Mapping the UVVR

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RESEARCH PROJECT WITH MANAGEMENT APPLICATION

Why: can we develop a consistent metric for marsh vulnerability that can be acquired rapidly and repeatedly?

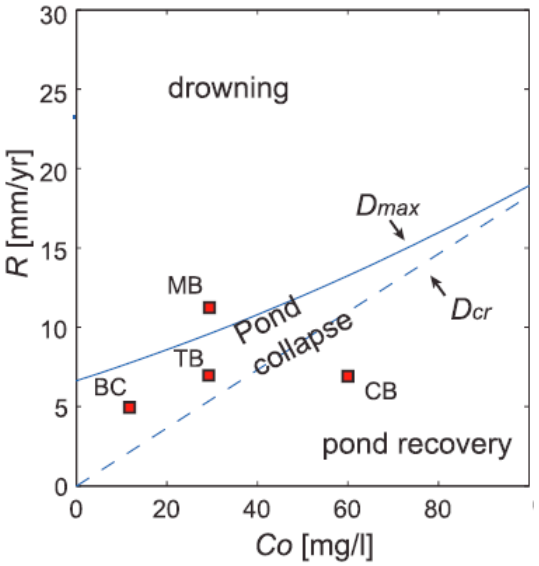
Federal, state, local managers need to evaluate marsh trajectory

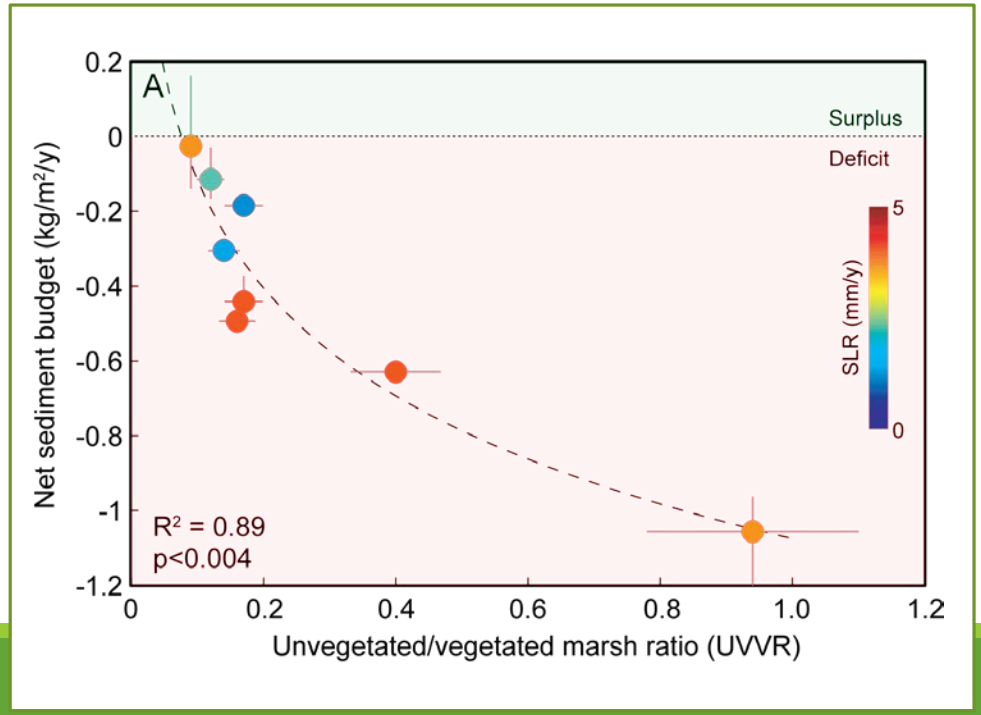
Point-based assessments not suitable given spatial variability

Models not capable of capturing geomorphic changes and ensuing vegetative response

Prior work shows that integrative metrics scale with each other, specifically sediment deficits and open-water conversion

Can we apply this knowledge to generate better metrics for managers?





What: Project Goals and Desired Outcome

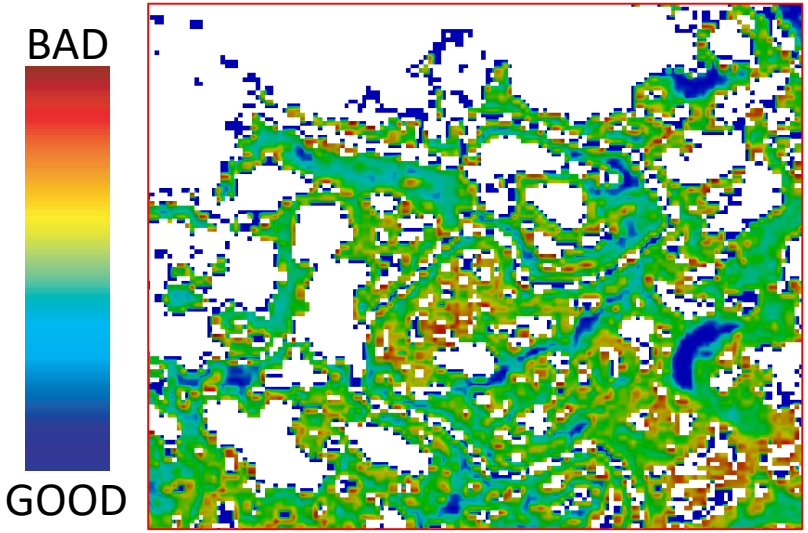
Our goal is to develop consistent, repeatable metrics for evaluating marsh physical state and future trajectory, using remote sensing

For each Landsat (or other) pixel, one can calibrate the within-pixel-information for NDVI, NDWI, and NDBI to yield fraction of non-vegetated pixel, and thereby get UVVR. Algorithm is calibrated with higher-resolution NAIP imagery at selected sites across the nation

Desired outcome:

Short-term: generate a baseline national map of UVVR from Landsat (2017), apply the method to the Landsat period-of-record, continue to update, and apply algorithm to Sentinel and other higher-resolution satellites

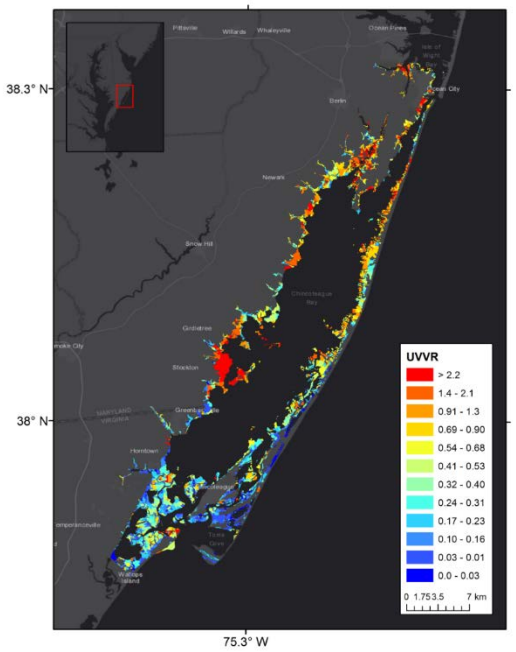
Long-term: synthesize these data to get rate-of-change, then use data to develop forecasting model using Kalman filter approach to yield future state at 30 m resolution across nation

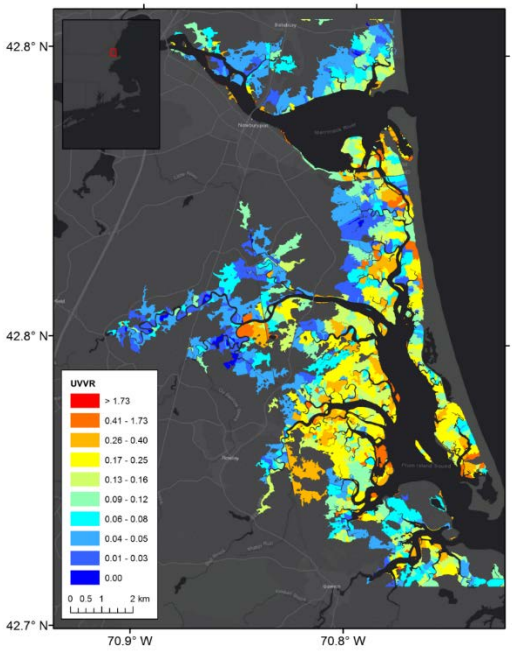


Where are you working

National: 30 m pixel with Landsat,
up to 10 m elevation contour

Regional: watershed delineated UVVR, at
PIE/PRNWR, Assateague NS, Forsythe NWR,
NY State, Cape Cod NS





Who is doing the work and **When** are you doing it?

Project lead: Neil K. Ganju, Zafer Defne, Brady Couvillion (USGS Wetlands Center)

Project partners: NPS, FWS, NY state, NFWF

Timeframe: 2011-retirement

Core task (“Tidal Wetlands”) under the Estuarine Processes, Hazards, and Ecosystems Project

Represents continuation of sediment transport studies; extension to Kalman filter modeling and forecasting integrates into USGS Coastal Change Hazards program

The baseline mapping is the first phase of what will be a long-term research focus

How

How is your work being funded (if you're comfortable sharing)

- 80-20 federal/state funded (a rough guess)

How is your work being communicated to your target audience(s)?

Conferences, workshops, perspective paper, USGS Coastal Change Hazards Program

Findings – take home message(s)

The UVVR is a no-brainer: we need it to track habitat, wave attenuation, carbon stock

Its correlation with sediment budgets is not necessarily causal, but the strong connection demonstrates that physical processes need to be better captured in vulnerability metrics

Remote sensing resolution is improving, and the fidelity of the UVVR will improve as well

The baseline data set already shows how UVVR and elevation are linked: low elevation marshes are approaching critical values of UVVR (>0.5) while higher elevation marshes are at stable values (~0.1). This information can help prioritize restoration efforts.

Baseline and rate-of-change data will open up avenues of research that were previously unavailable: how do external forcings modulate UVVR, are there latitudinal gradients, relationships with tide range, salinity stress, temperature, etc….