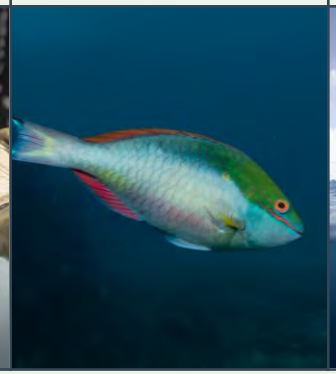
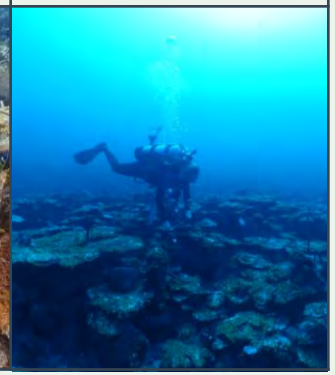
VI-EPSCoR Site Visit

Ridge to Reef (R2R): Processes and Interdependent Drivers of Small Island Resilience

Award No. OIA-1946412

R2R RESEARCH – 7 Research Themes

Research Theme 1	Research Theme 2	Research Theme 3	Research Theme 4	Research Theme 5	Research Theme 6	Research Theme 7
Watershed Monitoring & Land Use	Mangrove Ecosystem Function, Recovery & Restoration	Emerging Research Areas	Fish Ecology	Oceanography	Marine Disease And Restoration	Coral Reef Resilience
						

Research Theme 1:

Watershed Monitoring & Land Use

Introduction

Watershed Monitoring
& Land Use

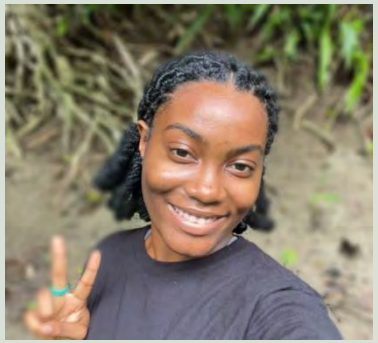
Monitoring the terrestrial inputs to the marine ecosystem by understanding Virgin Islands hydrology and quantifying the effects of land use on pollutant mobilizations

Meet The Team

David Hensley, research lead

Dr. Brittany Lancellotti, postdoctoral fellow

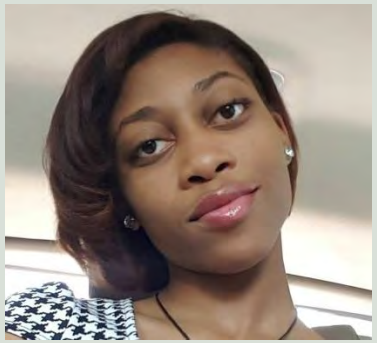
Sabrina Sorace*, graduate research assistant



SaVaughna John-Baptiste*, undergraduate research assistant

Race Stryker, graduate research assistant

N'Bari Alexander, undergraduate research assistant



N'Quoia Christian, undergraduate research assistant

Zach Eldridge, graduate exchange student (UF)

Major accomplishments

Spanning seven watersheds (but focused on two), and encompassing four land-use additional land use studies at several scales:

1) Watershed scale
2) Field scale
3) Plot scale

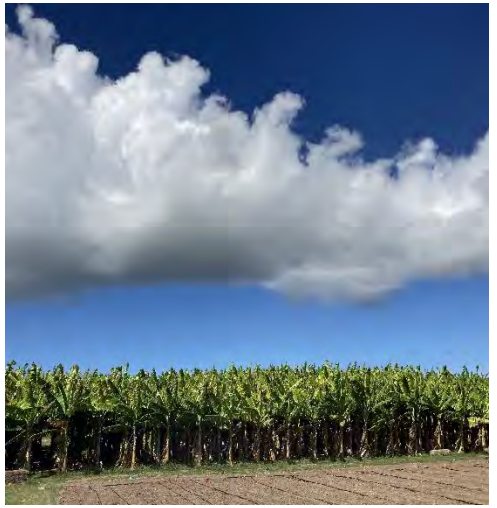
And engaging graduate and undergraduate student researchers (5 total) in earth sciences.

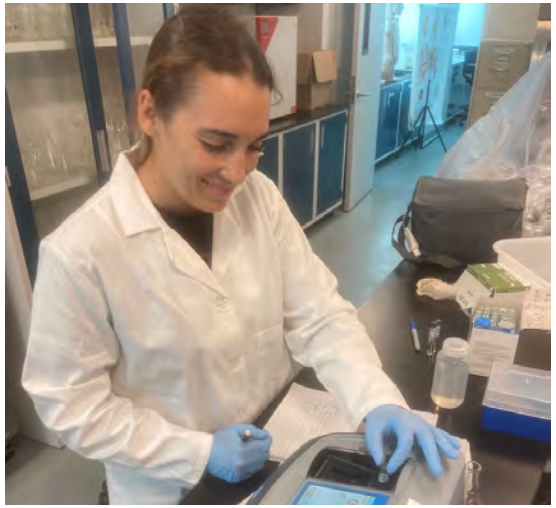
Comprehensive review article on the state of knowledge of USVI hydrology in review

Four more watershed monitoring sites established (2 major STT watersheds, 2 STX)

Water quality (nutrient and sediment) datasets produced, under analysis

Land use soil moisture mapping successful





Research Goals And Objectives

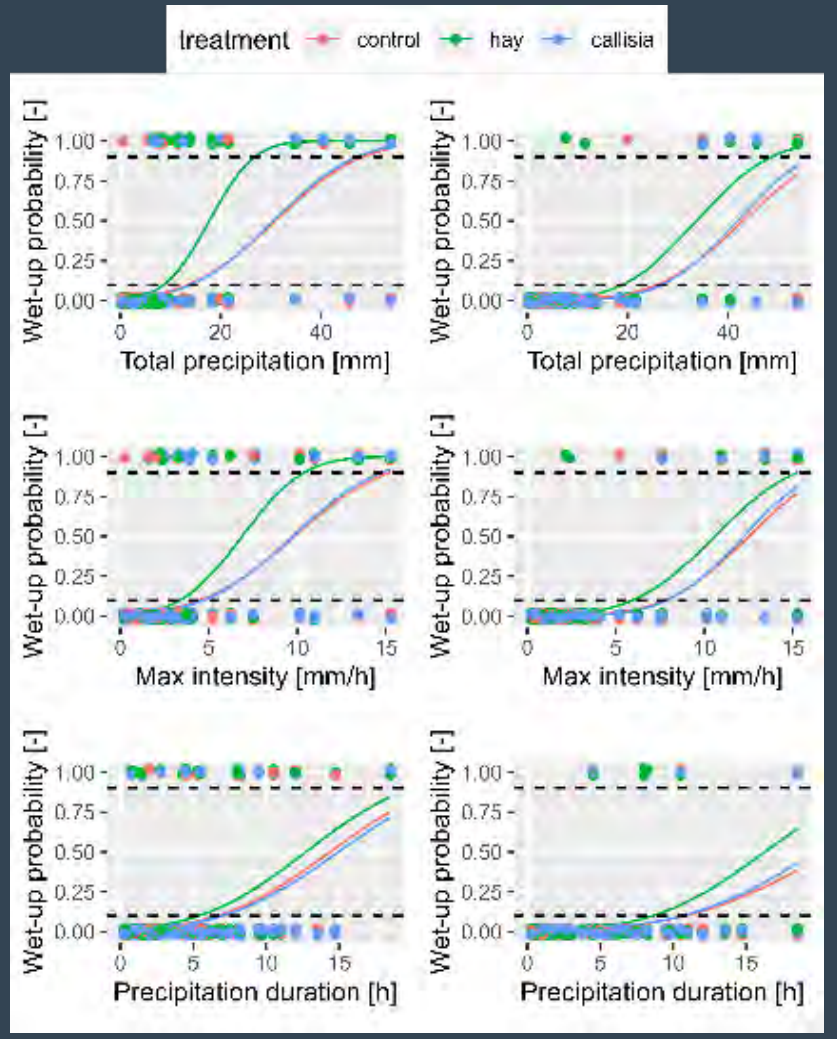
Year 1	REFERENCE SAMPLES COLLECTED; EQUIPMENT CONSTRUCTED
Year 2	MONITORING SITES ESTABLISHED, REGULAR MONITORING
Year 3	RESPONSE TO MAJOR RAINY SEASON, CONCLUDED SEVERAL LAND BASED EXPERIMENTS

Year 4 Goals

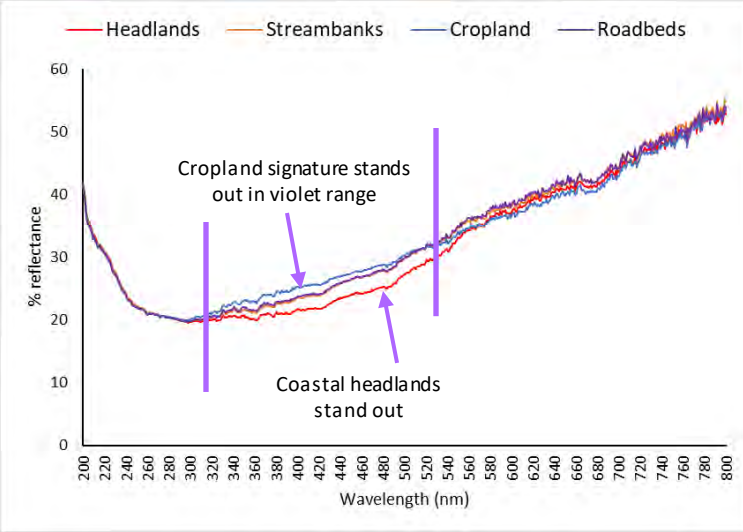
Significant datasets from all research goals of the Watershed and Land Use section are now produced. Most of our current goals are to analyze and publish results:

- Publish graduate student research on vegetative buffers
- Publish plantain/mulch study results
- Refine hydrological data (discharge, sediment and nutrient curves, and develop robust rating curves
- Present hydrological results at AGU

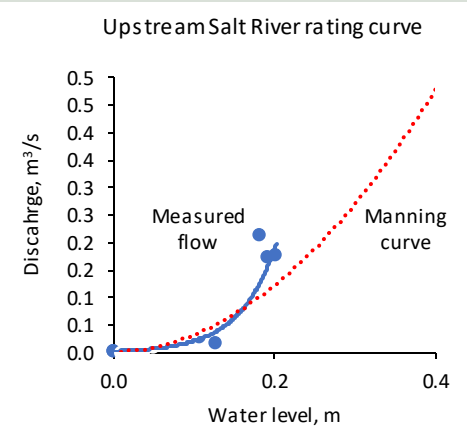
Goal WL2	Publication of manuscript on ground cover usage to reduce runoff and encourage groundwater recharge
Goal WL2	Publication of graduate student research (R. Stryker) in vegetated conservation buffers to prevent sedimentation
Goal WL1	Establishment of “rating curves” for Virgin Islands watersheds and watershed modelling

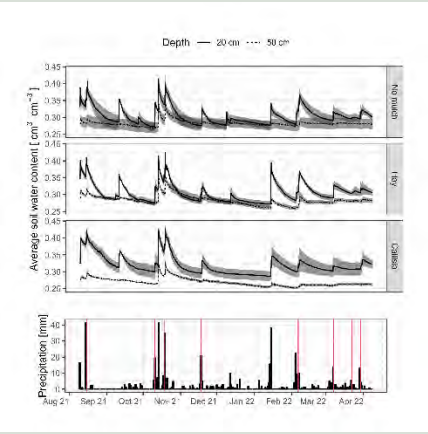


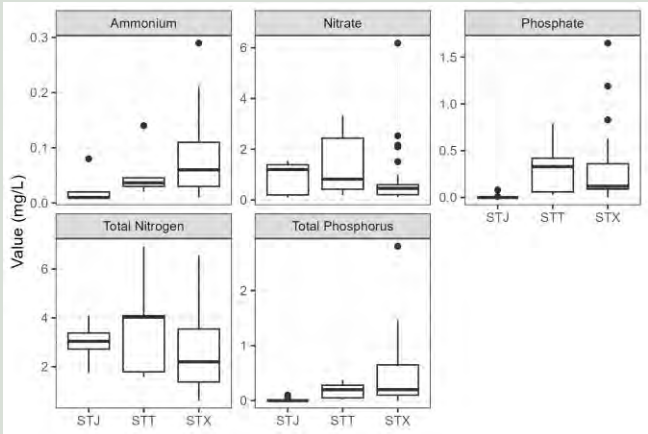
Results, Outcomes & Accomplishments

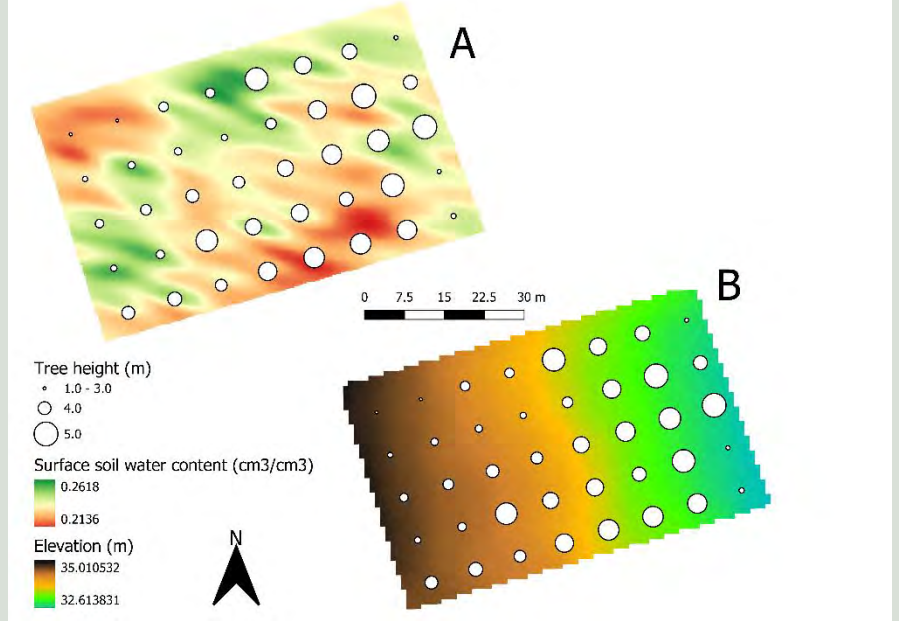


- ✓ Sediment reference sample spectra reveal land-use signature (violet-blue range)
- ✓ The first known rating curves in the Virgin Islands have been developed: requires refinement
- ✓ Soil moisture temporal response to precipitation
- ✓ Nutrient concentrations
- ✓ Soil moisture mapping
- ✓ Comprehensive review paper

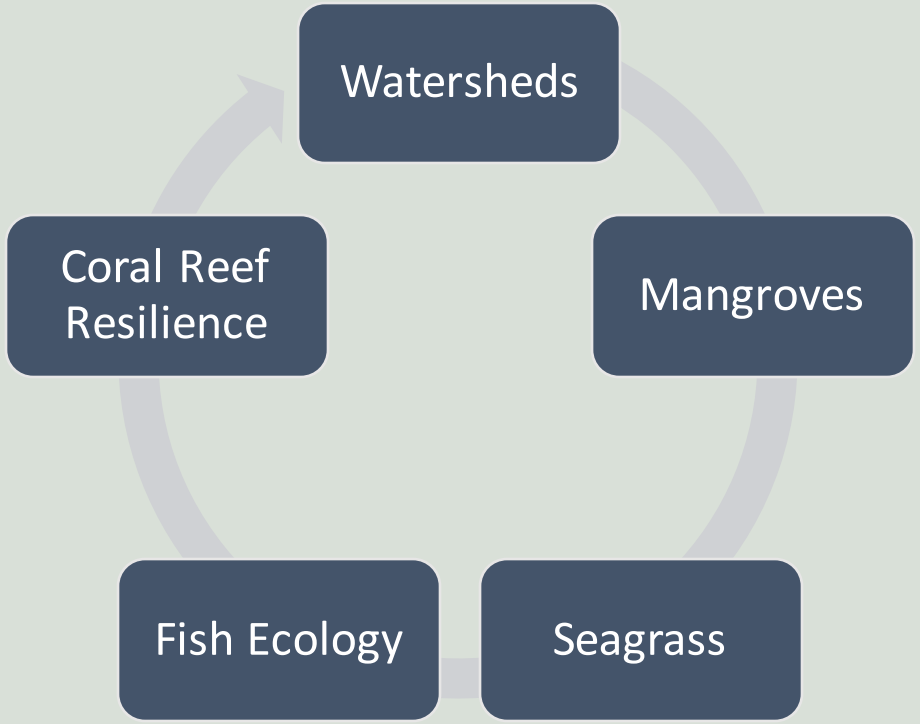




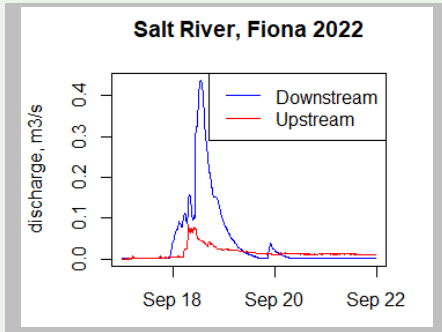




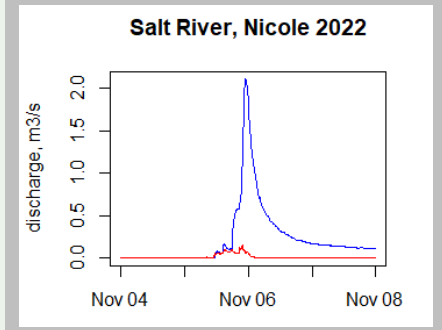
Research Interdependencies



- Connectivity questions affect whether mangrove environments receive inputs of fresh water, nutrient, and sediment.
- Fish and coral reef ecology are affected by the presence of sediments in the water – and quantity matters
- Shorelines and *Sargassum* interactions can affect whether freshwater discharges into the sea



Total rain = 438 mm
Max rate = 279 mm/h
Mangrove sediments = 12.4 mg/cm^2/d



Total rain = 182 mm
Max rate = 84 mm/h
Mangrove sediments = 17.3 mg/cm^2/d

RESEARCH INTERDEPENDENCIES

Mangroves: Antecedent soil moisture has major role in watershed connectivity & mangrove sediment deposition (left)

Fish Ecology: Even after normalizing by watershed size, undeveloped Reef Bay fluxed several times less sediment than Fish Bay (right)

Shorelines and *Sargassum*: May determine whether discharge occurs (below)

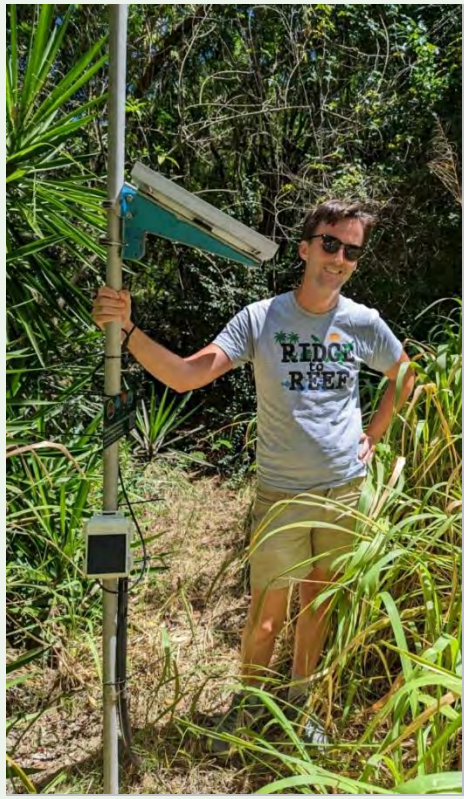
NOVEMBER 2022

FISH BAY
2.17x greater total water discharge than Reef Bay

REEF BAY
1.79x less sediment concentration than Fish Bay

Broader Impacts, Intellectual Merit, & Sustainability

UNDERSTANDING FLUXES IN WATERSHEDS	HYDROLOGICAL RESEARCH CAPACITY	RESOURCE MANAGEMENT	INTERDISCIPLINARY COLLABORATION	PROMOTING WATER SUSTAINABILITY
Predictions of flux (water, pollutants) possible for the first time in the VI through watershed modeling – assisting stakeholders and managers	Building capacity to carry out fundamental soil and hydrological research previously less represented at UVI	Surface water hydrology helps the USVI respond to drought and floods (climate change) while protecting the marine zone	Connecting terrestrial science in the USVI (agriculture and forestry) with marine scientists	Bringing attention and awareness though outreach and data collection to surface water and water security in the USVI



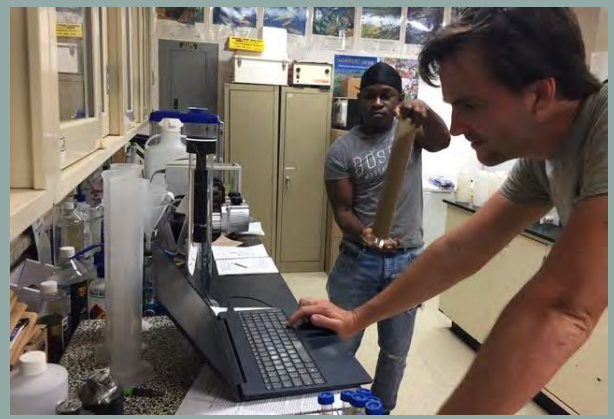
Diversity

Interactions with farmers (extension)

Community outreach events

Stakeholders and policymakers

Site visits

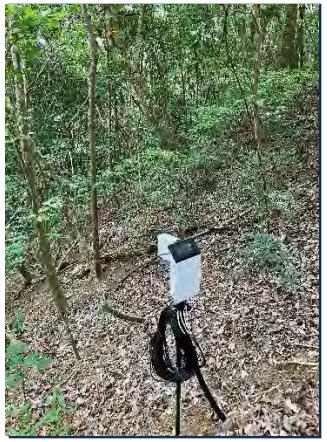


Student engagement

Field trips

Collaborations

Future Plans



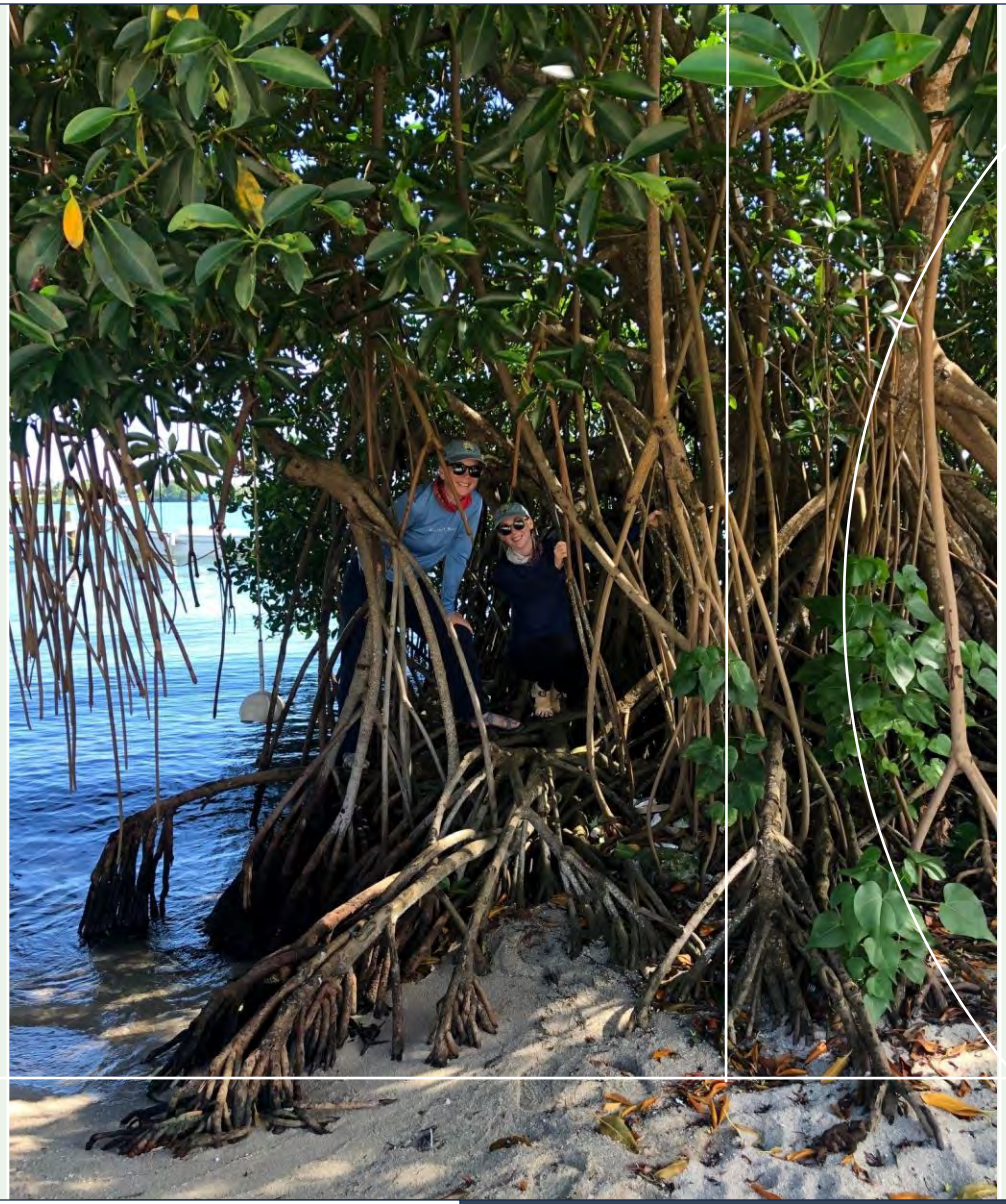
Ecohydrology	Ecohydrology of Virgin Islands plant covers (evapotranspiration of soil water and interception of rainwater)
Ponds	Function and role of freshwater ponds (recharge, habitat, resource, research site)
Remote sensing	Sediment discharge remote sensing automatic detection

Thank you!

David Hensley

EMAIL: david.hensley@uvi.edu

PHONE: 713-444-2659



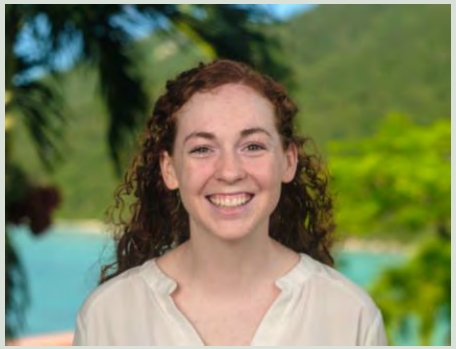
Research Theme 2:

Mangrove Ecosystem Function & Recovery and Mangrove Restoration

Introduction

Meet The Team

Dr. Kristin Wilson Grimes,
Research Associate Professor



Allie Durdall, M.Sc., Marine & Watershed Specialist

*indicates current lab members

Virgin Islanders

(3) NSF SEAS Islands Alliance and Securing STEM Island Pathways Workfellows:
Allison Holevoet*
Zola Roper
Kwami Alexander

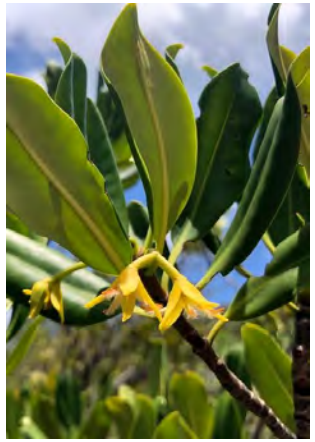
(1) Post-Doctoral Researcher:
Dr. Heather Stewart

(9) MMES Graduate Students:
Laura Palomino Bloem*
Lila Uzzell*
Kayla Halliday*
Jordan Silva*
Julia Plotkin*
Sarai Hutchinson*
Ella Troutman*
Stephanie Hibberts

(20) Undergraduate Students: (not all pictured)
Aaliya Warner Rawlins*
Hiba Hussein*
Sydney Taylor*
Lorely Granados*
Megan Anthony*
Shomyra Francis*
Naye Fernandez*
Savannah Carroll*
Denny Gonzalez
Kaidrian Ottley
Molly Mason
Miranda Goad
Tara Thompson
Zachary Briggs
Amanda Boissiere
VerNele Callwood
Nicholas Durgadeen
Ian Jin
Ellie Tanko
Heather Bruck

(4) High School Students:
D'jani Hurtault
Elyse Ayala
Flame Gonzalez
TJ Roy
Kanesha Tonge

Research Goals And Objectives



Goal M1	Investigate current and historic USVI mangrove distribution, recovery, and loss.
Goal M2	Grow USVI mangrove restoration opportunities.
Goal M3	Share USVI mangrove research with stakeholders and provide opportunities for new partnerships.

Research, Outcomes & Accomplishments

M1. Investigate current and historic USI mangrove distribution, recovery, and loss (Years 1-3).

GRROE USVI Mangroves started; Territorial Mangrove Monitoring Program (TMMP) established, 2 years of data collected.

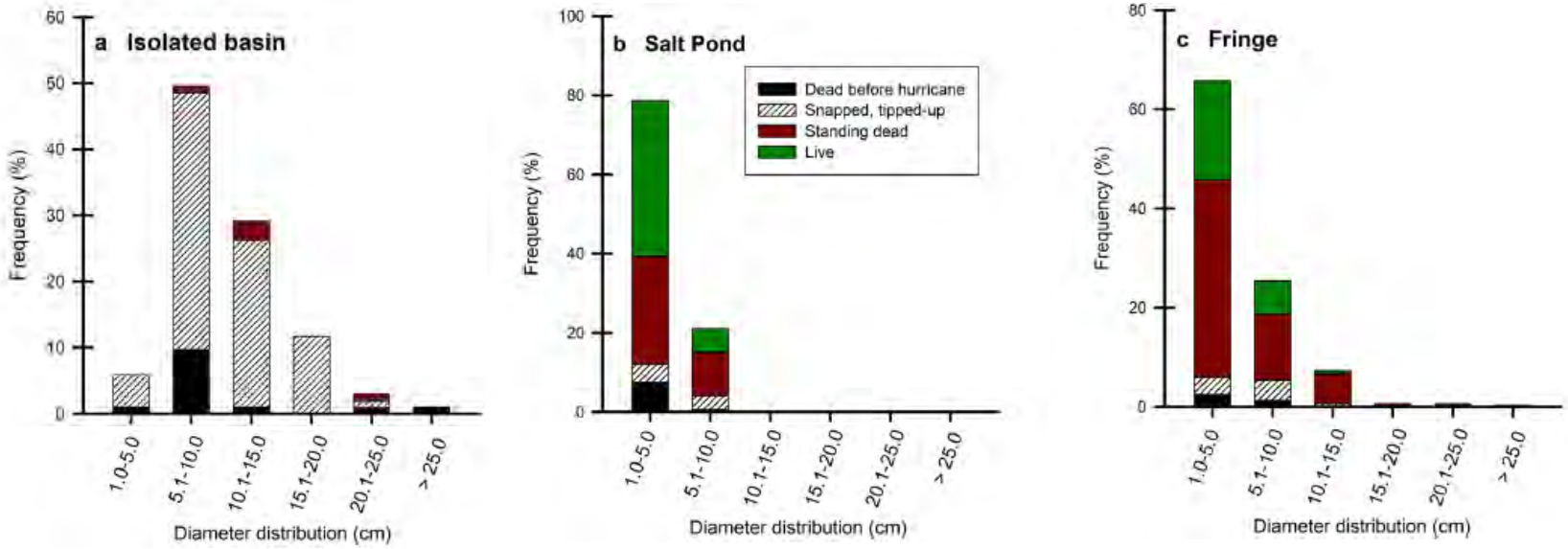
Wetlands
https://doi.org/10.1007/s13157-020-01313-5

WETLANDS AND CLIMATE CHANGE

Check for updates

Structural Impacts, Carbon Losses, and Regeneration in Mangrove Wetlands after Two Hurricanes on St. John, U.S. Virgin Islands

Ken W. Krauss[1] · Andrew S. From[1] · Caroline S. Rogers[2] · Kevin R. T. Whelan[3] · Kristin W. Grimes[4] · Robert C. Dobbs[1] · Thomas Kelley[5]



University of the Virgin Islands

VIRGIN ISLANDS EPSCoR

NSF EPSCoR

Research, Outcomes & Accomplishments

19 Sites Each site has 3 x 0.01 ha radial plots

8 sites in **St. Thomas**
- 4 Fringe | Brewers, Vessup, STEER, Mandahl
- 2 Salt Pond | Perseverance, Compass Point
- 2 Basin | STEER, Magens

7 sites in **St. John**
- 4 Fringe | Turner, Mary Creek, Princess, Water
- 3 Salt Pond | Reef, Francis, Lameshur

4 sites in **St. Croix**
- 2 Fringe | Krause Lagoon, Salt River
- 2 Salt Pond | Great Pond, Southgate

M1. Investigate current and historic USI mangrove distribution, recovery, and loss (Years 1-3).

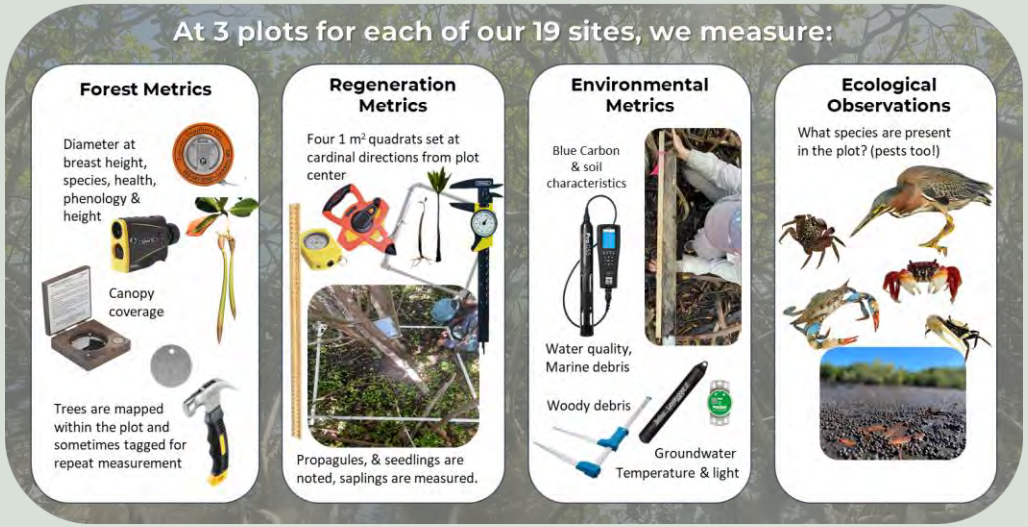
GRROE USVI MANGROVES — GROWING RESEARCH, RESTORATION, OUTREACH, AND EDUCATION

GRROE USVI Mangroves started; Territorial Mangrove Monitoring Program (TMMP) established, 2 years of data collected.

Geologic coring completed; analyses underway.

Drone certification obtained.

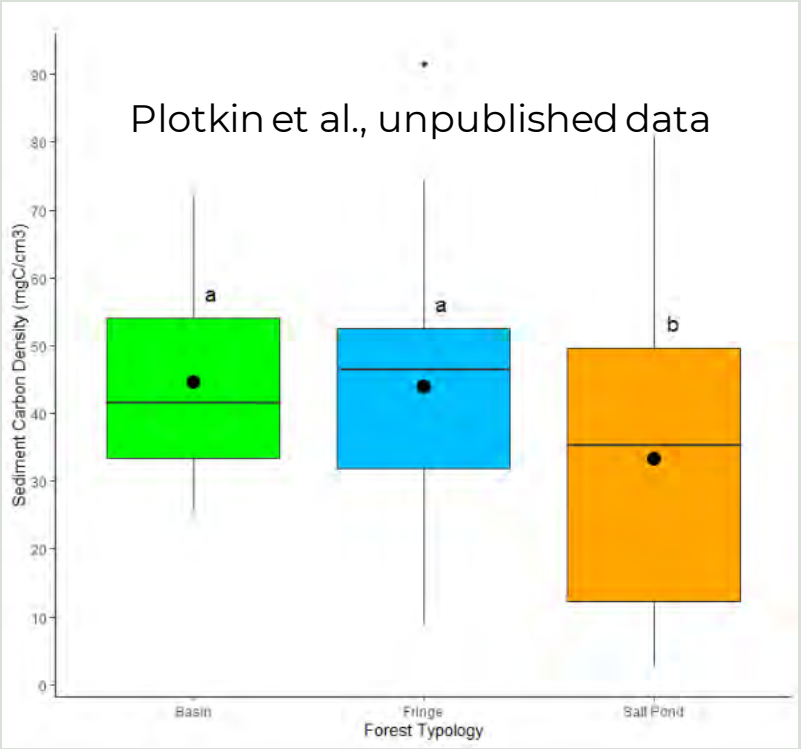
Historical analyses started.



University of the Virgin Islands | VIRGIN ISLANDS EPSCoR | NSF EPSCoR

Results, Outcomes & Accomplishments

M1. Investigate current and historic USI mangrove distribution, recovery, and loss (Years 1-3).

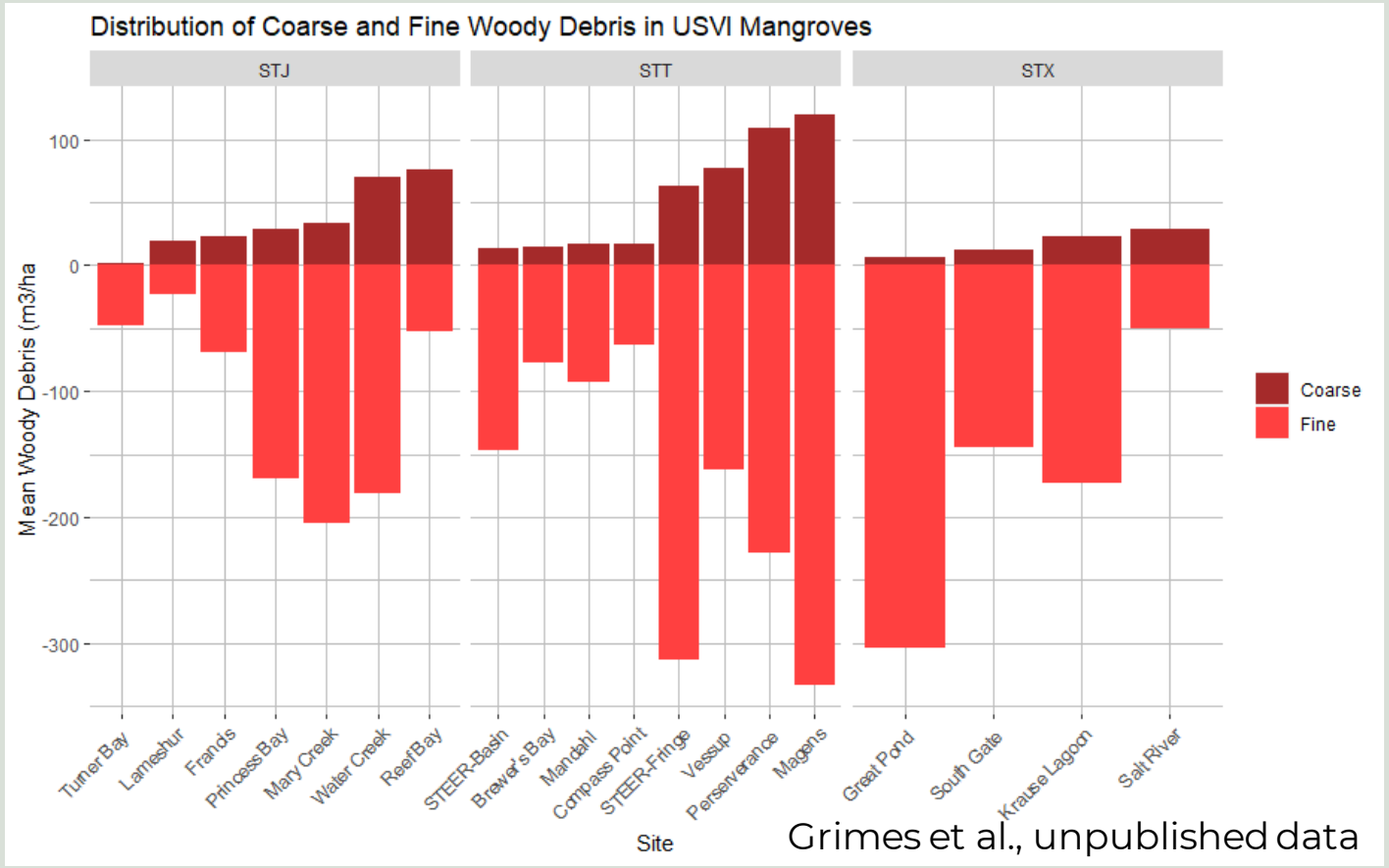


- ✓ **24 cores collected in Year 1; 14 collected in Year 2**
- ✓ **Sediment carbon density ranged from 2.72-91.55 mgC/cm^3 with a mean of 40.37; significant differences observed by typology**
- ✓ **MMES student, Julia Plotkin, trained in elemental analysis through collaboration with University of South Carolina**
- ✓ **Julia is an employee of VI DPNR, Div. Of Fish & Wildlife**

Results, Outcomes & Accomplishments

M1. Investigate current and historic USI mangrove distribution, recovery, and loss (Years 1-3).

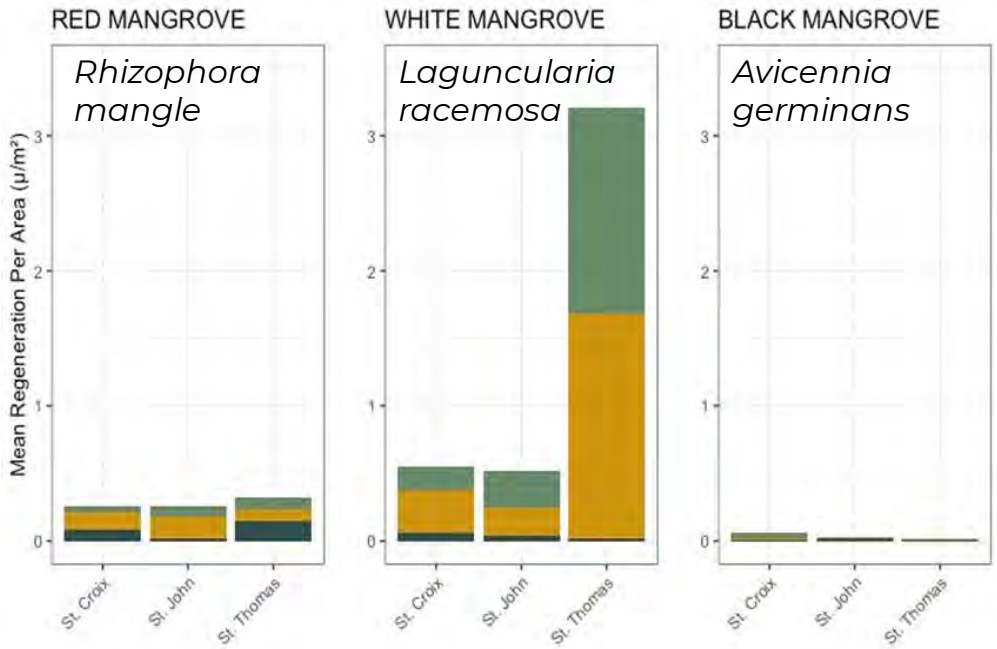
- ✓ **Coarse woody debris is variable across sites, but higher in STT and STJ**
- ✓ **Most sites have large amounts of fine woody debris**



Grimes et al., unpublished data

Results, Outcomes & Accomplishments

M1. Investigate current and historic USI mangrove distribution, recovery, and loss (Years 1-3).



Grimes et al., unpublished data

- ✓ **Natural regeneration (propagules, seedlings, saplings) is low across sites and islands (<1 individual per m^2)**
- ✓ **Active restoration may be needed at some sites, especially St. John**

Research, Outcomes & Accomplishments

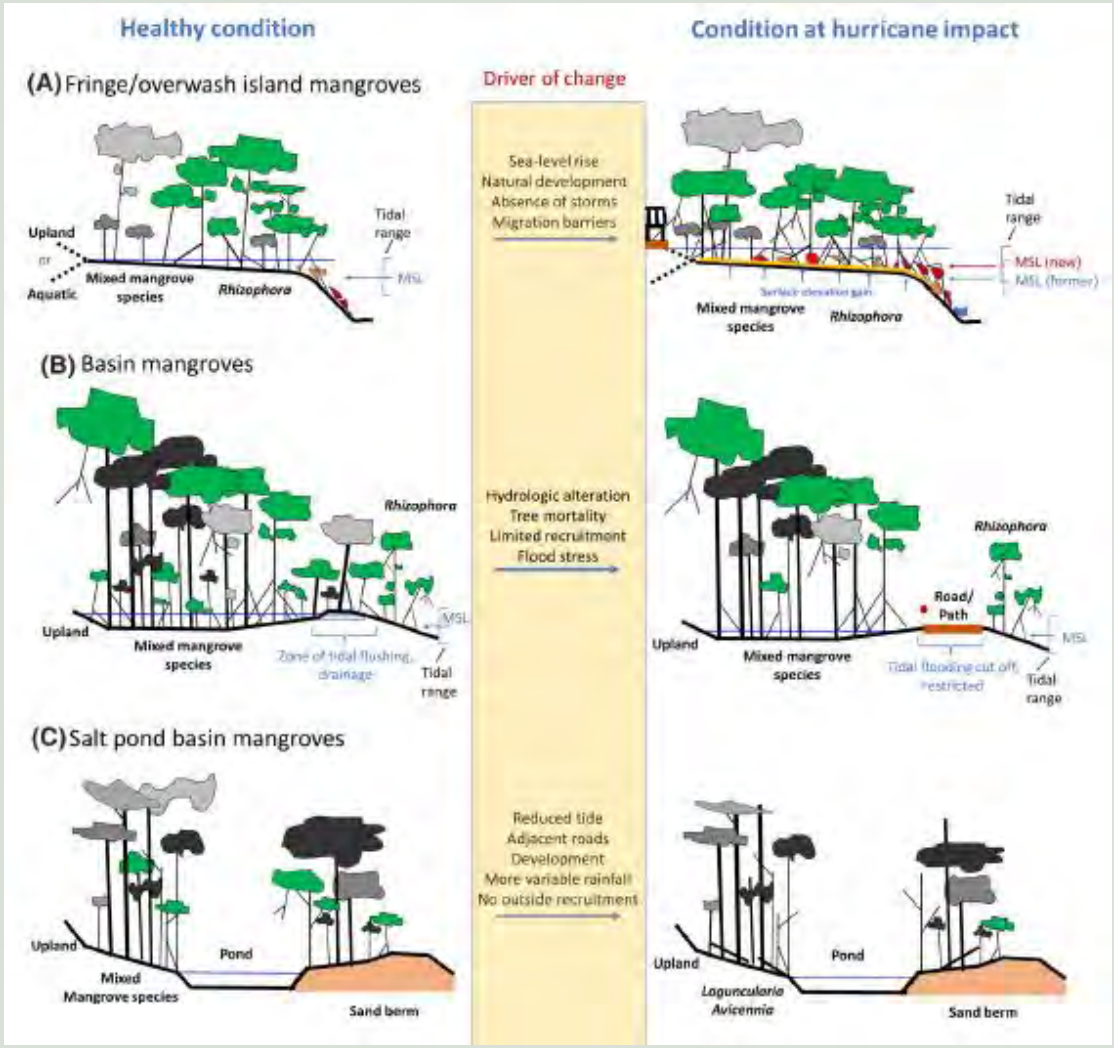
RESTORATION ECOLOGY
The Journal of the Society for Ecological Restoration
SER

REVIEW ARTICLE

Framework for facilitating mangrove recovery after hurricanes on Caribbean islands

Ken W. Krauss, Kevin R. T. Whelan, John Paul Kennedy, Daniel A. Friess, Caroline S. Rogers, Heather A. Stewart, Kristin Wilson Grimes, Camilo A. Trench, Danielle E. Ogurcak ... See all authors

M1. Investigate current and historic USI mangrove distribution, recovery, and loss (Years 1-3).



Research, Outcomes & Accomplishments

M2. Grow USVI mangrove restoration opportunities (Years 1-3).

UVI St. Thomas mangrove nursery established.

3 mangrove seedlings grown for local restoration projects; intake metrics recorded, seedlings monitored.

Nursery and outplanting experiments conducted (sprouting, container type, substrate, planting arrangement).

Educational training provided for students, and community volunteers.

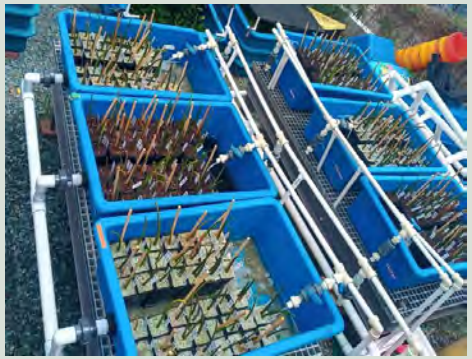
Results, Outcomes & Accomplishments

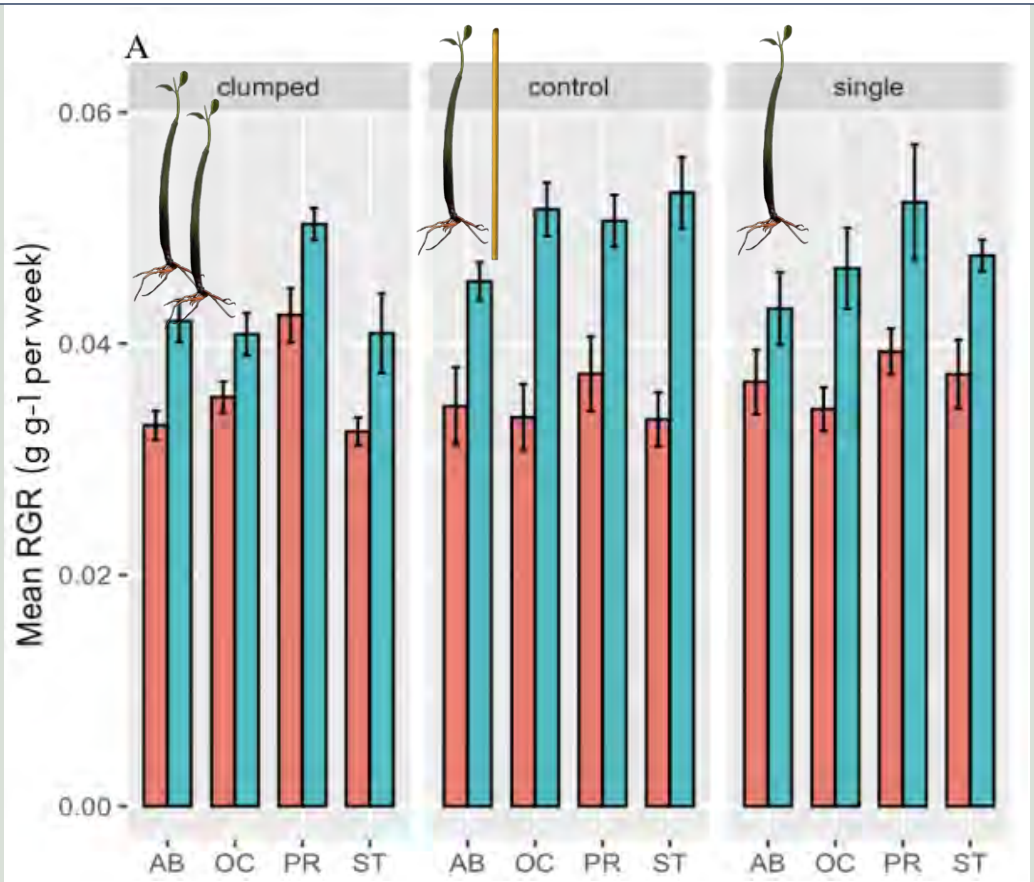
M2. Grow USVI mangrove restoration opportunities (Years 1-3).

- ❖ *Rhizophora mangle* (red mangrove): 3,355 planted, 74% nursery survivorship
- ❖ *Laguncularia racemosa* (white mangrove): 3,789 planted, 21% nursery survivorship
- ❖ *Avicennia germinans* (black mangroves): 969 planted, 58% nursery survivorship

*Numbers current as of Aug 2023.

- ✓ **Nursery survivorship varies by species**
- ✓ ***R. mangle* propagules grow equally well in all container types and container type has no effect on outplanting success.**
- ✓ **Recycled, crushed glass is a viable substrate to grow *R. mangle* in nursery settings (survivorship: 98% in glass, 99% in soil). However, soil-grown plants grow faster and larger than glass-grown plants.**





Holevoet et al., unpublished data

AB = Annaberg, St. John
OC = Oasis Cove, St. Thomas
PR = Perseverence, St. Thomas
ST = St. Thomas East End Reserves, St. Thomas

glass
soil

Research, Outcomes & Accomplishments

M3. Share USVI mangrove research with stakeholders and provide opportunities for new partnerships.

First community workshop held to create a shared vision for mangrove restoration and determine criteria for prioritizing restoration sites.

Survey of Community Perceptions of Mangroves launched.

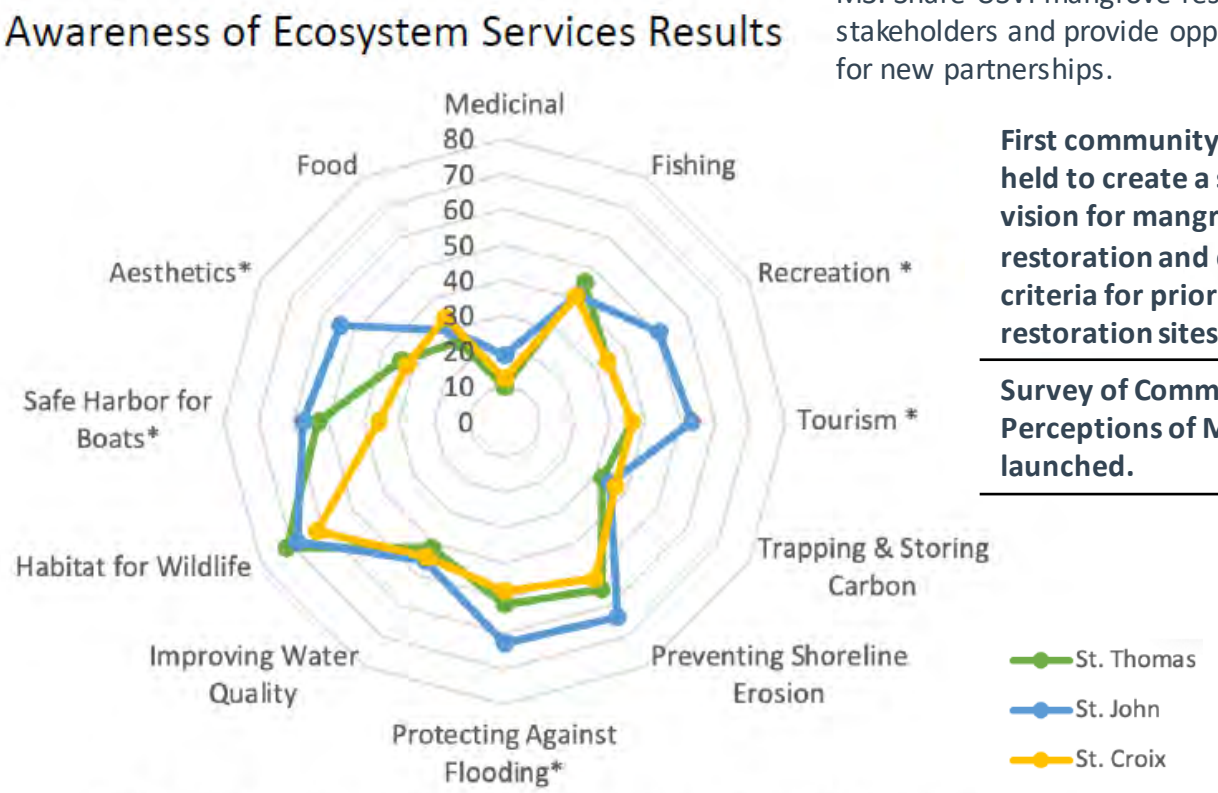


Figure 4. Radar diagram showing awareness of respondents for each of the listed ecosystem services by island for the category "extreme awareness" on the likert scale

Bloem et al., unpublished data

https://www.youtube.com/watch?v=Hr8WLBQPVKs

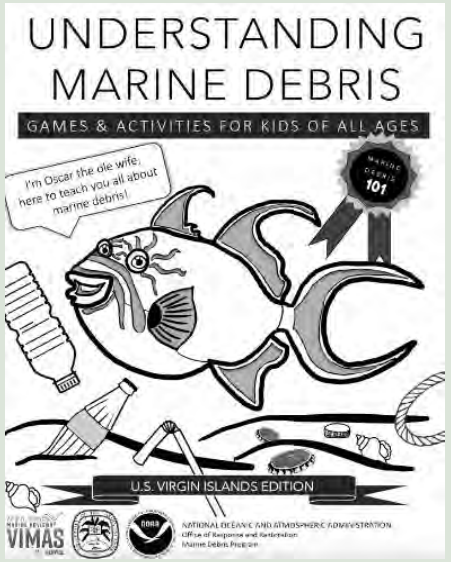
Research, Outcomes & Accomplishments

M3. Share USVI mangrove research with stakeholders and provide opportunities for new partnerships.

Follow us on Instagram!

@GRROE.USVI.MANGROVES

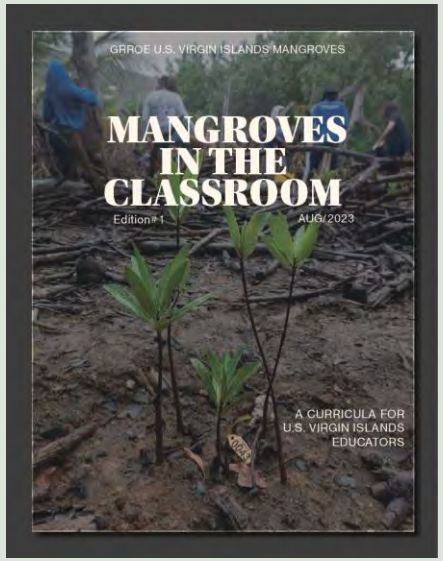
- **Annual, territory-wide Great Mangrove Cleanups events conducted.**
- **Educational partnerships: Mangroves in the Classroom, USVI Storm Strong Program**
- **Outreach: community events, newspaper articles, blogs, newsletters, social media**
- **Research shared at local, national, and international conferences.**
- **Place-based educational curricula, outreach books, and policy documents created.**

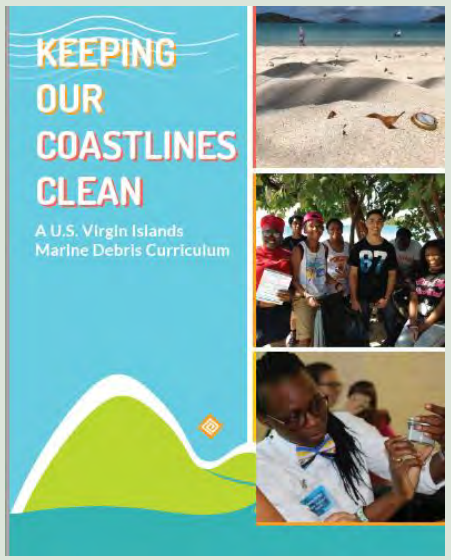


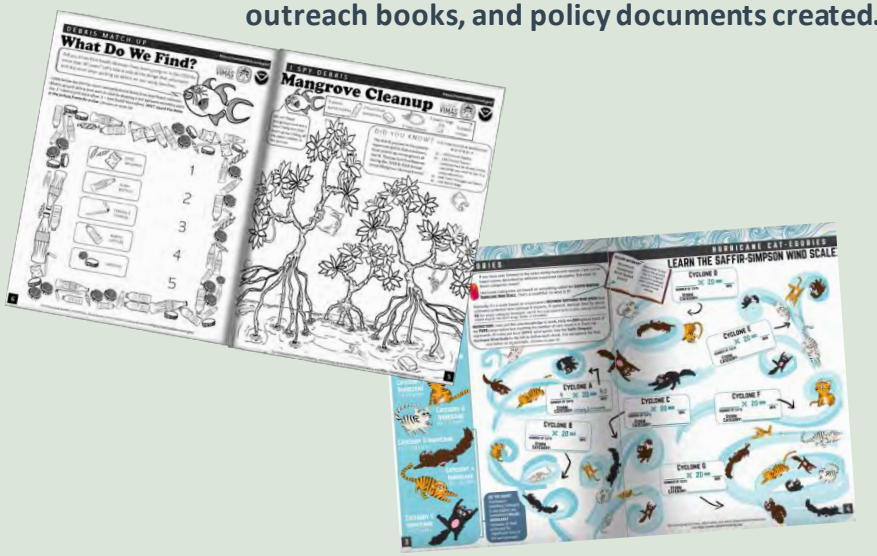
Research, Outcomes & Accomplishments

M3. Share USVI mangrove research with stakeholders and provide opportunities for new partnerships.

- **Annual, territory-wide Great Mangrove Cleanups events conducted.**
- **Educational partnerships: Mangroves in the Classroom, USVI Storm Strong Program**
- **Outreach: community events, newspaper articles, blogs, newsletters, social media**
- **Research shared at local, national, and international conferences.**
- **Place-based educational curricula, outreach books, and policy documents created.**







RESEARCH INTERDEPENDENCIES

Our work strongly supports the goals of Informal Learning, VI-ISERP, and more broadly, restoration. The Mangroves in the Classroom and USVI Storm Strong Programs support place-based, hand-on learning for USVI youth and co-creation of curricula with USVI educators; learning exchanges provide opportunities for undergraduate and graduate students, staff, and faculty; the Great Mangrove Cleanups engage hundreds of community volunteers; paid internships provide support and training.

Diversity

Our lab is committed to diversity and inclusion; we foster this in many ways.

On our team

38 of 40 folks are from underrepresented groups in the geosciences!

18 are Virgin Islanders!

In the community*

* Numbers for year 3 only. Participant diversity isn't collected. According to the 2020 census the USVI community is (76% African American or Black, 17% Hispanic or Latino)

- 5 public events, 11 nursery tours, 4 summer camps
- 2 DPNR CZM Science Saturdays
- 943 folks engaged
- 113 mangrove cleanup volunteers

- 286 students, 10 teachers from 8 schools (5 public, 3 private)
- 41 summer camp students

- 72 students from 3 classrooms
- 2 URM high school interns hired
- all Title 1 schools

1,464 folks in Year 3 alone

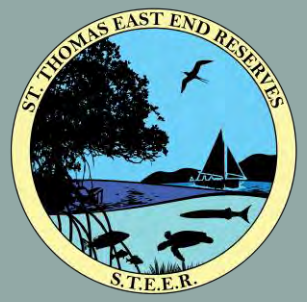
Now, and into the future

- NSF Eddie Bernice Johnson INCLUDES, *SEAS Islands Alliance*
- NSF Cultural Transformation in the Geosciences, *Navigating Home*
- NSF EPSCOR RII- BEC, *Securing STEM Island Pathways*
- NSF BIO LEAPS, *C-COAST*

Broader Impacts, Intellectual Merit, Sustainability

NEW INSIGHTS GAINED	GEOSCIENCE TRAINING PROVIDED	USVI COMMUNITY ENGAGED	WORK SHARED	FUNDING SUSTAINED
New understanding of mangrove ecosystem function and recovery following hurricane impacts, as well as the impacts of small island mangrove systems; innovations in mangrove restoration discovered.	1 post-doctoral researcher, 3 Workforce Fellows, 9 UVI Master's of Marine & Environmental Science, 13 undergraduate, 4 high school and 2 middle school students trained.	Sustained youth engagement through the Mangroves in the Classroom and USVI Storm Strong Programs reached 385 students across 19 classrooms, aligning to R2R goals. 8 cleanups hosted, with 376 volunteers.	To date, 30 presentations given at national and international conferences, 8 peer-reviewed articles published, regular contributions to R2R communications products provided, video shared.	23 new grants received, totaling $12.2M to support and expand this work, including NSF CTGC Navigating Home (Award #2228177), and NSF RII-BEC Securing STEM Island Pathways (Award #2225854), NSF BIO LEAPS (Award #2233701).

Collaborations



Year 4 Goals

The mangrove research theme has four goals for the coming year:

- Monitor and synthesize mangrove recovery data
- Advance mangrove restoration
- Engage community
- Share our work

Thank you!

Allie Durdall, M.Sc.

EMAIL: allie.durdall@uvi.edu

Dr. Kristin Wilson Grimes

EMAIL: kristin.wilson@uvi.edu

Research Theme 3:

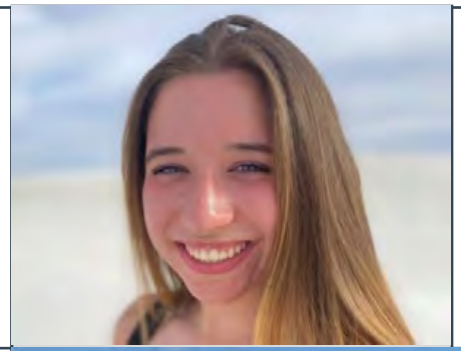
Emerging Areas
Movement Ecology of macrofauna in a changing seagrass environment

Meet The Team

Dr. Paul Jobsis

Dr. Kayla Blincow

Andrew McGregor
MMES Graduate student



Madison Miele
MMES Graduate Student

Taylor Brunson
MMES Graduate

Jordon Wilson
President UVI Sea Turtle Club
UVI Undergraduate Student

Corinne Johnson
MMES Graduate Student

Max Klemm
Vice President UVI Sea Turtle Club
UVI Undergraduate Student

Movement Ecology using a Fine Scale Positioning Acoustic Array

Dr. Paul Jobsis – Emerging Areas / Movement Ecology

Green turtles in a *Syringodium filiforme* dominated Brewers Bay - 2012

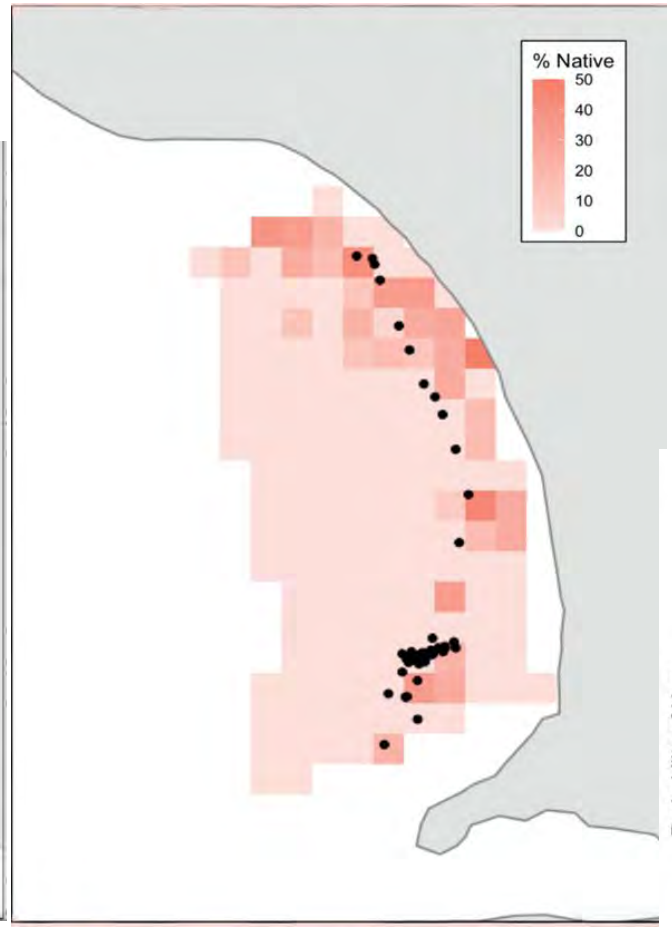
Brewers Bay is undergoing dramatic changes in its seagrass meadows and related communities due to an invasive seagrass *Halaphila stipulacea*. The installation of an 68 –receiver FPS acoustic array by VI-EPSCoR allows fine-scale tracking of its macrofauna such as green sea turtles, giant hermit crabs and stingrays as the bay changes.

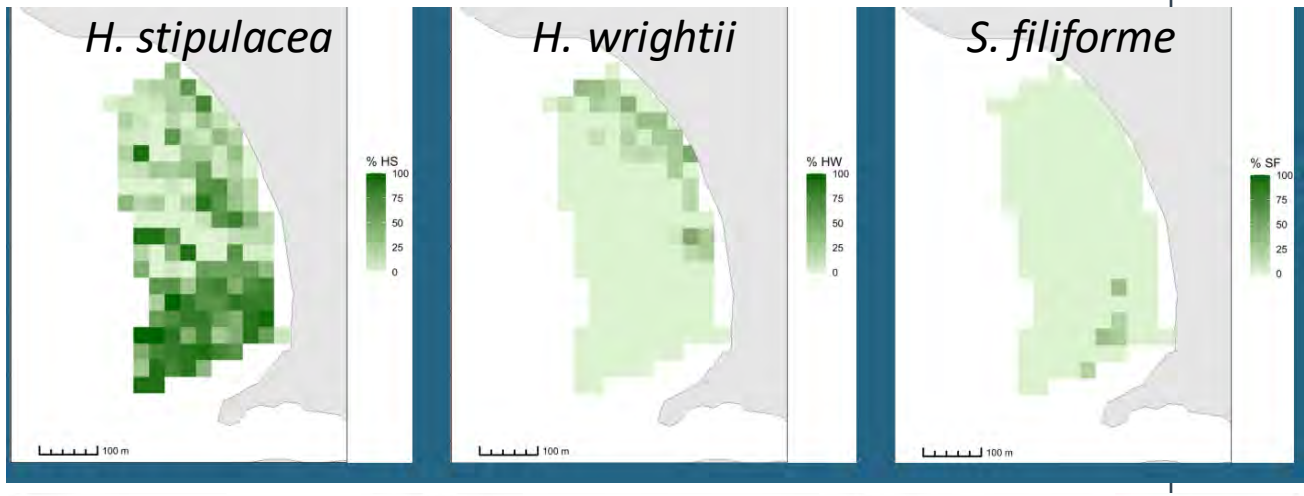
Halophila. stipulacea dominated Brewers Bay - 2019

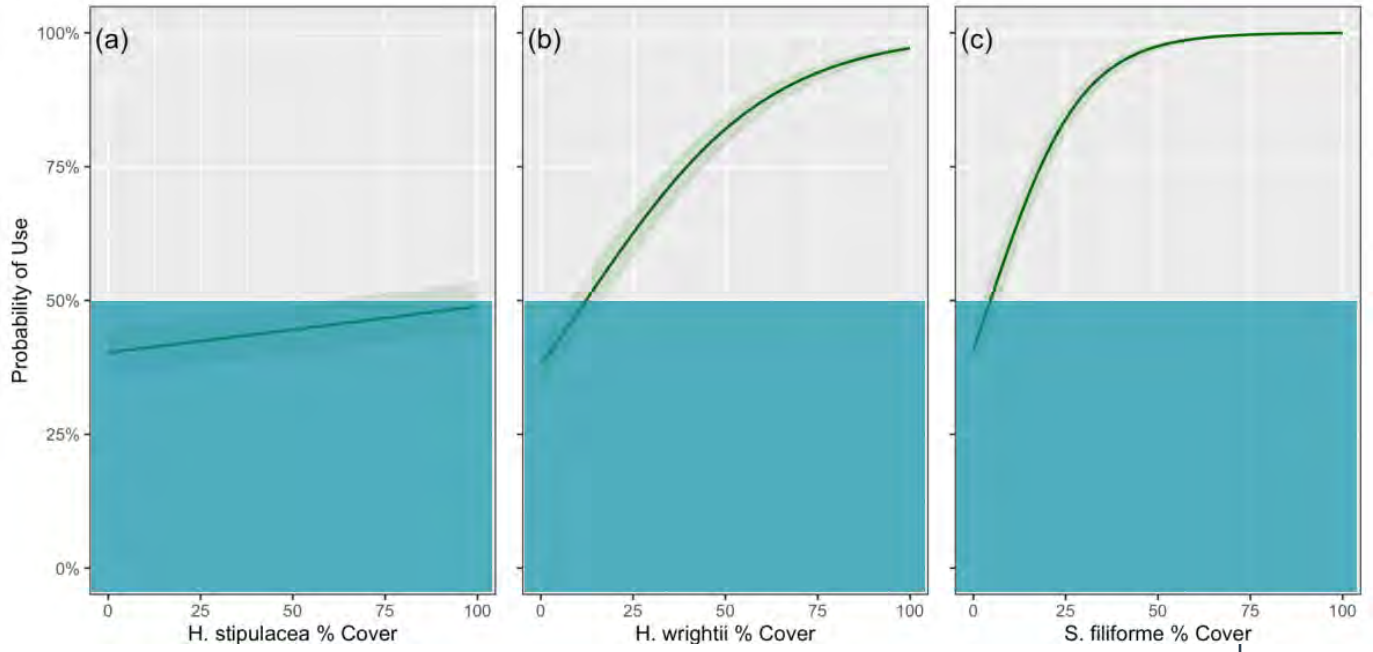
New 68 receiver FPS acoustic array

Green sea turtles select native seagrasses

Dr. Paul Jobsis – Emerging Areas / Movement Ecology





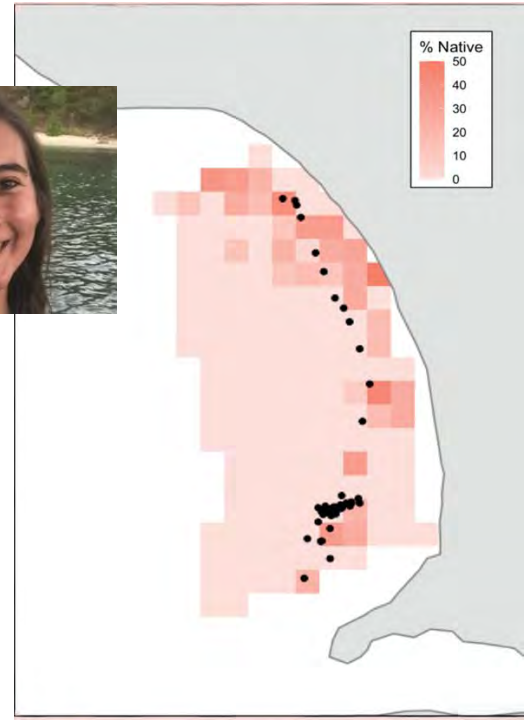


Movement Ecology Completed Year 3 Goals

1. Measure impacts of invasive seagrass, *H. stipulacea,* on animals adapted to the native seagrass meadows. - TB
2. Include undergraduate and graduate students in active research projects.
3. Conduct a turtle tagging outreach event.
4. Present research results in national and international conferences and journals.

Movement Ecology Year 4 Goals

- Maintain array and collect stingray movement and benthic habitat data
- Continue public sea turtle tagging with VIMAS and VI-ISERP participation
- Have two masters students complete their FPS-related theses
- Submit two manuscripts on FPS movement ecology studies
- Continue animal tagging and maintain FPS array to leverage additional grant and donated funds.



Brunson et al non-FPS submitted

Cassell et al. (non-FPS) accepted

Research Broader Impacts, Interdependencies, and Collaborations

- **Broader Impacts:** This data has been used in NMFS' effort to identify marine areas for critical habitat of the green sea turtle as part of an ESA review (2023). USVI DFW will receive data as part of their management of ESA-listed species.

- **Interdependencies:** Other Emerging Research Areas (Cruz-Rivera and G. Guannel VIMAS, Reef Bay research (R. Nemeth and K. Blincow), Formal Education (M. Guannel Sci100), formal and informal education within VI-EPSCoR.

- **Collaborations:** Kelly Stewart (Ocean Foundation), Kristen Hart (USGS), Larry Wood (Florida Hawksbill Project), Karen Bjorndal (Archie Carr Center, UF), Dr. Stephen Ratchford (UVI), and the VINP St John Sea Turtle project, USVI Division Fish & Wildlife, and US Fish and Wildlife Service (Claudia Lumbard, Sandy Point St Croix).

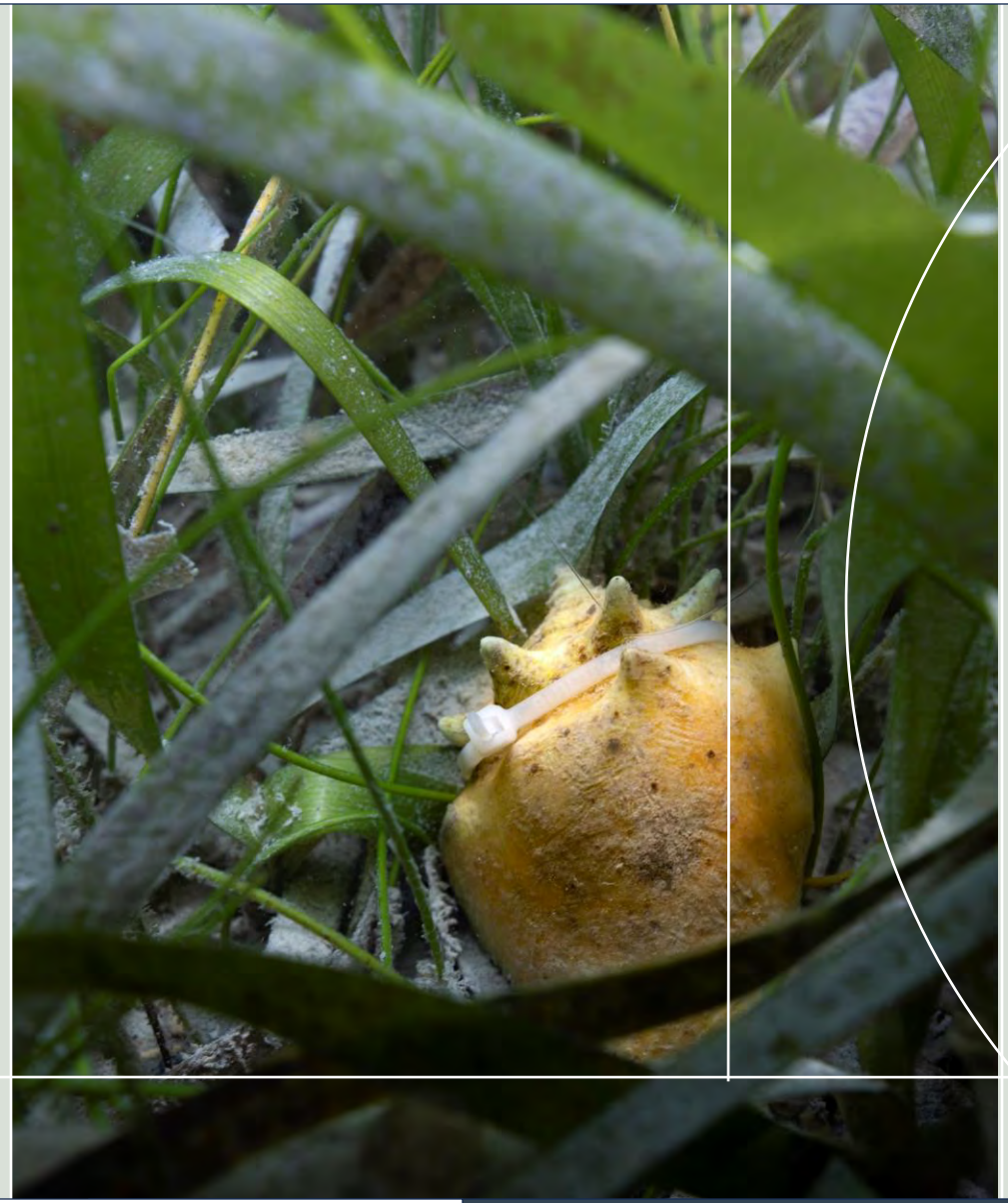
- **Partners:** Lana Vento Charitable Trust, Baird Family Trust, Community Foundation of the Virgin Islands, National Park Service, Ocean Foundation, the Hawksbill Project, and the National Save the Sea Turtle Foundation.

Thank you!

Dr. Paul Jobsis

EMAIL: PJobsis@uvi.edu

PHONE: 340-690-7500



Research Theme 3:

Emerging Areas

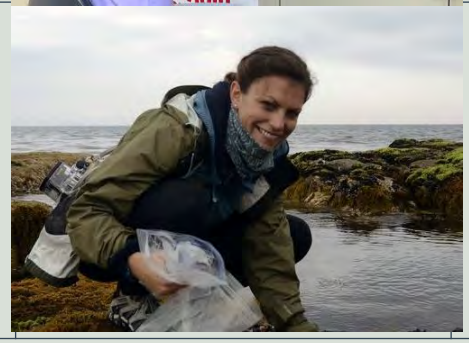
Seagrass and Sargassum Ecology

Introduction

Marine invasions and harmful algal blooms

Meet The Team

Edwin Cruz-Rivera –
Associate Professor
MSU/UVI

	Madyson Miller Graduate Student		Olivia Diana Graduate Student
	Matthew Souza Graduate Student		Jendahye Antoine Graduate Student
	Dr. D. Christopher Rogers University of Kansas. Kansas Biological Survey		Dr. Stacy Krueger-Hadfield Univ. Alabama, Birmingham

Research Goals And Objectives

Year 1	• Assess how *Halophila* spread links to herbivory
Year 2	• Study the effect of *Halophila* on predator-prey interactions and seagrass community
Year 3	• Assess physiological tolerance of *Halophila* to selected variables • Analyze how the emergence of floating *Sargassum* relates to genetic diversity

Seagrass Research

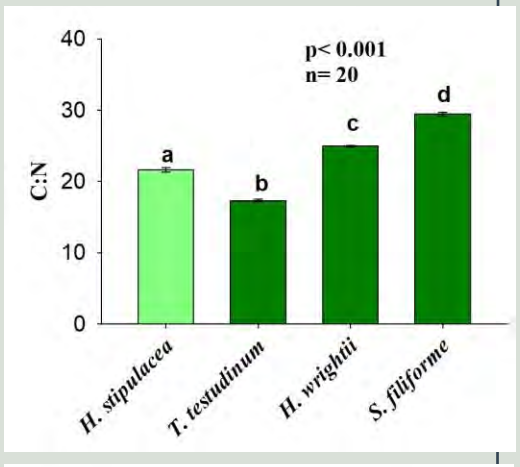
- The invasive seagrass *Halophila stipulacea* is now found in >24 Caribbean countries and often dominates seagrass meadows

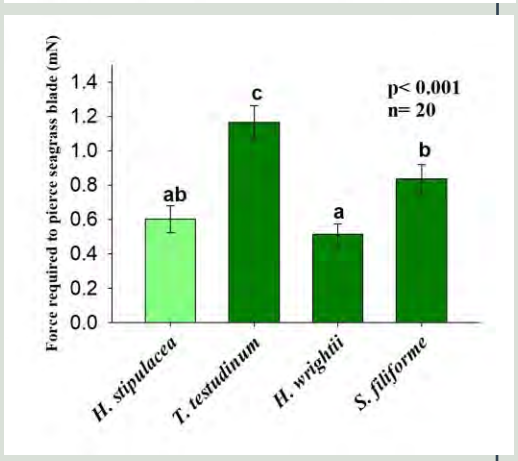
- Does this spread relate to palatability? Enemy Release Hypothesis

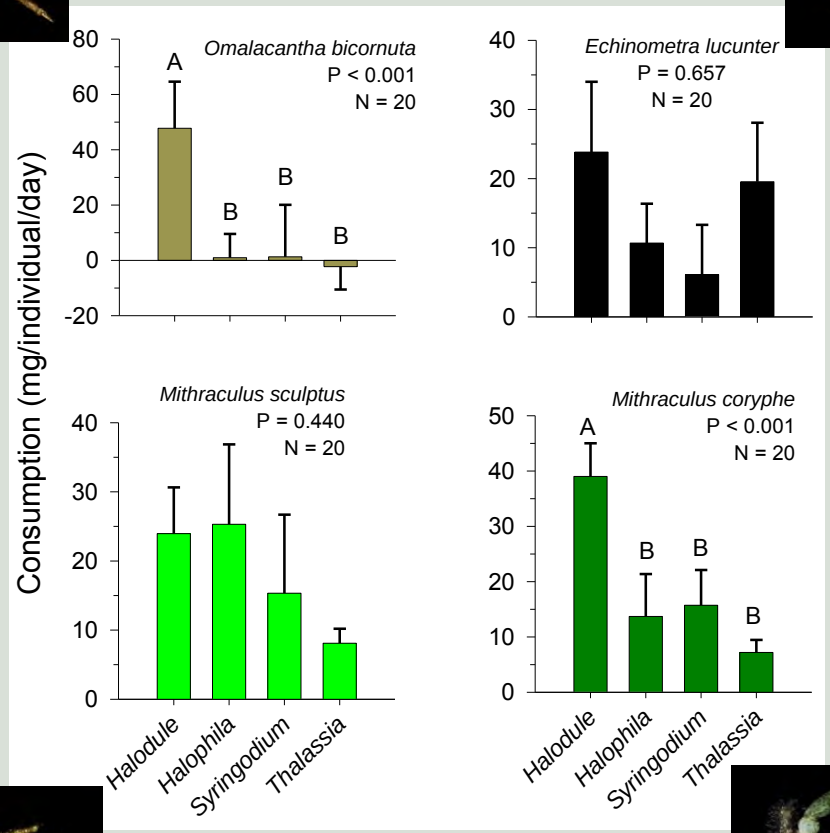
✓ Choice and no-choice experiments compared native and invasive seagrass against seven Caribbean herbivores

✓ Seagrass mechanical, chemical, and nutritional properties were measured

✓ Lower palatability of the invasive varied among species and was not explained by any given trait measured







Seagrass Research

- Intraspecific variation in palatability can rival that of interspecific patterns

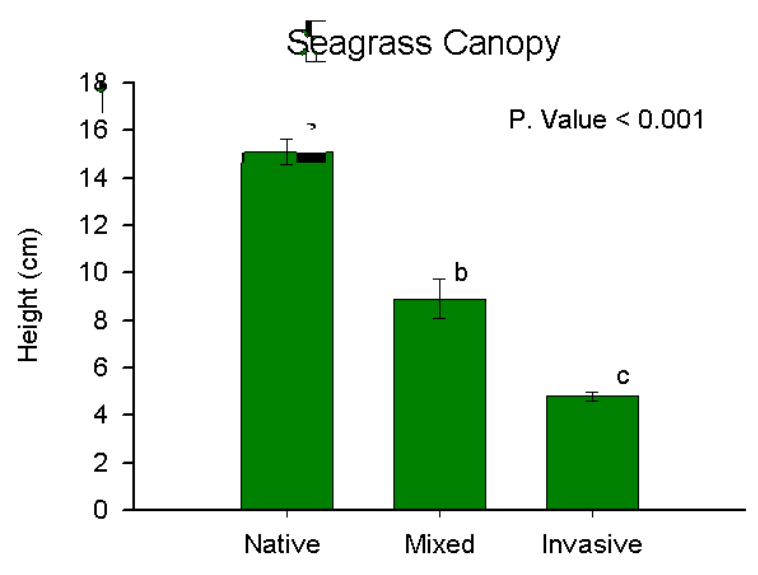
- Pairwise comparisons were performed with *H. stipulacea* from four sites and three depths, expose to three grazers

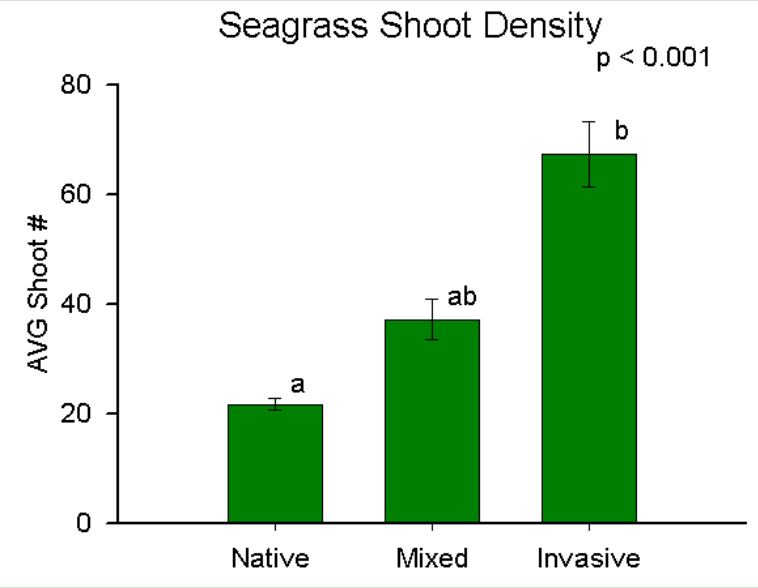
✓Most comparisons did not suggest differences but plants from the deep meadows of Lindbergh Bay were moderately more palatable



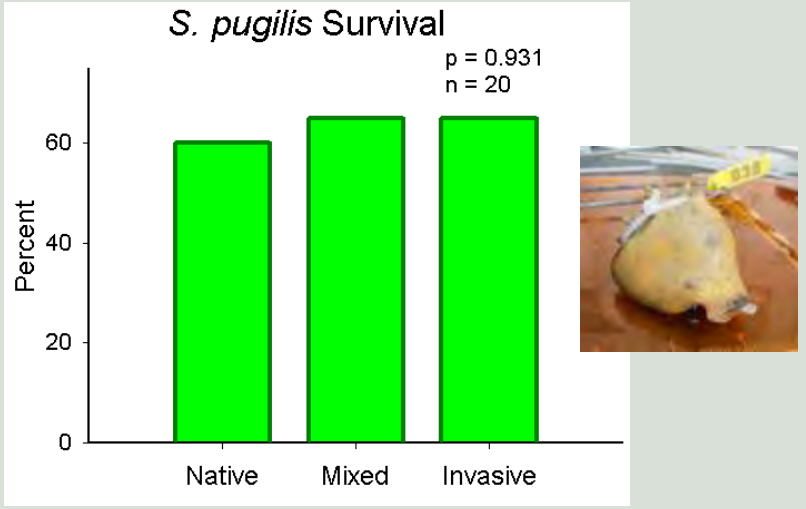
	Trial	*E. lucunter*	*M. s sculptus*	*O. bicornuta*
1	Brewer's Shall vs. Med	p-value= 0.908 n=18	p-value= 0.218 n=16	p-value= 0.528 n=18
2	Brewer's Med vs. Deep	p-value= 0.811 n=19	p-value= 0.105 n=16	p-value= 0.601 n=16
3	Brewer's Shall vs. Deep	p-value= 0.344 n=18	p-value= 0.156 n=19	p-value= 0.929 n=17
4	Lindbergh Shal vs. Med	p-value= 0.098 n=17	p-value= 0.779 n=19	p-value= 0.898 n=17
5	Lindbergh Med vs. Deep	p-value= 0.832 n=18	p-value= 0.035 n=19	p-value= 0.256 n=18
6	Lindbergh Shall vs. Deep	p-value= 0.185 n=18	p-value =0.022 n=16	p-value = 0.002 n=18
7	Water Shall vs. Med	p-value= 0.579 n=19	p-value= 0.223 n=19	p-value= 0.608 n=16
8	Water Med vs. Deep	p-value= 0.078 n=19	p-value= 0.699 n=18	p-value= 0.533 n=18
9	Water vs. Lindbergh Shall	p-value= 0.895 n=16	p-value= 0.895 n=16	p-value= 0.105 n=16
10	Water vs. Brewer's Shall	p-value= 0.811 n=17	p-value= 0.687 n=16	p-value= 0.236 n=16
11	Brewer's vs. Lindbergh Deep	p-value= 0.016 n=17	p-value= 0.101 n=17	p-value= 0.031 n=19
12	Brewer's vs. Lindbergh Shallow	p-value= 0.511 n=17	p-value= 0.102 n=18	p-value= 0.404 n=18

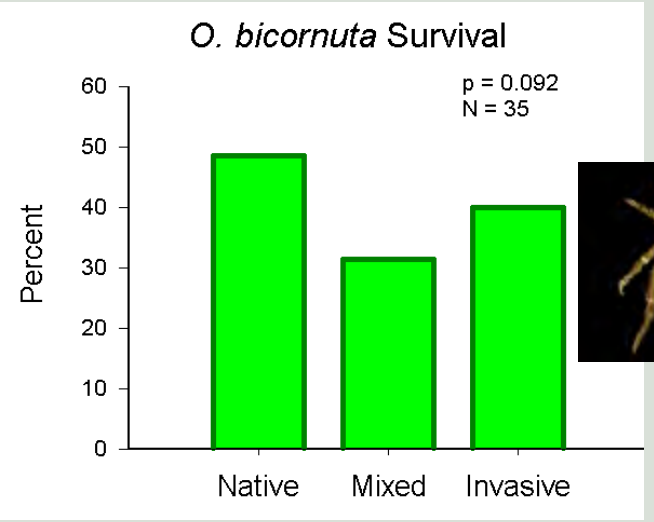
Seagrass Research





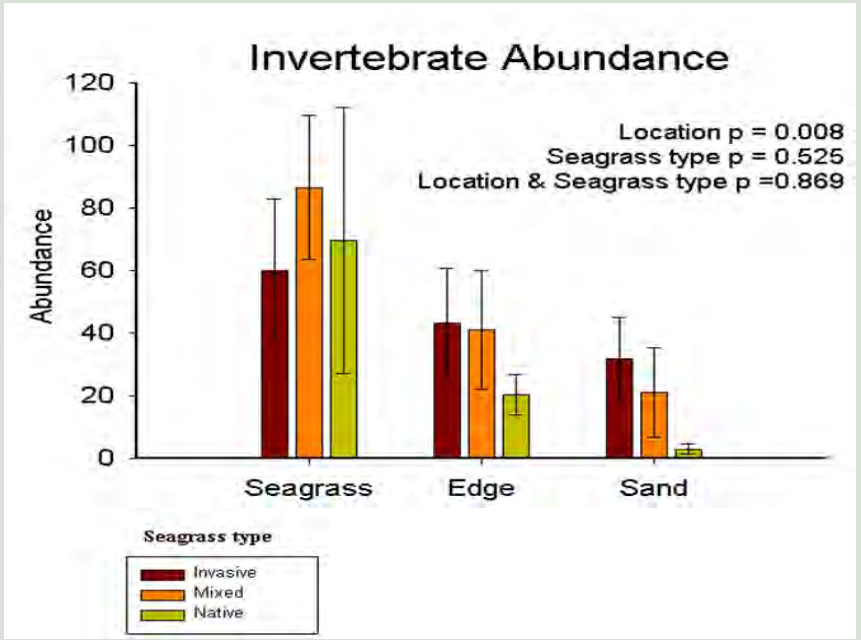
- Seagrass beds of native, mixed, or invasive seagrass differ in characteristics that could influence predation risk
- Tethering experiments with two prey species did not support an effect of bed type on predation





Seagrass Research

- Vacuum samples were obtained from three seagrass bed types, inside, at the edge, and outside beds
- Faunal density was higher inside beds, regardless of type



Dr. D. C. Rogers
Univ. of Kansas

Sargassum Research

First run of Hiplex sequencing finished (outsourced to Floragenex)

✓Second run underway

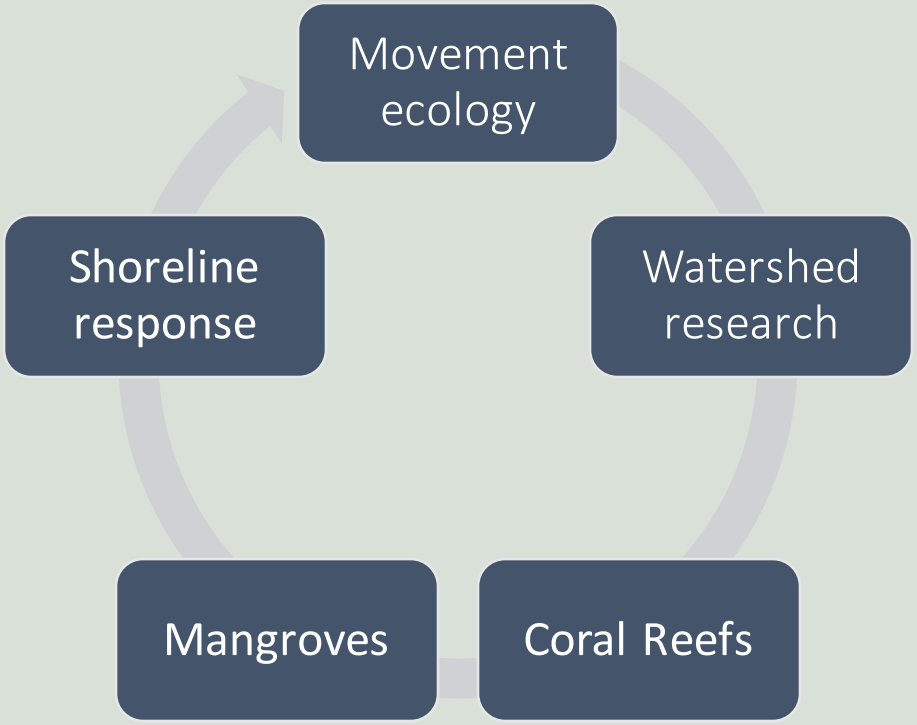
Species/Morphotype	SNPs
Sargassum fluitans III	1,150
S. natans I	1,759
S. natans VIII	1,374
S. polyceratium	1,755

Year 4 Goals

- Monitor the expansion of invasive seagrass beds and compare the tolerance of native and invasive seagrass to environmental stressors
  - Proposal development

- Analyze the impact of stranded *Sargassum* on water quality
  - Proposal development

Research Interdependencies



Collaborations

NASA

KU

NSF INCLUDES SEAS Islands Alliance

UAB

Recinto Universitario de Mayagüez – Universidad de Puerto Rico – CAAM

Conchologists of America, inc.

NIH National Institutes of Health
Turning Discovery Into Health

USGS
science for a changing world

Morgan State University
Growing the Future
Leading the World

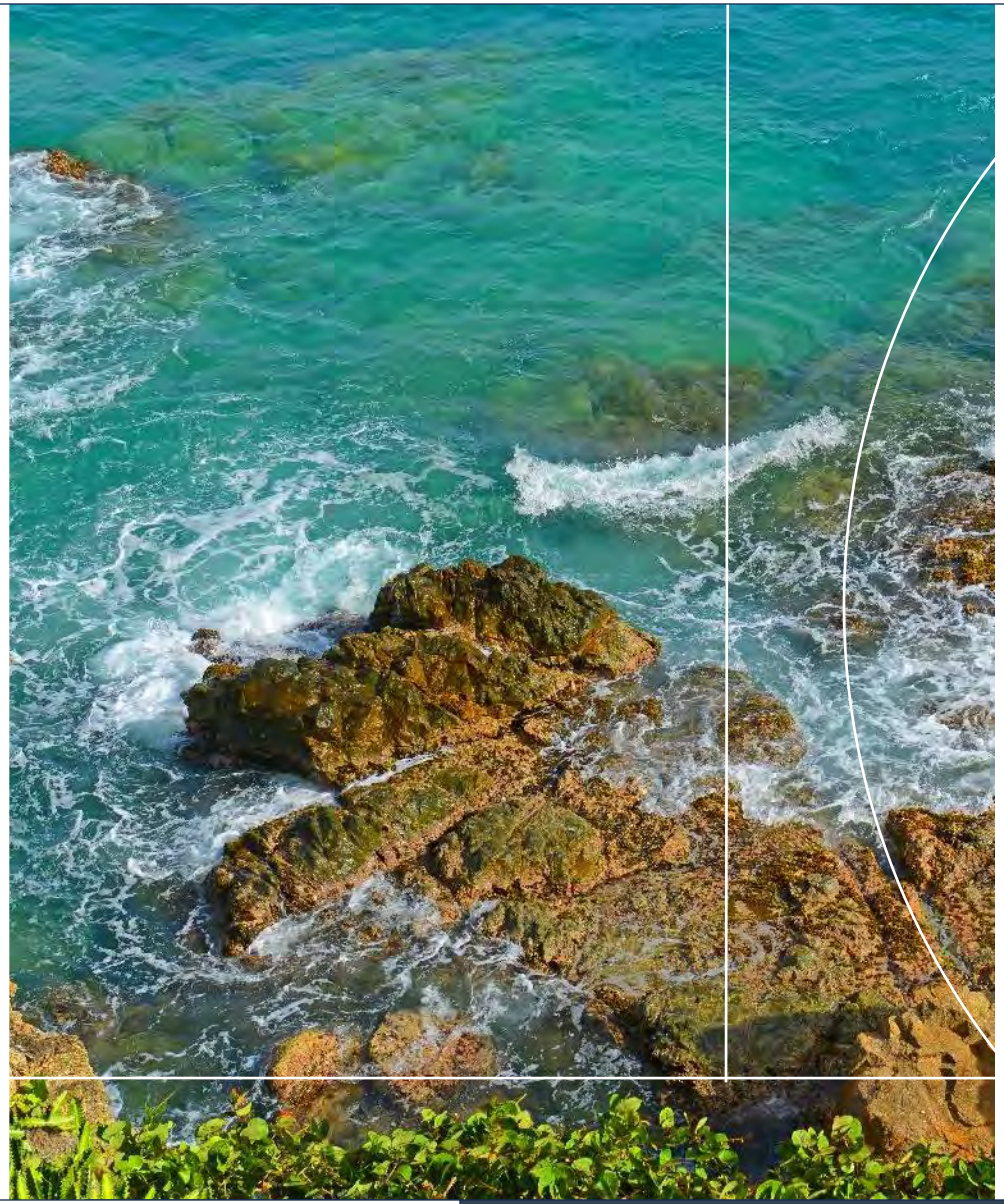
GEO BLUE PLANET

Thank you!

Dr. Edwin Cruz-Rivera

EMAIL: Edwin.cruz-rivera@morgan.edu

PHONE: (443) 885-2373



Research Theme 3:

Emerging Areas
Shoreline Response

Meet The Team

Greg Guannel, Ph.D.

Edwin Cruz-Rivera, Ph.D. (Morgan State)

Nikita Beck, Research Tech.

Joe Dwyer (Lynker)

Deborah Fernandes, Ph.D. Student

Zoe Price, M.S. Student

Bret Webb, Ph.D. (USA)

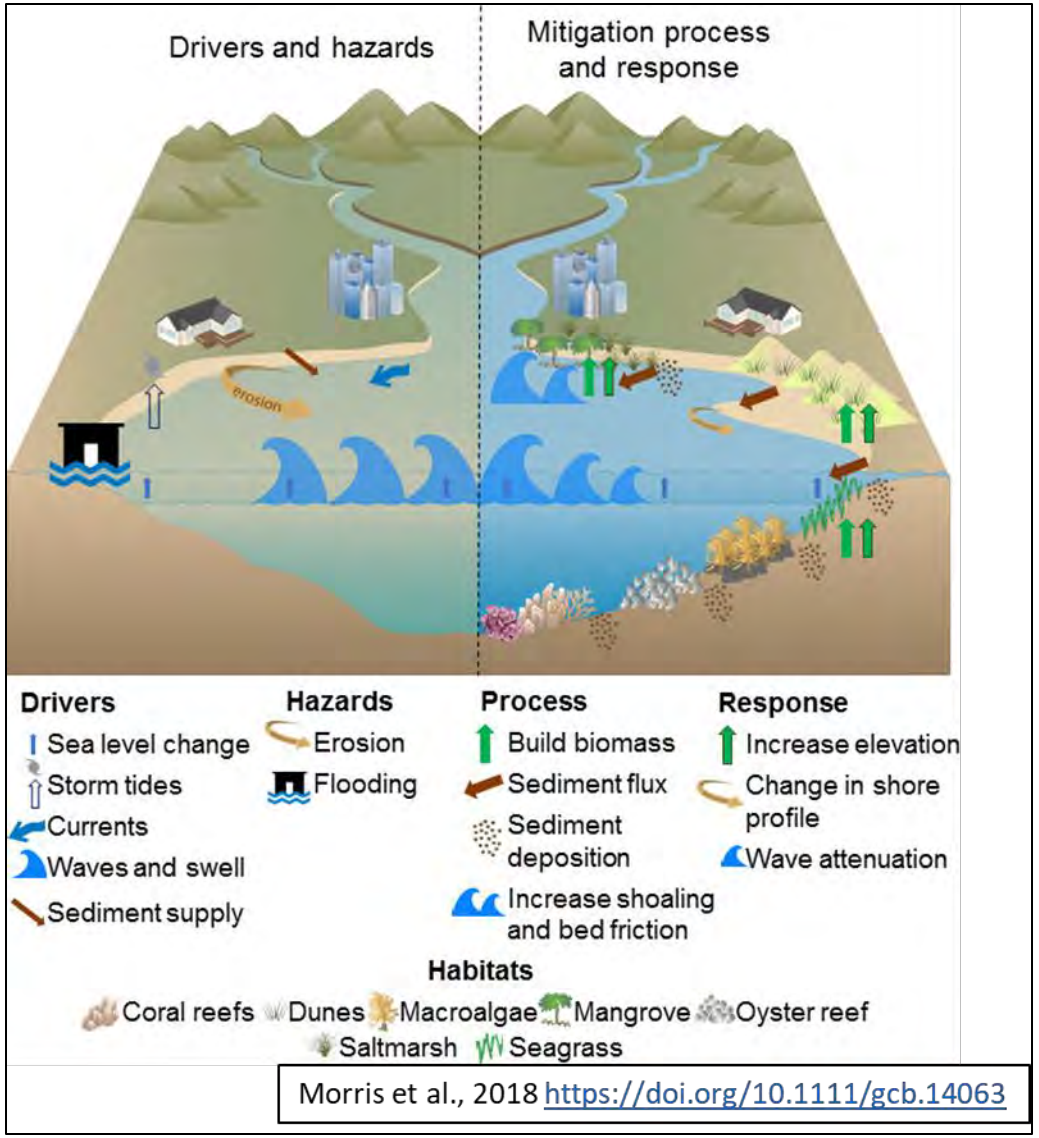
Dishon Heyliger, Undergrad Student

Tamia Grant, Undergrad Student

Joleen Buchanan, Undergrad Student

Introduction

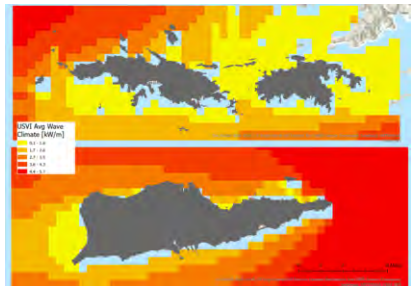
- Coastal hazards and their impacts are intensifying because of coastal development patterns, land use practices and climate change
- Natural habitats are seen as potential tool to help reduce impacts
- Seagrass (and other habitats) might play important role in sequestering sediment and moderating impacts of hazards
- Little is known about coastal processes in the USVI



Research Goals And Objectives

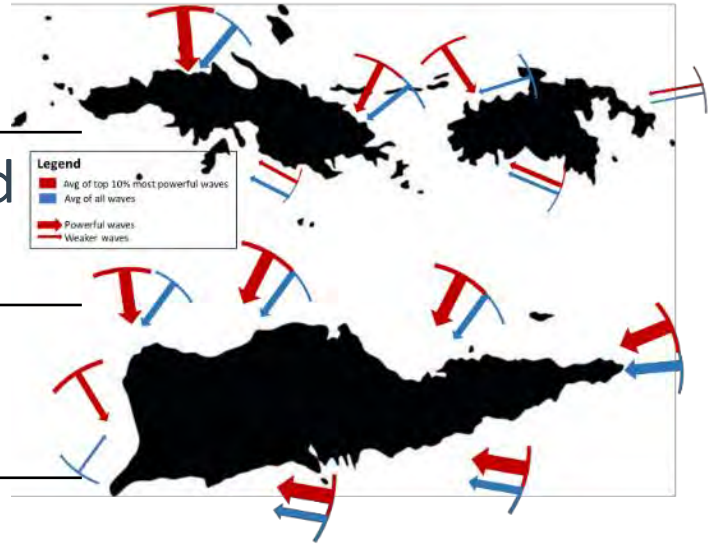
<u>Research Goal</u>: Quantify the role of seagrass type in short and long-term beach evolution.

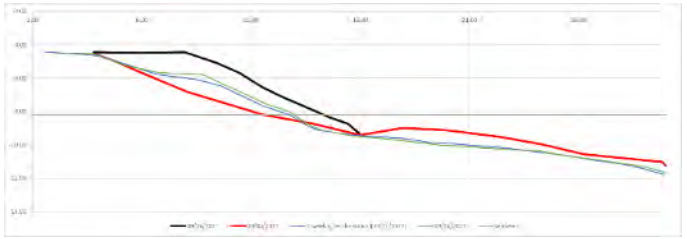
Year 1	Identify and recruit graduate student Identify study sites Acquire field survey equipment	Student identified and hired. Field equipment acquired and field methods developed. Coastal characterization starts.
Year 2	Deploy Equipment and Data Acquisition	Equipment tested and used to characterize coastal environment. UVI undergrad student hired. Coastal observations start.
Year 3	Linking Seagrass Hydrodynamics with Beach Response	Further characterization of coastal environment and processes. M.S. Student identified. Observations continue. Paperwork between UVI and USA finalized.

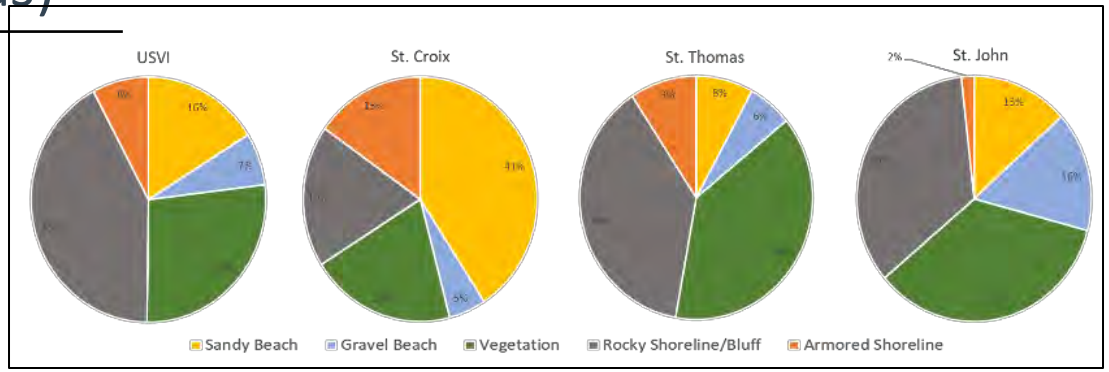


Research, Outcomes & Accomplishments

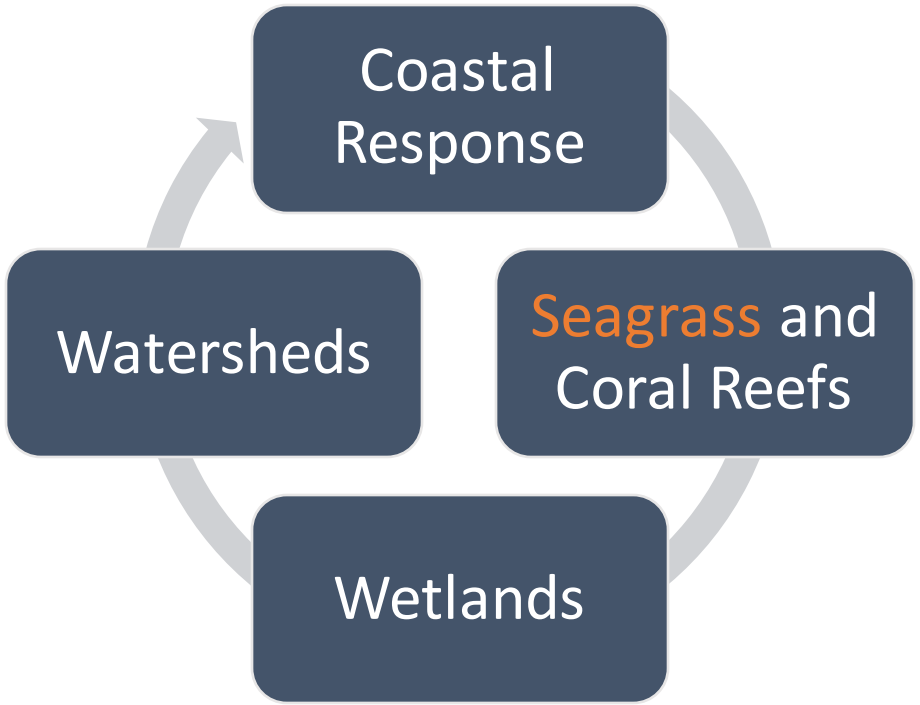
- Wave climate and climate hazards mapped and quantified
- Coastal environment of the VI mapped and characterized
- Active monitoring of nearshore wave field and beach response
- Testing remote sensing techniques to improve observations (Argus Cameras)
- 2 peer-reviewed publications (https://doi.org/10.3389/fbuil.2022.923965, https://doi.org/10.1142/9789811275135_0196)







Research Interdependencies



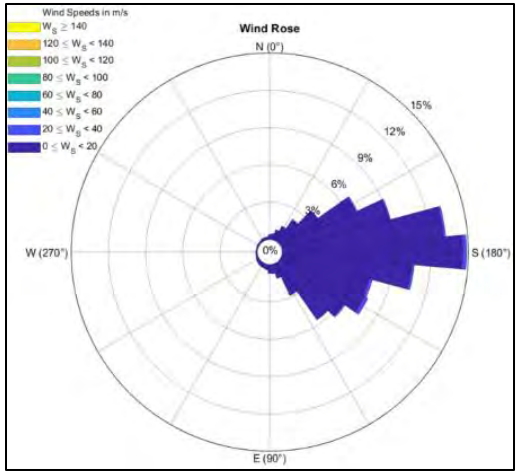
Coastal response to hazards is highly dependent on land use practices, watershed and sediment processes, and coastal ecosystems, including seagrass.

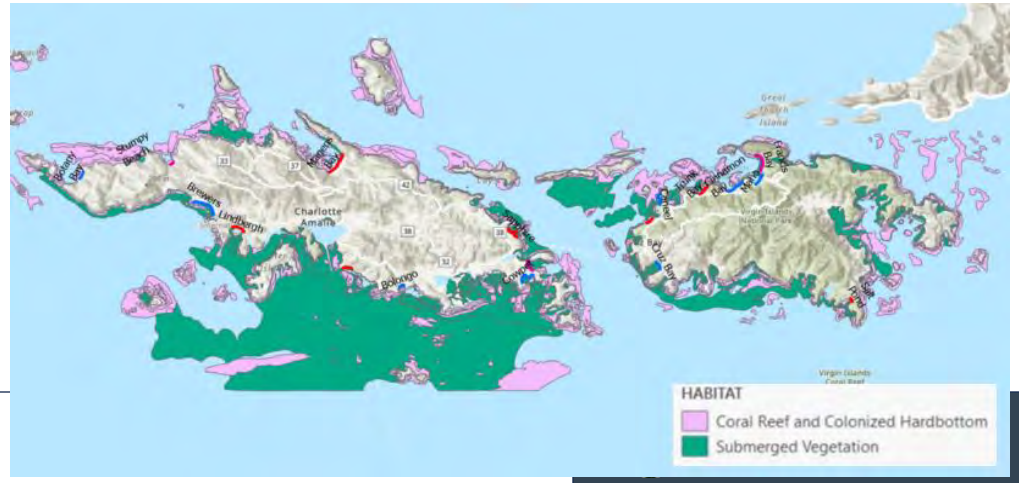
Broader Impacts, Intellectual Merit, & Sustainability

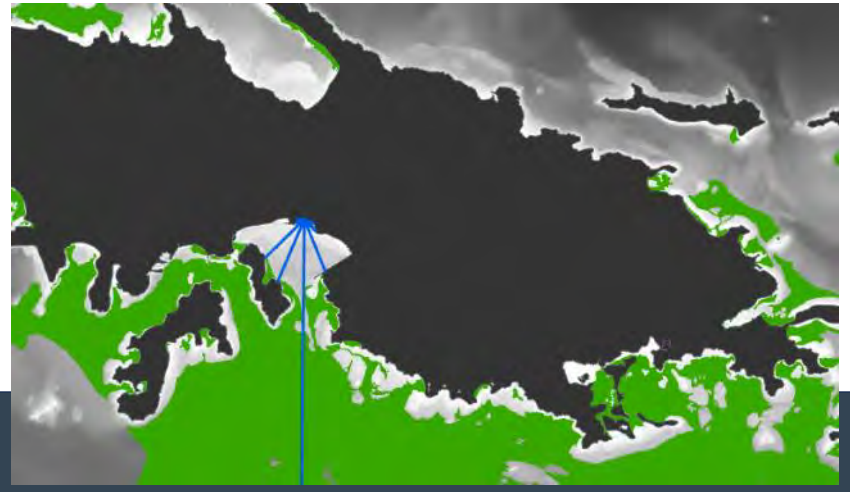
Student Engagement	Understanding of USVI Coastal Processes	Improved Understanding of Green Infrastructure	Capacity Building and Knowledge Exchange with Local Agencies	Collaboration with EPSCoR States/Territories
Many undergraduates are exposed to STEM activities that had not offered at UVI until now	Literature about USVI coastal systems and processes is rare. We are publishing and engaging stakeholders about this topic.	We have 2 peer reviewed publications on this topic and well underway in field efforts	Close collaboration with Coastal Zone Management, and strong linkages with USGS	Increased collaboration with Puerto-Rico, and strong collaboration with Alabama

Future Plans

- Deployment of remote sensing equipment at select sites
- On-site monitoring of select sites
- Creation of wind-wave generation tool
- Creation of wave atlas for the USVI
- Finalization of green infrastructure catalog for coastal systems
- Monitoring of hydrodynamics and beach response in seagrass dominated nearshore regions







Thank you!

Dr. Gregory Guannel

EMAIL: gregory.guannel@uvi.edu

PHONE: 340-693-1158