	POOR	⬇
 EELGRASS	POOR	⬆		
 TIDAL MARSH	FAIR	⬆	POOR	➔

Emerging Methodologies

- Advancement of tools and effectiveness of methodologies?

Refuge-scale mapping of UVVR in Northeast USA



Synthesizing & Evaluating Program Outcomes

How does cumulative effects analysis facilitate adaptive management?

