TECHNICAL MEMORANDUM

TRACKING THE SUCCESS METRICS OF CEA1/RFP1

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Re: RESTORE Act Center of Excellence for Louisiana – RFP1 Success Metrics

Introduction

OVERVIEW OF SUCCESS METRICS DEVELOPED IN STANDARD OPERATING PROCEDURE VERSION 1

Success metrics reflect the operational success of the RESTORE Act Center of Excellence for Louisiana (LA-COE) and the quality of the research conducted. The success metrics are categorized as follows: (1) Competitive Grants Process, (2) Research Progress, (3) Research Accomplishments, and (4) Outcomes (Table 1). Success of each of these categories is comprehensively assessed with quantitative targets dependent on the current budget, and the number and size of awards associated with the competitive grants, and reflect the inclusion of academia, industry, non-profits, and agencies. Success metrics were co-developed by the Louisiana Coastal Protection and Restoration Authority (CPRA), LA-COE, and the Executive Committee (EC). Success metrics for the program are approved by the EC. Amendments or changes to success metrics, assessment criteria, and targets require review and approval by the EC and are reflected in the Standard Operating Procedures (SOP). Every three years the LA-COE submits updated reports to CPRA which quantitatively track progress towards the targets, determine successes, and future challenges.

Success metrics co-developed by CPRA, LA-COE, and EC in SOP Version 1 (V1, Darnell et al., 2016) are used to monitor the progress of LA-COE projects that was funded under the first Cooperative Endeavor Agreement (CEA1). The tracking of success metrics enables LA-COE to identify important events and trends of subawards as well as guide the LA-COE to improve management of future requests for proposals (RFPs). Furthermore, the tracking of success metrics allows for clear and objective communication with subrecipients to focus subrecipients' efforts (e.g., see Table 1 for Research Progress, Research Accomplishments and Outcomes) and drive their performance. Success metrics have been

improved in SOP V2 (RESTORE Act Center of Excellence for, 2019) and V3 (RESTORE Act Center of Excellence for Louisiana, 2020). However, the LA-COE processes, research progress, accomplishments, and outcomes from the RFP1 projects were evaluated based on success metrics developed in SOP V1, which are outlined in this Technical Memorandum, so as to remain consistent in regard to reporting to the US Department of Treasury related to RFP1.

Table 1. Success metrics, assessment criteria, and targets from SOP V1.

Success Metric	Metric Assessment	Target
Competitive Grants Process	Percent of submitted proposals including more than one Louisiana-based institution [1]	>50%
	Percent of submitted proposals including collaborations between colleges/universities and industry/non-profits/agencies	>25%
	Percent of proposals that provide training opportunities for graduate/undergraduate students or postdocs at Louisiana-based colleges/universities	>90%
	Percent of topical areas identified in the Research Strategy addressed by the proposals	100%
	Maximum time from initiation of the contract to execution	10 weeks
Research Progress	On-time reporting	100%
	On-time completion of deliverables	100%
	On-time adherence to data management procedures	100%
	Percent of proposals for which no-cost extensions are requested	<20%
Research Accomplishments	Number of publications per funded project within one year of project completion	1–3
	Percent of funded projects that train graduate/undergraduate students or postdocs at Louisiana-based colleges/universities	>90%
Outcomes	Number of Coastal Master Plan projects and programs that directly utilize research findings within one year of project completion	>10

METHODOLOGY FOR ASSESSING SUCCESS METRICS

The term “assessment” in the context of the LA-COE success metrics refers to the process of summarizing the performance of LA-COE fundedRFP1 projects based on the success metrics and information collected from RFP1 proposals, final reports, and other deliverables. In order to establish a consistent framework with which to describe the results of success metrics, it is important to define how the collected information was assessed and how evaluations were conducted with the efficient and effective use of available information. The methodology developed at the start of the RFP1 grant for

assessing success metrics has been documented in this section and is listed in the "Methodology" column of Table 2. For the RFP1 grant, LA-COE received a total of 76 proposals including 15 for graduate studentships, 10 for collaborative awards and 51 for research awards, among which a total of six graduate studentship, five research awards and two collaborative awards were get funded. A series of essential equations used for assessing success metrics, which are listed below and in Table 2:

- The success metrics "percent of submitted proposals including more than one Louisiana-based institution" is calculated as:

$$\text{Percent} = \frac{A}{C+R} \times 100\% \quad (1)$$

where A=20 represents the number of proposals that included more than one Louisiana-based institution; C=10 and R=51 indicate total number of proposals for collaborative and research awards, respectively. Note that the additional 15 proposals for graduate studentship are not included in this assessment.

- The success metrics "percent of submitted proposals including collaborations between colleges/universities and industry/non-profits/agencies" are assessed using:

$$\text{Percent} = \frac{B}{C+R} \times 100\% \quad (2)$$

where B=21 represents the number of proposals which were based on collaborations between colleges/universities and industry/non-profits/agencies.

- The success metrics "percent of proposals that provide training opportunities for graduate/undergraduate students or postdocs at Louisiana-based colleges/universities" are obtained by:

$$\text{Percent} = \frac{D}{C+R+G} \times 100\% \quad (3)$$

where D=72 is the total number of proposals that provide training opportunities and G=15 is the number of proposals for graduate studentship.

- The success metrics "percent of topical areas identified in the Research Strategy addressed by the proposals" are evaluated by:

$$\text{Percent} = \frac{E}{T} \times 100\% \quad (4)$$

where E=8 is total number of topical areas that appeared in RFP1 proposals, T=8 is total number of topical areas listed under "Research Strategy" (RESTORE Act Center of Excellence for Louisiana, 2016).

- The success metrics "maximum time from initiation of the contract to execution" is evaluated by subtracting "Award Initiation Date" from "Award Execution Date":

$$\text{Maximum time} = \text{Execution Date} - \text{Initiation Date} \quad (5)$$

- The success of "on-time reporting" was calculated based on the on-time submission rate for Performance Progress Reports (PPR) for 13 RFP1 projects:

$$\text{On-time rate} = \frac{\sum Q_3 + Q_4 + \cdots Q_{11}}{N} \quad (6)$$

Where Q_i is the on-time reporting rate of the ith PPR; Nine (N=9) out of 11 PPRs were considered because Q_1 and Q_2 were excluded from the assessment due to contracting delays.

- The success metrics of "on-time completion of deliverables" are mainly evaluated for final reports and deliverables as follows:

$$\text{On-time rate} = \frac{F}{N} \times 100\% \qquad (7)$$

where F=2 represents projects that submitted their final reports less than 30 days after project completion, which was considered as "on time"; in addition, F also refers to the projects that requested no-cost extensions (NCE) but submitted deliverables before requested NCE date. Further, N=8 indicates the number of final reports that have been received from eight projects. Note that this success metric will be re-evaluated once all final reports are received.

Table 2. Success metrics, assessment criteria, and targets from SOP V1.

Success Metric	Metrics Assessment	Target	Methodology	RFP1 Results
Competitive Grants Process	Percent of submitted proposals including more than one Louisiana-based institution [1]	>50%	Equation 1	33%
	Percent of submitted proposals including collaborations between colleges/universities and industry/non-profits/agencies	>25%	Equation 2	34%
	Percent of proposals that provide training opportunities for graduate/undergraduate students or postdocs at Louisiana-based colleges/universities	>90%	Equation 3	95%
	Percent of topical areas identified in the Research Strategy addressed by the proposals	100%	Equation 4	100%
	Maximum time from initiation of the contract to execution	10 weeks	Equation 5	32 weeks
Research Progress	On-time reporting	100%	Equation 6	62%
	On-time completion of deliverables	100%	Equation 7	50%
	On-time adherence to data management procedures	100%	N/A	41% (five out of 12 projects completed data management)
	Percent of proposals for which no-cost extensions are requested	<20%	All projects requested NCE	100%
Research Accomplishments	Number of publications per funded project within one year of project completion	1–3	N/A	Seven out of 12 projects have 1-3

Success Metric	Metrics Assessment	Target	Methodology	RFP1 Results
				publications)
	Percent of funded projects that train graduate/undergraduate students or postdocs at Louisiana-based colleges/universities	>90%	All projects provide training opportunities	100%
Outcomes	Number of Coastal Master Plan projects and programs that directly utilize research findings within one year of project completion	>10	N/A	8

[1] Louisiana-based institutions are defined as those institutions with their main office based in Louisiana.

RESULTS AND DISCUSSION

Existing results for 1) Competitive Grant Process, 2) Research Progress, 3) Research Accomplishments, and 4) Outcomes, are provided in Table 1 (SOP V1).

COMPETITIVE GRANTS PROCESS

Percent of submitted proposals including more than one Louisiana-based institution

Louisiana-based institutions are defined as those institutions that have a main office based in Louisiana. The percentage of RFP1 grant proposals received that included more than one Louisiana-based institute was 33%, which is lower than expected (50%; Table 2). The RFP1 grant process supported three types of awards including collaborative, graduate studentship and research awards. This success metric was assessed only for collaborative (N = 10) and research awards (N = 51). It was found that two out of ten full proposals (20%; Figure 1) for collaborative awards included more than one Louisiana-based institution. Furthermore, 18 out of 51 proposals in the research award category (~35%; Figure 1) included more than one Louisiana-based institution. It is worthy to note that none of 15 graduate studentship proposals included more than one Louisiana-based institution, because this category supports graduate students working with a single principal investigator (PI), and thus, students and PIs were generally from the same organization.

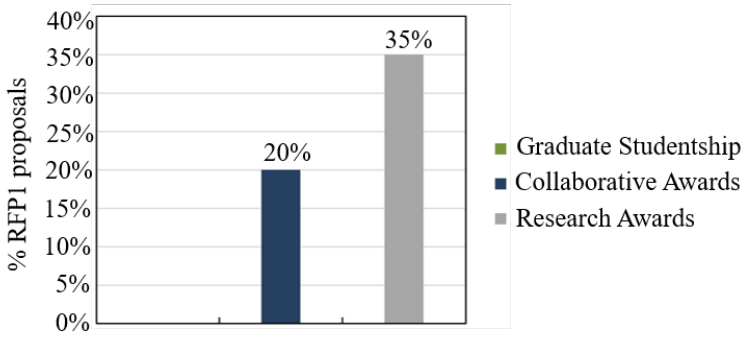

Figure 1. Percent of submitted proposals including more than one Louisiana-based institution.

Percent of submitted proposals including collaborations between colleges/universities and industry/non-profits/agencies

It was found that 34% of the full proposals for collaborative and research awards (N=61) had collaborations between colleges/universities and industry/non-profits/agencies. Furthermore, there were five out of ten collaborative awards proposals (50%; Figure 2) with PIs from colleges/universities that partner with industry/non-profits/agencies, including the US Geological Survey, ARCADIS, Center for Planning Excellence, Louisiana Audubon Institute Audubon Louisiana, National Oceanic and Atmospheric Administration Fisheries Service, and the US Naval Research Laboratory. In comparison, a relatively lower percentage (31%; Figure 2) of research proposals established collaborations with industry/non-profits/agencies, most of which have collaborations with colleges and universities.

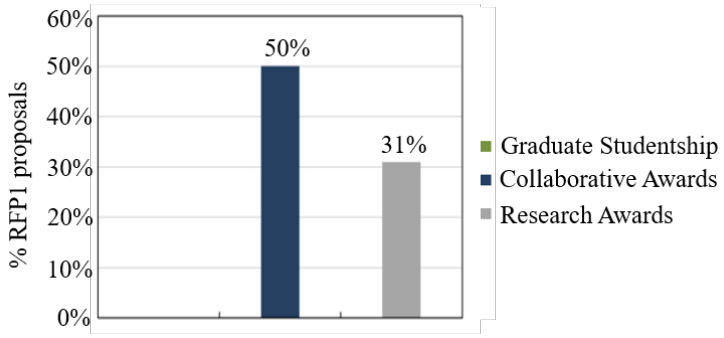

Figure 2. Percent of submitted proposals including collaborations between colleges/universities and industry/non-profits/agencies.

Percent of proposals that provide training opportunities for graduate/undergraduate students or postdocs at Louisiana-based colleges/universities

All the proposals for Graduate Studentship and Collaborative awards provided training opportunities for undergraduates, graduates, or postdocs (100%; Table 2). In comparison, it was found nearly 92% of proposals for Research Awards provided training opportunities.

Percent of topical areas identified in the Research Strategy addressed by the proposals

Of the RFP1 proposals, all of them (100%; Table 2) covered topical areas developed in the Research Strategy (RESTORE Act Center of Excellence for Louisiana, 2016). There were seven topical areas developed in SOP V1, including 1) Riverine Hydrology, 2) Coastal and Estuarine Ecology, 3) Geotechnical and Structural Engineering, 4) Deltaic Geology, Delta Building and Subsidence, 5) Coastal and Estuarine Hydrology, 6) Geomorphology and Sediment Dynamics, 7) Physical Climatic Processes and 8) Regulatory Policy Issues. The PIs listed up to four topics that their RFP1 proposals help to address. The number of topical areas that were listed in each RFP1 proposal are shown in Figure 3. Among these eight topical areas, topic 2, “Coastal and Estuarine Ecology”, was the most popular in the RFP1 process, and was listed 86 times in RFP1 proposals. Topic 5, “Coastal and Estuarine Hydrology” was the second most popular topic in RFP1 proposals, appearing in 40 proposals. Topic 8, “Regulatory Policy Issues,” received the least attention in RFP1 proposals compared to other topical areas—only appearing six times in RFP1 proposals.

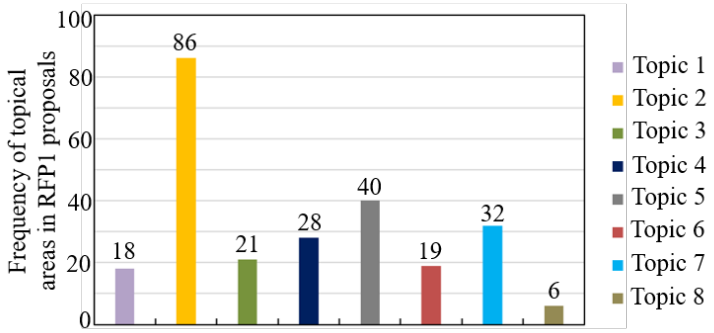

Figure 3. Topical areas identified in the Research Strategy addressed by the RFP1 proposals.

Maximum time from initiation of the contract to execution

The awards were initiated on July 21, 2017. The awards execution date depends on the length of the negotiation processes with individual universities. The awards could not be fully executed until The Water Institute of the Gulf (the Institute) and CPRA agreed on additional monitoring procedures that had potential impact on the awards. The awards were formally executed by the Institute in March and April 2018. The time from award initiation to when the award was sent to universities is shown in Table 2. Only two of the 13 awards (Xu and Chen, and Hagen) took longer than the 10 weeks; this longer time period was due to a need to obtain special approval (Table 3). The maximum time from award initiation date (08/01/2017) to the award execution date (04/01/2018) was 32 weeks for the project lead by Dr. Xu and Chen from Louisiana State University (Table 3).

Table 3. Time spent from initiation of the research subrecipient contract to execution for each LA-COE funded RFP1 project.

No.	PI Last Name	Award Initiation Date	Award Sent Date	Award Execution Date	Notes	Award Type
1	White	7/21/2017	8/14/2017	3/7/2018		Graduate Studentship
2	Tsai	7/21/2017	8/14/2017	3/7/2018		Graduate Studentship
3	Twilley	7/21/2017	8/14/2017	3/1/2018		Graduate Studentship
4	Nelson	7/21/2017	8/30/2017	3/1/2018	Needed prior approval of IRB from CPRA & Treasury	Research Awards
5	Xu & Chen	7/21/2017	12/7/2017	4/6/2018	Needed prior approval from CPRA & Treasury for international travel	Collaborative Awards
6	Habib	7/21/2017	8/11/2017	3/8/2018		Graduate Studentship
7	Hagen	7/21/2017	12/7/2017	3/14/2018	Subcontractor rate needed approval due to IDC	Collaborative Awards
8	Kulp	7/21/2017	8/14/2017	3/8/2018		Research Awards
9	Quirk	7/21/2017	8/15/2017	3/7/2018		Research Awards
10	Tewari	7/21/2017	8/14/2017	3/7/2018		Graduate Studentship
11	Xu	7/21/2017	8/15/2017	3/9/2018		Research Awards
12	Xue	7/21/2017	8/14/2017	3/7/2018		Graduate Studentship
13	Leberg	7/21/2017	8/14/2017	3/8/2018		Research Awards

RESEARCH PROGRESS

On-time reporting

The on-time reporting rate for RFP1 projects is 62% (Table 2), which was calculated based on the scheduled and actual submission date of PPR and final report. On-time reporting rates for each quarter were then available to calculate the average on-time reporting rate through CEA1 RFP1. Quarters 1 and 2 were not included in the calculation because of contracting delays. It was found on-time reporting rate for Q3 was lowest (23%) and improved with highest rate (92%) appearing in Q5 (Table 4). Overall, on-time

reporting was lower during Q9-11, which could be attributed to the influence of COVID-19 and disturbance from active hurricane season. Q12 showed highest reporting rate (100%) because four projects remaining in Q12 submitted their final reports and other deliverables before requested NEC dates.

Table 4. LA-COE reporting schedule along with on-time reporting rate for RPF1 projects.

Reporting Period	Quarter	Date Due	On-time Reporting Rate
August – October	Q1	November 30, 2017	N/A
November – January	Q2	February 28, 2018	N/A
February – April	Q3	May 31, 2018	23%
May – July	Q4	August 31, 2018	61%
August – October	Q5	November 30, 2018	92%
November – January	Q6	February 28, 2019	50%
February – April	Q7	May 31, 2019	75%
May – July	Q8	August 31, 2019	83%
August—October	Q9	November 30, 2019	33%
November- January	Q10	February 28, 2020	60%
February – April	Q11	May 31, 2020	44%
May- July	Q12	August 31, 2020	100%
August - October	Q13	November 30, 2020	N/A
Averaged on time reporting rate = (23%+61%+92%+50%+75%&+83%+33%+60%+44%+100%)/10=62%			

Percent of proposals for which no-cost extensions are requested

All LA-COE funded RFP1 projects requested NCE, detailed information regarding this is shown in Table 4. This is much higher than the target of 20% (Table 2). It was also found that a total of two out of eight projects (25%) submitted their final reports and other deliverables before NCE date before Q11, which will be considered as on-time reporting for final report and completion of deliverables. Four remaining projects requested NCEs to September 18th again in Q12, (due to COVID-related challenges at virtual learning and impacts from Tropical Storm Marco and Hurricane Laura), all of which completed project before requested NCE date.

Table 5. Summary of anticipated project end date, final report submitted date and no-cost extension date for 13 LA-COE funded RFP1 projects.

No.	PI Last Name	Request NCE Date	Final Report Submission Date	On-time completion of deliverables
1	White	10/31/2019	1/13/2020	No
2	Tsai	12/31/2019	1/28/2020	Yes
3	Twilley	1/31/2020	2/24/2020	Yes
4	Nelson	4/30/2020	6/9/2020	No
5	Chen	4/30/2020	6/28/2020	No
6	Habib	4/30/2020	7/13/2020	No
7	Hagen	9/18/2020	09/17/2020	Yes

8	Kulp	9/18/2020	09/17/2020	Yes
9	Quirk	9/18/2020	09/17/2020	Yes
10	Tewari	N/A	N/A	Terminated on 08/31/2018
11	Xu	4/30/2020	8/15/2020	No
12	Xue	4/30/2020	6/3/2020	No
13	Leberg	9/18/2020	08/25/2020	Yes

RESEARCH ACCOMPLISHMENTS

Number of publications per funded project

In this Technical Memorandum, we assessed the peer-reviewed publication for each project based on their current final deliverables of publications (Table 6 and Figure 5) instead of within one year of project completion in Table 1. In addition, manuscripts from subrecipients that were submitted or under review were not included in this evaluation. This metric will be reassessed after one year. The most basic metric related to publication data is the number of peer-reviewed publications by each LA-COE funded RFP1 project. We further used the impact factor (IF> 3) of journals (at the time of publication) to denote high-impact publications of each project to highlight unique research efforts and the quality of funded research. A total of six out of 13 projects have at least one peer-reviewed publication. The project "Constructing Mississippi River Delta Plain soil stratigraphy - Implications for coastal land building and compactional subsidence" lead by PI Dr. Tsai had the most publications (N=3), with one publication having an IF>3. In addition, the "Integrating High-Fidelity Models with New Remote Sensing Techniques to Predict Storm Impacts on Louisiana Coastal and Deltaic Systems" project lead by PIs Drs. Xu and Chen produced two publications with IF>3 (Table 6 and Figure 5). Project titled "Assessment of Coastal Island Restoration Practices for the Creation of Brown Pelican Nesting Habitat" which is led by Dr. Leberg produced one publication on Scientific Report (IF> 3.992). In addition, LA-COE Google Scholar account was established to track all the publications and citations (https://scholar.google.com/citations?hl=en&user=0j3dGmQAAAAJ).

Table 6. Summary of publications for 13 LA-COE funded RFP 1 projects.

No.	PI Last Name	# Peer Review Publications	# of Impact Factor >3	Journals and impact factors	Award Type
1	White	1	1	1*Estuarine, Coastal, and Shelf Science: 3.229	Graduate Studentship
2	Tsai	3	1	1*J. Hydrol: 4.405 1*Geo-marine Letters: 1.492 1* Hydrogeol. J: 1.718	Graduate Studentship
3	Twilley	1	0	1*ECSS 2.33	Graduate Studentship
4	Nelson	0	0		Research Awards
5	Xu & Chen	2	2	1*Geomorphology: 3.948 1*Coastal Engineering: 4.119	Collaborative Awards
6	Habib	1	1	1*Remote Sensing: 4.118	Graduate Studentship
7	Hagen	1	0	1*Frontiers in Water: 1.2	Collaborative Awards
8	Kulp	0	0		Research Awards
9	Quirk	0	0		Research Awards
10	Tewari	N/A	N/A	N/A	Graduate Studentship
11	Xu	1	0	1* ECSS 2.33	Research Awards
12	Xue	2	0	2* Water 2.5	Graduate Studentship

13	Leberg	2	1	1* Scientific Report 3.992 1* Restoration Ecology 2.721	Research Awards

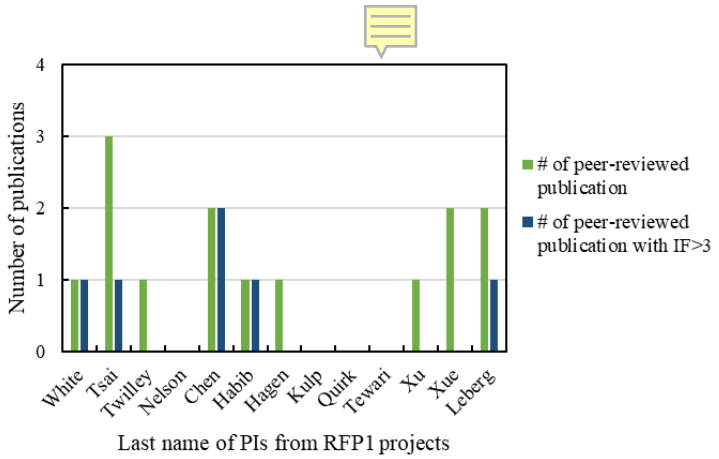

Figure 4. Summary of publications for 13 LA-COE funded RFP1 projects.

Percent of funded projects that train graduate/undergraduate students or postdocs at Louisiana based colleges/universities (100%)

A total of 100% of LA-COE funded RFP1 projects provided training opportunities for students or post-docs at Louisiana-based colleges/universities with the project lead by Leberg providing the greatest number of training opportunities (Figure 6).

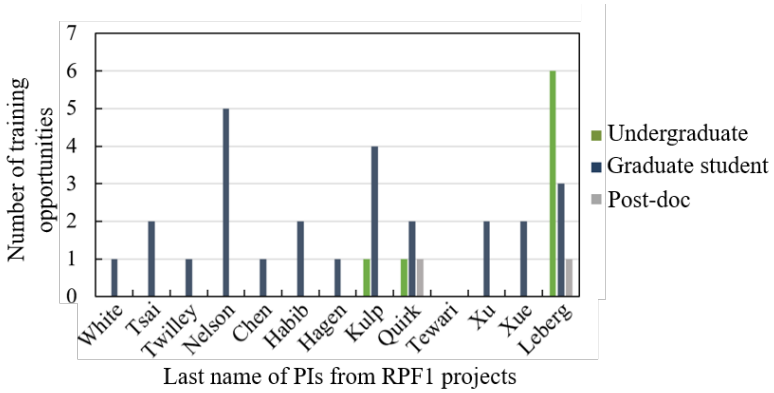

Figure 5. Summary of training opportunities for undergraduate students, graduate students, and post-docs from 13 LA-COE funded RFP1 projects.

Among the graduate students supported by LA-COE funded RFP1 projects, a total of seven students graduated based on the number of theses/dissertations successfully defended by Oct 31 (Figure 7). These theses and dissertations were from projects lead by White, Tsai, Twilley, Xu, Kulp and Quirk, among which Dr. Quirk's project had two graduated students during CEA1 RFP1.

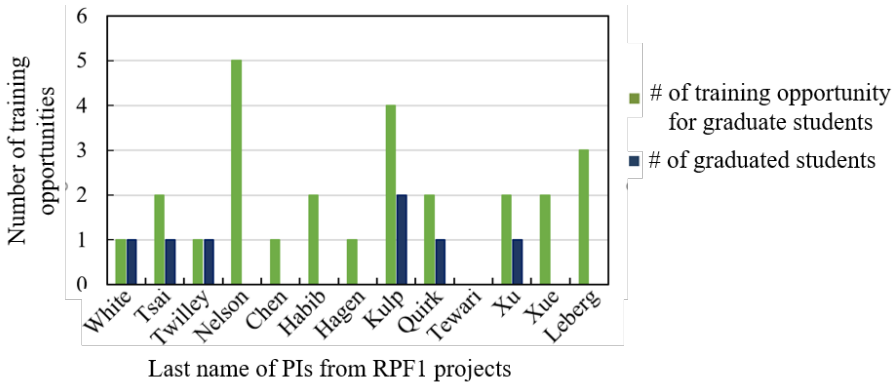

Figure 6. Detailed analysis on the how many students were trained and graduated based on the thesis/dissertation successfully defended.

A total of seven out of 13 RFP1 projects had at least one presentation (oral/poster) at a conference to present the RFP1 results. Note that presentations that were accepted at the conferences (e.g., State of Coast, 2020) but delayed by COVID were also considered in the evaluation. The "Constructing Mississippi River Delta Plain soil stratigraphy - Implications for coastal land building and compactional subsidence" project lead by PI Dr. Tsai gave the most poster presentations (N=5; Figure 8) and Dr. Kulp with project "An evaluation of faulting in Holocene Mississippi River delta strata through the Mississippi River delta strata through the merger of deep 3-D and 2-D seismic data with near surface imaging and measurements of vertical motion at three study areas" gave the most oral presentations (N=5; Figure 8).

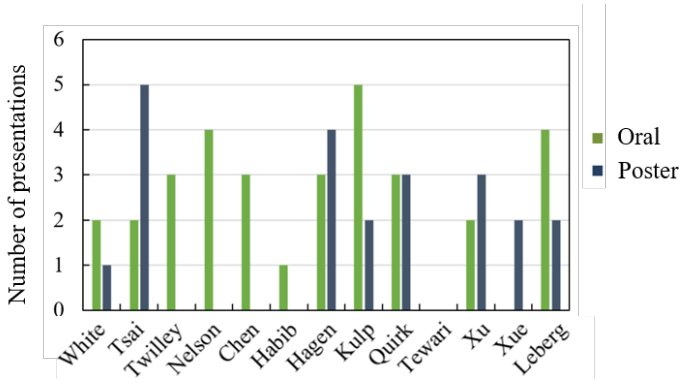

Figure 7. Summary of presentations for 13 LA-COE funded RFP1 projects.

The number of datasets generated or collected from 13 RPF1 projects are listed in Table 7. A total five out of thirteen projects completed data archiving and sharing. DOI of each dataset was listed in Table 7.

Table 7. Summary of dataset from RFP1 projects.

PI Last Name	# of Data Planned	# of Data Submitted	DOI	Dataset Title/Description	Repository	Note
White	1	1	1. https://figshare.com/s/6dfe383c8363fd4119f9	Tidal and nontidal marsh restoration: a trade-off between carbon sequestration,	figshare	

				methane emissions, and soil accretion		
Tsai	2	1	1. 10.4211/hs.55222b131564471cb0337dcc0b8196e0	Mississippi River Delta Boring Data	Hydroshare	Completed – 2 planned submitted under same DOI
Twilley	2	0	1. https://doi.org/10.6084/m9.figshare.13050899.v3 2. https://doi.org/10.6084/m9.figshare.21837207.v1	1. Nitrate Data at Wax Lake Delta Observatory (6 stations) - April-August 2015; Field data (water temperature, nitrate uptake, denitrification, dissimilatory nitrate reduction to ammonium, and soil organic matter) 2. Multiple Tools for Determining the Fate of Nitrate in Coastal Deltaic Floodplains; Delft3D Water Quality model output (water temperature, depth and age, nitrate concentrations)	1. figshare 2. figshare	Completed
Nelson	5	0	[*Data from project is confidential*]			N/A
Chen	6	5	1. https://doi.org/10.5281/zenodo.3862526 2. https://doi.org/10.5066/P9AZOHQU 3. [*DOI is pending*] 4. https://10.17603/ds2-cks2-9e45	1. LAI map and Trachytope files developed for Delft3D model 2. Coastwide Reference Monitoring System (CRMS) 2018 land-water classification data 3. New Field Data on Sediment Properties (LSU)	1. zenodo 2. ScienceBase Catalog 3. N/A 4. DesignSafe 5. Deltares Open Earth Tools	co-PI Kehui Xu archived data 3 in September 2022, DOI for data 3 is pending.

			5. https://svn.oss.deltares.nl/repos/openearthtools/trunk/matlab/applications/xbeach/delft3d_coupling/	4. Morphodynamic modeling of hurricane impact on Louisiana low-lying coast using Delft3D and XBeach 5. Coupling of Delft3D and XBeach		
Habib	1	1	1. http://doi.org/10.5281/zenodo.2797482	1. Evaluation of Radar-Based Precipitation Datasets for Applications in the Louisiana Coastal Master Plan	1. zenodo	Completed
Hagen	3	3	1. https://doi.org/10.5281/zenodo.3981956 2. https://doi.org/10.17605/OSF.IO/2PD87 3. https://doi.org/10.17605/OSF.IO/YXEWA	1. Quantification of Flood Tool 2. Coupling Hydrologic and Surge Processes to Examine Two Distinct Flood Transition Zones in Coastal Louisiana 3. Flood Zone Delineation	1. zenodo 2. OSF 3. OSF	Completed
Kulp	4	4	1. http://sonlite.dnr.state.la.us/pls/apex/f?p=108:9085:11376329172169 2. http://sonlite.dnr.state.la.us/pls/apex/f?p=108:9085:11376329172169 3. http://sonlite.dnr.state.la.us/pls/apex/f?p=108:9085:11376329172169 4. http://sonlite.dnr.state.la.us/pls/apex/f	1. Non-Proprietary seismic and sediment core data 2. ArcGIS shapefiles with X,Y,Z data of roadway elevations 3. Well Logs from State of Louisiana 4. ArcGIS shapefiles of surface fault and upward projected locations	1. SONRIS 2. SONRIS 3. SONRIS 4. SONRIS	Completed

			?p=108:9085:1137 6329172169			
Quirk	5	5	1. https://doi.org/10.5061/dryad.xpnvx0kkb 2. https://doi.org/10.5061/dryad.w6m905qsp 3. https://doi.org/10.5061/dryad.d2547d85j 4. https://doi.org/10.5061/dryad.mcvdnck4m 5. https://doi.org/10.5061/dryad.gqnk98ssq	1. Methane and carbon dioxide fluxes in an intermediate marsh in Barataria Bay, LA (v.0.10); Field data (site info, vegetation properties, soil properties, CO2 and CH4 flux rates) 2. The effect of nutrient-enrichment and sedimentation on belowground productivity and decomposition in marshes of Barataria Bay, Louisiana; Field data (lat, long, porewater nutrient concentrations, plant, species, productivity, decomposition, accretion rates) 3. Effect of elevation, nutrient-enrichment and sedimentation on productivity of Sagittaria lancifolia; Greenhouse study 1 (porewater and tank nutrient concentrations, species composition, productivity, biomass, soil organic matter) 4. Effect of soil organic matter	1. DRYAD 2. DRYAD 3. DRYAD 4. DRYAD 5. DRYAD	Completed

				content and nutrient loading on productivity of Spartina patens (v.0.10); Greenhouse study 2 (porewater nutrient concentrations, above and belowground biomass and productivity) 5. N-15 tracer study in coastal marshes of Barataria Bay, LA (v.0.10); N-15 field study (Dissolved inorganic N and N-15 tracer concentrations in plant parts and soil, gross and net NO3- mass balance)		
Tewari	N/A	N/A	N/A	N/A	N/A	Left RPF1 program
Xu	5	0	1. [No DOI available] 2. [No DOI available] 3. [No DOI available] 4. [No DOI available] 5. [No DOI available]	1. New tripod data collected in Barataria Bay (temperature, salinity, water level, waves, velocity, turbidity) 2. New sediment grain size, organic matter data (median grain size, organic matter %) 3. 3-D ROMS modeling data of hydrodynamics (temperature, salinity, water level, velocity) 4. 3-D ROMS modeling data of	N/A	PI informed LA-COE data was archived to NCEI

				sediment transport (sediment concentration, bed thickness) 5. New settling column data Barataria Bay (time series elevation of water-sediment interface; sediment concentration)		
Xue	2	2	1. https://doi.org/10.4211/hs.73a4997ae99c4357a79c8bb6bba5f8c6 2. https://doi.org/10.3390/w10050596	1. 30-yr hindcast of Surface Routing data, Hydrologic data, and Sediment data for Southwest Louisiana 2. Modeling Hydroclimatic Change in Southwest Louisiana Rivers	1. Hydroshare 2. MDPI	Completed
Leberg	7	3	1. https://doi.org/10.6084/m9.figshare.12811640 2. https://figshare.com/authors/Paige_Byerly/10203008, Code: https://github.com/pabyerly/BarrierIslandMonitoring 3. http://dx.doi.org/10.5441/001/1.212g53s7/1 4. [No DOI available] 5. [No DOI available] 6. [No DOI available]	1. csv file of presence and pseudo-absence points used in analysis, and R workspace containing GAM model object, which includes model structure 2. csv file of bird survey data used in Byerly 2020 include point counts, acoustic counts, sites, lat/longs, times, and dates 3. csv file of pelican telemetry locations including sites, lat/longs, dates, time, bird identification	1. figshare 2. figshare 3. Movebank	. 4. will follow up with NCEI after week of July 4th 5 – 6: facing delay; Will inform LA-COE when the analysis is done and csv file is ready – target date June 15 2023

			7. [No DOI available]	4. csv file of predator occurrence data including sites, lat/longs, dates, camera images, species ids, and behavioral observations (if any) 5. cs file of island, lag/long, data, % species cover, species biomass, vertical cover estimate, and elevation data 6. csv file of Pelican nest success data including sample images, nest island, lat/longs, dates, clutch size, and chick numbers 7. csv file of fire ant survey data including islands, lat/logs, dates, and ant numbers		

OUTCOMES

To support research directly relevant to implementation of Louisiana's Coastal Master Plan, the success metrics "*Number of Coastal Master Plan projects and programs that directly utilize research findings within one year of project completion*" was tracked by CPRA and LA-COE. Currently, eight out thirteen RFP1 projects that were utilized in Coastal Master Plan:

- Dr. Habib: Research evaluated and provided guidance on radar-estimated rainfall data utilized in the 2023 Coastal Master Plan ICM.
- Dr. Leberg: Research used to inform potential improvements to the 2023 Coastal Master Plan Brown Pelican HSI model; research will help inform the design of The Queen Bess Island and Rabbit Island Restoration projects.
- Dr. Hagen: Research results were used to inform the Louisiana Watershed Initiative, where the program could use the developed model

- Dr. Kulp: Research results used to inform subsidence rate estimates for Coastal Master Plan and project design.
- Dr. Nelson: Research results were used to inform CPRA's Flood Risk and Resilience Program.
- Dr. Xu: Research results were used to support analyses and development of the Mid-Barataria and Mid-Breton Sediment Diversion Environmental Impact Statements (though not necessarily cited in the documents).
- Dr. White: Research results were used to support analyses and development of the Mid-Barataria and Mid-Breton Sediment Diversion Environmental Impact Statements (though not necessarily cited in the documents).
- Dr. Twilley: Research used to support analyses and development of the Mid-Barataria and Mid-Breton Sediment Diversion Environmental Impact Statements (though not necessarily cited in the documents).

SUMMARY AND NEXT STEPS

In summary, success metrics helps to assess the LA-COE program in terms of the grants process, research progress and accomplishments and ultimately the outcomes to help implement the Coastal Master Plan. Success metrics for "Competitive Grant Process" for RFP1 projects showed that overall performance exceeded targets, except for the assessments conducted for "percent of submitted proposals including more than one Louisiana-based institution" and "maximum time from initiation of the contract to execution". To improve the results of assessments for "submitted proposals including more than on Louisiana-based institution", LA-COE will emphasize the importance of collaboration among Louisiana-based institutions by clearly indicating that future proposals will be evaluated against this metric. Further, success metrics in Research Progress showed overall worse results for "on-time reporting" with higher rate for applying NCE for RFP1 projects, for which, COVID-19 is an important reason for the delayed reporting in the second half of CEA1 RFP1. The assessment of "on-time adherence to data management procedures" is evaluated based on information from final reports and follow-up check-in meetings with RFP1 PIs. By November 30, 2022, a total of five projects completed the data management plan within two years after project completion. RFP1 PIs reported that it takes two-four months to obtain DOI with open-access repositories (e.g., NCEI). LA-COE will continue to work with RFP1 PIs, who haven't archived their datasets to repositories. All DOI links for deposited datasets from all LA-COE funded projects will be added to LA-COE RFP1 webpage (https://thewaterinstitute.org/la-coe/funded-research). In the Research Accomplishment category, the success metrics results exceed targets, most notably in the 100% training opportunities provided by RFP1 projects. In addition, seven out of thirteen projects meet publication requirements (1-3 publications within one year after project completion). For the outcome of "Number of Coastal Master Plan projects and programs that directly utilize research findings within one year of project completion", eight out thirteen RFP1 projects were utilized in Coastal Master Plan. LA-COE will continuously work closely with CPRA to discuss how to assess these metrics, improve the results, and to refine the metrics or targets as the program evolves for future RFPs.

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Appendices

APPENDIX A: SUMMARY OF LA-COE CEA1/RFP1 FUNDED PROJECTS

Determining the influence of surface water diversions on physical and nutrient characteristics of wetland soils ($83,328)
John White, Professor of Department of Oceanography and Coastal Sciences, Louisiana State University

Sediment and nutrient deprivation as well as saltwater intrusion are driving widespread organic soil erosion and coastal marsh loss in the Mississippi River Delta. Freshwater diversions were designed to reintroduce river water and dissolved nutrients into the adjacent basins to manage salinity and slow land loss by maintaining marsh vegetation and nutrient cycling. In this study, a soil characterization is presented for the receiving marsh of the Davis Pond diversion in 2007 and again in 2018 after 11 years of operation. Data for the top 0-10 cm of soil from the same 140 stations were used in spatial analysis to model soil properties. As a result of diversion operation, there has been a significant increase in soil mineral content and consequently soil bulk density. Elevated δ15N isotope values and increased inorganic soil P stocks delineated areas of diversion influence and nutrient enrichment of the wetland. These conditions led to an increased organic matter and carbon sequestrations in diversion influenced regions of the wetland. Multivariate methods demonstrate the effectiveness of certain parameters for monitoring impacts of river diversions on wetlands. The δ15N is an important indicator of the exposure to dissolved river water N and changes in inorganic soil P can identify areas of river sediment subsidy. Results have implication for continued freshwater diversion operation as well as far field effects of large sediment diversions on wetland soil properties.

Constructing Mississippi River delta plain soil stratigraphy – implications for coastal land building and compactional subsidence ($70,070)
Frank Tsai, Professor Department of Civil and Environmental Engineering, Louisiana State University

The Mississippi River Delta (MRD) is socioeconomically important to the state of Louisiana and the United States. Various types of land-water system data have been collected in the MRD. However, very few efforts have been made to utilize these datasets in modeling regional stratigraphy and groundwater dynamics in the MRD, especially for the upper 50 m of the depth. In this interval of depth, the Mississippi River and surrounding interdistributary bays intensively interact with the groundwater system. The lack of knowledge in regional stratigraphy and groundwater dynamics hinders an understanding of how hydrogeological setting affects processes such as surface-groundwater interaction, subsidence, and sediment erosion. In this study, topobathymetric, geological/geotechnical, and hydrological data were used to construct multiple 3-D stratigraphy models and a groundwater flow model in the MRD. Ordinary kriging, compositional kriging, and multiple indicator methods were found to be efficient in regionalizing different types of geological/geotechnical data. The stratigraphy models and groundwater model reveal a complex hydrogeologic setting in the MRD. The Mississippi River channel cuts through clay delta plain deposits into buried sands between -10 m and -35 m. Sands deposited at depth and near the surface provide pathways for groundwater to interact with surface waters. Groundwater flow rate is 3-4 orders of magnitude smaller than the river discharge rate. The groundwater system actively interacts with the surface water system in the Mississippi River and in the surrounding bays, especially during flood, storm, and hurricane events. Dramatic increase in pore water pressure and sharp groundwater recharge-to-discharge reversion are estimated to occur during hurricanes and right after hurricanes respectively. High pore water pressure during and after hurricanes may destabilize sediments and compromise safety of coastal infrastructures such as the ring levees. Groundwater activities may contribute to vertical movement in the delta.

Multiple tools for determining the fate of nitrate in coastal deltaic floodplains ($63,100)
Robert Twilley, Louisiana Sea Grant College Program Executive Director

Coastal deltaic floodplains provide important ecosystem services for land building and water quality improvement. Wetland plants, soils, and microbes within these floodplains functionally remove nitrate through uptake, burial, and denitrification, thereby reducing algal blooms and hypoxia in the Gulf of Mexico (GOM). This study was part of a larger effort to understand nitrate removal capacity by measuring factors that control denitrification rates and other nitrogen pathways in a developing delta. Our study area, Wax Lake Delta (WLD), is a young (<40 years) and actively prograding delta located within the Atchafalaya Bay, in southeastern Louisiana. The objective of this project was to quantify transformation of nitrate by wetland plants, soil, and microbes of deltaic floodplains of WLD. To determine nitrate uptake rates across WLD, we conducted several field incubation tracer experiments using 15NO3. These experiments measured nitrate uptake, denitrification, dissimilatory nitrate reduction to ammonium, and estimated assimilation of nitrate by plants and microbial communities in surface sediments. Total nitrate uptake rates, as well as denitrification rates, increased with soil organic matter content. Plant and soil assimilation of nitrogen was limited due to disturbance caused by Hurricane Barry, which killed vegetation and reworked surface sediments across the delta. Total nitrate uptake rates were incorporated into a Delft-3D Water Quality model.

From adapting in place to adaptive migration: designing and facilitating an equitable relocation strategy ($295,338)

PI: Marla Nelson, Associate Professor Planning and Urban Studies, University of New Orleans
Co-Investigators: Traci Birch, LSU Coastal Sustainability Studio; Anna Brand, University of California-Berkley; Renia Ehrenfeucht, University of New Mexico

In vulnerable areas across coastal Louisiana, nonstructural interventions are necessary to reduce risk and potential harm to residents and property. While nonstructural mitigation has primarily focused on helping people adapt in place, resident relocation will become increasingly necessary. This project responds to the need for effective programs that help people move away from risky areas in the face of ongoing environmental change and increasing disasters. The primary objective of these recommendations is to assist in implementation of nonstructural mitigation measures in Louisiana's 2017 Comprehensive Master Plan for a Sustainable Coast to shape equitable relocation assistance that helps enable people to preserve their coastal cultures. The project addresses two questions and interrelated sub-questions: Research Question 1: How do residents respond to threats from immediate and long-term environmental change? What factors drive decisions of whether, when and where to relocate? What factors drive decisions to stay in place? Research Question 2: How do public officials and land managers respond to threats from immediate and long-term environmental change? How can local officials facilitate equitable relocation for residents in at risk areas? How can communities develop low risk residential land use that accommodates relocating residents?
To answer the first question, we conducted interviews with 58 residents who live in Terrebonne Parish's bayou communities or who have relocated within or outside the parish. In answering the second question we interviewed 29 local officials, planners, nonprofit and business leaders and university researchers. We coded and analyzed the transcribed interviews for key themes using Dedoose qualitative analysis software. Additionally, we analyzed buyout and relocation programs in the US to identify useful lessons, promising practices and pitfalls to avoid during the relocation process. Results address the conditions associated with long term environmental change, the relationships among land loss and increased flooding and larger economic and population shifts, the diverse and changing circumstances of people living in at-risk communities, and their priorities when participating in initiatives to reduce risk and property damage. Based upon our results we present recommendations to inform relocation policies and programs that move beyond merely acquiring at risk properties and lead to just outcomes for communities and residents on the frontline of dealing with disasters from both extreme weather events and ongoing environmental change. Just and equitable policies and programs must be flexible, inclusive and transparent, and work beyond disaster recovery to ensure long term, inclusive and just adaptation.

Integrating high-fidelity models with new remote sensing techniques to predict storm impacts on Louisiana coastal and deltaic systems ($501,270)
PI: Kehui (Kevin) Xu, Associate Professor, Department of Oceanography and Coastal Science, Louisiana State University (acting PI).

Co-Investigators: Qin Jim Chen, Professor, Civil and Environmental Engineering, Northeastern University; Claire Jeuken, Deltares USA; Ap van Dongeren, Robert McCall, and Mindert De Vries, Deltares; Brady Couvillion, U.S. Geological Survey.

The successful implementation of the Louisiana Coastal Master Plan depends on (1) a thorough understanding of the deltaic system dynamics of barrier islands, shallow estuaries, and coastal wetlands as well as their connection in order to manage sediment budgets, and (2) the development of the modeling capability to quantify the effectiveness of these natural landscapes in mitigating storm-induced waves and surges, and thus reduce hydraulic loads on flood defenses. The effectiveness of the deltaic system in flood

risk reduction has thus far been difficult to quantify accurately. An outstanding issue is that state-of-the-art numerical models need spatially- and temporally-varying input parameters of vegetation biophysical properties, that are not easily obtained in-situ for large areas and at regular time intervals, and both remotely-sensed parameters and numerical models require validation by field measurements in coastal Louisiana. Moreover, the sediment fluxes during storms between the barrier islands, back-barrier wetlands, shallow lakes and open bays, and the marshes are not well understood. To address both issues, this project has developed an innovative model system, which integrates state-of-the-art numerical modeling of physical processes, in-situ measurements, and satellite-sensed vegetation properties. Caminada Headland Complex serves as a testbed. These products will have direct applicability and utility in support of the implementation of the Coastal Master Plan.

Evaluation of radar-based precipitation datasets for applications in the Louisiana Coastal Master Plan ($71,148)
Emad Habib, Professor of Department of Civil Engineering, University of Louisiana at Lafayette

Despite the potential advantages of using the spatially-continuous, high-resolution radar rainfall products in hydro-ecological modeling and ecosystem applications, only few studies assessed the quality of these products over coastal regions that lack adequate in-situ rainfall observations. This study evaluates two radar rainfall products, the National Center for Environmental Prediction (NCEP) Multi-sensor Stage IV and the National Severe Storms Laboratory (NSSL) Multi-Radar Multi-Sensor (MRMS), over the Louisiana coastal region in the United States. Surface reference rainfall observations from two independent rain gage networks were used in the evaluation analysis.

Coupling hydrologic, tide and surge processes to enhance flood risk assessments for the Louisiana Coastal Master Plan ($499,882)
PI: Scott Hagen, Professor & Director, Louisiana State University Center for Coastal Resiliency (LSU CCR)
Co-Investigators: Matthew Bilskie, LSU CCR; John Atkinson, ARCADIS; Donald Resio, University of North Florida

Traditional coastal flood hazard studies do not typically account for rainfall runoff processes in the quantification of flood hazard and related cascading risks. This study addresses the potential impacts of antecedent rainfall-runoff, tropical cyclone (TC)-driven rainfall, and TC-driven surge on total water levels and its influence in delineating a coastal flood transition zone for two distinct coastal basins in southeastern Louisiana. Rainfall-runoff from antecedent and TC-driven rainfall along with storm surge was simulated using a new rain-on-mesh module incorporated into the ADCIRC code. Antecedent rainfall conditions were obtained for 21 landfalling TC events spanning 1948-2008 via rain stations. A parametric, TC-driven, rainfall model was used for precipitation associated with the TC. Twelve synthetic storms of varying meteorological intensity (low, medium, and high) and total rainfall were utilized for each watershed (Barataria and Lake Maurepas) and provided model forcing for simulations of coastal inundation. First, it was found that antecedent rainfall (pre-TC landfall) is influential up to three days pre-landfall. Second, results show that antecedent and TC-driven rainfall increase simulated peak water levels within each basin, with antecedent rainfall dominating inundation across upper portions of the basin. Third, the delineated flood zones of coastal, transition, and hydrologic show stark differences between the two basins.

An evaluation of faulting in Holocene Mississippi River Delta strata through the merger of deep 3D and 2D seismic data with near surface imaging and measurements of vertical motion at three study areas ($349,174)

PI: Mark Kulp, Associate Professor of Earth and Environmental Sciences and Director of Coastal Research Laboratory, University of New Orleans
Co-Investigators: Nancye Dawers, Tulane; Rui Zhang, University of Louisiana at Lafayette; David Culpepper, The Culpepper Group; John Lopez, Lake Pontchartrain Basin Foundation; Kevin Yeager, University of Kentucky

The focus was to map the geographic extent and history of displacement on Cenozoic fault systems that trend across the Holocene Mississippi River delta plain. The work was concentrated in Terrebonne-Timbalier Bay, Bayou Lafourche near Golden Meadow, and the Lake Pontchartrain/Lake Borgne. Each of three Louisiana universities involved in this project hold license agreements with energy companies, who have provided access to high-quality, industry-standard 3-D and 2-D seismic reflection data that image Cenozoic strata in the study areas. These data allow for an assessment of whether deep-seated faults are present and if these faults extend upward into overlying strata. These seismic datasets are essential for the success of any study attempting to document the potential impact of faults on geomorphology, deltaic geology, and the stability of Holocene sedimentary units of the north central Gulf coast. Louisiana Master Plan efforts strongly rely upon an understanding of vertical elevation changes and if modern fault motion is occurring Master Plan efforts could be jeopardized. The research unites industry seismic reflection data (3-D, 2-D) with additional methods of data analysis including high-resolution seismic imaging, construction of near-surface stratigraphic sections, geochronology, GPS surveys and quantification of sediment accumulation rates. Primary research questions included: 1) Do geologic structures influence modern Mississippi River delta plain evolution?, 2) Are fault slip rates variable across the delta plain because of proximity to major late Pleistocene and Holocene depocenters and interaction with underlying ductile salt bodies?, 3) Can Holocene motion be detected using shallow, high-resolution seismic imaging, radiocarbon stratigraphic horizons, GPS surveys, and sediment accretion rates. All three of the industry seismic datasets image an array of faults, with variable lengths and geometries. The depth to which the faults can be projected upward varies between the datasets because of the quality of the industry seismic data but maps of suspected shallow faults can guide decision making and an assessment of potential fault impacts to Holocene strata and geomorphology. Only locally does high resolution seismic data clearly image the subsurface of the study areas because of shallow water and gas-charged sediments. Radiocarbon dated horizons locally indicate offset of Holocene strata as do geomorphologic features at the surface. Continued efforts to fully document the exact location and overall extent of latest Quaternary fault offsets across all of the delta plain should include the acquisition of additional industry seismic data, shallow seismic data, sediment cores, GPS surveys and radiocarbon dated strata.

Plant and soil response to the interactive effects of nutrient and sediment availability: Enhancing predictive capabilities for the use of sediment diversions and dredging ($292,914)

PI: Tracy Quirk, Assistant Professor, Department of Oceanography and Coastal Sciences, Louisiana State University
Co-Investigator: Sean Graham, Nicholls State University

Marshes in the Mississippi River Delta are rapidly deteriorating due partly to inadequate sediment supply to equilibrate to a high rate of relative sea-level rise. Restoration strategies include sediment diversions and marsh creation. However, high nutrient loading into existing and newly created marshes may have potential negative impacts on belowground biomass and soil organic matter accumulation. The goal of this research

is to provide critical information on the interactive effects of nutrient- and sediment availability on marsh nutrient cycling, plant productivity, decomposition and soil organic matter accumulation and accretion. In a field study across three marsh types, low nutrient-enrichment stimulated both the accumulation and decomposition of dead roots across marsh types. Intermediate marsh plugs in a greenhouse had lower species richness, stem density, aboveground biomass, root productivity at lower elevations. Nutrient-enrichment tended to negatively affect plant structure at low elevations without sedimentation and positively affect plant processes at high elevations and/or with sediment deposition. Spartina patens in a greenhouse had greater aboveground biomass and root productivity in mineral rather than organic soils. Overall, these results show that the effects of nutrient-enrichment on plant productivity and soil processes are strongly dependent on elevation and sediment availability, which have a greater influence on the vegetation and soil.

Enhancing sediment retention rates of receiving basins of Louisiana sediment diversions ($292,495)
PI: Kehui (Kevin) Xu, Associate Professor, Department of Oceanography and Coastal Sciences, Louisiana State University (LSU)
Co-Investigators: Samuel Bentley, LSU; Yanxia Ma, LSU; Zuo George Xue, LSU

Mud and sand represent >80% and <20% of sediment load in the Mississippi/Atchafalaya Rivers, respectively, so the loss of mud represents a substantial issue in the land-building process. Muddy sediment dynamics, however, is complicated and has widely been recognized to be controlled by multiple nonlinear processes. Operation strategies, based on results of this project, can be considered that allow sediment consolidation and reduce sediment loss/bypass. This can be used in rotations in multiple receiving basins to maximize total land gaining. A new hydrodynamics and sediment dynamics study is proposed to quantify: (1) cohesive muddy sediment characteristics in a receiving basin, (2) mud retention rate in a receiving basin, (3) settling and compaction of dredged sediment to be used to build marsh and Sediment Retention Enhancement Device (SRED), (4) the impact of SREDs on wave-induced shear stress, and (5) the impact of SREDs on sediment retention rate. This project helps evaluate the interaction and interdependence between sediment diversion and marsh creation; dredged materials for marsh creation, either from river channels or wetland canals, can be placed in the receiving basin as SREDs to enhance the retention of sediment diversion. This project also helps the design and implementation of engineering structures like wave attenuation and sediment collection devices in the near future.

Project Louisiana rivers' sediment flux to the coastal ocean using a coupled atmospheric-hydrological model ($77,015)
Zuo (George) Xue, Assistant Professor, Department of Oceanography and Coastal Sciences, Louisiana State University

In this study we propose to incorporate sediment modules and oceanside boundary conditions to a newly developed hydrologic model (WRF-Hydro). Our long-term objectives are to: 1) Quantify water and sediment flux from Louisiana rivers to the Chenier Plain; 2) Project possible changes in water and sediment flux regarding future climate and ongoing/planned restoration activities of the Louisiana Coastal Master Plan. For this 2yr fellowship project we further developed and validated a SW Louisiana WRF-Hydro model and performed a 35-yr model hindcast. Our model detected a possible change-point around the year 2004, after which the monthly precipitation decreased from 140 to 120 mm, evapotranspiration slightly increased from 80 to 83 mm, and water surplus decreased from 60 to 38 mm. In addition, we successfully adapted a new sediment module to WRF-Hydro and applied the coupled hydrological-sediment model in a

small test watershed in Mississippi. We also applied ocean boundary condition to drive the WRF-Hydro model and performed another test study for a hurricane event along the US east coast. Development and application of the sediment module and oceanside boundary condition confirmed WRF-Hydro's potential as a toolbox to assess the changes of water and sediment flux regarding future climate and ongoing/planned restoration activities along the Louisiana coast. Further improvement of model parameterization, parallelization, and the fully coupling with an ocean model is needed.

Assessment of coastal island restoration practices for the creation of brown pelican nesting habitat ($299,733)
PI: Paul Leberg, Professor in Department of Biology, University of Louisiana at Lafayette
Co-Investigator: Jordan Karubian, Tulane University

There is limited understanding of the success of the most common restoration approaches in providing seabird habitat. In light of the threats coastal Louisiana faces, and the region's importance for seabirds, our goal was to address a suite of questions including how birds and colonies respond to a shifting mosaic of available islands and fisheries, how far they travel to provision nestlings, and the extent to which birds move between breeding and foraging areas in our dynamic coastal landscape. By tapping into the opportunities provided by numerous habitat restoration efforts in coastal Louisiana, this research increases understanding of which outcomes are due to the restoration, the location of the restoration in relation to marine and wetland resources, or the level of predation threat.

Because many coastal islands in Louisiana have experienced some level of restoration, this research employed a space for time substitution approach comparing restoration sites of varying ages, focusing on use by brown pelicans. To quantify the spatial extent of habitats, we gathered existing satellite and aerial imagery for nesting sites as well as unused islands. The extent of each habitat type and its change over time was determined. We quantified how factors altered by restoration such as vegetation type, predator communities, and site characteristics affect bird use of barrier islands as nesting habitat. Cameras and other survey techniques were used to monitor nests to determine nest success, the causes of nest failure, and the abundance of nest predators. We found evidence that seabirds readily used restored islands and that restoration created vegetation conditions that favored use by brown pelicans and other birds. However, restoration actions can also increase conditions that favor mammalian predators, so a balance must be struck in project planning.

The role of island location on nest success, movement and habitat is being characterized using GPS-based tracking devices. This research is ongoing as we are affected by delays in funding and by the pandemic. When completed, this information will be related to physiological condition, foraging ecology, breeding success, and survival. Telemetry data will be used to quantify foraging ecology (frequency, distance, and duration of foraging trips) and parental care (trips to their nests coupled with direct observations of food delivery to nestlings per visit). The research will quantify how connectivity and position of restoration and other potential colony sites, relative to hypoxic zones and salinity gradients, affect their use as nesting habitat.

APPENDIX B: SURVEY RESULTS FROM RFP1 PROCESS

The mission of the RESTORE Act Center of Excellence for Louisiana (LA-COE) is to provide research directly relevant to implementation of Louisiana's Coastal Master Plan by administering a competitive grants program and providing the appropriate coordination and oversight support to ensure that success metrics are tracked and achieved.

LA-COE is finishing its fifth year of operation, which included establishing the procedures, releasing the first request for proposals (RFP1), and managing the first round of research subrecipients. Constructive feedback from the research subrecipients (also known as the principal investigators), Technical Points of Contacts, and the CPRA Liaisons is requested to help evaluate past performance and to improve future operations.

QUESTIONS:

The following survey questions are organized based on three major phases, Peer-review of Proposed Research, Research Engagement, and LA-COE Operations.

Please select your role from the following list:

a) Technical Point of Contact
b) Research Subrecipient (principal investigator)
c) CPRA Liaison

There are a total of 13 responses including three from CPRA Liaisons, four from Research Subrecipient and six from Technical Point of Contact (TPOC).

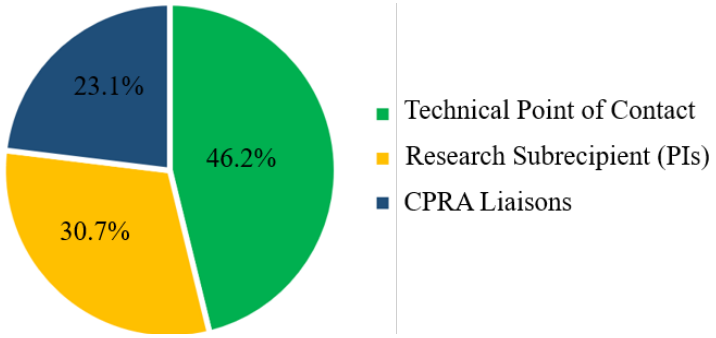

Figure 8. Respondents of LA-COE RFP1 survey.

A. Peer-review of Proposed Research

1. What is one aspect of the LA-COE request for proposal process (RFP1) that you appreciated?
   Below are comments from different respondents:
   - Technical Point of Contact
     - The proposal review process was well organized with a wide range of review input.
     - Fair and solid scientific review
   - Research Subrecipient (principal investigator)
     - Flexibility in topical areas
     - Transparency
     - Specificity with respect to the LA Coastal Master Plan
   - CPRA Liaison
     - The collaborative effort (LA-COE and CPRA) was used to develop the RFP and review proposals.
2. What is one aspect of the LA-COE request for proposal process (RFP1) that you would modify or streamline?
   Below are comments from different respondents:

- Technical Point of Contact
  - "*Narrowing the scope of the RFP would be helpful*"
- Research Subrecipient (principal investigator)
  - "*The LA CMP is obviously critical; however, I would suggest having a category that is not constrained by its direct benefit to the LA CMP. Open the call just a little to some basic science that the LA-COE may not see the immediate direct connection.*"
  - "*Early announcement of the RFP.*"
- CPRA Liaison
  - "*Reducing the number of proposals to review would increase the effectiveness and efficiency of the funding process.*"

3. Please provide any comments about how the **Peer-review of Proposed Research** phase was conducted.

   Below are comments from different respondents:

   - Technical Point of Contact
     - "*An automated online system for scoring and commenting.*"
   - Research Subrecipient (principal investigator)
     - "*My project was funded so I loved it!*"
     - "*Seemed to work well*"
     - "*The reviewers and the panel provided constructive comments.*"
   - CPRA Liaison
     - "*As mentioned above, the large number of proposals to review was a bit of a juggling act. CPRA probably should have more internal folks plugged into the process*".
4. Overall, how satisfied are you with the LA-COE grant application process?

   1- not at all satisfied, 5- extremely satisfied

   All Research Subrecipients gave positive feedback with "very satisfied" and "extremely satisfied". Two out of three responses from CPRA showed "not so satisfied".

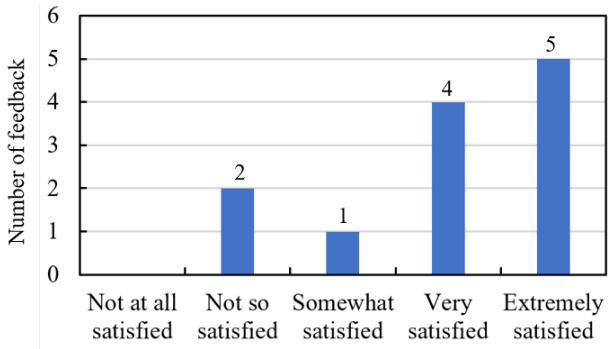

Figure 2. The RFP1 responses (N = 13) about the satisfaction of LA-COE grant application process.

Researcher Engagement

5. Research scientists from The Water Institute of the Gulf served as Technical Points of Contact (TPOC) and worked with CPRA Liaisons to ensure that the funded research results and outcomes of research subrecipients were relevant to implementing the Coastal Master Plan. Do you think this type of engagement with research subrecipients helps to urge the need for application of research results?

   1- not at all, 5- extremely useful

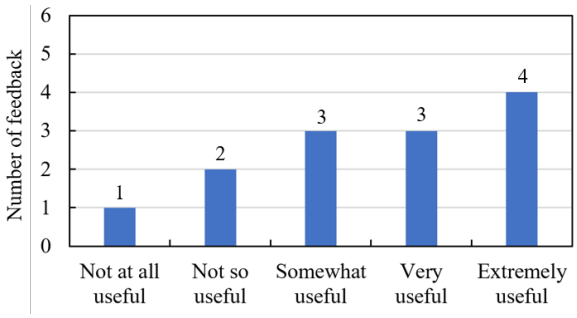

Figure 3. The RFP1 responses (n = 13) about the engagement of TPOCs and CPRA Liaisons.

6. Attendance of quarterly webinars and one-page updates via performance progress reports (PPRs, one-page updates) were requested for two years to allow the research subrecipients to provide updates on their research projects to Technical Points of Contact and CPRA Liaisons and to discuss how it relates to CPRA's needs, discuss data management best practices, and the dissemination of information requirements of CPRA. Do you think this type and frequency of engagement with research subrecipients was sufficient?

   1- not at all sufficient, 5- extremely sufficient

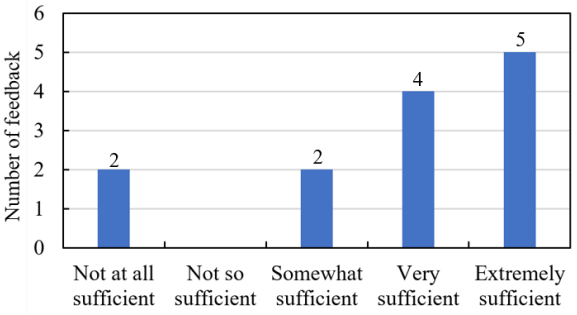

Figure 4. The RFP1 responses (n = 13) to the quarterly webinars and PPRs.

7. An annual in-person All Hands Meetings was hosted by LA-COE to bring research subrecipients, including their students and post-doctoral scholars, together with Technical Points of Contact and CPRA Liaisons to discuss coastal research that is relevant to CPRA. Evaluation forms were provided to gain their feedback. Do you think this annual engagement is effective in stressing the need of applied research in coastal Louisiana?

   1- not at all effective, 5- extremely effective

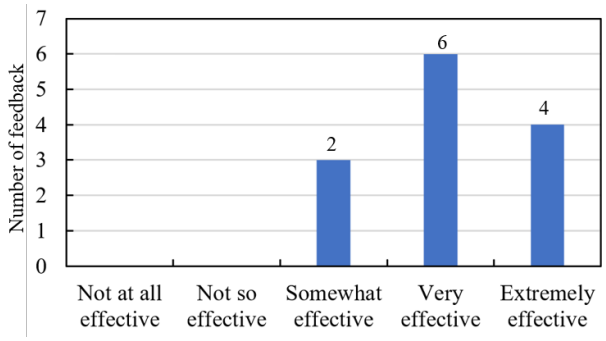

Figure 5. The RFP1 responses (n = 13) to the annual in-person All Hands Meetings

8. Please provide any other comments you have about the prior activities involved with **Researcher Engagement**.
   Below are comments from different respondents shown in *Italic*:
   - Technical Point of Contact
     - "*Having direct engagement to help with identifying cross-linkages of research with application was very helpful.*"
     - "*Honestly, the engagement was primarily administrative rather than technical. As a technical POC I benefited from learning more about the research and was able to assist the researchers navigate some administrative / political aspects of the work and COE - but I do not feel it had a major impact on the uptake of the work into CPRA."*
     - *"In my view, the one-page progress reports provided nearly no useful information about the research and was purely a busy work exercise. While obviously needed to ensure timely performance from the PI, it was laughable how this was originally billed as a "technical" task. It was purely grant management marketed as technical collaboration."*
   - Research Subrecipient (principal investigator)
     - *"The Researcher Engagement greatly helps network with other PIs, Co-PIs and graduate students."*
     - *"Overall, I was quite impressed. Feedback from the roundtables was valuable and productive for the project. One thing that was odd was the intense oversight of all presentations, publications, etc. that come out of the project. I have had funding from NSF, FEMA, NOAA, ONR, etc., and never experienced such requirements. The LA-COE provided grants to the experts so why would they need such oversight. Perhaps the oversight just needs better explanation."*
   - CPRA Liaison
     - *"The only real connection to these projects as a CPRA Liaison came during the in-person meeting and any review to the progress reports that were emailed. The progress reports were extremely minimal in information provided and did not really provide much insight into the research project's progress. I am not sure if there was any value added to the process via this Liaison approach. Any guidance or input regarding the impacts to the Master Plan seemed to come in the RFP process and the selection of projects to fund...after that, there did not seem to be much interaction, discussion, or dialogue at all."*
     - *"The amount of oversight that the researchers received was probably too much. Perhaps engagement with the CPRA liaison could be focused at that the start of the project, with subsequent engagement limited to quarterly/semi-annual progress reports and the annual meeting. Also, I feel that some of the researchers may have been confused about the role of the CPRA liaison."*

B. LA-COE operations

As a Center of Excellence, we strive to provide exceptional research leadership, best practices, and focus on the application of research results to help implement the Coastal Master Plan.

1. Communicating the results of the funded researchers through press releases, website news such as summaries of research progress from the All-hands Meeting, social media, and hosting conference sessions (e.g., SOC 2018, GOMOSES 2019) helps to get the word out about this applied research program. Do you think the communication efforts have been sufficient to inform others about the work that is being funded by LA-COE?
   1- not at all sufficient, 5- extremely sufficient

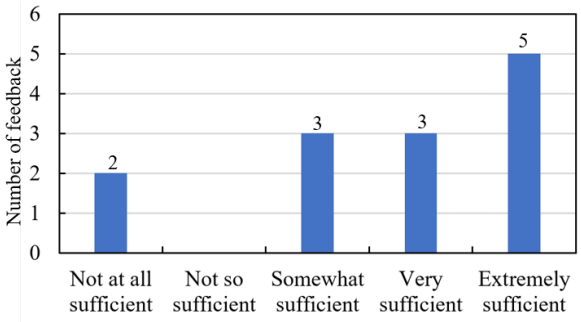

Figure 6. Responses (n = 13) to the communication efforts done by LA-COE during RFP1?

1. In the first five years of LA-COE operation, overall, how well do you think we are doing?
   2- poor, 5- excellent

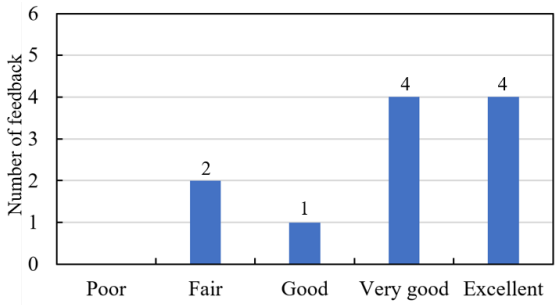

Figure 7. RFP1 Responses (n = 13) about the first five years of LA-COE operation.

2. Please provide any other feedback about the first five years of **LA-COE operations** and ideas for continuation or improvement?
   Below are comments from different respondents shown in *Italic*:
   - Technical Point of Contact
     - *"Worked well overall. More visibility and cross-linking to applications is always great."*
     - *"The link between strategic and targeted knowledge gaps / research needs for current management and the research questions being addressed was not very explicit for RFP1. Seeking mechanisms to make that linkage stronger could greatly benefit the process, ensuring that the COE funded research is timely, applied, and has a specific mechanism to be utilized for coastal restoration management."*
     - *"I think that the research projects funded are producing helpful and new science, so that is good. The LA-COE as a brand/messaging system (as the above question pertains to) seems wasteful to me to not have paid dividends."*
   - Research Subrecipient (principal investigator)
     - *"The alignment of the LA-COE with TWIG is a bit uncomfortable. Especially when scientists and leadership of TWIG are actively competing with the universities and consultants for research funding. Is important to realize where the historical, present and future scientific discovery and technical expertise has, is and will originate: universities within and outside of LA."*
     - *"Reducing quarterly reports to mid-year reports."*
   - CPRA Liaison
     - *"Around the COE. I suppose there needs to be some accountability, certainly, but having several dozen people provide cursory oversight seems to be a very inefficient*

and ineffective way to handle this. A few dedicated staff would likely be a better approach, who can point researchers to technical staff as needed (for either data, questions, troubleshooting, etc.) may be more efficient."

3. Please provide ideas about what you would like to be done in future **LA-COE operations**?

   Below are comments from different respondents:

   - Technical Point of Contact
     - *"Perhaps additional focused (by topic) sessions to cross-link work with management needs."*
     - *"Focusing future FRPs around a small number of specific and identified management/restoration knowledge gaps or research needs to feed into specific management decisions or processes (ongoing or planned for the future) would help greatly. Perhaps targeting research to a small number of specific restoration projects or project types could be a way to do that? This would also provide CPRA project managers that can specifically benefit from the research,\and may increase the likelihood of active engagement. I personally enjoyed being the WI technical POC - I am not sure I had much input to the science, but I did feel at times that I was able to advocate for the researchers and understood their work well enough to be able to do that (in particular in relation to the implication of delayed funding availability and need for NCE due to specific field sampling seasons etc.). The delay in funding availability after successful researchers had been notified and projects commenced was (obviously) a major challenge, so avoiding this in future RFPs would immediately solve many of the largest challenges from the first round of projects."*
     - *"I would streamline the progress report review process by having one (or two) dedicated administrative staff review these for accounting purposes. I would then provide a list of technical contacts and liaisons who are aware of the funded project list and will be available to provide data, make introductions, and troubleshoot on an ad hoc basis, rather than having dedication technical contacts for each individual project."*
   - Research Subrecipient (principal investigator)
     - *"Work to remove "The Water Institute of the Gulf" from the logo below. If anything, it should be recognized as the CPRA RESTORE Act LA-COE. That was the original intent of the US Department of the Treasury."*
     - *"Continue the Researcher Engagement."*
   - CPRA Liaison
     - *"See previous answer. I feel like an attempt was made to include EVERYBODY - at the detriment of meaningful involvement. Since everyone is expected to spend a few hours per RFP on this, it takes a limited resource and spreads it really thin across a bunch of people. I suspect that Angelina and Melissa have much more informative opinions and thoughts on the program due to their in-depth involvement and perhaps concentrating the internal COE resources on depth as opposed to breadth may be a bit more efficient and effective."*
     - *"My only comment would be that the list of applied research topics should be more specific and that it should be tied to identified research gaps."*