STATE OF THE COAST

SOC2023
Poster Presentation Abstracts

Coastal Law, Policy & Funding						
Coastal Law, Policy & Funding	1	Leading legislation: the value of the Coastal Wetlands, Planning, Protection, & Restoratio n Act	The Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA), approved by the U.S. Congress and signed into law by President George H. W. Bush in 1990, brings together five federal agencies and the State of Louisiana in a committed and concerted program to stabilize, protect and rebuild Louisiana's coastal wetlands. CWPPRA's area of activity encompasses nearly half of Louisiana's population and thus, includes the public, local governments, stakeholders and nonprofit organizations in a synergistic approach to coastal restoration and protection. Though the program	Kacie	Wright	USGS

			works specifically to restore and protect Louisiana's wetlands, the impacts of the CWPPRA program are not bounded by state lines; Louisiana's working coast is an economic, recreational and cultural asset for the nation. The restoration of Louisiana's wetlands provides protection of oil and gas infrastructure and ports for shipping, healthy habitat and nursery grounds for commercial fisheries to flourish, direct influence on diverse cultures, and the rebuilding of ecosystems that capture and store carbon in wetland plants with complex and dense root systems. Since it 1990, CWPPRA has funded over 230 coastal restoration and protection projects, building, protecting, and enhancing over 100,000 acres of wetlands, through a combination of restoration strategies. CWPPRA projects are			

			notable for their interagency cooperation, academic collaboration, and local engagement to move a project from conception to construction in three to five years. CWPPRA restoration and protection projects are federally funded by the Sport Fish Restoration and Boating Safety Trust Fund with a 15% cost-share from the State of Louisiana. CWPPRA is a successful federal-state partnership with far reaching impacts at the local, state, and national level. With 32 years of success, CWPPRA continues to work to address immediate restoration needs based on strong science, public participation, and agency cooperation.			

Coastal Law, Policy & Funding	2	Treasury RESTORE Act Direct Component Grant Program - Entities funding challenges and opportunit	Twenty Louisiana parishes, 23 Florida counties, and the states of Alabama, Mississippi, Texas, Louisiana are eligible for funding under the U.S. Department of Treasury's RESTORE Direct Component program, which is funded by the penalties from the Deepwater Horizon oil spill. Learn how communities in Louisiana and across the Gulf Coast have leveraged the program—or can leverage the program—to fund infrastructure; promote ecosystem restoration including marsh, ridge, barrier island, hydrologic, and oyster reef restoration; and prepare for sea-level rise, including climate risk modeling. The poster will also address how eligible parishes can blend and leverage other Federal funding sources with RESTORE Direct Component funds for maximum impact, and how parishes can integrate planning for sea-level rise and	Shelby	Servais	Office of Gulf Coast Restoratio n

			climate resilience into infrastructure projects.			
Coastal Law, Policy & Funding	3	Rice and Rights: Navigating the Complexities of Water Allocation in Southwest Louisiana	This poster will examine the relationship between water allocation and rice farming in southwest Louisiana, highlighting the legal framework that governs water allocation in the region, as well as the history of the issue. It will provide an overview of the challenges and opportunities facing rice farmers in terms of accessing sufficient water resources for irrigation. Rice irrigation accounts for some of the largest volume of groundwater withdrawals in the southwest region,	Jackson	de Gruy	Louisiana Sea Grant

			and farmers have used a variety of methods to alleviate shortage issues in the past, from limiting acreage to recycling existing water supplies. The relationship between water allocation, law and policy, and rice farming in southwest Louisiana is complex and multifaceted. Rice is a water-intensive crop, and the success of this industry depends on the availability and quality of water resources, which can be a source of tension between rice farmers and other users. The poster will illustrate the historical change in the resource as well as the farming practice itself and provide an overview of the effects of climate change on rice farming in the region and potential solutions.			

Coastal Law, Policy & Funding	4	How to address ecosystem services and equity into Benefit-Cost Analysis (BCA)	Floods are the environmental hazard that causes the most human suffering, property damage, and economic losses in the Gulf of Mexico region. Federal agencies, such as FEMA and USACE, fund flood mitigation projects and recovery programs. Agencies use benefit-cost analysis (BCA) (i.e., FEMA BCA toolkit 6.00) as a selection criterion to ensure projects are cost-effective, meaning there is a benefit-cost ratio greater than one. However, many common BCA toolkits fail to incorporate the quantity and quality of water entering the watershed, disturbances, or alterations within the watershed, surrounding natural functions, and the ecosystem. Moreover, the BCA toolkits do not include mechanisms for valuing the distributional impact of projects, because considering equity requires identifying how damages differ among low-income	Fahmida	Akhter	Graduate Research Assistant

			and high-income communities. This poster will provide a framework for addressing these shortcomings by incorporating environmental spillovers (positive and negative), as well as distributional impact in the BCA of mitigation projects. Initially, a framework will be developed that will include all the components, that the BCA toolkit currently has. This framework will then be compared with a logic model which will represent the blueprint of the footsteps to incorporate the environmental spillovers as well as the distributional impact in the BCA toolkit. The logic model will incorporate downstream impact while specifying the target area to understand the project from the whole watershed perspective. It will also include equity by addressing the marginal utility of income and wealth.			

			The purpose of this logic model based on the BCA toolkit is to improve the decision-making process for flood mitigation projects so that it can include environmental benefits like natural functions and simultaneously ensure equal benefits for the disadvantaged community.			
Disaster Impacts, Mitigation and Recovery						

Disaster Impacts, Mitigation and Recovery	5	The Effects of Mississippi River Pollutants on the Growth of Microcystis aeruginosa	along the Mississippi Gulf Coast due to a sudden deluge of freshwater from the opening of the Bonnet Carre Spillway in St. Charles Parish, Louisiana. M. aeruginosa is an ecological and public health concern due to its production of neurotoxins (lipopolysaccharides) and hepatotoxins (microcystins), and ingestion causes vomiting, diarrhea, and lethargy. Vibrio vulnificus, a flesh eating, pathogenic bacteria, thrives from the availability of M. aeruginosa and its organic qualities. V. vulnificus infections have a 31% mortality rate from seafood exposure (i.e. raw shellfish, crab, and shrimp). This experiment measures the growth of Microcystis aeruginosa with the addition of common pollutants in the Mississippi River: calcium hydroxide Ca(OH)2, lead nitrate Pb(NO3)2, cow manure, nitrogenous soil, and iron metal. A solution of sodium	Emerson	Morris	St. Patrick High School

			chloride and water was created in a BSL-1 lab; this solution was combined with M. aeruginosa and each additive and was incubated for 96 hours. This experiment proves the presence of pollutants enhances the growth of Microcystis aeruginosa. Cultural eutrophication of the Mississippi River is caused by centuries of unmonitored dumping from industrial, agricultural, and wastewater industries. Eutrophication prevention can be implemented through Crassostrea virginica beds (non-edible), wire filtration devices, and more screening from the Environmental Protection Agency (EPA). An algorithm is being developed to alert engineers and policymakers when favored conditions arise for an M. aeruginosa bloom, and current studies are being done on the effects of Serratia marcescens			

			production of prodigiosin on the growth of M. aeruginosa.			

Disaster Impacts, Mitigation and Recovery	6	Impacts of Major Hurricanes on Barrier Island Geomorphology: A Case Study of Grand Isle, LA	Barrier islands are a type of natural infrastructure that provide protection to coastal communities by mitigating coastal flooding and attenuating storm surge and waves. As a result, they experience intense rates of coastal erosion. Coastal hazards, such as hurricanes and storm surge, pose a severe threat to the integrity of barrier islands along Louisiana's coast and cause dramatic transformations to their geomorphology. The increasing frequency and intensity of coastal hazards highlights the need to better understand the impacts of these hazards on the geomorphology of barrier islands and their effectiveness for flood and hazard mitigation. Grand Isle, Louisiana's last inhabited barrier island, experienced direct landfall impacts from Hurricane Zeta in 2020 and Hurricane Ida in 2021, providing a unique case study	Cyrus	Bahman	LSU Dept of Civil and Environmental Engineering

			to evaluate the response of the barrier island to major hurricanes. Drone imagery was collected in Grand Isle following Hurricane Ida and derived into a Digital Elevation Model (DEM), allowing for quantification of the damage done to the island's levee. Additionally, post-Zeta levee elevations were utilized to determine the effectiveness of rebuilding efforts after Hurricane Zeta. An analysis of the hydrodynamic loading on the levee coupled with observations of areas with significant damage and elevation change will elucidate the mechanisms controlling the damage. The conference presentation will present the results of the damage quantification analyses. In particular, we will present comparisons between the post-Zeta and post-Ida levee elevations,			

			highlighting areas with substantial elevation differences. Hydrodynamic loading results will also be presented to couple elevation change with hazard intensity. Implications from the results of this study, such as identifying areas on the island at high-risk for erosion, will be discussed. These efforts aim to assist decision-making for rebuilding efforts to improve coastal defense against future hurricanes.			

Disaster Impacts, Mitigation and Recovery	7	Geomorphological Response of Coastal Wetlands to Major Hurricanes in Rockefeller Wildlife Refuge	Natural and nature-based infrastructure (NNBI) consists of dunes, salt marshes, mangroves, coral or oyster reefs, and barrier islands that mitigate coastal flooding and erosion caused by wave action and storm surge. The design and implementation of natural and hybrid infrastructure (NHI) for coastal protection are severely hindered by inadequate knowledge on the response and recovery of NHI from extreme events to quantify its flood defense services. Rockefeller Wildlife Refuge, located along the Chenier Plain in Southwest Louisiana, contains NHI and was the location of the sequential landfall of Hurricanes Laura and Delta in 2020, providing an opportunity to evaluate the response of the NHI to major hurricanes. Additionally, a system of breakwaters was partially constructed at the time of both hurricanes, allowing for a comparison on	Jasmine	Bekkaye	Louisiana State University

			the performance of natural infrastructure versus hybrid. Elevation profiles were collected using a GPS-RTK system during field explorations before and after Hurricanes Laura and Delta along two transects in the Refuge; one with a natural shoreline and one protected by a breakwater system. The elevation profiles were investigated to evaluate geomorphological changes between the two storms at the natural and hybrid transects. Historical elevations at the Refuge from topobathymetric surveys spanning previous years were also utilized to determine elevation changes from historical values at the natural and hybrid transects. The conference presentation will present the results of the geomorphological comparative analyses. Specifically, we will present comparisons between the 2020 post-storm elevations to			

			historical elevations, emphasizing the performance of the natural infrastructure compared to the hybrid. These measures will inform decision-making and facilitate the implementation of NHI to mitigate the impact of storm surge and waves on coastal communities and civil infrastructure.			
Ecosystem Restoration						

Ecosystem Restoration	8	Comparison of littoral and pelagic aquatic faunal communities at a degraded estuarine ridge	Ridges in the Mississippi River delta are unique estuarine ecotone areas. Bottomland hardwood forests, swamps, mangrove forests, marshes and open water habitats occur in close proximity to each other along the elevation and salinity gradients of ridges. Although it is documented that wetlands reduce predation and act as nursery grounds for aquatic fauna including many commercially harvested species, there has been little research on ridge influences on aquatic faunal communities. The purpose of this research is to compare the littoral and pelagic aquatic faunal communities at a natural estuarine ridge in Terrebonne Basin to examine ridge edge habitat use by aquatic fauna. Fish and macroinvertebrate abundance and diversity and water quality parameters were compared between littoral and	Elizabeth	Myers	Nicholls State University

			pelagic locations at a ridge near Isle de Jean Charles in southern Terrebonne Basin. Monthly sampling began in July 2022 and will continue for one year. Sample efforts employed multiple passive sampling methods including minnow traps, crab traps, and gill nets. Catch per unit effort, species richness and diversity, and overall size in aquatic fauna between littoral and pelagic ridge sites will be compared. Additionally, seasonal differences in community structure and water quality will be examined at the conclusion of the study. Preliminary data show higher species richness at the littoral ridge site (n = 25) compared to the pelagic site (n = 11). Examination of the ecological function of a degraded natural ridge can help inform conservation and preservation efforts for Louisiana's estuarine and wetland habitats and			

			future ridge restoration efforts.			

Ecosystem Restoration	9	EVALUATION OF LOUISIANA ECOTYPES OF SALTGRASS FOR SELECTION AND USE IN SALT MARSHES OF THE COAST	Garret Thomassie USDA-NRCS Golden Meadow Plant Materials Center Saltgrass (Distichlis spicata) is a mat-forming, strongly rhizomatous perennial grass that prefers moist, saline soils, and is often found in sandy, alkaline locations. It is important in salt marshes as nesting habitat for birds, fish and larvae of many species of marine invertebrate animals. Saltgrass persists in saline inundated ecosystems including marshes along the coasts of the Atlantic and Pacific Oceans, and the Gulf of Mexico. It is also one of the more drought-tolerant marsh grasses. Saltgrass is a highly desired plant for coastal restoration projects and is frequently requested for re-vegetation contracts by conservation partners, including those representing federal, state and parish governments	Garret	Thomassie	USDA/NRCS Golden Meadow Plant Materials Center

			and private consultants. However, there is a lack of quality tested plants of this species, especially in sufficient numbers for growers to obtain for commercial production. The USDA-Natural Resources Conservation Service Golden Meadow Plant Materials Center (PMC), Galliano, LA has evaluated 25 accessions of saltgrass collected across coastal Louisiana. Objective of this effort was to identify accessions exhibiting vigorous, drought and flood tolerance, active seed germination, with exceptional spread. Accessions were planted in an initial evaluation in a randomized complete block with three replications in a field where water levels can be managed and manipulated to simulate tidal flux, as in the coastal marsh. Ten of the 25 accessions exhibited			

			superior growth characteristics and worthy of further evaluation and selection. Evaluations of the 10 promising accessions will continue in 2022 by comparing their performance and adaptation at multiple sites in South Louisiana. The PMC plans to release a saltgrass for commercial production for coastal restoration projects in Louisiana coastal parishes.			

Ecosystem Restoration	10	Impact of river diversions on salinity and nutrient availability in brackish marsh soils	Louisiana plans to restore eroded coastal marshes by diverting sediments, nutrients, and fresh water from the Mississippi River to the Barataria Basin estuary. Models predict that surface water salinity in lower Barataria Basin may decrease by as much as 13 ppt once the Mid-Barataria Sediment Diversion is in operation. Changes in surface water salinity can alter soil porewater chemistry, plant productivity, and carbon- and nitrogen-cycling in wetland soils. This study investigated the impact of a freshwater pulse associated with river diversions on porewater salinity and nutrient availability in brackish marsh soils of lower Barataria Basin. Replicate soil cores were continuously flooded with a fresh or control salinity treatment for 0, 7, or 28 days, mimicking the continuous operation of the Mid-Barataria Sediment Diversion for upwards	Robert	Feder	Louisiana State University

			of one month. At the end of each incubation period, the intact soil cores were destructively sampled to characterize porewater salinity and ammonium (NH4+) availability every 2 cm for the top 10 cm of soil. Porewater salinity decreased by 5.3 ppt at 0-2 cm in brackish marsh soil after 7 days of a continuous freshwater pulse. The NH4+ partition coefficient, a ratio of the NH4+ bound to soil versus NH4+ mobile in porewater, also increased in the top 2 cm of soil after 7 days of freshwater pulsing. Porewater salinity and the NH4+ partition coefficient in the top 10 cm did not experience any additional change between 7 to 28 days of freshwater pulsing. A decrease in the surface water salinity of lower Barataria Basin may ultimately decrease porewater salinity in brackish marsh soils and increase the concentration of NH4+ bound to soil			

			particles. This change could potentially conserve additional nitrogen for plants and microbes in marsh soils, whereas a decrease in NH_4^+ sorption might release excess nitrogen into Barataria Basin where it can support harmful algal blooms that threaten coastal communities.			

Ecosystem Restoration	11	Impact of River Reconnection on Water Quality in Brackish Marsh in Coastal Louisiana, USA	Wetlands provide important ecosystem services including improving surface water quality through nutrients removal. Louisiana has experienced ~4800 km2 of coastal wetland loss between 1932 and 2016 due to high relative sea level rise, and reduced sediment from Mississippi River (MR) due to levees. The 2017 LA Coastal Master Plan aims to restore Louisiana's degraded coastline through restoration projects, including sediment diversions. The Mid-Barataria Sediment Diversion Project is intended to reconnect MR sediment-laden water with the wetlands of Barataria Basin to nourish degrading marshes. However, the diversion will also deliver substantial nitrate (NO3-) to the basin, potentially negatively impacting water quality. We sought to quantify NO3- reduction rates for marsh and submerged sediments in Barataria Basin using soil cores	Mercedes	Pinzon Delgado	Louisiana State University

			receiving 2 mg N-NO3 L−1. In addition, 2 cm of mineral river sediment from a MR crevasse splay was placed over the organic marsh soil as an additional treatment to replicate sediment deposition on the marsh once the MR is reconnected. We hypothesized that NO3- reduction rates would decrease once mineral sediment is deposited on the organic marsh soil. For an aerobic water column, nitrate reduction rates for vegetated marsh, post-diversion marsh, submerged eroded marsh (fringe) and estuarine mud zones were 71.1 ± 2.7, 27.8 ± 4.5, 19.7 ± 1.2, and 13.0 ± 0.75 mg N m−2 d−1, respectively. Thus, the post-diversion marsh NO3- reduction rate decreased by ~60% compared to current vegetated marsh. However, we predict the newly deposited sediment will increase NO3- removal by 1.17x in the fringe and mud zones, which are			

			always flooded. The marsh is only flooded 31-48% of the time, lessening the impact of the reduction. These findings can improve parameterization of water quality models used to project nutrient loading and fate more accurately across the basin under a scenario of an operating large river reconnection project.			

Ecosystem Restoration	12	Assessing Two Materials for Novel Use in Coastal Wetland Restoration	Southeastern Louisiana experiences some of the greatest land loss in the country. Over 18,000 acres of coastal wetlands are lost each year due to subsidence, saltwater intrusion, loss of their natural sediment supply, and erosion. At the same time, thousands of tons of glass are sent to landfills each year that could otherwise be upcycled for use in marsh restoration projects as recycled glass sand. Yet before introducing a new material to sensitive habitats, we need to understand its ecological effects. In two phases, our research examines how glass sand influences plant growth, nutrient uptake, and, as a key component, plant-microbial symbioses. In phase one, we demonstrated that three species used in wetland restoration can grow in the glass sand and that there were no significant growth differences between plants growing in dredged	Elizabeth	MacDougal	Tulane University

			sand and those growing in a mix of dredged sand and glass. Similarly, substrate type did not influence fungal colonization of plant roots. We will also assess whether soil microbiota varied between substrates. In phase two, we examine how glass sand influences plant nutrient uptake, and explore the use of biopolymer stabilization across the glass and dredged sand mixtures.			

Ecosystem Restoration	13	Presence of mammalian predators in seabird colonies located on restored barrier islands of Loui	The aggregation of seabirds is usually attributed to nesting substrate and predation pressure. Colonial seabirds are one of the most abundant but vulnerable species inhabiting the Barataria-Terrebonne Bay island system. Colonial nesting seabirds, such as Brown Pelicans (Pelecanus occidentalis) and other wildlife depend on these unique habitats for breeding and survival. Coastal land loss due to erosion, subsidence, and overwash from tropical storms and hurricanes has caused Louisiana's barrier islands to decrease more than 40 percent in the last century. This rapid land loss has led to the state's completion of several restoration projects on barrier islands. We investigate the presence or absence of mammalian species on barrier islands pre- and post-restoration in Barataria and Terrebonne Basins in order to determine	Bonnie	Slaton	University of Louisiana at Lafayette

			predation pressure on colonial nesting seabirds.			

Ecosystem Restoration	14	Assessing the Success of CRUSH Tree Plantings across Coastal Louisiana	Coastal land loss is one of the most pressing environmental crises Louisiana faces today, losing a football field of land every 100 minutes. Coastal wetlands in southern Louisiana help reduce storm surge and erosion, preserving land for future generations to live, recreate, and work on. As the land loss crisis rages on, Louisiana communities are fighting back through wetland reforestation efforts across the state. Since 2018, the Coalition to Restore Coastal Louisiana has worked under an EPA grant to implement a multi-year coastal reforestation project called Communities Restoring Urban Swamp Habitats (CRUSH). CRUSH tree plantings have been organized all over coastal Louisiana, in various different locations and ecosystems. Trees are tagged with ID numbers and their GPS coordinates are recorded when they	Andrew	Ferris	Native Plants Program Technician at CRCL

			are first planted, so that their health and growth can be monitored one to two years later. Monitoring includes taking height and DBH (diameter at breast height) measurements, as well as noting any observations about a tree's health or condition. By comparing elements of different CRUSH plantings across Louisiana, we can gain a better understanding of what factors contribute to successful plantings, to help inform future coastal reforestation efforts. This project uses CRUSH monitoring data from 2018 to 2023 to assess the success of tree plantings across the state. We look at how different tree species, locations, salinities, and ecosystems play a role in the survivability and growth rate of a tree in the years immediately after it is planted. Ultimately, we hope that this research can be used			

			in the future by the Coalition to Restore Coastal Louisiana as they continue the fight against coastal land loss via other reforestation efforts.			

Ecosystem Restoration	15	: Understanding key characteristics influencing the ecological services of recycled oyster shell	Since its founding in 2014, the CRCL Oyster Shell Recycling Program (OSRP) has collected 12.6 million pounds of oyster shell from New Orleans area restaurants. After following an informed curing protocol for 6 months, shell is then returned to the water as sanctuary reefs along coastal marshland especially vulnerable to erosion from wave action. Reefs are monitored annually for 5 years following construction. As rate of shell collection increases, CRCL will be able to construct more reefs in coming years. It is important that existing reefs are used to inform best practices for the construction of future reefs. Data collected from each reef reflects the benthic community assemblage present at the time of monitoring as well as water temperature, salinity, and turbidity. The goal of this research is to better inform future restoration projects	Fiona	Lightbody	CRCL / Serve LA

			by CRCL and identify key physical reef characteristics that enhance community resilience and recruitment. Additionally, understanding how the age of a reef contributes to the overall ecological functioning of the reef is critical for a larger understanding of how restoration activities by CRCL will impact the Gulf Coast in coming years. This poster will establish cross analysis between 5 reefs that have been constructed along the Louisiana coast. The first two reefs were constructed using gabion net baskets to contain the shell while the following reefs are built using aquaculture netting. Using factors such as oyster recruitment and subsequent survivability, environmental characteristics of reef location, and reef engineering procedures will allow critical differences in the relative success of each reef to be teased out. Though			

			these projects are not explicitly oyster reef restoration efforts, we can marry the methodologies of restorative ecology with CRCL's community reefs so that future sites can see maximum ecological benefit.			

Ecosystem Restoration	16	Numerical Investigation of Marsh Terracing as a Coastal Restoration Technique	Marsh terracing is a new coastal restoration technique implemented within the Northern Gulf of Mexico, particularly the Louisiana Coast. Its application is intended to combat the devastating land loss rates occurring as a result of sea level rise, land subsidence, and anthropogenic alterations to the hydrologic system. The technique involves dredging in-situ subtidal marsh soils and placing the excavated material into subaerial berms, or terraces, adjacent to the dredged borrow pit. There is significant research addressing the ecological benefits of marsh terracing, but there is a lack of research investigating the proposed hydrodynamic benefits of marsh terracing. This study aimed to (1) quantify the ability of marsh terracing to reduce shoreline erosion, (2) determine the potential depositional effects and subsequent marsh emergence, and (3)	Katelyn	Keller	U.S. Army Corps of Engineers

			provide a set of metrics to assess project performance and determine the optimal terrace configuration for a specific site. The study site, Vermilion Bay, Louisiana, was analyzed through the creation of a 2D numerical model using Delft 3D Flexible Mesh. Coupling of D-Flow and D-Waves allowed for the analysis of high-resolution flow and wave dynamics within terrace configurations. Generalized terrace configurations were examined to give insight to various terrace performance aspects, including [1] the wave energy attenuation experienced on the leeward coast, [2] the storm-induced coastline erosion rates during a localized wind event, [3] the estimation of depositional area and sedimentation patterns within a configuration in relation to the terrace area constructed, and [4] the optimization of project benefits to			

			project costs. Site specific conclusions were drawn for Vermilion Bay, Louisiana. However, the numerical modeling methods presented provide a methodology that can be used to determine the optimal configuration for any terrace project site and provide a strong foundation for future marsh terracing modeling efforts.			

Ecosystem Restoration	17	Evaluating the Oyster Shell Curing Process and Potential Pathogens from Restaurant to Reef	There are several oyster shell recycling programs that exist in Louisiana, Texas, North Carolina, Maryland, Massachusetts, and more that use oyster shells post-restaurant in the creation of living shoreline barriers to mitigate wave action and create self-sustaining, biodiverse reefs. This study examines recycled oyster shells from restaurants for bacterial pathogens that pose potential risks for the ecosystems that the recycled oyster shells enter. The study will examine potential temporal correlations between species throughout the curing process. While the OSRP currently uses a 6 month curing process, this is a conservative timeframe based on a study done by Bushek et al. that only focused on Perkinus marinus, a common protozoan pathogen of oysters in the Gulf of Mexico that can cause reef collapse.	Dexter	Ellis	University of Saint Joseph

			There is little to no research on any bacteria on oyster shells from restaurants. By identifying the types of bacterial pathogens that grow on oyster shells that are collected from restaurant food waste, this study is providing further data to inform best curing practices for oyster shells throughout coastal regions providing opportunities for this research to have a nationwide and potential global impact on best practices for oyster shell curing. This project is currently in later stages with data expected by mid-February and bioinformatics and analysis following shortly thereafter.			

Ecosystem Restoration	18	Ecology of Crassostrea virginica Population Health in the Chesapeake Bay and Gulf of Mexico	Today, our shorelines are being met with constant threats of sea level rise, land subsidence, wave erosion, increased intensity of natural disasters, and increasing water temperature and salinity. It seems like we are in a race against climate change as Louisiana loses an equivalent amount of land to a football field every 90 minutes which is about 25,000 acres of land a year. In the Chesapeake Bay watershed, we are met with many of the same issues losing about 10,942 acres of land each year. I have had the amazing opportunity to partner with the Coalition to Restore Coastal Louisiana (CRCL) and the Chesapeake Bay Foundation (CBF) in collecting data in the field analyzing the productivity of planted oyster reefs. Specifically highlighting the impact of protecting the sacred grounds of BIPOC communities of the Nansemond	Leila	Avery	Student

			Indian Nation located in Norfolk, VA and the Pointe-au-Chien Indian Tribe located in Montegut, LA.			

Ecosystem Restoration	19	CRCL's Oyster Shell Recycling Program: Innovative Methods to Optimizing Oyster Shell Recycling	Oysters are an incredible natural resource. Living oysters and oyster reefs help improve water quality, provide abundant floral and faunal habitat, support the local economy and help protect shoreline by breaking waves. However, we are experiencing a shell deficit – more oysters are being removed than can naturally regenerate, and not enough shell is being returned. This has contributed to the loss of an estimated 85% of Earth's oyster reefs. In response, large-scale oyster shell recycling for restoration is taking center stage in many seafood-rich coastal regions. One of the nation's most popular seafood delicacies, the restoration of oyster reefs is critical for socio-economic, cultural and environmental well-being alike. The Coalition to Restore Coastal Louisiana began offering shell pick-up services to New	Darrah	Bach	CRCL

			Orleans restaurants through our Oyster Shell Recycling Program in 2014. Since then, we have returned over 12.6 million pounds of shell to Louisiana waters in the form of recycled oyster shell living shoreline reef restoration projects. In preparation for reef restoration projects, CRCL engages hundreds of volunteers each year in the processing and bagging of shells. In collaboration with 4 oyster shell recycling programs (Billion Oyster Project, Chesapeake Bay Foundation, Galveston Bay Foundation and Partnership for the Delaware Estuary), CRCL has collected information of best practices in the preparation of recycled oyster shells for use in restoration projects. One significant innovation resulted from the inquest: the design and implementation of CRCL's "BEAST", the 'Bagging Efficiently and Sorting Table', designed in			

			partnership with Al Duvernay, utilized by volunteers to optimize bagging recycled oyster shells. This poster will include 1) a review of CRCL's Oyster Shell Recycling Program; 2) a summation of best practices from a review of 4 oyster shell recycling programs' methods; and 3) an explanation of the design and utility of the "BEAST".			

Ecosystem Restoration	20	Created Wetlands for the Reduction of Organic Carbon Loading: a case study at Myrtle Grove, LA	This study reports on the use of two created wetlands at a grain export terminal to improve removal of organic matter in stormwater runoff from the facility. The CHS Inc. Grain Export Terminal in Myrle Grove, LA on the lower Mississippi River operates under various federal and state permits, one of which is a LDEQ LPDES permit that allows the discharge of stormwater runoff from the facility into Bayou Dupont. The LPDES permit has a limit for TOC of 50 mg/L daily, however, average TOC concentration was 83 mg/L in 2007-2008. To comply with the LDEQ LPDES permit, Comite Resources designed and directed construction of two stormwater wetlands directly north (1.15 ha) and south (0.45 ha) of the facility in the winter of 2011-2012. During March 2012, approximately 800 baldcypress seedlings were planted in the two wetlands, and herbaceous species,	Robert	Lane	Comite Resources

			such as cattail mixed with pickerelweed, smartweed, arrowhead, and bulltongue colonized the wetlands naturally. Alligators and a large population of whistling ducks, along with other wildlife are also currently using the wetlands. Water quality has greatly improved, with a 70% decrease in TOC and an 89% decrease in TSS as stormwater flows through the primary wetland to the north. Baldcypress trees have grown rapidly, with a mean annual diameter growth increment of 2.2 cm/yr and a mean tree biomass at the end of the 10-year study of 182±11 kg/tree. The CHS facility has been in compliance with its LDEQ discharge permit since the stormwater wetlands were constructed.			

Ecosystem Restoration	21	Fish communities at four Louisiana coastal ridges identified through environmental DNA metabarco	Linear coastal ridges in Louisiana within the Mississippi Delta historically support diverse flora and fauna, but there is a paucity of studies documenting this diversity. Further, restoration of coastal ridges is often not thoroughly assessed. The aim of this project is to compare faunal communities across a diversity of ridges to determine ecological characteristics of those habitats and how these communities may change over time. In addition to partner studies that are collecting vegetation data and elevation data, we used environmental DNA to explore the diversity of fishes at ridge sites. Ridge sites, varying in age and salinity, included ridges in Grand Isle, Elmer's Island, Grand Liard, and Isle de Jean Charles. Sampling was conducted in October – December 2022 and will be repeated in March-May 2023. At each site, 4 water samples	Justine	Whitaker	Nicholls State University

			were collected using a Smith-Root encapsulated, self-preserving filter. DNA was extracted using the Qiagen DNeasy Blood & Tissue kit with modifications for filters. MiFish primers, which target a 170 bp fragment of the 12S rRNA gene, were used and amplicons were sequenced on the Illumina MiSeq ®. Sequences were denoised and chimeras were filtered using QIIME 2 and the plugin DADA2. Sequences were collapsed into operational taxonomic units and those representative sequences were then compared to a curated database of fish sequences. Sequences were then manually checked for accuracy to identify incorrect identification due to a lack of local species in the database. Frequency of occurrence maps and species composition per site are reported. This data will ultimately be compared to			

			traditional sampling methods of fish and crustaceans, elevation data, and flora diversity to identify characteristics associated with ridges communities.			

Ecosystem Restoration	22	Artificial Reef Units: 10 Years of Lessons Learned	Artificial reefs can provide shoreline protection while providing ecosystem enhancement. However, performance for both is not well-developed. This topic presents lessons learned from 10 years and four projects with a total of 14.7 miles of artificial reefs implemented in coastal LA on the analysis, design, procurement, and construction of Artificial Reef Units (ARUs). ARU analysis for shoreline protection requires tools to quantify their interaction with waves and stability during storms. Manufacturers are building empirical studies, but they are typically for specific configurations and a narrow range of coastal conditions. Computational fluid dynamics models calibrated with field data can accurately predict wave transmission through ARUs. Additionally, changes to the configuration of ARUs	Casey	Connor	Mott MacDonald

			have been found to have a significant impact on performance. Sites with poor soils are ideal for ARUs as they have lower bearing pressures than traditional rock structures. This allows the crest to be placed at or above MHHW. Challenges remain with geotechnical stability and mitigation of scour. Several variations in foundation and scour protection design have shown mixed results. Scour protection is preferred, and the foundation is best considered on a site-specific basis. Most ARUs are patented and/or sole-licensed so specifying ARUs by brand name presents legal challenges in public procurement. Requiring manufacturers to prove their product achieves specific performance characteristics can allow the use of “or equivalent”. Having multiple, qualified ARU manufacturers			

			can improve competitiveness and reduce prices. However, long manufacturing timelines can limit a contractor's flexibility during construction. Construction accounts for about half of the cost of ARU project implantation. Constructability improves with easy and rapid placement using designated lifting points or specified lifting methods. Larger units are placed faster when compared to smaller or stacking units.			

Ecosystem Restoration	23	GRAND ISLE – HOT SPOT PROTECTION AND BEACH NOURISHMENT	Grand Isle, Louisiana has a long history of engineering for storm protection. Due to these efforts, by the year 2016, most of the Grand Isle shoreline was in the best condition it had been in the past 70 years. However, a hotspot on the west end of the Island continued to have localized (hot spot) erosion. The hot spot is caused increasing tidal prism in Barataria Bay, increasing the Caminada Pass ebb shoal volume, which changes the wave patterns and causes erosion. To address this issue, a solution was developed consisting of a breakwater field and a beach nourishment. Morphological modeling showed that the breakwater field would not have a measurable impact on sediment bypassing across Caminada Pass and feeding Grand Isle. However, shoreline response modeling showed that a longer breakwater field	Josh	Carter	Mott MacDonald

			resulted in unacceptable downdrift impacts. As a result, 5 breakwaters along with a beach and dune nourishment were recommended to mitigate the hot spot. Borrow source investigation focused on two sources: the Barataria Pass and Caminada Pass ebb shoals. Both sources have sufficient material of good quality, with Barataria shoal was 8 miles away, while Caminada shoal was 2 miles away, making it a more cost-effective option. The Caminada Pass ebb shoal facilitates the bypassing of sediment onto Grand Isle, an important source of stability of Grand Isle shoreline. Morphological modeling was conducted to assess the potential impact on sediment bypassing which indicated a minor reduction in sediment bypassing and the Caminada ebb shoal was chosen as the			

			sediment borrow source. The project was completed January 2021 and placed 789,000 cubic yards of sand on the shoreline. On August 29th, 2021, Hurricane Ida made landfall near Port Fourchon with sustained winds of 150 mph, causing significant damage to the beach nourishment. USACE is currently evaluating repairs and upgrades to the Grand Isle Levee-Dune system.			

Ecosystem Restoration	24	Connecting the Dots: Spatial Analytics of Plastic Pellet Remediation	Plastics pollution is a global concern, and the Gulf coast states have become hotspots for plastics pollution remediation efforts. The dynamics of how plastic pellets are transported through fluvial and bay systems is complex, but potentially more complex is mapping their distribution. Spatial data analytics is a growing field that focuses on the utilization of GIS applications to analyze, visualize, and interpret spatial data. This field is rapidly becoming an important tool for uncovering patterns, trends, and spatial relationships that can be used to gain insights into a wide range of events, including plastic pellet distribution. Freese and Nichols, Inc. (FNI) was selected as the remediation consultant for a plastic pellet remediation effort along the Texas coast. This presentation discusses how the FNI team has employed	Kelsey	Calvez	Freese and Nichols, Inc.

			innovative solutions using GIS applications, including ArcGIS Survey123 and ArcGIS Field Maps, to better understand the horizontal and vertical distribution of plastic pellets and how they are influenced by aquatic vegetation, bottom substrate types, and the cross-sectional geometry of the creek channel. Additionally, this presentation highlights the insights gained from the FNI team and the measures taken to dynamically and adaptively map the remediation efforts of Cox Creek.			

Ecosystem Restoration	25	COMPARISON OF EFFICIENCY IN MARSH CREATION PROJECTS	Because coastal wetlands provide protection against hurricane storm surge, waves, and associated land loss the 2017 Louisiana Coastal Master Plan prioritized marsh creation projects. These projects are costly, and the dredging cost accounts for approximately 60% of the project cost. Reducing the unit dredging cost even by a factor as small as 5% will result in savings in the order of tens of millions of dollars, even in small projects. To make informed decisions for marsh creation projects, it is imperative that uncertainty in volume projections of dredge material be minimized. This is possible by having a better knowledge of dredged material consolidation. Studying completed projects will help have a better understanding of the impact of different factors in the efficiency of the marsh creation	Daniel	Gallegos	Louisiana State University

			process. Contractor daily reports, completion reports and surveys provided by LACPRA were analyzed to obtain data that helps better understand the factors affecting efficiency. The goal is to maximize the restored areas, while minimizing the resources required. This study will present the comparative analysis of four marsh creation projects. To quantify the project efficiency, the bulking ratio, which is the ratio of volume dredged from the borrow area to the total volume of the new soil structure was calculated for each project. It is expected that projects with coarser materials will have bulking ratios close to 1, whereas finer sediments will produce higher bulking ratios. In addition, the sediment transport and consolidation will be assessed, observing the effects of the dredge outfall location, the type and			

			size of the equipment, sediment type, and project location. These analyses differ based on the methods used to monitor elevation increase within the cell; grade stakes or surveys.			

Ecosystem Restoration	26	Coastal Restoration Toolkit - An online resource to launch a restoration project in your communi	Staff at public agencies and non-profit organizations often receive phone calls or applications from individuals outside the professional restoration community (e.g. NGOs, municipalities, or individuals) who have a sincere desire to restore local habitats, but have difficulties figuring out where to begin. Restore America's Estuaries has developed an online "Toolkit" (RestoreYourCoast.org) to support coastal residents and citizen scientists who identify problems with their local coastal environment and have an interest in transforming the idea into a project. The Toolkit enables community members who aspire to improve their local ecosystem, but who need the information and guidance to go from project idea, to design, to implementation. The	Elsa	Schwartz	Restore America's Estuaries

			Toolkit is divided into five main topic areas: Water Quality, Flooding, Coastal Erosion, Invasive Species, and Wildlife Habitats. Each topic has the tools and resources needed to start developing a restoration project in your community.			
Flood Risk Management: Coastal and Inland						

Flood Risk Management: Coastal and Inland	27	Assessing the Impact of Mangroves on Flood Risk Mitigation in Coastal Residential Communities	The utilization of nature-based solutions, such as mangroves, is becoming increasingly popular as a method of coastal protection due to their ability to decrease flood risks during storm events. Mangroves specifically have been found to be effective in reducing wave and surge impacts, thereby protecting coastal buildings from natural hazards. However, it is not entirely clear how the reduction in waves and surges translates to a decrease in flood risk to the built infrastructure. This study aims to present a methodology for assessing the expected flood risk mitigation effect of mangroves by quantifying flood hazard and risk using the Gumbel extreme value distribution and average annual loss (AAL) metrics, respectively. Through the use of Monte Carlo simulation, AAL is calculated at the individual building level for a	Md Adilur	Rahim	Louisiana State University

			hypothetical building in Mexico Beach, Florida. The study assumes scenarios where mangrove forests can reduce waves by 10%, 20%, 30%, 40%, 50%, and 60% and surge by 5 cm, 10 cm, 20 cm, 30 cm, 40 cm, and 50 cm. The results show that AAL is reduced by 9.5% for the scenario where waves are reduced by 10% and surge by 5cm, and 72% for the scenario where waves are reduced by 60% and surge by 50cm, compared to the scenario with no wave and surge reduction. This study will assist decision-makers, including government and community officials, in evaluating the potential of mangroves as a coastal protection strategy and the design necessary to achieve a certain level of flood risk reduction for buildings in coastal areas. Future research will focus on determining the necessary level of mangrove			

			development to achieve these levels of flood risk reduction for buildings in coastal areas.			

Flood Risk Management: Coastal and Inland	28	A Water Level Sensor Network and SWMM Model for the Design and Assessment of Low Impact Develop	Large cities like New Orleans have embraced green infrastructure (GI) strategies to help absorb, delay, and treat stormwater to reduce flood risk and improve environmental resilience. The Gentilly Resilience District, for example, is the City's first ever resilience district with a focus on projects that reduce flood risk, and support the area's recovery and revitalization. With the University of New Orleans Lakefront campus located within the area along the north shore of Lake Pontchartrain, it is an ideal location for this campus-wide case-study. UNO is developing a cost-effective network of water level sensors for real-time monitoring and calibration of a Stormwater Management Model (SWMM) for the campus and will implement this tool to study the effectiveness of GI systems. Currently, SWMM calibration	Gianna	Cothren	University of New Orleans, Civil Engineering

			for large-scale site-specific simulation is cost prohibitive because observed subsurface drainage flow data is needed in multiple locations during the same event. Investigators are testing an inexpensive unit that includes a microcontroller, Wi-Fi antennae, battery pack within a waterproof junction box and an adjustable linkage to a Maxbotix ultrasonic distance sensor mounted inside the manhole. It is installed simultaneously with a Teledyne area-velocity meter recording observed water level for data correlation to provide improvement in the ultrasonic sensor's corresponding measurement estimates. The Wi-Fi antennae allows communication through the cloud-based IoT Thingspeak open data platform allowing real-time adjustment of sampling rate for an expected storm event and display of adjusted water level			

			readings. The SWMM model can be used to design/assess low-impact development (LID) storage structures and provide comparison to required permitting of peaks and volumes for evaluating long-term impacts of LID structures. This system will allow the designers to assess the condition of the stormwater drainage system and the efficiency of the LID alternatives.			

Flood Risk Management: Coastal and Inland	29	GIS-SWMM based LID Design Evaluation	University of New Orleans investigators are developing a cost-effective network of flow monitoring sensors to calibrate a campus Storm Water Management Model (SWMM). The pre-calibrated model is used as a preliminary tool to measure and study the effectiveness of GI design alternatives on the campus for the 10yr/24hr design event. A geographic information system (GIS) that facilitates large scale, site specific, low impact development (LID) modeling in SWMM is essential in simplifying and defining model development for the LID system. Several SWMM parameters, such as pervious/impervious surface areas, subcatchment width, and surface and subsurface drainage slope, among others, are a function of onsite attributes such as infiltration rate, depression storage, roughness, flow length, etc. With GIS processing, these	Gianna	Cothren	University of New Orleans, Civil Engineering

			attributes can be more precisely defined. The LID-GIS becomes a valuable pre-processing input tool for SWMM model development and site LID analysis by properly delineating GIS layers and assigning attributes specific to LID modeling. This study conducts a preliminary evaluation of the effectiveness of LID features in a SWMM model on the UNO Lakefront campus. Five LID systems are designed as an exercise to test the preliminary model and identify nodes of interest for hydraulic analysis. At each node of interest, the effectiveness of the LID at reducing Peak Flow, Mean Total Inflow, Total Inflow Volume, and delayed Time to Peak was tested using the paired t-test for LID effectiveness and the Nash-Sutcliffe Efficiency coefficient (NSE) for evaluation of statistical significance of differences between the baseline model			

			and the LID implementation. One example LID implementation with the addition of a bioretention cell and impervious pavement parking results in a simulated 7% mean peak flow reduction, 14% mean inflow volume reduction, and little change in time to peak. Results like these are then used to evaluate and recommend specific LID design modification alt			

Flood Risk Management: Coastal and Inland	30	A Systems Approach to Stormwater Management in Baton Rouge	As many cities around the world continue to grow, they will need to rethink their approach to urban flooding due to the current problems they face and the worsening conditions posed by climate change which will lead to more intense storms and a greater risk to human lives (Green et al., 2021). To do this cities need to reduce their reliance on grey infrastructure and use it alongside nature-based solutions to restore natural hydrological means of flood management. Under two cooperative agreements with the US Army Engineer Research and Development Center (ERDC), the Coastal Ecosystem Design Studio (CEDS; formally CSS) ran a summer internship to understand and design solutions to adapt to rapidly changing coastal urban conditions. The agreements with ERDC were: Anticipating Threats	Grayson	Loudon	Louisiana State University

			to Natural Systems (ACTIONS) and Develop Engineering Practices for Ecosystem Design Solutions for Army Futures Command (DEEDS). These projects will inform the Army on land-use management designs and help enhance the resilience of military missions and operations. As a part of the Coastal Ecosystem Design Studio (CEDS), our team worked on a systems approach to stormwater management in East Baton Rouge Parish by understanding the use and site specificity of nature-based solutions such as riparian edges, constructed wetlands, retention areas and others. This system is intended to respond to nature by reducing flooding for cities in coastal settings with the added benefit of connecting communities and ecosystems to themselves and each other. To start thinking about how these designs can be			

			implemented we had to find a suitable case study with many different boundary conditions with previous flooding problems so that various sites could be considered for nature-based solutions. We chose Ward Creek in Baton Rouge because it is a major drainage channel that extends from North Baton Rouge through South Baton Rouge which, historically these two areas have been separated along a racial line.			

Flood Risk Management: Coastal and Inland	31	Large-scale laboratory direct shear testing for wetland root strength	Wetlands are examples of nature-based sustainable, and resilient coastal protection solutions. Therefore, there is a need to evaluate the shear strength of wetland soil-root, which is defying due to the complex nature of roots. The testbeds for this study are the Atchafalaya (natural active delta) and Terrebonne (continued river abandonment) Basins to forecast how long-term vulnerability to hurricanes, coastline erosion, and sea level rise will impact these distinct basins. Fieldwork included sample collection, from 3 sites per basin across a salinity gradient of fresh to saline marsh, using a biomass core sampler (15 cm diameter) and extruded into an HDPE pipe with a diameter of 15 cm and length of 35 cm. Samples were kept at cold to moderate temperatures to preserve the live biomass. A Large-scale Direct Shear Apparatus (LDSA) is	Youssef	Mousa	Louisiana State University

			used to measure the samples' shear strength. The equipment originally consists of 2 boxes sliding on each other, the top one is a square while the bottom is rectangular with dimensions of 12x12 in and 12x16 in respectively, each being 4 in deep. Hence, a wooden mold was assembled to modify the test configuration into a circular appearance to fit the samples. The large-scale direct test was performed on samples (15 cm height) from different depths. Samples were not subjected to vertical confinement during the test while the bottom half of the split shear box is displaced horizontally at a controlled rate of 1 mm/min (0.04 in/min). Preliminary results show that the shear strength increases non-linearly with the horizontal displacement. Samples from different sites will be tested to study the effect of the plant species on the shear strength and			

			determine the failure criteria.			

Flood Risk Management: Coastal and Inland	32	Advances in amphibious retrofit construction for flood risk reduction and climate adaptation	Protecting vulnerable communities from the increasing risk of flooding wrought by climate change is a challenging prospect. Unpredictable future flood levels require innovative solutions that can adjust to our changing environment. Large populations living in deltaic or riverine floodplain regions will be particularly severely affected. Amphibious architecture offers an inexpensive, adaptable and resilient approach to flood mitigation. A buoyant foundation refers to a specific type of amphibious architecture—a retrofit to an existing building that enables it to remain in place until the event of a flood, when it then rises completely passively and floats on the surface of the water until the floodwater recedes. Amphibious construction is an adaptive flood risk reduction strategy that works in harmony with a	Elizabeth	English	University of Waterloo

			flood-prone region's natural cycles of flooding. A buoyant foundation retrofit is capable of providing protection from flood damage with minimal change to the appearance of a home or the surrounding landscape. For some locations it is a viable alternative to relocation. In environmentally sensitive locations, amphibious construction suggests how to sit lightly on the land and live WITH the flooding, temporarily, when it occurs. Although amphibious retrofits are a solution that is not universally suitable for all types of flooding or building construction, they nonetheless provide a flood risk reduction and climate change adaptation strategy that in appropriate situations has much to offer. This poster will feature case studies of affordable, low-impact prototypes implemented in Louisiana, Ontario,			

			Bangladesh and Vietnam, and visionary projects designed for other flood-vulnerable locations around the world.			

Flood Risk Management: Coastal and Inland	33	Gulf-COAWST: Using a Noval Coupled Hydrological-Ocean Model to Better Focecast Water Level Varia	Hurricane-induced compound flooding is a combined result of multiple processes, including overland runoff, precipitation, and storm surge. Hurricane Harvey made landfall in Texas in August 2017 as a Category 4 Hurricane and brought historic amounts of rainfall to southern Texas. The combined effect of rainfall and wind produced a typical compound event in the Houston-Galveston Bay region. In this study, Harvey-induced compound flooding was investigated by a novel coupled hydrological-ocean modeling suite, where a state-of-the-art hydrological model (WRF-Hydro) is connected with a regional ocean model (ROMS) on the platform of the Coupled Ocean-Atmosphere-Wave and Sediment Transport Modeling System (COAWST). The hydrological and oceanic processes were simulated by WRF-Hydro and	Daoyang	Bao	Louisiana State University

			ROMS, respectively. The compound effect was represented via the seamless coupling along the boundary shared by the two models. The coupled model demonstrated a robust representation of the water level variations and circulation evolution in Galveston Bay during Hurricane Harvey. With a series of sensitivity experiments, the compound effects between runoff and storm surge as well as the contribution from different physical processes, were untangled and quantified.			

Flood Risk Management: Coastal and Inland	34	FRAGILITY CURVES OF LEVEE RELIEF WELLS DURING HIGH RIVER STAGE	Levees can be subjected to excessive underseepage through their alluvial foundations during high water periods; this excessive underseepage can cause levee erosion, piping, heaving, and uplifting. Thus, it is necessary to control the underseepage by installing relief wells. The USACE uses a modified version of the blanket theory to design relief wells. However, uncertainty is involved in relief well performance based on the field observation data. This study aims to examine the relief well system's probability of failure and the parameters that control relief well safety. This was accomplished using a 3D MODFLOW-USG model and a Random Forest regression model. For training and sensitivity analysis, random values were generated using the Latin hypercube sampling for each design parameter for sensitivity analysis	Omar	Alawneh	Louisiana State University

			and to train the random forest model using the MODFLOW model. The sensitivity analysis showed the design parameters' effect on the discharge rate and total head. The most critical parameters are entry and exit distance and the aquifer's hydraulic conductivity. The Random Forest model was used to run Monte Carlo simulations (MCS) to build the fragility curves. The curves showed that the probability of failure depends on the river head, skin factor, and well spacing. Based on the paper's findings, there is a potential to decrease the economic cost because the results showed that the well spacing might not play a significant role in the performance of relief wells.			
Managing our Rivers for Multiple Uses						

Managing our Rivers for Multiple Uses	35	Undrained shear strength comparison of mud-capped dredged pits in the Northern Gulf of Mexico	Louisiana's barrier islands have been experiencing high rates of land loss during the last decade. Therefore, barrier island restoration efforts have increased to combat land loss. Buried paleo-river channels are suitable sand sources for restoration efforts because of their location and complex buried network of available material. Excavated borrow pits in paleo-river channels are referred to as mud-capped dredge pits or MCDPs. However, there is limited knowledge about the properties of MCDPs. This study aims to investigate the geotechnical properties of the MCDPs at two locations in the north of the Gulf of Mexico (Raccoon Island and Peveto Channel). Vibracores were collected inside and outside the MCDPs to study their shear strength and index properties. The torsional ring shear device was used to	Omar	Alawneh	Louisiana State University

			find the peak and residual shear strength with varying effective stress and displacement rates. The results showed that the sediment outside the pit has higher shear strength than inside the pit in the two MCDPs. Also, both sediments inside the MCDPs showed a comparable shear strength value even though they were filled up during different periods with different filling rates. These findings will provide a better understanding of the MCDPs behavior and their long-term impacts on oil and gas infrastructure and safe management for future offshore infrastructure projects.			

Managing our Rivers for Multiple Uses	36	The Coastal Protection and Restoration Authority Atchafalaya Basin Program	The Atchafalaya Basin Program (ABP) was established in 1998 to develop, implement, and manage a comprehensive state master plan (Atchafalaya State Master Plan) for the United States Army Corps of Engineers (USACE) Atchafalaya Basin Floodway System, Louisiana. The Atchafalaya State Master Plan directs the efforts of the State as the non-federal sponsor for USACE Atchafalaya Basin Floodway Projects. In 2018, the ABP was transferred from the Department of Natural Resources to the Coastal Protection and Restoration Authority (CPRA). CPRA's ABP focuses on improving water quality and water management within the Atchafalaya Basin and increasing public access to and awareness of the Basin. The ABP Fiscal Year 2024 Annual Plan includes six (6) water quality and water management improvement projects, four (4)	Michelle	Felterman	CPRA

			recreation and access projects, and an update to the 1998 Atchafalaya State Master Plan.			

Managing our Rivers for Multiple Uses	37	Lower Mississippi River Freshwater Allocation through Natural and Manmade Diversions	The Lower Mississippi River conveys flow from of a water shed covering of over 3.2 million square kilometers. The continental flux of water, sediment, and nutrients passes through the state of Louisiana in the last stretch of its journey to the Gulf of Mexico. During this time, a portion of the river detours (particularly during high flow events) on its way to the gulf through a series of natural and manmade diversions. This distribution of freshwater away from the main channel is a highly engineering and evolving system of hard infrastructure and naturally occurring low openings. Studying the distribution of flow across the Southern Louisiana landscape is critical to the health of the region's environment and communities. Systemic understanding of its behavior is crucial to the sustained function of its communities,	Laura	Manuel	Tulane University

			habitats, and industries, namely fishing and navigation. Here we discuss the balance and strategies for freshwater allocation in the Lower Mississippi River. We also suggest the possibility of varying the operational strategies of existing and proposed manmade structures for optimal service and protection to human and biological communities in the receiving basins. Furthermore, we discuss the development of a large-scale operational forecasting system and its utility in informing river diversion management. By evaluating the tradeoffs associated with varying diversion operation strategies from both standalone and forecasting perspectives, we hope to provide valuable information to managers working in the Northern Gulf of Mexico. Harnessing the benefits of the Mississippi River's			

			water, sediment, and nutrients is an important step in the preservation and protection of coastal Louisiana.			

Managing our Rivers for Multiple Uses	38	Real-Time Estimation and Forecasting of Streamflow Response to Cyclical Processes	NUMERICAL MODELING OF RIVERINE STREAMFLOW UNDER HYSTERETIC CONDITIONS Emma House1, Ehab Meselhe1, Nazmul Beg1, Marian Muste2, Ibrahim Demir2 Hysteretic conditions are present in the flow regime of most rivers gauged by the USGS. Under these conditions, flow variables in the Saint-Venant equations exhibit a cyclical peaking phenomenon with unsteady flow, most significantly in the stage vs. index velocity relationship. Hysteresis effects due to flood wave propagation or seasonal vegetation growth have been known to cause significant errors in streamflow estimation with traditional rating curve techniques. Improvements in instrumentation technology within the last few decades can help to narrow the gap between our current knowledge of	Emma	House	Tulane University

			cyclical flow dynamics and the protocols for monitoring continuous streamflow. This approach applies novel flow monitoring technology based on water surface slopes and velocities in two rivers that are known to exhibit hysteresis: Clear Creek, IA, and Illinois River, IL. With directly measured data that does not rely on rating curves, we aim to study the relationships between the parameters under hysteretic conditions, run numerical simulations to provide real-time streamflow estimates, and develop a short-term forecasting system using data mining and machine learning. The modeling tools HEC-HMS and HEC-RAS are employed for 1D and multi-dimensional modeling of the riverine systems. This project will be a combination of experimental and data-driven methods with numerical flow simulations for developing			

			measurement protocols that can advance streamflow estimation and forecasting closer to the level of the current understanding of the physics in the field. In conjunction with a team from the University of Iowa, streamflow measurement equipment has been deployed, and 1D modeling and a machine learning exploration has begun for one of the rivers. The project background, plan, and progress will be outlined during the poster presentation.			

Managing our Rivers for Multiple Uses	39	Quantifying sediment retention and morphologic evolution in the Fort St. Phillip Crevasse Splay	Investigating water and sediment transport in uncontrolled diversion from the Mississippi River to build crevasse splays is essential to help in the strategic planning for ecosystem restoration and wetland loss reduction on the coast of Louisiana, USA. The Fort Saint Philip (FSP) crevasse was created in the 1973 flood on the east bank of the Mississippi River 19 miles above the Head of Passes and is considered a valuable analogue for proposed sediment diversions. In this study, FSP crevasse's hydrodynamics and morphodynamics will be simulated numerically utilizing Delft3D. The numerical simulation aims to quantify the land area change and sediment retention as a percentage of the diverted sediment. The amount of diverted water and sediment to this crevasse will be estimated based on the observed data at	Sherif	Ahmed	Dept. Of River-Coastal Science and Engineering - Tulane University

			the Belle Chasse monitoring station as well the discrete boat-based measurements in the vicinity of the crevasse mouth. The tidal signal at the basin-side of the crevasse will be determined based on the CRMS stations in the Breton Sound Basin. The geotechnical characteristics (erodibility and shear strength) and the sediment's underlying stratigraphy will be collected in cooperation with a team from Louisiana State University through in-situ cone penetrometer measurements, laboratory cohesive strength meter, and torsional ring shear testing. The elevation loss rate due to subsidence and global sea level rise will be determined based on the rates reported in the 2017 CPRA master coastal plan.			

Managing our Rivers for Multiple Uses	40	Improving Vertical Referencing of Mississippi Delta Water Levels Using Delta-X Campaign Data	Accurate monitoring of water levels is vital for understanding how water flows through our coastal regions, and for understanding which areas are vulnerable to flooding. Most publicly available water level data are collected using in situ water level gauges. Field surveys are required to reference the water levels from a gauge to an absolute vertical datum that can be accurately compared to other datasets, and these surveys need to be repeated periodically as water level gauges change in elevation over time, e.g., due to subsidence. There is additional confusion because water level data can be referenced to different vertical datums, such as those based on historical tidal conditions, or to a geodetic reference system such as the North American Vertical Datum of 1988 (NAVD88). Conversion between datums can be difficult since they are	Michael	Denbina	Jet Propulsion Laboratory, California Institute of Technology

			periodically updated over time, with multiple versions. As well, gauge data released by different organizations (e.g., USGS, NOAA, or the Coastwide Reference Monitoring System) can use different datum versions that must be converted when comparing between datasets. The NASA EVS-3 Delta-X campaign collected different types of field and remote sensing measurements in the Mississippi River Delta, Louisiana, USA in Spring and Fall of 2021 [https://deltax.jpl.nasa.gov]. Delta-X collected water level measurements in the Atchafalaya and Terrebonne basins using an airborne radar called the Airborne Surface Water and Ocean Topography (AirSWOT) instrument. We compared AirSWOT-derived water levels to those of in situ gauge data and derived offsets between each water			

			level gauge datum and NAVD88. AirSWOT allows the absolute water level of gauge data to be estimated without field surveys, and different sets of gauge data to be adjusted to a common reference. Our work underscores the need for improved record keeping and datum conversion methods for coastal water level data, and shows how remote sensing can be useful for this application.			
Human Dimensions						

Human Dimensions	41	Living With Water - Creating a Water Literacy Program at Louisiana Children's Museum	As the recipient of the prestigious Institute of Museum and Library Services' "Museums for America" grant, Louisiana Children's Museum is using its new home in New Orleans' City Park to envision learning opportunities for the next generation of water management leaders and problem-solvers. Living With Water leverages the museum's unique exhibits and settings to encourage learning through play -- splashing at the 100-foot Mississippi River water table, measuring erosion at the Sedimentation Table, or observing the wetland ecosystem in its backyard. The three-year start-up project includes developing an outreach and museum visit experience aligned with Louisiana's third grade science standards, creating media assets to promote and explain the museum's water exhibits, and implementing a new family festival called	Maria	Comiskey	Louisiana Children's Museum

			MudFest. Louisiana Children's Museum views children as capable, engaged citizens of our community, and this project seeks to document and share experiences that cultivate curiosity about instead of fear of the way water shapes our world.			

Human Dimensions	42	From English Lookout to Immigrant Labor: Salvage Archaeology on Pearl River Island, Louisiana	Pearl River Island lies at the mouth of the Pearl River in the Gulf of Mexico. Its use as a wilderness hunting ground today belies a long history of occupation, likely pre-dating the arrival of European settlers on its shores. British armed forces garrisoned the island in preparation for the Battle of New Orleans, imparting the name “English Lookout” to succeeding settlements in the area throughout the 19th century. In the early 20th century, the Dunbars, Lopez, and DuKate Company established an oyster cannery and associated workers’ village in the area of English Lookout, with the settlement appearing as “Dunbar” on contemporaneous maps. Records indicate the oyster cannery employed immigrant families, including children, in industrial-scale operations until a disastrous hurricane killed 52 people and destroyed the	Sherman	Horn III	Center for Human-Environmental Research, New Orleans

			settlement in 1915. Archeological survey in the wake of the Deepwater Horizon disaster identified several historic artifact concentrations and architectural remains on the Gulf shore of Pearl River Island, near the location of the English Lookout and Dunbar settlements. Artifacts spanned all periods post-dating European contact, supporting the continuous settlement history inferred from patchy historical records. Later reconnaissance by Center for Human-Environmental Research (CHER) staff documented extensive shoreline erosion and the disappearance of cultural features, which led to the initiation of salvage operations to mitigate the loss of important archaeological data. This poster presents preliminary results of mapping and test excavations conducted by CHER at			

			the English Lookout/Dunbar site. Comparisons of maps to historical photographs, and the contents of an adjacent garbage dump, indicate the largest structure at the site was an oyster shucking facility documented by photographer Lewis Hine. This important site, used by Hine and others to build the case against legalized child labor, is in danger of disappearing beneath rising Gulf waters.			

Human Dimensions	43	Gauging the Water: Exploring Adaptive Capacity Needs for Young People in Louisiana	Louisiana's land loss crisis and the efforts to mitigate and adapt to it are unique in many ways. One of which is the abundant amount of future planning that is being carried out to deal with the issue in the long-term (Coastal Protection and Restoration Authority, 2023). This project hopes to add to these future-oriented efforts by conducting a case study on adaptive capacity needs as it pertains to young adults in the New Orleans area living with land loss issues now and into the future. Additionally, this project hopes to identify how young adults currently meet those adaptive capacity needs and how they do not. An individual's or community's adaptive capacity can be characterized as the ability to address, plan for, or adapt to an environmental hazard (Ford et al., 2006). While adaptive capacity on an individual and community level	Brett	Pickett	Coalition to Restore Coastal Louisiana

			includes many factors, this project will mostly focus on some of the cognitive and social factors shown to be relevant for adaptive capacity needs to be met in flood prone communities such as knowledge, skills, abilities, risk-perception, beliefs, and behaviors (Lòpez-Marrero, 2010). To understand adaptive capacity in the context of land loss in Louisiana, semi-structured interviews will be conducted with community members, and experts from a variety of fields whose work and lives touch on land loss in Louisiana. These interviews will be done to identify relevant issues, what actions can or should be taken for a given issue, and what of the above factors is necessary to carry them out. Then, using the established adaptive capacity needs as a guide, focus groups with young adults will be conducted to determine how they			

			are currently well-equipped to live with future land loss issues and where progress needs to be made. Discussion will then be on further research needed on the topic, and how both the state and other entities can help advance the adaptive capacity of future generations in Louisiana.			

Human Dimensions	44	Interpretive Services: Visualizing information through an interdisciplinary process	Incorporating an interdisciplinary approach to interpretive services produces an excellent range of visualized information. As tools of measurement and collection have progressed, the level of data increased in volume while concentrating in specificity. There has never been a more important time for the distillation and representation of information. This project investigates the role of interpretive signage in improving access to public lands in the Atchafalaya Basin Floodway System (ABFS), a federally sponsored program managed by the US Army Corps of Engineers, New Orleans District. Over the course of two years, an interdisciplinary team of designers, architects, anthropologists, biologists, ecologists, and mapping scientists developed interpretive panels to be installed at various locations across the	John	Oliver	Freese & Nichols, Inc.

			ABFS project. The goal was to improve public awareness of Corps installations and the role that the Corps plays in providing critical flood control measures at Old River Control Structure in Vidalia, LA, as well as recreational opportunities in the Indian Bayou area north of Lake Henderson. Included on this poster are a sampling of the maps, renderings, diagrams, text, and branding symbology that were developed. The project team concludes that an interdisciplinary approach is essential to ensure that each topic is interpreted accurately and concisely presented to the public in a way that is consumable at all levels of prior knowledge. The synergistic coupling of social science, natural science, engineering, and design are key to the success of interpretive services and the promotion of access and ecotourism on public			

			lands. John Oliver (1,2), Michael Stout (3), Dan Burkett (2), Jeff Lush (2), and Whitney Broussard III (1) (1)Freese and Nichols, Inc. (2)University of Louisiana at Lafayette, School of Architecture and Design (3)Michael Stout Planning Services, LLC			

Human Dimensions	45	Coast In Crisis - Oral History Findings	As part of the Spring 2023 UL Lafayette's Coast in Crisis course, students will conduct a series of History Harvests, or oral history interviews, with members of frontline coastal communities. This research is part of a grant project funded by Restore the Mississippi River Delta (MRD) and is a combined effort between students and the Blanco Public Policy Center. Through the collection phase, our goal is to gather community members' perspectives on local coastal restoration efforts. The ramifications of mass land loss manifest within a human lifetime and coastal communities have witnessed this process in their everyday lives. Transversely, we hope that the effects of coastal restoration efforts have been just as tangible to community members. These communities live on the frontline of the coastal landscape, and their	Emma	Willis	University of Louisiana at Lafayette

			perspective on restoration is vital to understanding the long-term societal impact of these efforts. From there, our graduate students will conduct a qualitative analysis process, identifying common themes throughout the interviews and creating a data set from their yield. Transforming a community's recollections and personal stories into statistical results is aided by a humanities-informed perspective and students of history specializing in placing personal accounts within the context of wider historical and societal processes. Our poster will walk the reader through our methods of qualitative analyses, how we achieved our results, and the conclusions we are able to draw from this work.			

Human Dimensions	46	Eva Legard Center for Coastal and Environmental Studies: a university-public school partnership	Overview and Vision We started with a dream of creating an environmentally focused school where the concept of coast and environment is infused throughout the curriculum in a transdisciplinary manner. Students will also experience the joy of being a scientist and solving problems in their community through place-based learning. In August 2022 we started with sixth grade and will add each grade in the next few years. The only admission criterion is student interest the environment. We want the students to identify as scientists and want to stir up their excitement in science. The goal is to create an educated workforce and informed voters who understand the importance of protecting the coast and environment. Students who graduate from Eva Legard gain automatic admission into LSU and College of Coast and	Linda	Bui	Department of Environmental Sciences, College of Coast and Environment

			Environment. The Process To actualize this dream, educational standards were examined, and enhancements were created based on geosciences; we added to existing curriculum using an NSF grant. All the curriculum was intertwined with Phenomena-Based Learning (PhBL), and themed Accelerated Reader books enhance literacy. The teachers participated in two weeks of Professional Development (PD) to learn the enhancements and create a framework for the PhBL. Problem-based learning, hands-on activities, and monthly environmentally focused field trips were intentionally pushed into the framework to enhance students' understanding. Two public service Graduate Assistants from LSU help implement PhBL and provide support to			

			the teachers for the success of this program. Outcomes and Experiences Students are engaged in PhBL and had the opportunity participate in environmentally focused field trips. Additionally, sixth graders have learned to throw a cast net and identified, measured, and weighed fish and used to teach ratios and equations. Eva Legard students' proficiency in math and English language arts has improved by 40% and 30%, respectively since August 2022.			

Human Dimensions	47	LSU National Academies of Sciences Gulf Renaissance Scholars Program	We are pleased to host the Louisiana State University National Academies of Sciences Gulf Renaissance Scholars Program (LSU NAS GRSP). Our program is a renaissance for undergraduate-level creative and research efforts at LSU in support of local communities and ecosystems in and adjacent to the Gulf of Mexico region. This program focuses on social, environmental, and scientific issues facing the Gulf, its people, and their diverse cultures. The program is transdisciplinary and collaborative, engaging a large and diverse cohort of undergraduate students from the sciences, engineering, humanities, and arts. The GRSP uniquely advances curriculum about a global Gulf of Mexico. Students will take coursework focused on the Gulf Science as well as the possibilities and histories of economic, political and cultural exchange activates and extends students	Linda	Bui	Department of Environmental Sciences, College of Coast and Environment

			historical and moral imagination. The capstone of this program will be a Gulf Impact Project—a mentored individual or group research experience or creative pursuit. LSU is focused on research and creative activity embodied in the “Pentagon Plan” of LSU President William F. Tate IV’s “Scholarship First” plan, with the emphasis areas of agriculture, biotechnology, coast, defense, and energy. LSU researchers study connections among the coast, energy, and environment as they reflect the increasingly complex relationships humans face with land, sea, and air. LSU’s NAS GRSP has two central themes: (1) research and creative activities for undergraduates and (2) service to the Gulf region, with a global perspective. We are looking for collaborations with our innovative Gulf Scholars such as internships, imbedded research			

			and creative activity, mentorship, and support of specific Gulf Scholars who are focusing on subjects of interest. This program offers new, cross-disciplinary curricula will incorporate novel understandings of Gulf science and culture, creative expressions in film and art, and strong ethics and values.			

Human Dimensions	48	Safeguarding Ecological Knowledge from the Effects of Climate Change: An Archival Approach	Creating resources that facilitate the preservation of community-based archives and ecological knowledge in the Louisiana coastal region is integral to residents' survival amongst the effects of climate change. Research and records created and stored within the Louisiana coastal region have a higher predisposition to the drastic and pervasive effects of climate change and natural disasters. Modern archivists can insert themselves into the work of climate change action through their advocacy of safeguarding collections that have been created by communities and individuals through raw scientific and observational data and unpublished research. Just as archivists continue to frame their professional work around a theory of best practice, a similar module can be created to navigate preservation of	Daena	Carrillo	Louisiana State University

			documents, plans, photos, narratives, and other ephemera in this Anthropocene. To create best practices, it is essential to build a foundational understanding of the unique development and needs of the communities, individuals, and researchers. The project is designed to craft a toolkit to facilitate the safeguarding of ephemera from community-based archives and ecological knowledge that relates to climate change and its impacts. The ephemera of conservationist and engineer John Edgar Land will function as a case study model. The intent is for the unprocessed content to serve as a prototypical case of ecological knowledge. Through the content arrangement, description, and preservation methods, Land's Legacy collection will serve as a toolkit for			

			other knowledge and community-based collections. The objective is for the collection to model the use of community and ecological archival knowledge in filling historical gaps and empowering communities. Action must be taken to ethically secure information and knowledge created by communities, through raw scientific data and unpublished research by working collaboratively with communities.			

Human Dimensions	49	St. Tammany Parish Adopt a Pond Program: Developing Lifelong Environmental Stewards through Publ	Wetland education has been a priority in St. Tammany Parish for many years. After devastating impacts of tropical storms and heavy rainfall events caused widespread a loss of trees and flooding, St. Tammany Parish developed programs to mitigate these impacts. Ongoing wetland education and tree planting projects merged into the Adopt-a-Pond Program (AAP), a partnership between St. Tammany Parish Government, St. Tammany Public School System, La Sea Grant, LSU AgCenter, US Fish & Wildlife Service, and Sunbelt Innovative Plastics that provides an opportunity to improve local habitats while learning hands-on STEM applications. The objective of the AAP is to restore and preserve natural resources, prevent flooding and monitor water quality in local waterways. Retention and detention ponds managed by the Parish served as the	Whitney	Wallace	LSU AgCenter

			outdoor classroom for tree restoration and water quality testing methods. These ponds are an important part of drainage for rainfall runoff. They reduce flooding and serve as tertiary treatment for non-point source pollution before runoff enters local streams. Plant communities in these manmade wetland areas can reduce the amount of nutrients, total suspended solids and potential toxins from the receiving waters. Seventh through twelfth grade students from ten (10) schools participated in classroom and pond site lessons to support our objective. Teachers attended an introductory workshop to outline lesson topics and activities, and students participated in at least one classroom and two pond activities, each school year. Approximately 450 students planted 13,000 trees and			

			monitored seven water quality parameters (pH, nitrate, phosphate, dissolved oxygen, temperature, H2O clarity and salinity). By testing water quality and comparing data over time, as the trees and other plants grow, students and parish officials can potentially show a reduction of pollution in the receiving streams. Students gain knowledge and become stewards of the environment.			

Human Dimensions	50	INVESTIGATING THE FEASIBILITY OF USING RECYCLED GLASS SAND IN COASTAL PROTECTION AGAINST EROSION	The Louisiana coast significantly contributes to the US's human, economic, and environmental prosperity. However, Louisiana coast loses on average 25 km2/year of coastal wetlands due to the combined impacts of coastal erosion, subsidence, and accelerated sea level rise. Terrebonne Bay and the associated Lafourche deltaic lobe headland are critical regions for wetlands and infrastructure protection and restoration in the state's master plan, which rapidly retreated and eroded due to wave attack and relative sea level rise in the past 150 year according to the historical imagery. This study aims to investigate the feasibility of using recycled glass sand to reinforce the existing coastal defenses, particularly terraces, and suggest locations for additional protection. With the help of Pointe Au Chien tribe leaders,	Ali	Abdelrahim	Tulane University

			these locations will be chosen to optimally protect, and restore regions of high importance to the tribe within the Terrebonne Bay. Two models using Delft3D Flexible Mesh are under development to examine the change of maximum bed shear stress in Terrebonne Bay to determine the required resistance of the recycled glass sand, which will be used for the new proposed coastal protection in the region, or the reinforcement of the existing structures. The first model is a storm surge model that simulate hurricane Ida, which made a landfall in Louisiana on August 29, 2021, and covers the main part of the Terrebonne Bay. The other model is a coupled flow-wave model that combines the hurricane Ida storm surge model with a three-level nested wave model to estimate the contribution of waves to the maximum shear stress.			

			Therefore, a better estimation of the required material characteristics is efficiently determined under the worst-case scenario. In addition, the morphological processes will be activated in the following stage to study and analyze the behavior of the structures over time to estimate the erosion and accretion rates of the proposed recycled glass sand.			

Human Dimensions	51	CWPPRA's WaterMarks360: Highlighting Coastal Restoration Using Virtual Fieldtrips & Curriculum	Louisiana's coastal wetlands are some of our nation's most valuable and fragile ecosystems, and they are also home to some of our most vulnerable communities. Coastal communities often lack the resources and opportunities for teachers and students in K-12 schools to access quality STEM curricula, especially on locally relevant material. The WaterMarks360 Experience is a multifaceted project intended to teach students about wetland ecosystems and restoration efforts by virtually exploring different two CWPPRA projects in Southeast Louisiana. In addition to self-navigated 360° video hotspots and informational videos, this project also includes resource materials and several STEM experiments in which students will explore concepts like wetland formation and erosion, as well as restoration strategies like	Lauren	Leonpacher	Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA)

			vegetative planting and construction of terraces. These activities will give students the confidence to participate in conversations surrounding Louisiana's land loss crisis with their peers and community members. Getting students excited about Louisiana's wetlands will help create future stewards of Louisiana's beautiful coastal environments, but opportunities for students to visit these areas don't come easily. The WaterMarks360 Experience increases accessibility by providing this open-source learning experience anyone with an internet connection so community members of all ages can experience Louisiana's wetlands without needing hip boots.			

Human Dimensions	52	Spatial Trends of Human Population Dynamics with Louisiana Wetland Ecosystem Services	The ecosystem services concept is a tool that scientists created to communicate the value of natural environments to human well-being. The Louisiana Coastal Master Plan uses the ecosystem services provided by the Mississippi River Delta as rationale for why coastal Louisiana should be protected. For this study, we conducted a meta-analysis of the ecosystem services in Louisiana's coastal zone, a survey of over 600 coastal Louisiana residents, and a subsequent spatial analysis to understand the spatial relationships between how and why people place value on nature, as it relates to coastal restoration and the utility of the ecosystem services framework. First, we conducted a meta-analysis of over 100 ecosystem service valuations for Louisiana wetlands. We took the averages +/- 1 SD of each service for each	Vanessa	van Heerden	Department of Oceanography and Coastal Sciences, Louisiana State University

			ecosystem and geospatially analyzed them in ArcGIS Pro to find hot spots of ecosystem services in coastal Louisiana and overlaid socioeconomic and population dynamics to those areas. With this, we created an index of socioeconomic and demographic factors that elucidate spatial relationships between people and ecosystem services. Survey results created an index of economic and cultural factors that influence how and why residents place value on nature. This research informs the validity of the ecosystem services framework, and the societal contexts for valuing coastal environments. By conducting a mixed methodological study, we identified how people's value of nature can be used as science communication approaches for policy strategies in the future, specifically with coastal restoration. Mixed			

			methods will be utilized not only to obtain a fundamental understanding of the relationship between humans and ES in the coastal zone of Louisiana, but also to understand the processes and motivation behind residents' place attachment, valuation rationale, and communication needs in the era of statewide coastal restoration efforts.			

Human Dimensions	53	An Environmental Justice Perspective on Louisiana's aging Oil and Gas Wells	Louisiana once had many new oil and gas wells drilled each year. However, since 2012, and a pivot to fracking, much has changed in the number of new wells drilled, as well as the number of wells on the official Orphan well list. In 2022, there were many more wells in need of monitoring for methane leaks, or plugging, than new wells drilled. Based on SONRIS data, the Louisiana Legislative Auditor's Reports on Orphan Wells, and a definition of "Unplugged Wells" al la Townsend-Small et al 2016, I have reviewed how the number of uneconomic wells with the potential for releasing methane has more than doubled since 2012, up to a potential of 28,516 uneconomic wells across the state as of October 2022, (12,942 in 2012) inclusive of, yet much higher than the official Orphan well number of 4,615, (also more than	Scott	Eustis	Community Science Director

			doubled from 2,108 in 2012). The Environmental Justice implications of petrochemical hazards on the Louisiana Coast have been previously reviewed (Hemmerling, DeMeyers, Parfait, 2021). Adapting a "rural" environmental justice review process developed for wetlands impacts (Bullard, Mohai, Saha, Wright, 2008; USACE 2017), as well as the federal Climate and Economic Justice Screening Tool (1.0, Nov 2022), I review how the list of active oil wells (14,566 as of October 2022) and Unplugged wells (up to 28,516) is distributed geographically across "Disadvantaged" and Environmental Justice areas. For example, 89.3% of LA Active Oil Wells are in Disadvantaged Areas subject to Justice 40 policy. On the coast, after Ida, Native American areas were disproportionately affected by leaking, uneconomic wells. This preliminary			

			review shows that re-hiring oil workers to tackle methane issues would primarily benefit Environmental Justice and Disadvantaged areas. Funding challenges exist for coastal wells that require waterborne vessels to maintain or plug. This underlines the importance of engaging Native and low-income fishing communities in order to secure Justice 40 funding.			

Hydrology, Geomorphology and Ecology of the Coast	54	Exploring the potential use of BALOs as a probiotic control agent in marine environments.	Bdellovibrio and Like Organisms (BALOs) are predatory bacteria that can feed on certain Vibrio spp.. The bacterium Vibrio coralliilyticus is not only pathogenic to corals but also has caused shellfish larval mortality. This project is to explore the possibility of using BALOs to reduce Vibrio coralliilyticus populations in coastal waters and applying these predators to decrease the mortality of larval oysters affected by the pathogenic Vibrio. First, BALO isolates from the Gulf of Mexico water that are maintained in PI Hou's lab will be tested for their specificity for Vibrio coralliilyticus strains in coastal water using microcosms; second, once a suitable BALO isolate is determined, it will be introduced to cultural plates containing Vibrio bacteria and live oyster larvae. It is hypothesized that the BALO isolate can prevent a large larval mortality event by predating on the	Caleb	Cavness	Louisiana State University

			Vibrio spp. The results will help build a foundation for developing novel, environmentally friendly measures to control Vibrio infection in marine environments. Additionally, Undergraduate Researcher Cavness, along with PI Hou will communicate the research to underrepresented middle school students from the Glasgow Middle School in Baton Rouge.			

Hydrology, Geomorphology and Ecology of the Coast	55	Micropaleontological analysis of a Holocene sediment core from Myrtle Grove, Louisiana	Long sediment cores from the Mississippi Delta can elucidate how this system responded to Holocene relative sea-level rise and slowdown, in terms of landward and seaward changes of the shoreline. Micropaleontological analysis of a 40 m long core taken near Myrtle Grove, Louisiana, provides insight into the change in paleoenvironments during the entire Holocene. The field site is located at CRMS site 0276 which has recorded surface level change over the last 15 years and is near the planned Mid-Barataria Sediment Diversion. Previous radiocarbon and OSL ages provide sedimentation rates and depositional context for the uppermost and lowermost lithological units. However, there is a lack of information on the homogenous mud package that dominates the middle portion of the core. To build on existing	Trap	Puckette	Tulane University

			stratigraphic data, assemblages of benthic foraminifera were used to obtain water depth and salinity indices and further pinpoint paleoenvironmental transitions that reflect the Holocene marine transgression and subsequent regression. Paleontological results largely support the lithologic transitions. Shallow water assemblages reflect the formation of the modern deltaic plain and lobe switching cycles in the upper unit of the core while shifts in foraminifera abundance and assemblages were used to subdivide the prodelta deposit in the middle unit of the core. In particular, the presence of planktonic foraminifera characterizes transitions from fluvial-marine to fully marine environments throughout the prodelta deposit. Benthic foraminifera were also used to obtain additional radiocarbon ages and			

			further constrain the time of deposition for this middle unit.			

Hydrology, Geomorphology and Ecology of the Coast	56	Airborne Imaging Spectrometer Products over Coastal Louisiana from NASA's Delta-X Campaign	Aboveground biomass (AGB) is a dominant factor influencing the stability and elevation dynamics of herbaceous deltaic wetlands along the Louisiana coast. The development of accurate landscape-scale AGB maps is critical to better understand seasonal and spatial changes in vegetation and to predict the sustainability of these coastal deltaic systems. In this study, we used Airborne Visible/Infrared Imaging Spectrometer—Next Generation (AVIRIS-NG) data from NASA's 2021 Delta-X mission in coastal Louisiana to map seasonal changes in AGB across two deltaic basins with contrasting sediment delivery and hydrologic regimes: the Atchafalaya (active) and Terrebonne (inactive). We assessed the performance of a machine learning regression model against empirical	Daniel	Jensen	NASA Jet Propulsion Laboratory

			PLSR models, hypothesizing that a machine learning approach will produce the best overall AGB map products. We found that our Random Forest regression approach based on the corrected AVIRIS-NG data outperformed the PLSR models in both overall model performance (R2 = 0.89, Mean Absolute Error = 109.30 g/m2) and visual quality, having greatly reduced the severity of noise and discontinuities in AGB estimates across the AVIRIS-NG flightlines. We additionally mapped vegetation types across these coastal basins, allowing us to assess productivity trends related to differing plant communities.			

Hydrology, Geomorphology and Ecology of the Coast	57	Seagrass Epibiota Biodiversity in the Northern Gulf of Mexico	Epibiota on seagrass leaves contribute substantially to productivity and trophic interactions in seagrass bed ecosystems. However, differences in epibiota composition and factors that contribute to diversity have been little studied in the northern Gulf of Mexico where the pioneering seagrass Halodule wrightii forms beds of economic importance. For this system, we have adopted a metabarcoding approach to describe epibiota biodiversity from seven seagrass beds located within four bays across the Northern Gulf of Mexico. We intend to present preliminary data examining correlations between measured in-situ environmental conditions as well as seagrass bed health metrics at each site, and the corresponding epibiota biodiversity. Seagrass epibiota DNA was extracted	Margo	Boucetta	University of New Orleans

			and PCR amplified using three established metabarcoding markers (18S, CO1, rbcL), with the hope of capturing a broad range of marine eukaryotic taxonomic diversity. Different extraction kits and preservation media were compared to assess which methods yielded the best DNA amplification results. A preliminary assessment of species diversity was carried out using Sanger sequencing and sequences were identified using the NCBI Blast tool. Finally, samples from all seven sites were NGS sequenced on the Illumina platform. We predict epibiotic diversity will differ among beds due to differences in environmental conditions. Based on the idea of mutual feedback between genotypic diversity and epibiota biodiversity, we also predict that epibiota diversity will be positively correlated			

			with seagrass genotypic diversity.			

Hydrology, Geomorphology and Ecology of the Coast	58	Impact of 2022 Freeze on Belowground Biomass of Avicennia germinans	Black mangroves (Avicennia germinans) are an integral part of the Louisiana coastal system, providing protection against edge erosion and attenuating wave action. Mangrove coverage has been expanding in Louisiana (Osland et al., 2017). Thriving in warmer climates, mangroves are negatively impacted by below freezing temperatures. To investigate the impact of freezing on belowground biomass, we collected cores of before and after the event in December 2022 at three locations in the West Belle Pass area. Cores were 30-cm deep and were divided into 2-cm sections to analyze vertical distribution of biomass. Two of the sites were within the West Belle Pass Restoration planting area, and one was within naturally occurring mangroves. Preliminary results show that belowground biomass was reduced at	Agathe	Desthomas	University of New Orleans

			restored sites with coarse material. The December 2022 event was an example of an Arctic blast initiated by a sudden stratospheric warming (SSW) event. Our results have implications for future landscape changes along the Louisiana coast, as the frequency of SSW and extreme cold could increase with future climate change (Baldwin et al., 2021). Osland, M. J., Day, R. H., Hall, C. T., Brumfield, M. D., Dugas, J. L., & Jones, W. R. (2017). Mangrove expansion and contraction at a poleward range limit: climate extremes and land-ocean temperature gradients. Ecology, 98(1), 125–137. https://doi.org/10.1002/ecy.1625 Baldwin, M. P., Ayarzagüena, B., Birner, T., Butchart, N., Butler, A. H., Charlton-Perez, A. J., et al. (2021). Sudden Stratospheric			

			Warmings. Reviews of Geophysics, 59(1). https://doi.org/10.1029/2020RG000708			

Hydrology, Geomorphology and Ecology of the Coast	59	Barge-driven resuspension enables sediment bypassing in the Gulf Intracoastal Waterway	Ship traffic can increase sediment resuspension in shallow channels and coastal areas. Here we show that ship-driven resuspension is the major morphological agent in the Gulf Intracoastal Waterway (GIWW), a 4-5 m deep and 60-150 m wide navigational channel located in the Mississippi Delta (Louisiana, USA). Single ship passage increases total suspended sediment (TSS) from the background value of ~20 mg/l to peaks of 100-400 mg/l, which then decays exponentially within an e-folding time of about 8 minutes. Resuspension is mainly driven by barge traffic, and it is associated with the primary wave (Bernoulli drawdown) rather than the short waves in the Kelvin wake. Sediment resuspension is strongly correlated to the maximum velocity of the primary wave (up to 0.8 m/s), whose	Giulio	Mariotti	Louisiana State University

			magnitude is mainly controlled by the barge draft (and hence by the barge load). When averaged over time, ship traffic (~10 loaded barges per day) increases the mean TSS to about 50 mg/l, i.e., double the background value. We suggest that this resuspension explain how the GIWW can transport sediment over ~150 km – from the Atchafalaya River to Barataria Basin – despite relatively low advection velocity (~0.1 m/s). More generally, we suggest that ship traffic in confined channels, as opposed to channels bordering tidal flats, facilitates sediment bypassing and should reduce in-channel sedimentation.			

Hydrology, Geomorphology and Ecology of the Coast	60	Linking coastal flooding to an unusual hypoxic event using microbial ecology	In July 2016, a severe coral reef invertebrate mortality event occurred in the Gulf of Mexico, approximately 200 km south Cameron Parish, wherein ~82% of corals in a small area of the East Flower Garden Bank (EFGB) coral reef suddenly died without warning. Satellite data showed a large plume of brackish water was present in the northwest Gulf of Mexico at the time but whether this was linked to the mortality event was unknown. This plume primarily originated from the Mississippi/Atchafalaya River system and was supplemented by intense precipitation and flooding events that had occurred across southeast Texas and southwest Louisiana earlier in the spring of 2016. Here we describe the use of microbial ecology analyses in an environmental forensic context to determine the cause of this mortality	Shawn	Doyle	The Water Institute

			event. Microbes respond quickly and specifically to physiochemical disturbances such as hypoxia or pollution. As a result, measuring shifts in the composition and structure of microbial communities can provide clues to the cause of specific disturbances. In this study, we analyzed microbes in water samples collected over several years at the Flower Garden Banks, including shortly after the mortality event. Our findings indicate that shortly after the mortality event, microbial communities in deep waters were enriched with species known to be active and abundant in oxygen minimum zones or that have known adaptations to oxygen limitation, suggesting there was a widespread depletion of dissolved oxygen concentrations in the deep waters around the EFGB around the time of the mortality event. Analyses of			

			parallel physical oceanographic data suggests some of this deep, oxygen-depleted water had upwelled onto the coral reef and become trapped in depressions on the reef. This stratification would have prevented reoxygenation from the surrounding water column and led to localized pockets of hypoxia on the reef.			

Hydrology, Geomorphology and Ecology of the Coast	61	Effects of cyanobacteria Microcystis aeruginosa on eastern oyster feeding	The eastern oyster is of great socioeconomic, ecological, and cultural value to Louisiana. Oysters are filter feeders that obtain nutrition by capturing and ingesting phytoplankton, and can preferentially ingest specific particles while rejecting others as pseudofeces. This selectivity means that particle clearance rates measured from the disappearance of prey do not necessarily equal ingestion. The freshening and warming of Louisiana estuaries—driven by climate change and human modifications—will favor phytoplankton assemblages dominated by smaller, less nutritious, and potentially harmful cyanobacteria such as Microcystis aeruginosa (M.a). Using controlled, static, single-oyster, laboratory feeding experiments, we quantify differences in clearance rates,	Julia	Sweet	University of Louisiana at Lafayette

			pseudofeces production, and pseudofeces composition in the presence of environmentally relevant concentrations of a non-toxic strain of M.a. Two phases of feeding experiments were performed. First using simple diets containing M.a alone or with the similarly sized but more nutritious diatom Thalssiosira pseudonana, then with more complex, realistic diets using natural phytoplankton assemblages with and without M.a. Preliminary results reveal no significant differences in clearance rate or pseudofeces production between M.a treatments and controls for both the single-species and natural phytoplankton communities. Ongoing molecular work (qPCR) seeks to quantify potential differences in pseudofeces composition and determine whether			

			M.a is actually ingested by oysters after it is cleared from the water. Ingesting this lower quality phytoplankton food source may have repercussions on oyster fitness, whereas the selective rejection of M.a may result in a feedback loop, promoting a high abundance of a potentially harmful species. While M.a at the concentrations tested does not appear to affect the ecological functioning of oysters (i.e., filtration), it could affect nutritional requirements and physiological condition.			

Hydrology, Geomorphology and Ecology of the Coast	62	Assessment of heavy metal pollution in surface sediment along the Calcasieu River	To better understand the potential for metal pollution in an estuary heavily concentrated with petrochemical industries, we measured concentrations of metals and metalloids in the Calcasieu River estuary, which is an estuary entering the northern Gulf of Mexico. We sampled six sites along the last 88-km reach of the river monthly between May 2013 and November 2015, identify their sources, and assess their potential risk. The results demonstrated that the degree of pollution from seven heavy metals decreases in the following sequence: arsenic (As) > silver (Ag) > copper (Cu) > cadmium (Cd) > zinc (Zn) > chromium (Cr) > lead (Pb). Results of the enrichment factor analysis and the geo-accumulation index evaluation showed that As and Ag were present in the surface sediments of the river at low or partial serious pollution levels, while Cu, Cd,	Zhenwei	Wu	Louisiana State University

			Zn, Cr, and Pb existed at zero or low pollution levels. According to Sediments Quality Guidelines (SQGs), heavy metals except for As have low biotoxicity, and As could potentially result in harmful effects on the aquatic organisms. This study suggested that more attention should be directed to the comprehensive risk assessment of heavy metals of this riverine aquatic environment.			

Hydrology, Geomorphology and Ecology of the Coast	63	A multi-factor approach to understanding oyster success in Louisiana estuaries	Oysters have long been an important fishery resource in Louisiana. Recent oyster mortality events have been documented from known causes, such as the 2019 openings of the Bonnet Carré Spillway, and unknown causes, such as that in Barataria Bay the winter of 2021. With ever-fluctuating estuarine conditions coupled with increases in storm frequency and riverine output, understanding how these and future events impact oyster success is crucial to management and restoration of oyster resources. Changing conditions bring potentially new stressors that may impact oyster condition, growth, mortality and fecundity. Beginning in November 2022, we deployed cages of oysters at two contrasting locations (Grand Isle and Cocodrie, LA) and implemented sampling to measure potential harmful	Devin	Comba	LSU AgCenter

			algal bloom and algal toxin exposure in oysters. Initial results demonstrate different oyster growth and condition between the two sites, with lower growth at the lower salinity site (Cocodrie). We have also documented the presence of multiple phytoplankton taxa that can be toxic (Pseudo-nitzchia spp.), or otherwise harmful to shellfish (Akashiwo sanguinea, Chaetoceros spp., and Coscinodiscus spp.) but lack data to assess their impact on oyster success. Understanding multi-factor stressors on oyster growth, mortality and fecundity will help better model and predict oyster resource status and trends.			

Hydrology, Geomorphology and Ecology of the Coast	64	CDIP wave and current monitoring in Louisiana	The Coastal Data Information Program (CDIP) at Scripps Institution of Oceanography, UC San Diego, maintains an array of wave monitoring buoys in US waters worldwide, with primary funding from the US Army Corps of Engineers (USACE). In 2019 CDIP began a partnership with the Louisiana Coastal Protection and Restoration Agency (CPRA) and installed a wave buoy station off Grand Isle, LA. In 2021 the station was relocated to CDIP 256 Southwest Pass Entrance W. Every 30 minutes, it reports high precision data including wave height, period, direction, spectra, plus surface currents, water temperature, and air temperature, which is then made freely available to the public and disseminated via the weather service. The System Wide Assessment and Monitoring Program (SWAMP) was developed by the Coastal Protection	James	Behrens	Coastal Data Information Program

			and Restoration Authority (CPRA) of Louisiana as a long-term monitoring program. The SWAMP design recommended documenting wave dynamics to improve understanding of the processes that impact water circulation, mixing and marsh edge erosion in the estuarine and nearshore environments, and to characterize offshore boundary conditions. The partnership between CDIP and CPRA provides critical data that will inform the Coastal Master Plan via SWAMP and contribute to informed decisions to protect Louisiana's coast and its citizens. In addition to coastal restoration, the data are available and useful to all coastal mariners for safety and situational awareness.			

Hydrology, Geomorphology and Ecology of the Coast	65	A Location-Based Model for Restoration Experimentation: The Bay Denesse Living Lab	The backbone of Louisiana's plan to manage its shrinking coast is to use the power of the Mississippi River to deliver sediment to subsiding wetlands. The strategy requires resource managers to guide a rapidly evolving delta landscape towards a configuration that optimizes sediment delivery and retention to maximize wetland extent. Despite the urgent need for techniques to optimize sediment retention, there is very little understanding of which strategies are the most effective, or how they can be deployed most efficiently. The Bay Denesse Living Lab is a platform for collaborative research into wetlands restoration design to facilitate active, collaborative interaction. It consists of a physical location to support site access and data collection, as well as a community of collaboration and	Christopher	Esposito	The Water Institute

			logistical support for researchers, practitioners, and educators. The rapid expansion of Neptune Pass, immediately adjacent to Bay Denesse, has increased the relevance and urgency of activities in the Bay Denesse Living Lab. Our presentation highlights recent activities from the Bay Denesse Living Lab, including a series of design experiments demonstrating planting methods and structures for enhancing sediment retention in deltaic environments. Our presentation focuses on in-situ monitoring data showing adjustments to environmental flows in the vicinity of these projects. We also will present a unique GIS tool to facilitate field trips and site access. This tool relies on crowd-sourced measurements from local boat pilots to produce bathymetric maps. These show rapid changes due to			

			erosion and sedimentation associated with Neptune Pass, and provide a workflow for rapid response bathymetry collection. The Bay Denesse Living Lab is providing a vehicle for fundable proposals that involve researchers, restoration practitioners, and educators. We aim to make the community aware of this unique environment, and hope to increase participation.			

Hydrology, Geomorphology and Ecology of the Coast	66	Investigating the role of flooding and phytotoxins in Phragmites australis dieback	Phragmites australis is a cosmopolitan wetland reed that grows abundantly in fresh to intermediate marshes of southern Louisiana. Here, it occurs as at least three distinct haplotypes, the invasive Eurasian-, Gulf- and Delta-types. In many parts of the U.S. and Louisiana, P. australis is managed as an invasive species. However, in the Mississippi River Delta (MRD), it is valued for its ability to stabilize marshes and navigation channels. Beginning in 2012, P. australis in the lower MRD has suffered from dieback, where previously healthy stands have died, resulting in marsh converting to mudflat in some areas. To examine the potential for flooding and site conditions to influence survivorship and growth of P. australis and the potential for differential responses of the three main haplotypes, we established a marsh organ study in the	Austin	Lynn	Louisiana State University

			MRD and in the Rockefeller Refuge of Mermentau Basin (n = 5). Flooding dynamics differed between the two sites with generally higher water levels in the MRD (average 0.34 m above NAVD 88; marsh organs flooded on average 100, 99, 82, 19, and 2 percent of the time) compared to Mermentau (0.13 m NAVD 88; marsh organs flooded 100, 81, 34, 12, and 1 percent of the time). Salinities, however, were higher in the Mermentau Basin (average 17.6 ppt) compared to the MRD (average 1.6 ppt). After two growing seasons, survivorship and growth were significantly lower in the Mermentau Basin than in the MRD. Increased flooding led to lower survival across both sites, but reduced biomass only in Mermentau. Finally, porewater sulfides were associated with decreased live belowground biomass in the MRD, and were			

			overall much more abundant in Mermentau, where survivorship was low. These data support the hypothesis that both flooding and porewater phytotoxins play a role in the P. australis dieback, and that greater sulfides and salinity can increase the negative impact of flooding on P. australis growth and survival.			
Predicting and Planning for the Future of the Coast						

Predicting and Planning for the Future of the Coast	67	Small areas, Big Events: Planning for Future Migration in Coastal Louisiana	When estimating migration, unique place-based factors must be considered. The scope of our work empirically models how disaster events have influenced mobility over time. Our study aims to model disaster events and quantify migration based on the sensitivities coastal communities experience such as environmental, demographical, and economic variables. Our model is unique because we use a primate micro-level consumer data set of individual address locations, allowing us to build a geographically specific monthly migration data set. We combine that with Census tract-level data to determine the localized effects of storms, controlling for contribution of these independent variables. Other models at the local level have not included migration flows, and those models that do focus	Anissa	Hyde	Louisiana State University

			on flows are often yearly at the county level, or build on specific snapshots, not a comprehensive storm history. We chose this scale because county based data may overlook the variance of hazard exposure and risk across neighborhoods. We are interested in multiple datasets that can give us insight into factors such as natural hazards (FEMA Disaster Declarations), flood exposure and coverage (NFIP Claims), and migration flow patterns (consumer reference data). The poster's content will visualize the conceptual network of unique place-based factors contributing to migration in Coastal Louisiana. This poster will present the audience with the collection and framework our model will use to quantify future migration trends.We believe matching flow data with factors such as flood exposure can provide better			

			migration estimates and, therefore, better planning for coastal communities over time.			

Predicting and Planning for the Future of the Coast	68	LOUISIANA'S ALTERNATIVE OYSTER CULTURE GRANTS PROGRAM: DEVELOPMENT, IMPLEMENTATION, AND PRESENT	Wood Oglesby, Earl Melancon, Anne Dugas, Leslie Davis, Albert (Rusty) Gaudet, Brian Callam The Louisiana Department of Wildlife and Fisheries (LDWF) developed the Louisiana Oyster Management and Rehabilitation Strategic Plan at the request of the state legislature and the Governor's Office of Coastal Protection and Restoration (CPRA). The fourth initiative (of 12) within the plan is Expansion of Alternative Oyster Aquaculture (AOC). In Louisiana with its historical and highly productive traditional wild-harvest oyster fishery, hatchery-spawned cage-cultured oyster farming is known as AOC. AOC is not a replacement for the traditional fishery, but a supplement for those fishers who have an interest in developing this "new" state fishery. CPRA and LDWF awarded Louisiana	Wood	Oglesby	Louisiana Sea Grant

			Sea Grant (LSG) a $3M, three-year grant, to help enhance existing AOC farmers within the state and to expand the fishery. Specifically, LSG addressed the program's implementation through $1.8M of competitive grant awards to Louisiana fishers and companies to enhance and develop: (1) aquaculture parks with multiple farms located within each ($100K each), (2) seed nursery farms ($15K each), (3) grow-out farms for market oysters ($45K each), and (4) private in-state hatcheries ($225K each). All monies have been allocated with nineteen grow-out farms funded and three encumbered for later this year, eight nursery farms, four parks, and one hatchery. To facilitate this effort, LSG has developed workshops, instructional materials, and other forms of outreach to support the grant			

			awardees and other individuals interested in AOC. We are in our third (3rd) year of the three-year program. We document how grant awardees were selected through a competitive process that combines environmental metric scoring with interviews; the demographic characteristics of the awardees; and, the outreach resource products developed to assist the AOC farmers and general public.			

Predicting and Planning for the Future of the Coast	69	Planning for Future Sea Level Rise	Coastal Louisiana has lost over 5000 sq km of wetlands over the last century due to a combination of natural and anthropogenic factors and is facing a land loss crisis. Sea level rise and associated environmental change has far-reaching impacts on the ecology, economy, and culture of coastal Louisiana and many of the drivers of land loss are expected to intensify with continuing climate change. The Louisiana Coastal Protection and Restoration Authority (CPRA), through the Coastal Master Plan, is responsible for guiding planning efforts leading to the implementation of large-scale coastal restoration and risk reduction projects in the state. Undertaking long-term (50 year) planning efforts requires consideration of several uncertainties, including that related to future climate change and rates of	Krista	Jankowski	

			sea level rise. This poster presents the approach of CPRA to selecting plausible sea level rise curves as part of a set of environmental scenarios used in the project selection process for the development of the 2023 Coastal Master Plan. It also discusses the additional analyses conducted by CPRA to explore a wide range of plausible future sea level rise rates and discusses important considerations when selecting sea level rise projections for use in various planning efforts.			

Predicting and Planning for the Future of the Coast	70	What's Cookin' on the Louisiana Coast: A Recipe for Adaptive Management of Sediment Diversions	To address Louisiana's coastal land loss crisis, the Coastal Protection and Restoration Authority (CPRA) will construct and operate sediment diversions to reconnect the Mississippi River to nearby wetlands to deliver fresh water, sediment, and nutrients. These projects will create a sustainable, productive delta and build and maintain tens of thousands of acres of wetlands that protect communities from storm surge and sea level rise, provide fish and wildlife habitat, and support a working coast. A sediment diversion is being constructed in an already dynamic and ever-changing deltaic environment with innate uncertainties. But climate change and sea level rise add a layer of complexity to understanding the future of the Louisiana coast, both with and without the construction and	Rachel	Rhode	Environmental Defense Fund

			operation of sediment diversions. These projects will be operated using Adaptive Management (AM), which will help project managers achieve project goals while iterating over time as they collect data on changing conditions. Adaptive management is similar to perfecting a recipe - it starts with planning, putting the plan into action, gathering feedback, and then making adjustments to improve results. At the end of this process, we are left with a bountiful delta and a delicious gumbo to pass along to future generations. Building a sustainable delta takes careful planning and strategic operations, but coastal managers and scientists have a lot of tools at their disposal. AM will ensure they achieve diversions' primary goal of land building, while also considering factors important to the communities,			

			wildlife, and industries of the delta. This approach brings people into the process, providing you with access to information and opportunities to engage.			

Predicting and Planning for the Future of the Coast	71	Lower Mississippi River Discharge Forecasting using Deep Learning	The Lower Mississippi River (LMR), below Baton Rouge, shows a wide variation of discharge, from as low as ~100,000 cfs during dry winter months to ~1,400,000 cfs (or ~1,250,000 cfs below Bonnnet Carre) during peak Spring floods. The day-to-day variation can be about 50,000-150,000 cfs due to tidal and meteorological influences. Accurate and reproducible LMR discharge forecasts, particularly over weekly to bi-weekly periods are often critical for flood mitigation planning, planning for river surveys, river works maintenance, port operations, operating locks and freshwater diversions and navigation planning for deep draft vessels particularly over shallow reaches of the river. In this study, the Long Short-Term Memory (LSTM) Machine Learning (ML) model will be utilized for forecasting the daily discharge of the LMR over 7 to 14 day	Agnimitro	Chakrabarti	FTN Associates

			periods. LSTM is a type of Recurrent Neural Network (RNN) which is particularly effective for analyzing time-series data. The data is preprocessed by first normalizing it and then dividing it into training, validation, and testing sets. The effectiveness of the trained model is gauged using the validation data, and the output is used to make predictions on previously unseen time-series data, referred to as test data. The performance of the model is measured by the Root Mean Squared Error (RMSE). Historic discharge data over 12 years (2009-2021) from USGS Baton Rouge and Belle Chasse gages will be used as training (2009-2016) and validation (2017-2019) datasets for the model. The model will be tested for accuracy for the prediction period of 2019-2021. Additionally, water level data from			

			USACE Natchez will be used to reinforce the learning and prediction capabilities of the LMR LSTM model. The use of this ML model can play a pivotal role in predicting LMR discharge in real-time and provide a cost-effective solution over traditional deterministic numerical models while offering greater accuracy over simple rating curve models.			

Predicting and Planning for the Future of the Coast	72	Machine Learning Based Organic Soils Classification Using CPTu Data	Soil classification methods and organic soil layers' location and thickness is currently determined by soil borings. These are often accompanied by Piezocone Penetrometer Tests (CPTu) which can be used as an alternative method to predict the soil type by determining the well-known Soil Behavior Type (SBT). Current soil classification methods using CPTu data are adequate for clays, silts, and granular soils. Nonetheless, due to their complexity, organic soils are not adequately classified with the available methods. In addition, CPTu measurements are also effective to assess the unit weight for inorganic soils but fail to do the same for organic soils. This study comprises the analyses of data from co-located CPTu and borings obtained from a project used for the future construction of a levee system in West Shore Lake Pontchartrain in	H. Omar	Ulloa	Louisiana State University

			Louisiana, USA. Due to its intricacy and non-linearity, machine learning algorithms were developed to handle the data complexity. A Logistic Regression algorithm was found to be appropriate for the organic classification model, whereas a Random Forest model was developed to predict the unit weight values of the organic soils. The resulting models prove to be adequate and provide an accuracy greater than 85%.			
Preparing for Climate Change: Mitigation and Adaptation						

Preparing for Climate Change: Mitigation and Adaptation	73	Time traveling to 2100:Wetland response under accelerated sea-level rise along the US Gulf Coast	As one of the most severe consequences of climate change, sea-level rise has been a significant concern of society for a long time due to the negative impacts on coastal populations. According to the latest IPCC report, sea-level rise will continue to accelerate toward the end of this century. Indeed, many Gulf coastal communities have recently already been experiencing sea-level accelerations with rates in excess of 10 mm/yr. While often caused by a combination of both anthropogenic forcing and internal variability and limited to periods that last no longer than a few decades. These large rates offer a unique opportunity to study the impact of accelerated sea-level rise on coastal wetlands. In this study, we take advantage of the well-established CRMS (Coastwide Reference Monitoring System) network, reprocessed satellite	Guandong	Li	Tulane University

			altimetry data, and tide gauges to examine the details of the hydrological and geomorphological conditions among 300 individual sites in coastal Louisiana that shed light on coastal wetland response under accelerated sea-level rise. As indicated by coastal altimetry and CRMS water level data, trends of relative water level change in wetlands show significant correlations with accelerated sea-level rise in the Gulf of Mexico. We also examined sediment deficit and wetland inundation on site-by-site scale by analyzing local relative water level and adjacent wetland surface elevation change at individual CRMS sites. These results challenge the point that the wetlands can keep pace with local sea-level rise, especially when the rising rate is high and accelerated. As such, the past decade provides a window to the end of this			

			century, when climate-driven sea-level rise under the SSP 2-4.5 scenario (which we are on track for under current policies) is expected to exhibit rates similar to what Louisiana's coastal wetlands have been subject to in the past decade.			

Preparing for Climate Change: Mitigation and Adaptation	74	Analyzing wetland change along the Louisiana Coast during a period of rapid sea-level rise	Coastal wetlands encompass important ecosystems that separate the oceans from land. They serve as a buffer between saline water and freshwater and as storm barriers against surges and intense waves. With the changing global climate, the existence and organization of these coastal wetlands will change. A recent study (Dangendorf et al., 2022) has shown accelerating mean sea level rise in the Gulf Coast starting approximately in 2009. Such acceleration in rising sea level can result in drowning these wetlands. The Coastwide Reference Monitoring System (CRMS) has sites spread across the entire Louisiana Coast, including in wetlands, that have instruments measuring water surface and marsh surface elevation. The measurements from these instruments also show rising water levels. The marsh surface	Melinda	Quock	Tulane University

			elevation may or may not keep up with the water levels. However, these instruments measure a single point. Here, we look at the larger surrounding area of each CRMS site to investigate if point observations can reflect trends in a larger spatial area. We analyze wetland change from 2009 to 2021 using Normalized Difference Vegetation Index (NDVI) image analysis on Landsat imagery. The trend of the spatially averaged NDVI values can tell us if that spatial extent has marshes keeping up with water level or if that area is drowning. By comparing our trends that represent the area spatially to the trends identified in the CRMS data, we can determine the potential for an instrument's point data to represent a larger area. This will give insight into the potential for a point observation to represent change in a larger surrounding wetland area and			

			highlight the importance of conserving these natural storm barrier ecosystems.			

Preparing for Climate Change: Mitigation and Adaptation	75	CO2 Outgassing from the Atchafalaya River	Discharging approximately 200 km3 of water annually into the Northern Gulf of Mexico, the Atchafalaya River (AR) contributes significantly to the Louisiana Shelf's fluvial nutrient cycle as well as dissolved carbon. Carbon is a vital source for all life forms and is transported from river systems to the seas primarily in the forms of Dissolved Organic Carbon (DOC) and Inorganic Carbon (DIC). The riverine carbon can be also laterally transported from surface water into the atmosphere primarily as carbon dioxide gas (CO2). This study aimed to estimate CO2 degassing from the Atchafalaya River into the atmosphere by estimating total carbon and examining seasonal variations in the river's CO2 emissions. DIC and DOC concentrations are measured in water samples, and monthly field measurements of water temperature,	Anamika	Dristi	Department of Renewable Natural Resources

			dissolved oxygen, pH, chlorophyll-a, CDOM, turbidity, and partial pressure of CO2 (pCO2) are collected from the Atchafalaya River mouth in Morgan City from January 2019 to December 2021. CO2 outgassing is calculated by analyzing the CO2 exchange between pCO2 in water and CO2 in air using a gas exchange coefficient. The Atchafalaya River has an average DOC level of 6.97 mg L-1 and an average DIC concentration of 24.58 mg L-1. According to our analysis, the AR releases on average 512.75 mmol C m-2 every day into the atmosphere. However, this study suggests that the peak CO2 degassing (1326.68 mmol C m-2) occurred in the summer and the low CO2 emission (201.35 mmol C m-2) happened in the winter. The considerable CO2 degassing from the Atchafalaya River that exhibits seasonal variations is			

			supported by the findings, which is also consistent with our research hypothesis. This study will provide updated estimates of CO2 outgassing from large rivers, as well as the total CO2 contribution of world rivers to the atmosphere.			

Preparing for Climate Change: Mitigation and Adaptation	76	Gulf-COAWST: Quantify Carbon Transport and Cycling at the Land-Estuary-Ocean Continuum using a C	Estuaries serve as transition zone along the land-ocean continuum. The high productivity of estuaries combined with terrestrial runoff makes these coastal areas important carbon-cycling regions that transform and store carbon through production, respiration, and burial processes. However, the impacts of episodic yet extreme events such as hurricanes and flooding, which are expected to increase in intensity in the future, on coastal carbon transport and cycling remain unknown. The purpose of this presentation is to demonstrate the capability of state-of-the-art regional ocean carbon models in quantifying carbon flux along different boundaries such as air-sea, land-ocean, and coastal-pelagic. The coupled physical-biogeochemical modeling was built on an open-source community model that covers the entire	Le	Zhang	Louisiana State Univeristy

			Gulf of Mexico with a high-resolution nested Barataria Bay domain. The carbon model boundary was driven by historical runs of the CMIP6-CESM2 (Community Earth System Model products) and incorporated the dynamics of organic carbon pools as well as the formation and dissolution of carbonate minerals. The model's robustness was evaluated via extensive model-data comparison against buoy, remote sensing, and ship-based measurements. Results of two case studies are presented to highlight 1) the importance of carbon released from eroded soil in coastal carbon cycling and 2) how a coastal carbon system can be disturbed by hurricane-induced vertical mixing.			