Blue Carbon Collaborative

3.25.21

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Welcome

Meeting Objectives & Agenda

Meeting Objectives:

1) Recap Blue Carbon Collaborative (BCC) goals from meeting 1

2) Learn about other blue carbon efforts and discuss how to apply California context

3) Discuss BCC path forward

Meeting Agenda:

3:00pm	**Share BCC Purpose and Vision Discussed in Meeting #1**
3:10pm	**Blue Carbon and Achieving Conservation and Climate Benefits**
3:50pm	**Blue Carbon Leaders in the Field: Opportunities and Lessons Learned**
4:55pm	**Next Steps**
5:00pm	**End of Meeting**

BCC Purpose and Vision Discussion Meeting #1

- Better understand how blue carbon can be integrated into climate action planning
- Leverage knowledge, resources, and experience
- Support policy and science

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BCC Purpose and Vision Discussion Meeting #1

- Need for database and data sharing
- Desire to learn from other regions, states, and countries
- Better outreach
- Financial and jurisdictional hurdles


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166 samples taken from 25 cores collected (additional 28 cores collected)
San Dieguito Lagoon and Kendall-Frost Marsh
Some cores extend more than 2 m in depth, representing centuries of sediment accretion
Famosa Slough and Batiquitos Lagoon
Analysis and reporting

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Blue Carbon and Achieving Conservation and Climate Benefits

- **Mark Gold**, *Executive Director, Ocean Protection Council; Deputy Secretary for Ocean and Coastal Policy, California Natural Resources Agency*
- **Nathan Fletcher,** *San Diego County Supervisor*
- **Q&A Discussion**

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Blue Carbon Leaders in the Field: Opportunities and Lessons Learne

- **John Baxter**, *Chair of the Scottish Blue Carbon Forum*
- **Lindsey Sheehan**, *Principal Engineer, Environmental Science Associates*
- **Michael Beck**, *AXA Chair in Coastal Resilience, University of California Santa Cruz*
- **Christopher Janousek**, *Department of Fisheries and Wildlife Oregon State University*
- **Q&A Discussion**

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Next Steps

Thank you

Contact us:

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tegan@coastal-quest.org

Scotland's Blue Carbon Resource

Blue Carbon

Blue carbon is the **carbon** captured and stored by the ocean and coastal ecosystems. The **carbon** captured by living organisms in the ocean is stored in the form of biomass and in sediments

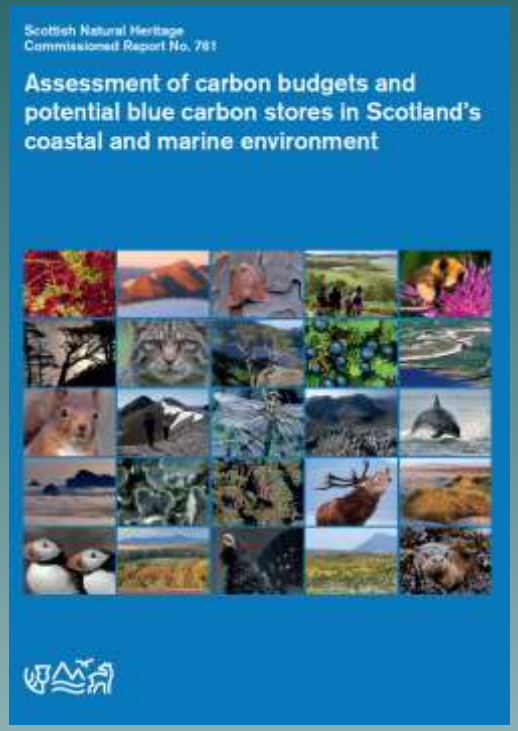
Inorganic carbon - shells and other skeletal material

Organic carbon – either labile or recalcitrant

Some potential key carbon capture and sink habitats

‘Direct’ sequestration, i.e. the capture and storage of atmospheric carbon dioxide

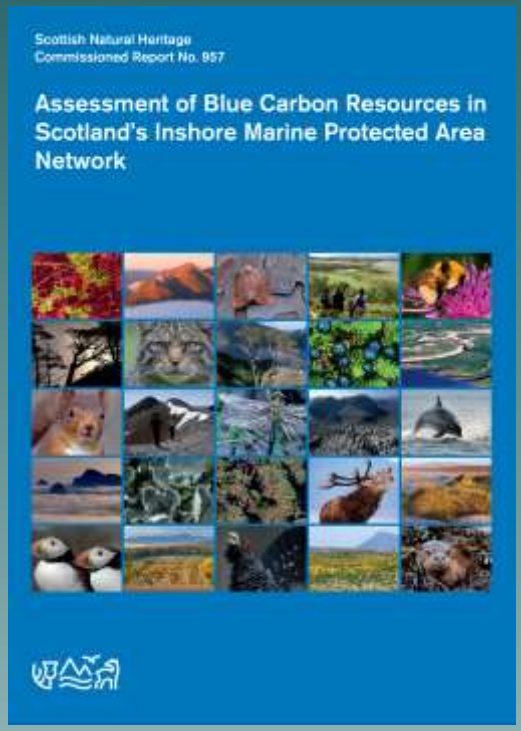
‘Indirect’ sequestration, i.e. the secondary capture and storage of atmospheric carbon dioxide of both terrigenous and marine origin



The Report had three aims:

1. Review the carbon budgets of a range of potential marine carbon stores
2. Estimate the extent of the various habitats and their capacity to trap and store carbon
3. Review the main threats and the implications for the carbon stores

Burrows MT, Kamenos NA, Hughes DJ, Stahl H, Howe JA, & Tett P. 2014



An inventory of the blue carbon resource in Scotland's inshore MPA network

Estimated 9.4Mt organic C
Estimated 47.8 Mt inorganic C
Equivalent to 1.6% and 2.7% respectively of Estimated total blue carbon stocks in Scottish waters

Burrows et al., 2017

The Scottish Government is committed to better understanding **blue carbon** and how it can help us mitigate and adapt to climate change. It is important that policy development is evidence led and built on sound science, so the Scottish Government a initiated a blue carbon research programme to better inform future policy and management decisions.

Scottish Blue Carbon Forum

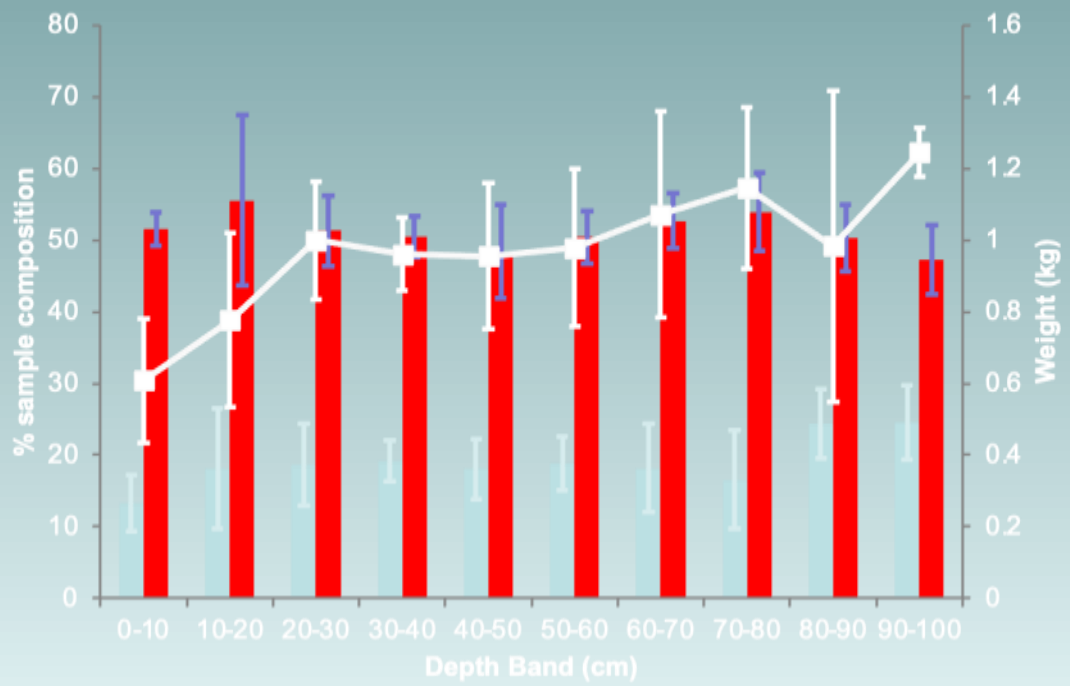
PhD programme:

- Carbon sequestration in Scottish saltmarsh
- Carbon sequestration in Scottish seagrass meadows
- Carbon sequestration in Scottish shelf sea sediments
- Carbon sequestration in Scottish pock marks
- Fate of kelp detritus and carbon storage potential
- Impacts of fishing on carbon in sediment surface layers
- Carbon sequestration in biogenic reefs (mussels & oysters)
- Maerl blue carbon stocks under global change
- Scotland's deep-water blue carbon resources: Sources, rates and fates
- Underpinning marine spatial planning of blue carbon resources: Orkney Island Audit case study

Research Fellow:

- Carbon in coastal and near-shore systems over multiple timescales (Holocene to present day)

Total carbon content 710,735t



Biogeosciences, 14, 5663–5674, 2017
https://doi.org/10.5194/bg-14-5663-2017

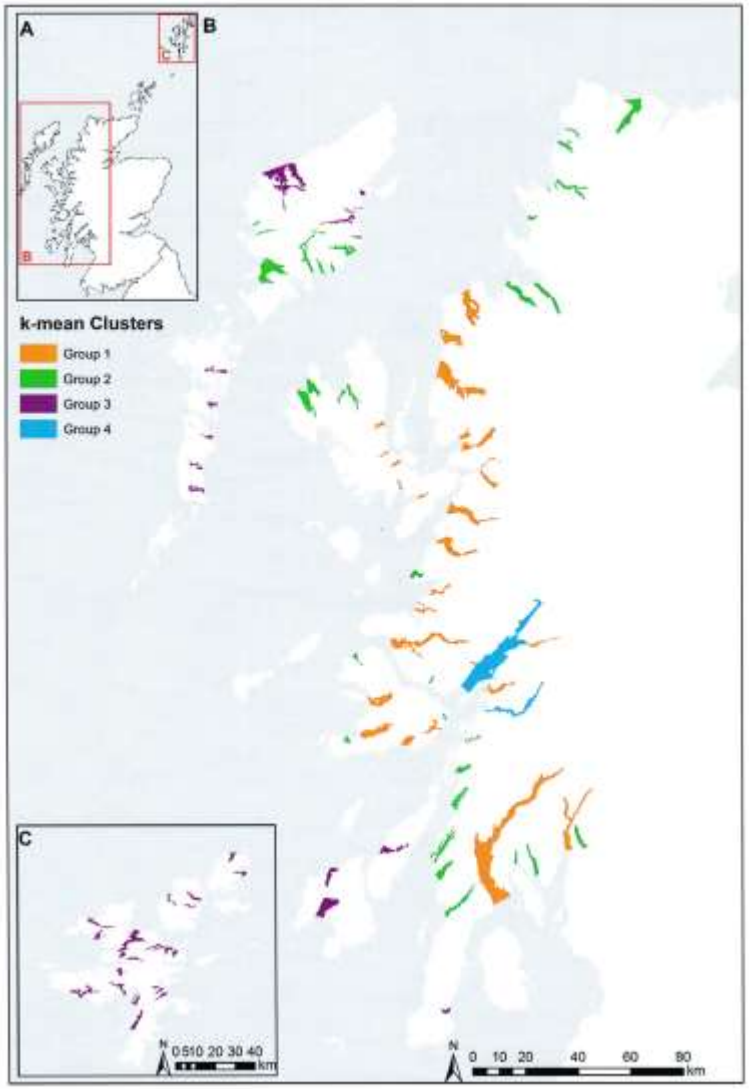
Biogeosciences

Scotland's forgotten carbon: a national assessment of mid-latitude fjord sedimentary carbon stocks

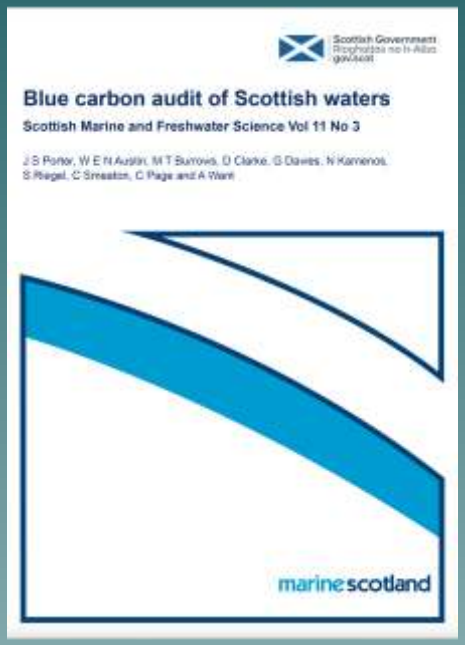
Craig Smeaton[1], William E. N. Austin[1,2], Althea L. Davies[1], Agnes Baltzer[3], John A. Howe[2], and John M. Baxter[4]

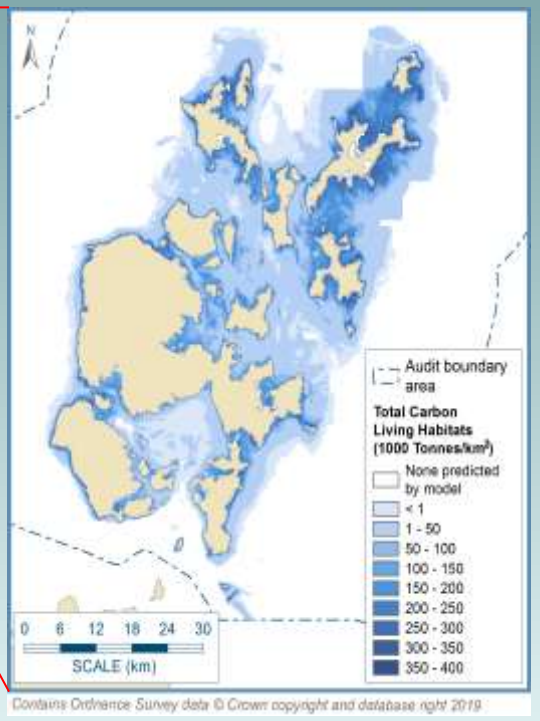
[1]School of Geography & Geosciences, University of St Andrews, St Andrews, KY16 9AL, UK
[2]Scottish Association for Marine Science, Scottish Marine Institute, Oban, PA37 1QA, UK
[3]Institut de Géographie et d'Aménagement Régional de l'Université de Nantes, BP 81 227 44312 Nantes CEDEX 3, France
[4]Scottish Natural Heritage, Silvan House, Edinburgh, EH12 7AT, UK

- Scottish fjords are a more effective store of C than the terrestrial environment.
- A total of 640.7 ± 46 Mt of C is stored in the sediment of Scotland's 111 fjords.
- An estimated 31 139–40 615 t yr^{-1} of C is buried in the sediment of Scotland's fjords.
- Fjord sediments are potentially the most effective store of C globally.



Incorporation of blue carbon protection into marine plans





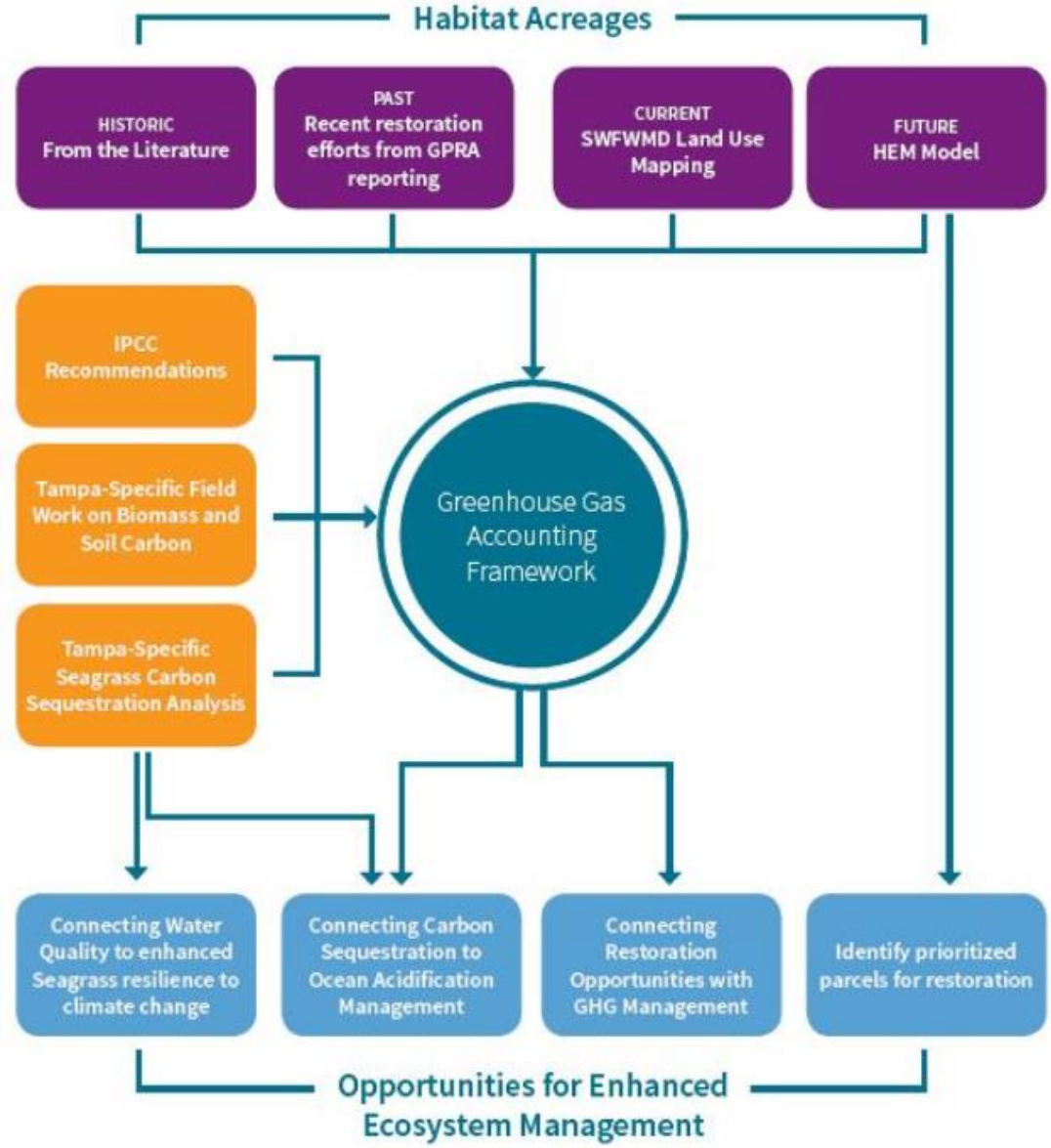
California Blue Carbon Working Group

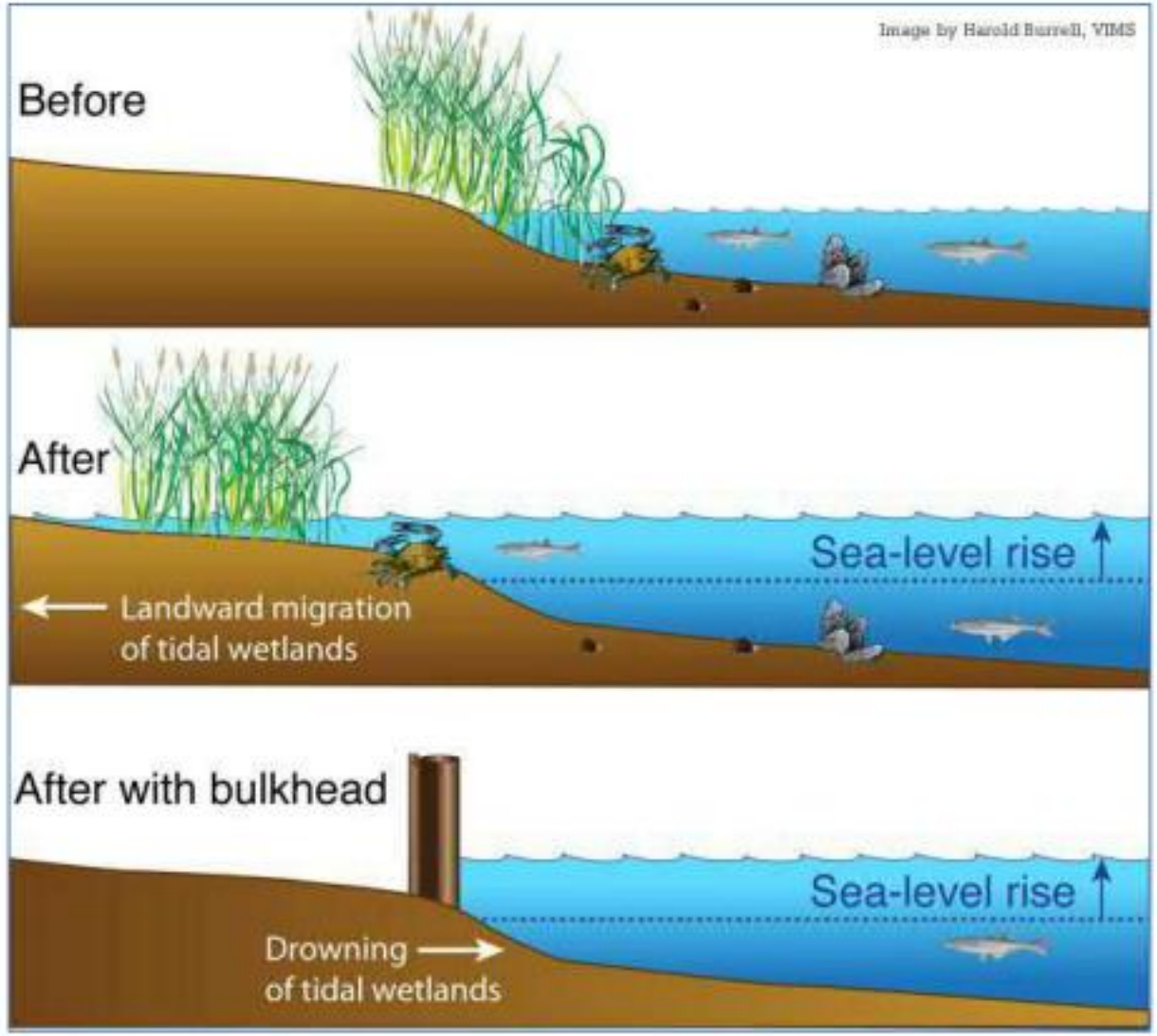
Quantifying Blue Carbon in Evolving Habitats in Tampa Bay, Florida

Lindsey Sheehan, P.E.
Principal Engineer

March 25, 2021

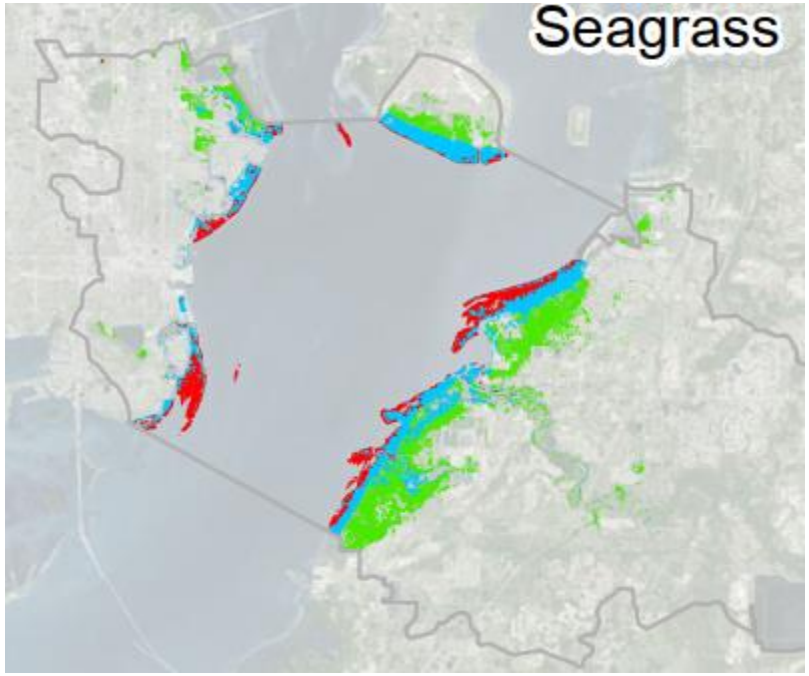
Tampa Bay Blue Carbon Assessment

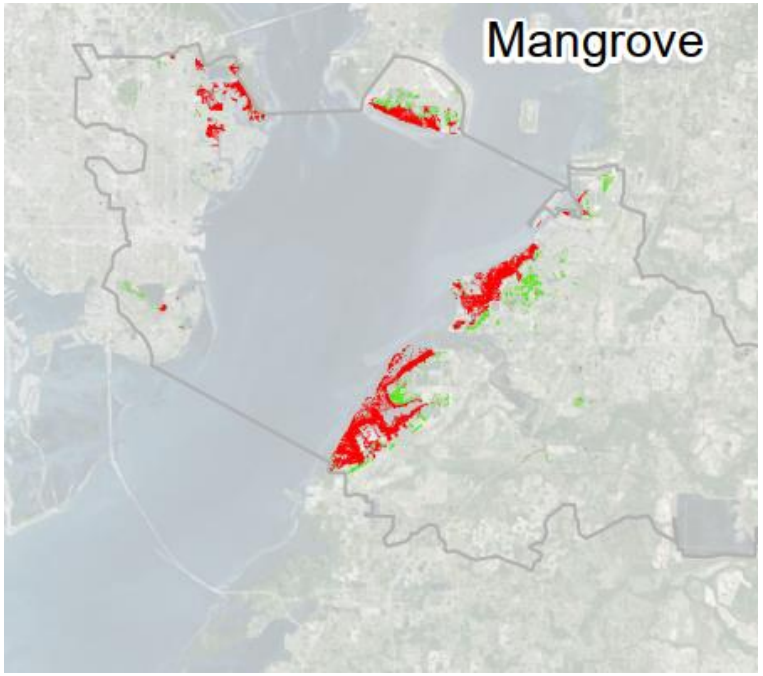




SOURCE: NOAA, 2019

Habitat Evolution





Seagrasses projected to move into mangrove habitat with sea-level rise

Middle Tampa Bay Segment Boundary

Seagrass Habitat Change 2007 - 2100

Seagrass Loss

Seagrass Gain

No Change

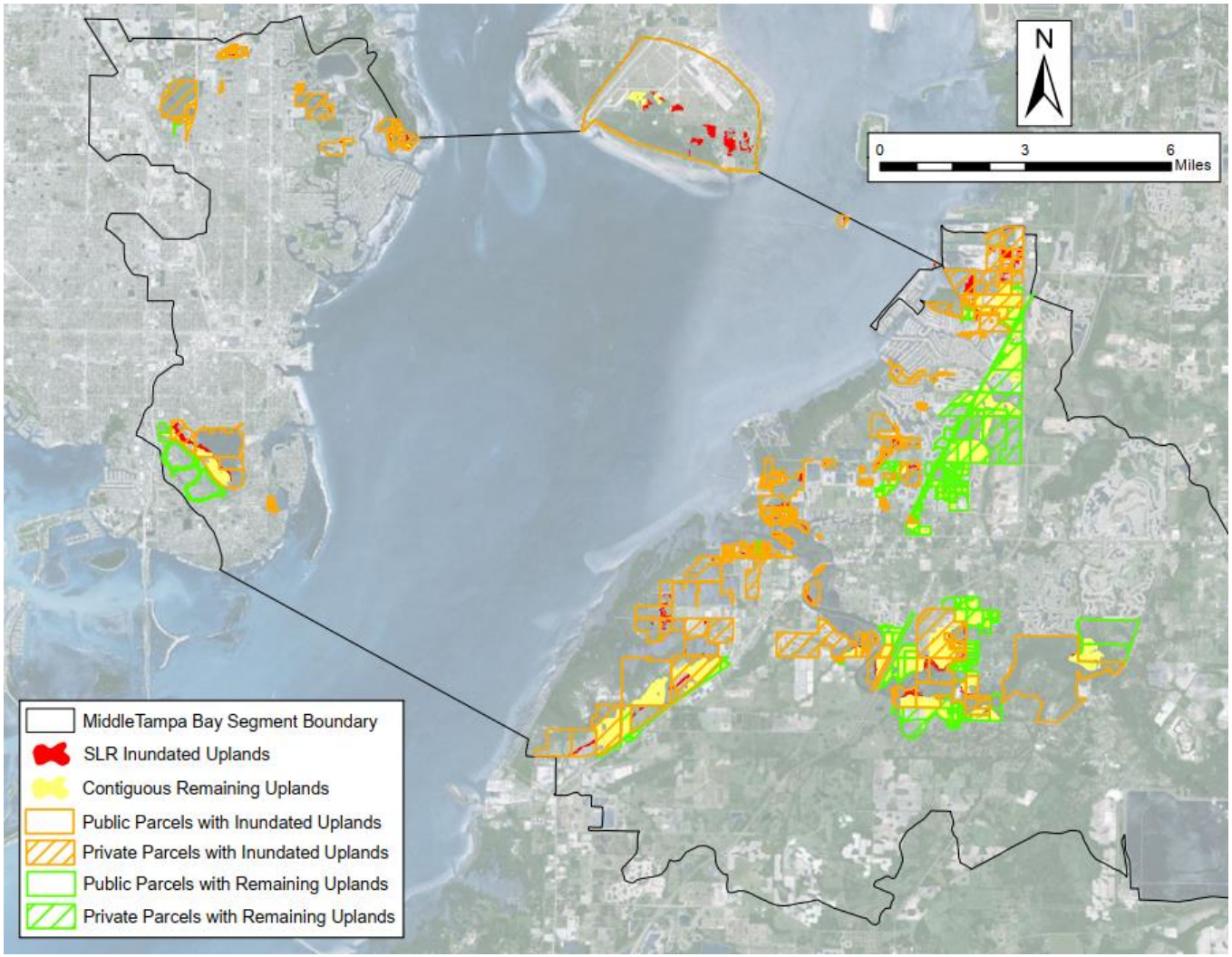
Mangrove Habitat Change 2007 - 2100

Mangrove Loss

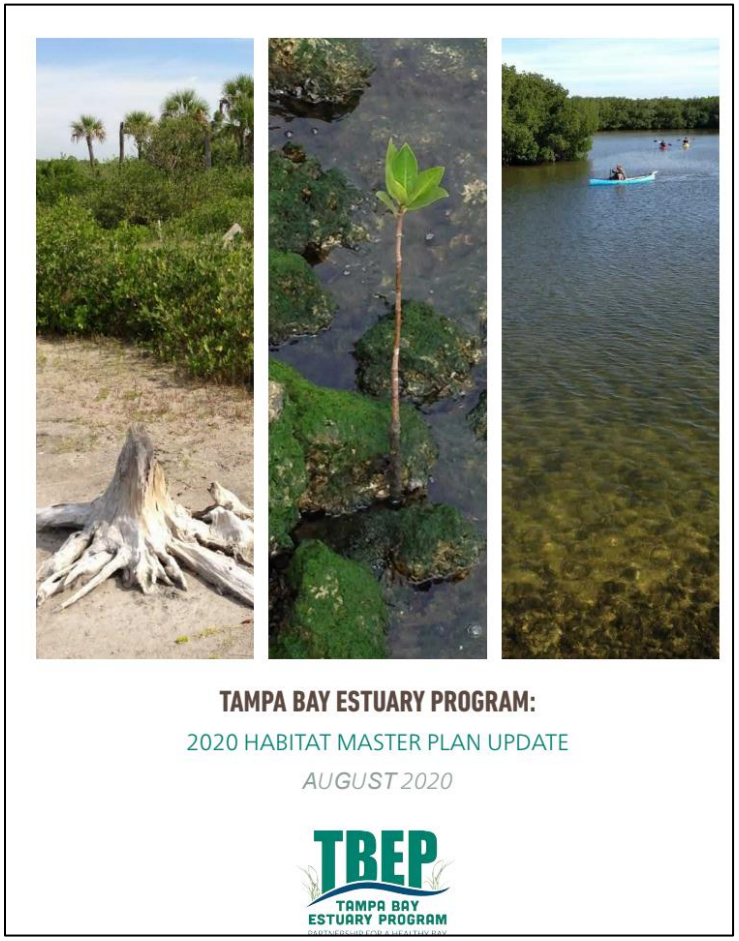
Mangrove Gain

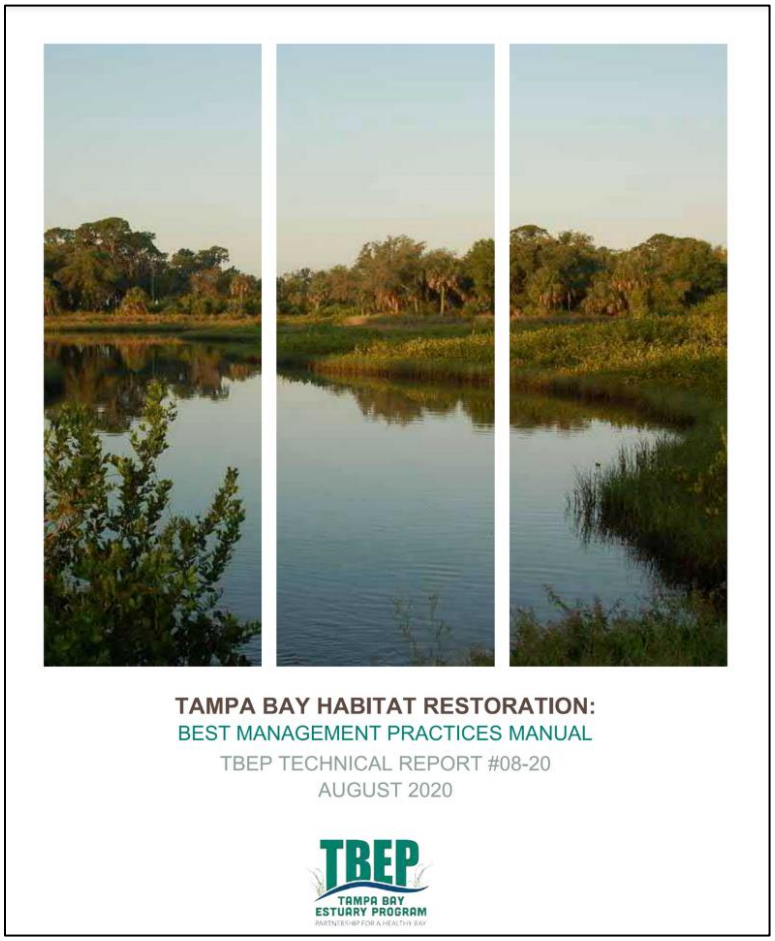
No Change

Priorities for Acquisition and Restoration



Next Steps in Tampa





Project Example: Tampa Bay, FL

For additional information see:

- Blue Carbon: an Additional Driver for Restoring and Preserving Ecological Services of Coastal Wetlands in Tampa Bay (2019) https://link.springer.com/article/10.1007/s13157-019-01137-y
- A Blue Carbon Primer: The State of Coastal Wetland Carbon Science, Practice and Policy (2018) https://www.crcpress.com/A-Blue-Carbon-Primer-The-State-of-Coastal-Wetland-Carbon-Science-Practice/Windham-Myers-Crooks-Troxler/p/book/9781498769099

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The Financing of Natural Coastal Defenses
Lessons Learned for Blue Carbon Initiatives

Michael W. Beck
Research Professor, Institute of Marine Sciences
AXA Chair in Coastal Resilience

UNIVERSITY OF CALIFORNIA
SANTA CRUZ

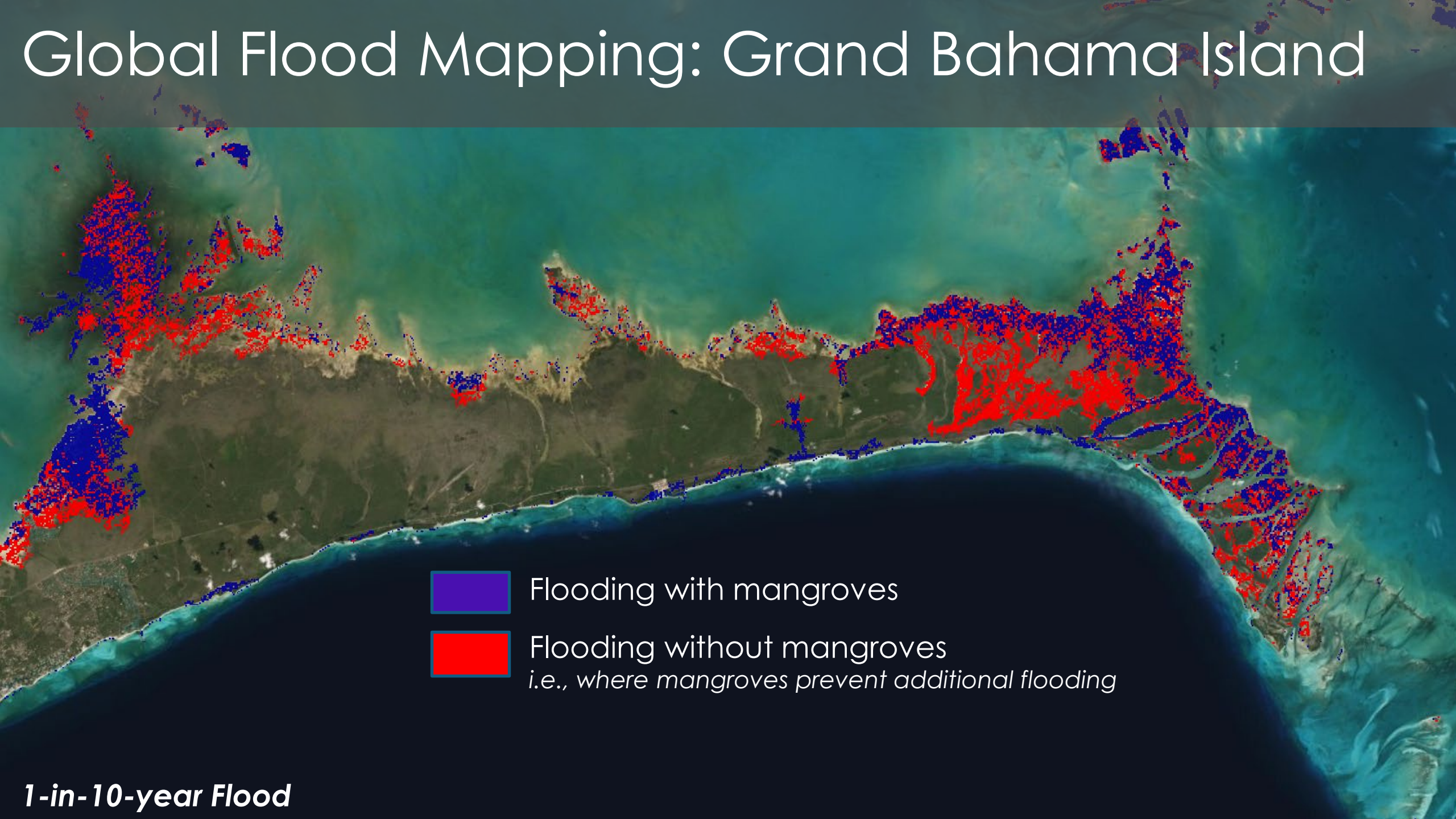
COASTAL RESILIENCE LAB

Assessing Flood Risk & Mangrove Benefits

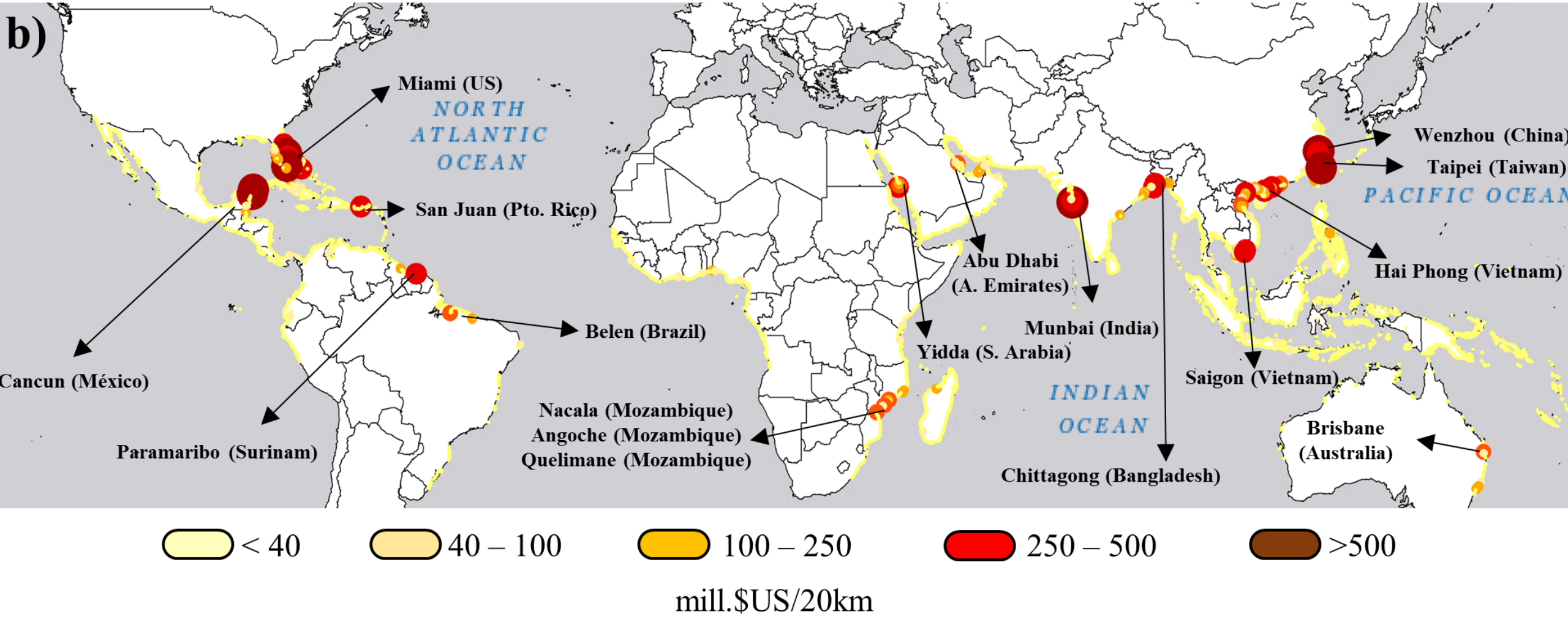
Forces of Nature: Assessment and Economic Valuation of Coastal Protection Services Provided by Mangroves in Jamaica. World Bank.

WORLD BANK GROUP

Global Flood Mapping: Grand Bahama Island

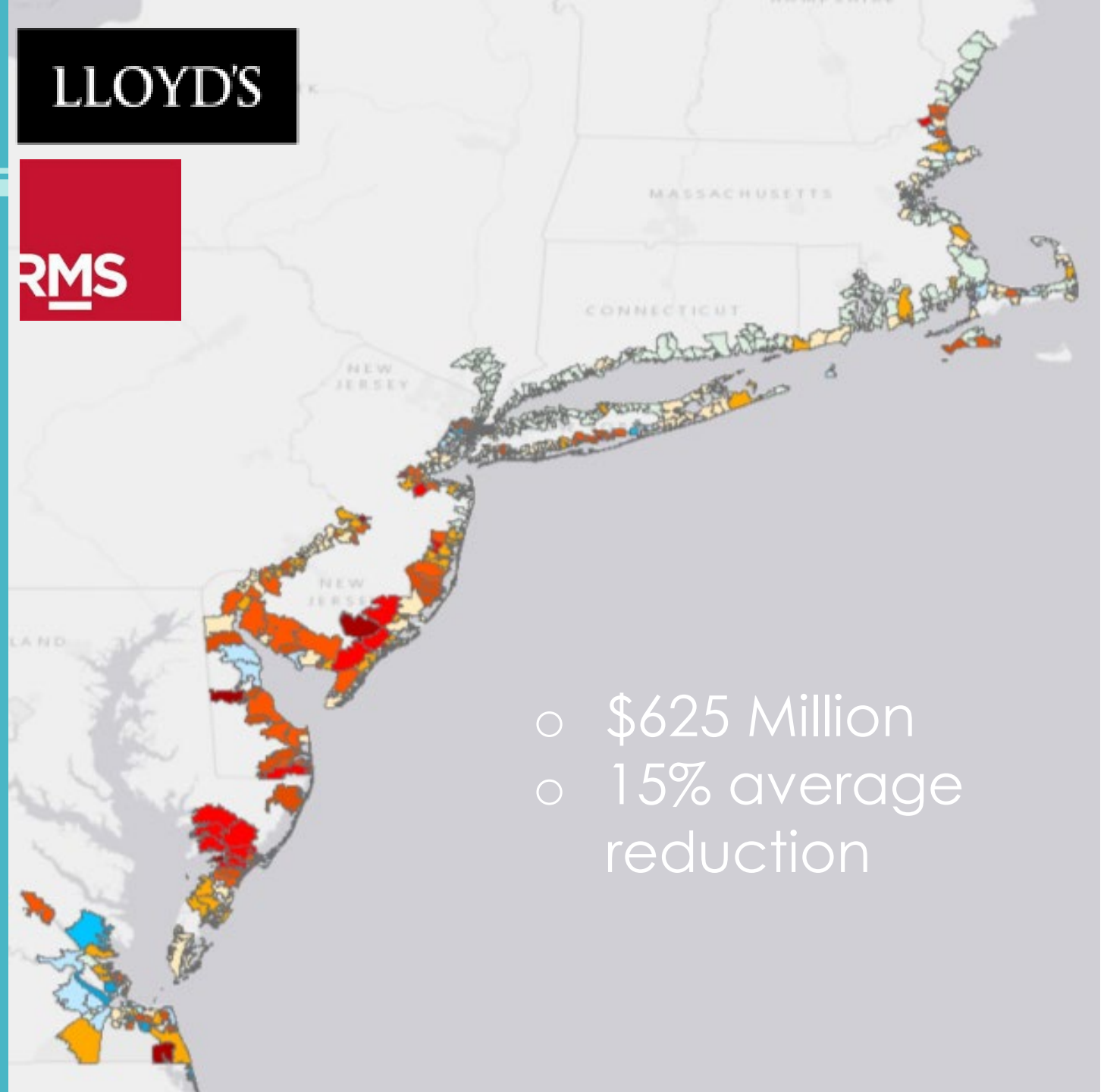


Annual Flood Reduction Benefits from Mangroves



Menéndez, Beck et al. 2020. Global flood protection benefits of mangroves. *Scientific Reports*.

Effects of Marshes on Sandy Flood Damages



- $625 Million
- 15% average reduction

0

Narayan, Beck et al. 2017. The value of coastal wetlands for flood damage reduction in the northeastern USA. Scientific Reports. 7:9463.

VERRA

Sustainable Development Verified Impact Standard

First SD VISta Methodology Addresses Coastal Resilience Benefits – Open for Public Comment

20 January 2021

Verra is pleased to announce that the first methodology under the Sustainable Development Verified Impact Standard (SD VISta) Program is now open for public comment until 19 February 2021. The new "Methodology for Coastal Resilience Benefits from Restoration and Protection of Tidal Wetlands" will assess how many people benefit from reduced flood risk due to the restoration or protection of coastal ecosystems.

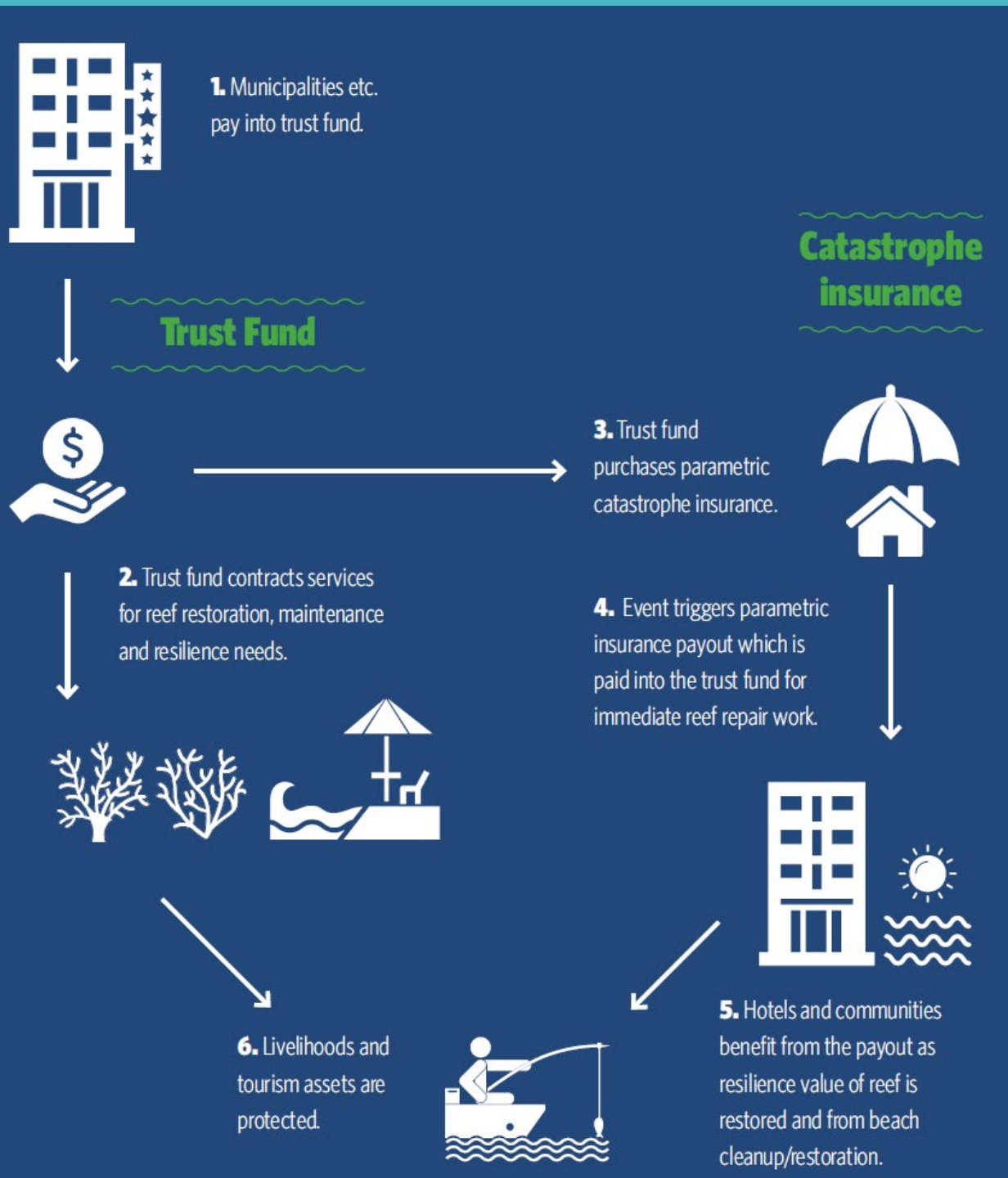
Recommendations

**if I substitute Blue Carbon for Risk Reduction the answers seem relevant*

- Better analyses of Blue Carbon benefits for more habitats;
- Advance Blue Carbon in risk models;
- Greater inclusion of Blue Carbon in cost effectiveness analyses;
- Improve restoration approaches to help meet blue carbon and environmental goals;
- More bonds that include blue carbon
- **New insurance-based tools for blue carbon**

Beck, Quast, Pfliegner. 2019. Insurance and Ecosystem-based Adaptation: Successes, Challenges and Opportunities. Insuresilience Secretariat, Germany.

Mexico Trust Fund & Insurance Mechanism



Adapted from Beck et al. 2020. Reducing Caribbean Risk: Opportunities for Cost-Effective Mangrove Restoration and Insurance. TNC and AXA.

Mexico Reef Example Inspires CA Policy

California Senate

SB-30 Insurance: climate change.

[Approved by Governor September 21, 2018. Filed with Secretary of State September 21, 2018.]

LEGISLATIVE COUNSEL'S DIGEST

This bill would require the Insurance Commissioner to convene a working group to identify, assess, and recommend risk transfer market mechanisms that, among other things, promote investment in natural infrastructure to reduce the risks of climate change related to catastrophic events, create incentives for investment in natural infrastructure to reduce risks to communities, and provide mitigation incentives for private investment in natural lands to lessen exposure and reduce climate risks to public safety, property, utilities, and infrastructure.

Lessons Learned to Inform Blue Carbon Efforts

- Need to rigorously value benefits
- This supports innovative funding for conservation
- Follow the same approaches as economists and engineers; Use Risk Industry models When Possible

- **Opportunities to transfer Blue Carbon risk**
- Identify the parameters that create risk and identify datasets to assess their likelihood
- Be clear on the benefit you want to insure/invest in and the relevant stakeholders (who will pay to transfer risk)

Building coastal resilience, naturally,

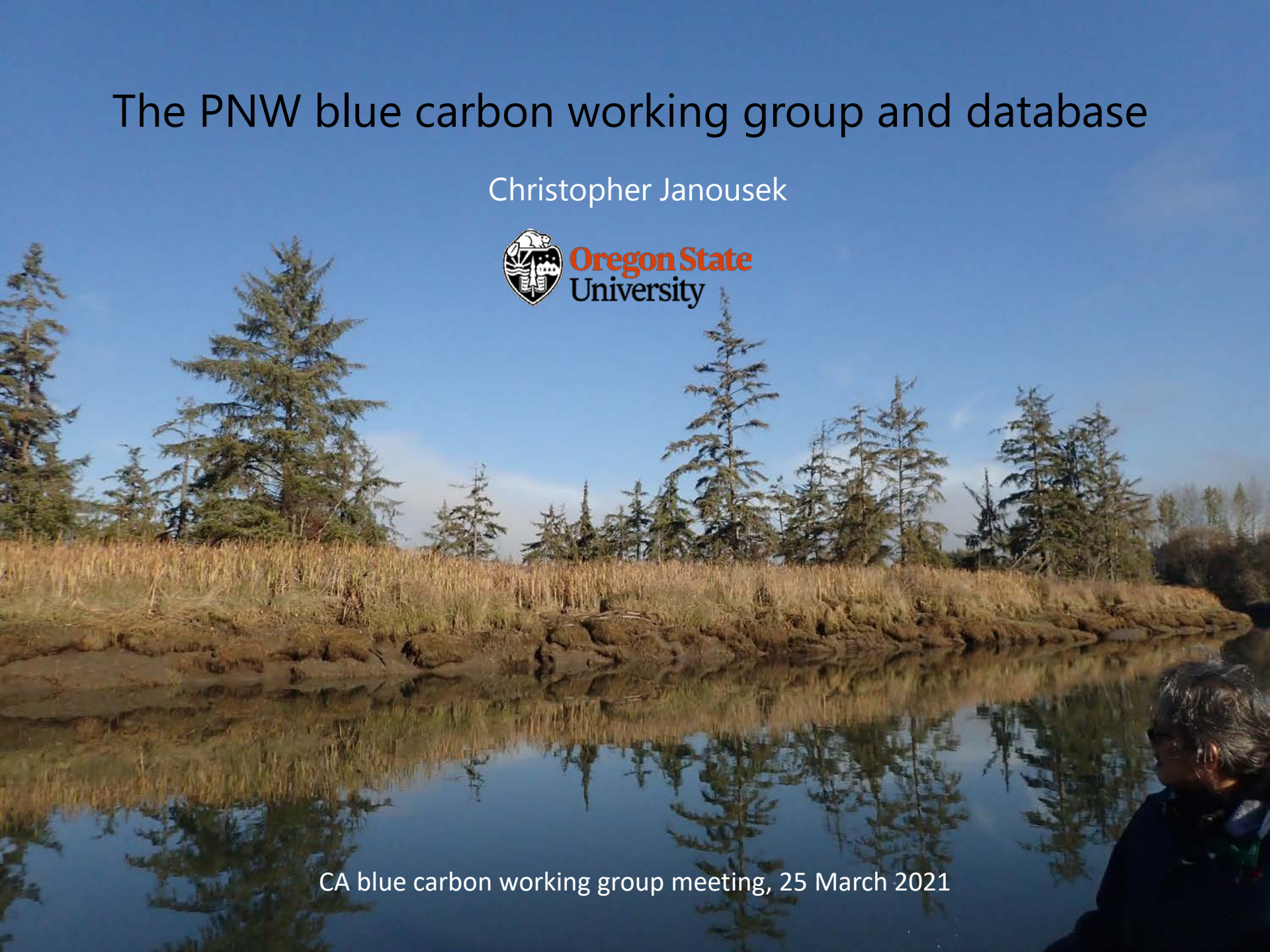
to protect people, property, and nature

mwbeck@ucsc.edu
www.coastalresilience.ucsc.edu

The PNW blue carbon working group and database

Christopher Janousek

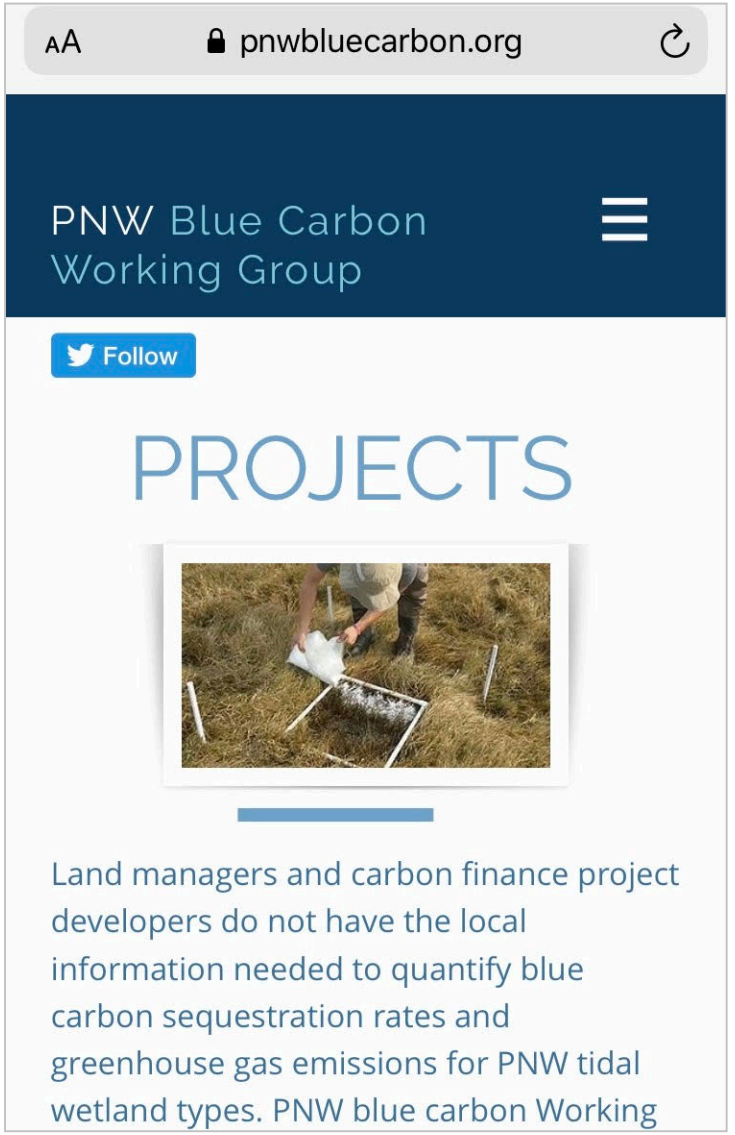
Oregon State University



CA blue carbon working group meeting, 25 March 2021

PNW Blue Carbon Working Group

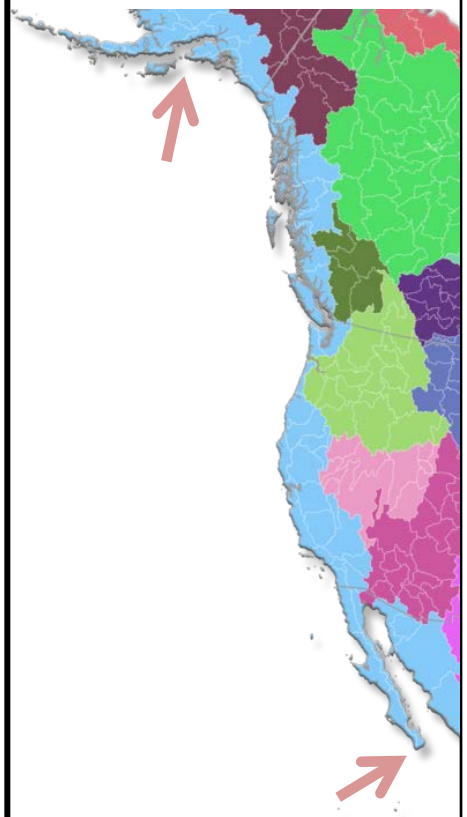
- Established in 2014
- Brings together natural scientists, social scientists, managers, & policy makers to advance BC science & data sharing
- Informal membership and structure, mainly operates in sub-groups around specific funded projects
- Efforts mostly based from northern CA to British Columbia



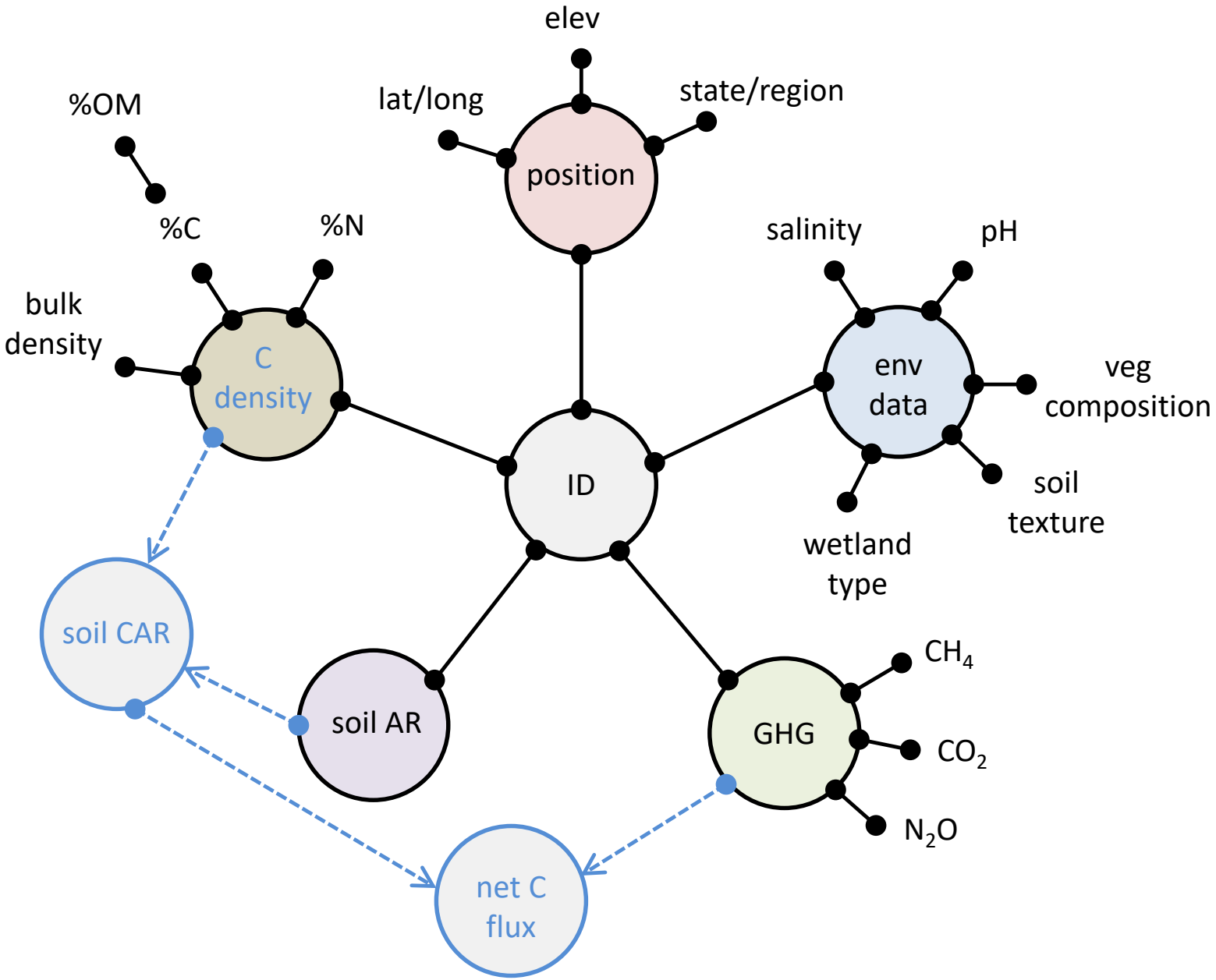
PNW Blue Carbon Working Group projects

- PNW stocks project (2016-2019) to quantify blue carbon stocks & start a regional database
- Assessment of blue carbon finance project feasibility in the PNW (2018-2019)
- Two current (2019-2023) carbon sequestration & GHG emissions projects (NOAA and NERRS Science Collaborative)
- Other recent and pending projects by UO, USGS, OSU, WWU, others

Blue carbon database

Geographic scope	Wetland types	Data types
Baja California to Alaska 	• Seagrass meadows • Tide flats • Tidal marsh (freshwater to salt marsh) • Mangroves • Temperate scrub-shrub wetlands • Temperate forested tidal swamps • Pastures (diked former tidal wetlands)	• Soil carbon content and density • Soil accretion and carbon accumulation rates • Environmental drivers (e.g., elevation, plant species) • Greenhouse gas emissions (chambers)

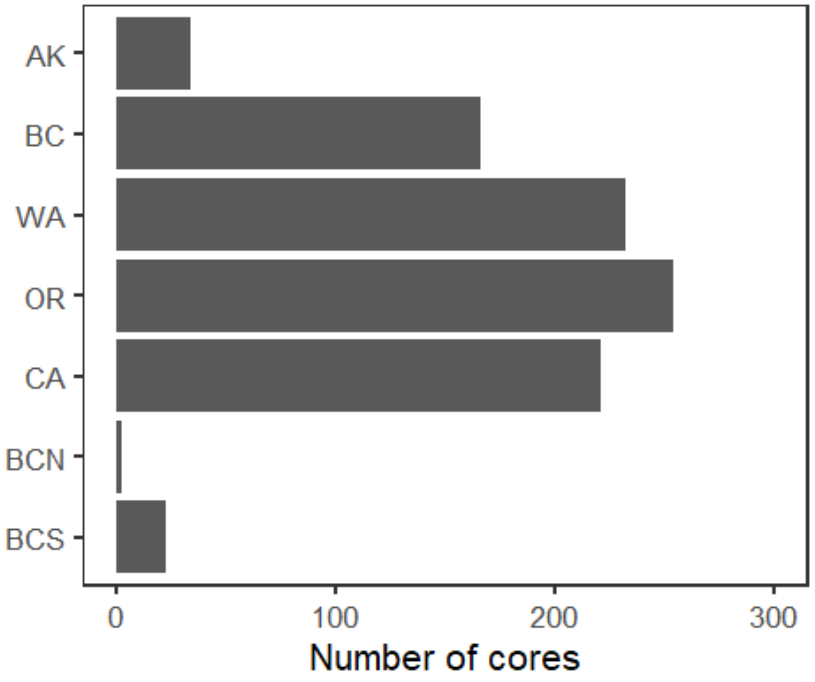
Database structure



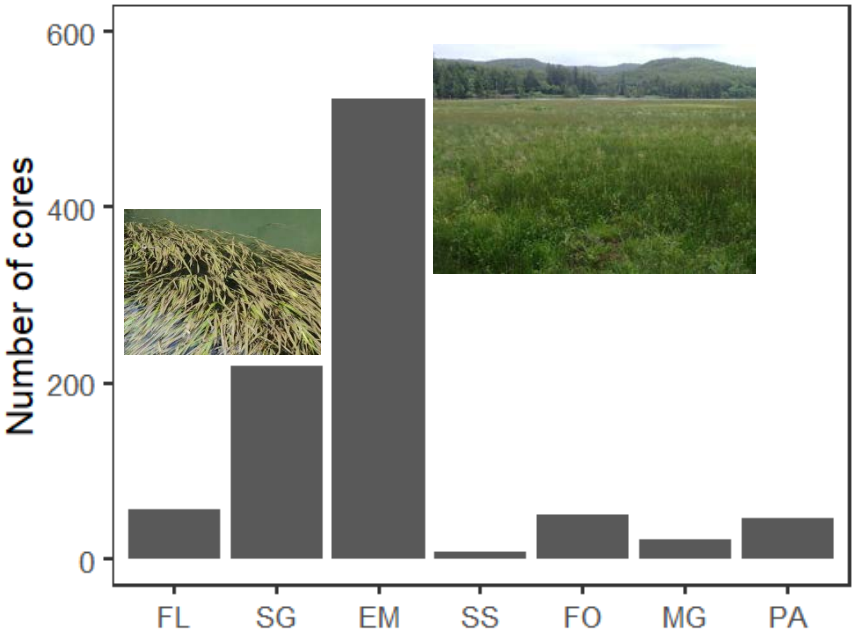
Some summary statistics

- >900 cores presently in the database from >30 studies
- >850 cores with depth-specific carbon density values
- ~250 some measure of accretion rate (usually ^{210}Pb or ^{137}Cs)

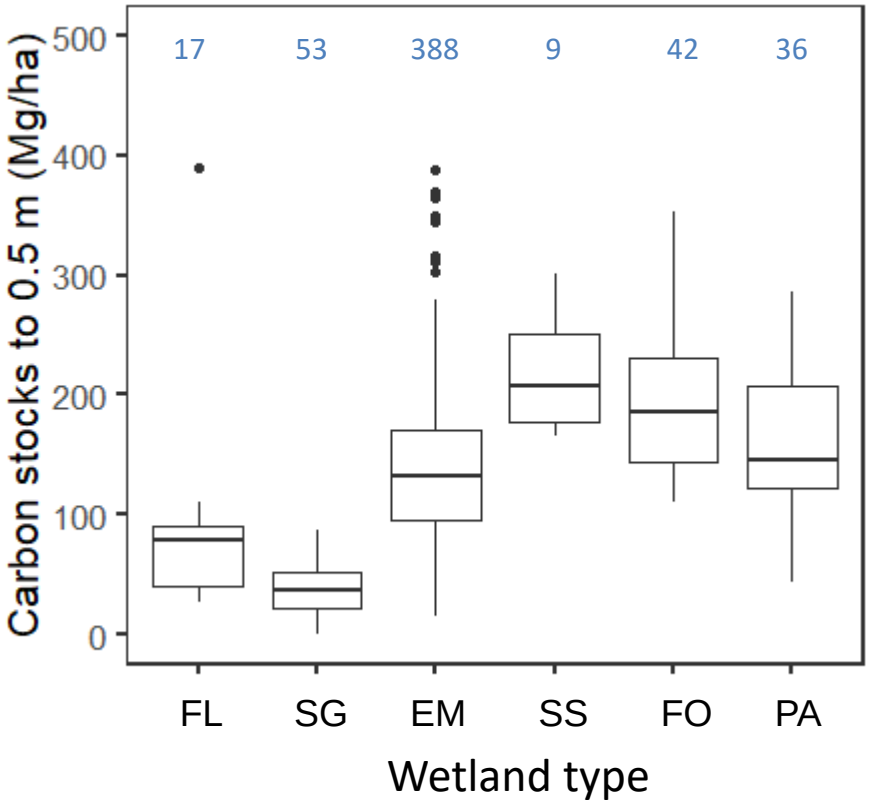
States/provinces



Wetland type



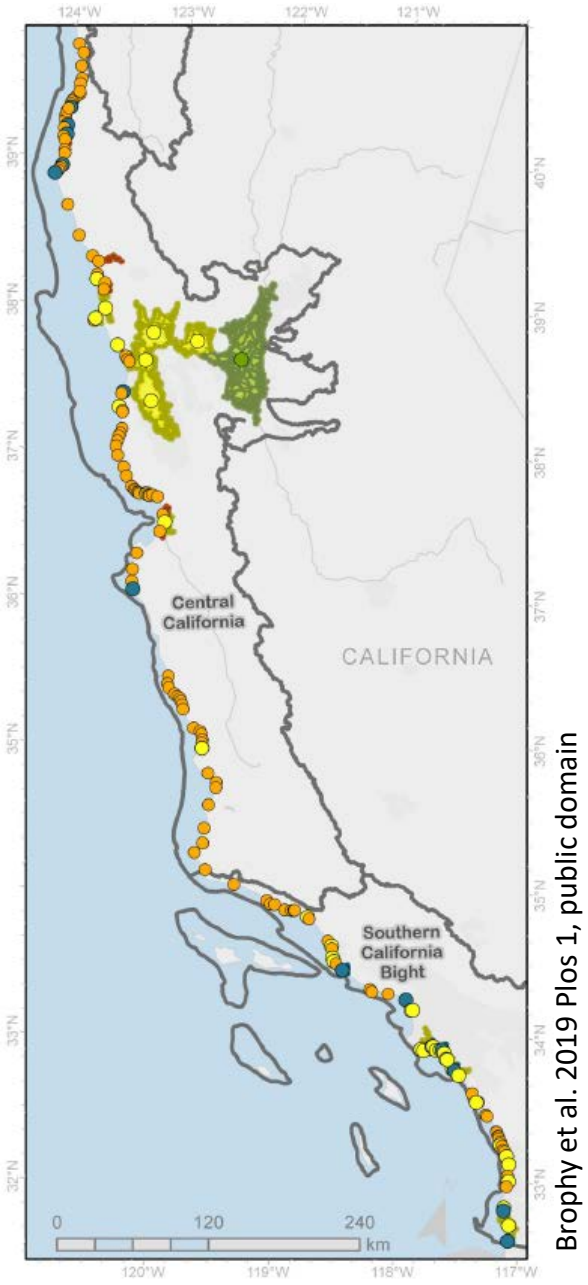
Soil carbon stocks by wetland type



- Tidal marshes have high, but quite variable, soil blue carbon stocks
- Stocks are lower in tide flat (FL) and seagrass meadows (SG)
- Median stocks are highest in temperate woody wetlands such as Sitka spruce swamps (see also Kauffman et al. 2020)

Final points about the database

1. The database has been valuable for identifying **data gaps** regionally.
2. We are happy to incorporate any **new data** you may wish to share.
3. Two **synthesis publications** are planned for the database.
4. Many of the data sets are **available** on the CCRCN's Coastal Carbon Atlas and Figshare.



Brophy et al. 2019 Plos 1, public domain

Contact: janousec@oregonstate.edu, @JanousekWild

PNW Blue carbon working group on social media: @PNWBlueCarbon

REFERENCES

Brophy LS, Greene CM, Hare VC, Holycross B, Lanier A, Heady WN, O'Connor K, Imaki H, Haddad T, Dana R. 2019. Insights into estuary habitat loss in the western United States using a new method for mapping maximum extent of tidal wetlands. PLoS ONE 14:e0218558

Kauffman JB, Giovanonni L, Kelly J, Dunstan N, Borde A, Diefenderfer H, Cornu C, Janousek C, Apple J, Brophy L. 2020. Total ecosystem carbon stocks at the marine-terrestrial interface: Blue carbon of the Pacific Northwest coast, United States. Global Change Biology 26:5679-5692.

FUNDING

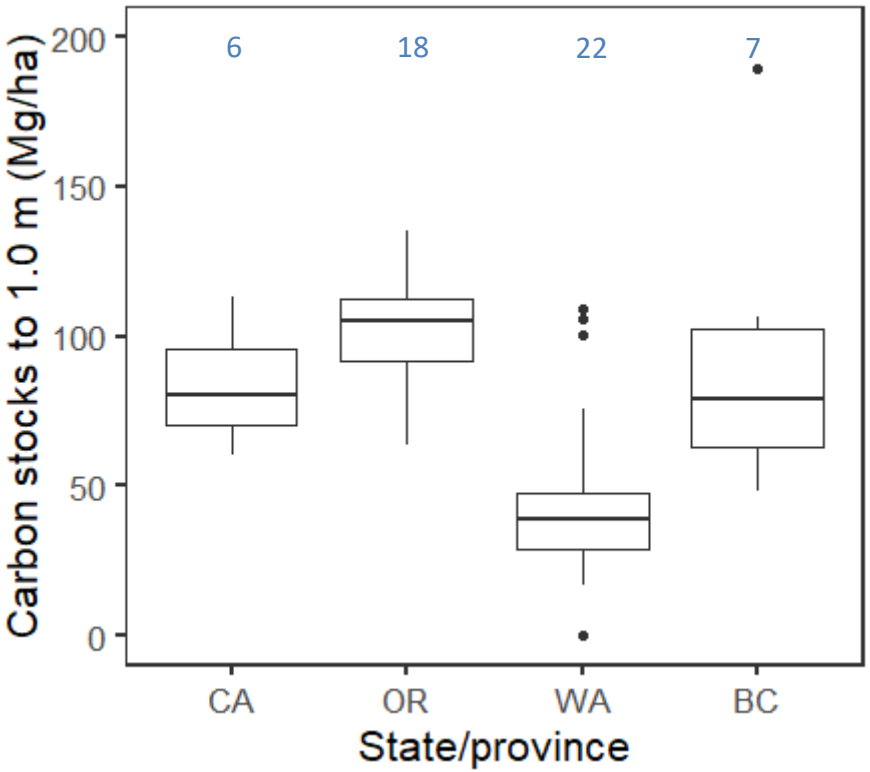
- NOAA NERRS Science Collaborative
- NOAA EESLR grants NA15NOS4780171 and NA19NOS4780176
- OWEB 219-923-17145

DATA LINKS

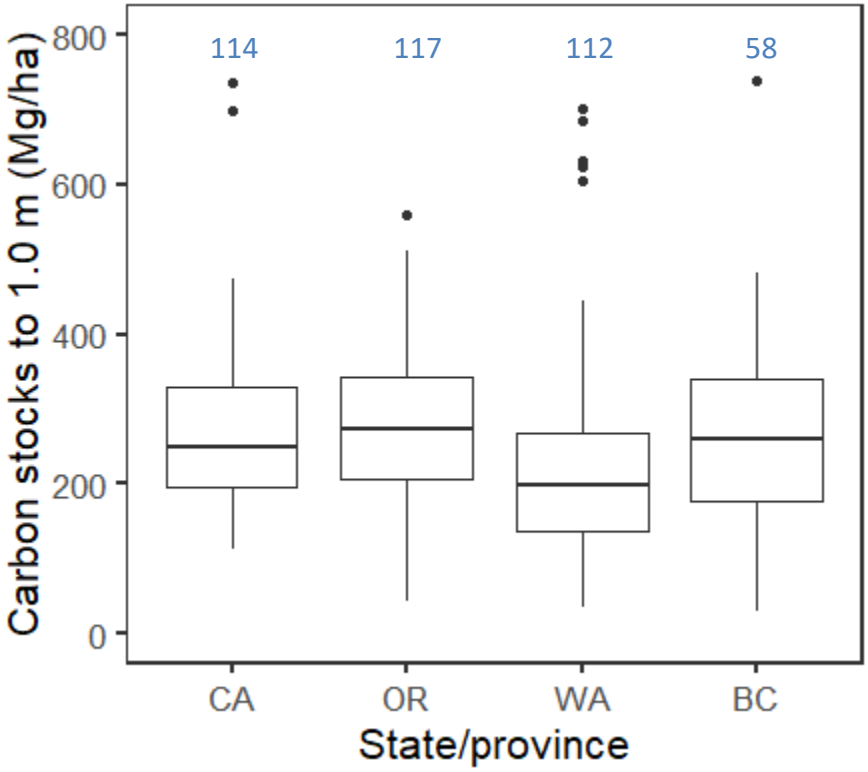
- Link to CCRCN's international Coastal Carbon Atlas
- Figshare data release for Kauffman et al. 2020 *Global Change Biology*

Soil carbon stocks by geographic region

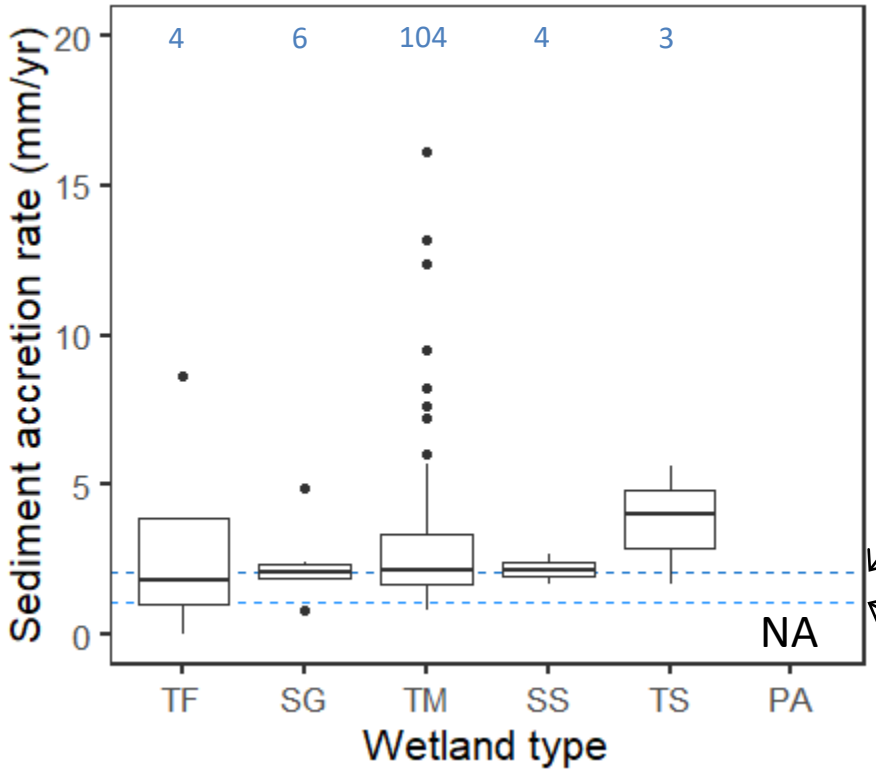
Seagrass meadows



Emergent marshes



Accretion rates by wetland type (^{210}Pb only)



- Median tidal marsh accretion rate = 2.15 mm yr^{-1}

Seattle, WA, 2.06 mm yr^{-1}

Charleston, OR, 1.1 mm yr^{-1}