# WORKSHOP SUMMARY

## NOAA/CPRA Working Meeting on Proposed River Diversion Project Socioeconomic Analysis and Adaptive Management Plan Development

October 5-7, 2015, Lod Cook Alumni Center, LSU Campus, Baton Rouge, Louisiana

## OVERVIEW

In July 2014, coastal scientists and managers from state and federal agencies, academia, and the private sector convened at Stennis Space Center, MS for the 5th Annual NOAA/NGI Gulf Hypoxia Research Coordination Workshop[1]. A primary outcome of that meeting was the consensus agreement that a more in-depth workshop was needed to discuss science and policy questions specific to the large-scale river diversions proposed in *Louisiana's Comprehensive Master Plan for a Sustainable Coast*[2]. Representatives of NOAA, the Louisiana Coastal Protection and Restoration Authority (CPRA), and Louisiana Sea Grant (LSG) coordinated a follow-up workshop at Lod Cook Alumni Center on the campus of Louisiana State University (LSU) on October 5-7, 2015 in Baton Rouge, Louisiana.

The three-day workshop had two overarching themes. The first theme focused on socioeconomic data and predictive analyses of proposed diversion projects (page 13). The goal of this theme was to establish how best to consider socioeconomic factors in diversion project implementation. Specific objectives included determining the state of the science; identifying goals for future data collection and analysis, and development of a broad work plan to expand on current assessments. The intended outcome of this portion of the workshop was to identify a multi-agency strategy for the development of socioeconomic data and tools needed to assist project decision-making and adaptive management of diversion operations.

The second theme of the workshop focused on the adaptive management of existing and proposed river diversions (page 14). The goal of this theme was to establish how best to build a science-based adaptive management framework to guide decision making. Specific objectives under this goal included establishing a common intent, relevant data, and management structure for optimizing diversion management. The intended outcome of portion of the workshop was to identify recommendations for adaptive management in the development and implementation of river diversion projects.

A total of 50 subject matter experts (SMEs; pages 21-24) were invited to the workshop; including representatives of six state and federal resource management agencies, five academic institutions, and three private sector consulting firms. The agenda for the three-day meeting included 15 technical presentations and 15 hours of facilitated discussions. The following report briefly summarizes those discussions according to specific guiding questions developed under each theme by the planning committee[3].

[1] www.ncddc.noaa.gov/activities/healthy-oceans/gulf-hypoxia-stakeholders/workshop-2014/proceedings
[2] http://coastal.la.gov/a-common-vision/2012-coastal-master-plan/
[3] The appendix of this report contains a complete listing of the goals, objectives, agenda, list of attendees, and unabridged notes

## SOCIOECONOMIC DISCUSSIONS

October 5-6, 2015

### Objective 1: Determine the state of the science regarding socio-economic data development in south Louisiana

#### *What socioeconomic baseline data exists and what can we do with it?*

*Background*

The workshop opened with considerations provided by Rusty Swafford (NOAA) and Bren Haase (CPRA; page 15). Opening considerations were followed by Alan Lewitus (NOAA) giving a summary of 2014 workshop at Stennis Space Center and the resulting white paper. These presentations reiterated the rationale for the workshop and provided context on the magnitude of coastal land loss in Louisiana. Following a brief discussion, three presentations addressed ongoing efforts to collect and analyze baseline socioeconomic data (page 16). Melanie Saucier reviewed CPRA's project assessment and stakeholder engagement processes that were conducted for the 2012 master plan; Scott Hemmerling provided an overview of more than 50 years of data inventoried in the Water Institute of the Gulf's (TWIG's) Gulf Coastal Atlas[4]; and Stephen Barnes (LSU Department of Economics) provided preliminary findings on studies conducted in concert with RAND Corporation to quantify economic impacts of land loss and measure commercial fishing logistics in the state's coastal zone.

*Role of socioeconomics to date*

Feasibility of river diversions in the state's coastal master plan has historically focused on technical considerations of hydrology, geomorphology, structural engineering, and ecological response. To date, socioeconomic analyses have centered primarily on programmatic justification and project cost-efficacy. In this context, it has been (and will continue to be) necessary to evaluate a wide range of costs and benefits related to both action, and inaction. The Water Institute's Gulf Coastal Atlas and the LSU/RAND simulations of potential economic damage are two good examples of data collection and analysis efforts that are helping to evaluate this broader question.

*Data availability*

Baseline socioeconomic data has been collected and analyzed on relatively large spatial and temporal scales (e.g. basin-wide, coast-wide; decadal, 20y, 50y). As programmatic emphasis transitions from planning to implementation, data resolution will need to increase to address project level feasibility and impacts. The group agreed that the 67 variables currently tracked via the Gulf Coastal Atlas appear to capture much of the information needed for a wide range of socioeconomic tracking and analyses. Examples of additional information mentioned for consideration included data from the Census Designated Places (CDP) and American Community Survey (ACS); administrative records of resource management agencies (e.g. LDWF license records and trip tickets data); and federal dredging records associated with river shoaling. It was noted that a major constraint of any socioeconomic analysis is the limited suite of time-series data available and the lack of sufficient sensitivity in these data to capture project-specific effects. For this reason, targeted assessments by sector and location were recommended in the form of longitudinal surveys, one-off economic studies, and case-based sociological analyses. It was generally recognized that while river diversions may ultimately prove to be net positive to society, they could result in localized negative impacts. The degree to which these impacts are assessed will be determined by both legal and programmatic expedience requirements.

[4] Hemmerling, S. The Gulf Coast Atlas: A Place of Constant Change: Mapping Historical Resilience in Coastal Louisiana, Water Institute of the Gulf, forthcoming, Summer 2016.

## *What are the appropriate linkages for socioeconomic analysis?*

*Background*

An ongoing project commissioned by CPRA to estimate socioeconomic responses based on biophysical modeling was presented by Mitch Andrus (Royal Engineering; page 17). The presentation was a methodological review of how Delft3D-based biophysical simulations of four Barataria and Breton Sound Basin diversion projects are being coupled with Ecopath with Ecosim (EwE) to estimate future fisheries biomass and catch that will in turn drive long-term economic projections of market and non-market values. These economic projections will be calculated using a combination of input-output modeling (IMPLAN) and the Ecosystem Valuation Toolkit (EVT), a proprietary benefit-transfer database maintained by Earth Economics. The completed analysis is scheduled for December 2015.

*Challenges of long-term analysis*

Efforts to couple biophysical and socioeconomic models were recognized by all workshop participants as a positive step forward. Concerns over the study's design, however, included questions over the potential double counting of economic benefits, validity of assumptions underlying the input-output model, and the source and appropriateness of values obtained from the EVT. These details will be reviewable when Royal Engineering's final report is made public. Moreover, it was asserted that this particular study falls within the realm of programmatic evaluation, and as conceptualized would not capture near-term impacts at the project, sector, or community level. These concerns are similar to those raised by the state's expert panel on diversion planning and implementation[5]: *"While the EVT and IMPLAN model are academically defensible as broadly informative first-cut forms of analysis, when subjected to more aggressive academic, technical, or even community scrutiny – such as in litigation or regulatory contexts – the tools may not serve CPRA's needs"*. Finally, some participants expressed additional concern over the potential error involved in long-term biomass projections, and the compounded error associated with projecting economic activity from these estimates as far out as 50 years. For long-term analysis, it was suggested that the ultimate focus might best be limited to projections of resource availability.

*Rationale and linkages for near-term analysis*

Participants discussed the merits of commissioning parallel, near-term socioeconomic impact analyses for years 1-5 of diversion operations, although exactly how both short-term vs. long-term predicted effects will be weighted to inform project decision-making would still need to be determined by CPRA, its partners and stakeholders. Implemented at the project scale and for specific sectors, such an analysis might be better suited to address distributional effects and transition costs to private property and commercial operations within and adjacent to the project footprint. Such assessments would also rely on some degree of nested biophysical input. Biophysical linkages needed for such an analysis consist primarily of aquatic metrics (e.g. volume, velocity, depth, salinity, total suspended solids, temperature) and their related effects on physical stocks under operational conditions of average and maximum flow (e.g. biomass, shoaling, and land area). Some participants expressed concern that commissioning near-term impact assessments might be premature given ongoing refinements to the hydrodynamic models. Others asserted that the scrutiny of large-scale projects makes it problematic to defer such questions until biophysical modeling is finalized. At a minimum, the "front loading" of preliminary impact assessments might help to objectively delineate differences between correlation and causation, and to identify any legitimate losses that might accrue to private property and businesses. It was agreed that conducting such assessments would not obligate the state to compensate for any losses not required under law. Nevertheless, some participants argued that projects of this scale will invariably require some level of required expropriation – and that the benefits of limited, pre-emptive mitigation and/or transition programs should be weighed against the opportunity cost associated with protected legal disputes.

[5]http://cdn.thewaterinstitute.org/userfiles/file/Expert%20Panel%20on%20Diversion%20Planning%20and%20Implementation%20-%20Report%205_Final.pdf

### *What are the appropriate time frames and horizons for estimating socioeconomic impacts?*

*Background*
Bill Klein (U.S. Army Corps of Engineers (USACE) New Orleans District) presented, for Gigi Coulson, an overview of the socioeconomic data development and analyses planned for the LCA Mississippi River Hydrodynamic and Delta Management feasibility study (page 18). This presentation illustrated the systematic review processes of the USACE, and served as a catalyst for workshop discussions about the mechanics of sequencing, time, and capacity that will likely be required for authorization and permitting of large-scale diversion projects involving multiple institutional players.

*Time frame for decision making*
A principle concern of both agencies and academia was that the state would soon be voting on whether or not to move forward on construction of large-scale diversions outlined in the state master plan. Given this short time frame, it would be impossible for SMEs to address any of the major, remaining socioeconomic questions. Representatives of CPRA clarified that the vote scheduled for before the end of calendar year 2015 would not be a final vote on construction but instead be to move zero to four diversions into the engineering and design (E&D) phase for continued evaluation.

*NOTE: On 21 October 2015 the CPRA Board approved the recommendation of CPRA staff to move the Mid-Barataria and Mid-Breton Sediment Diversions into E&D in State Fiscal Year 2017 (beginning July 2016).*

In response to questions about the length of E&D, CPRA staff anticipated that a minimum of three to four years is likely. During this time, CPRA stated that they are committed to refining the socioeconomic projects recently initiated, expanding socioeconomic analysis where appropriate, and will withhold any final decisions on construction until feasibility and permitting questions are fully explored with federal partners.

*Time horizons for analysis*
A discussion of appropriate time horizons for socioeconomic analysis echoed earlier comments on the advantages of both short-term (1- to5-year) and long-term (50-year) parallel assessments. Having analyses at these different scales could help diminish what one participant described as the “tyranny of the horizon” - in which feasibility and impact results are unintentionally biased by commissioning analyses at temporal and spatial scales that are either too large or too small. Conversely, economists at the workshop suggested that any analysis focused solely on terminal stocks might prove insufficient. They suggested that the intervening years of a project are most relevant, and that a robust assessment would include an appropriately discounted comparison of project benefits (ecosystem services) and project costs over time. Finally, SMEs in coastal law suggested that one of the most urgent next steps will be defined by public trust and early scoping efforts under NEPA. Environmental impact statements (EIS) could soon be commissioned for one or more diversion projects. From a legal standpoint, it is critical to know what questions must be addressed by the EIS process.

## Objective 2: Establish a consensus goal for future socioeconomic data development and predictive modeling.

### *What are our goals for applying socioeconomic data and tools to diversion project decision-making?*

From a socioeconomic perspective, the group collectively expressed support for development of program-level and project-level analyses that would provide timely and relevant socioeconomic guidance on questions regarding diversion feasibility and project impact. Realizing this goal during the E&D phase involve refining and expanding the long-term, coast-wide socioeconomic studies; commissioning parallel near-term analyses at the project and sector levels; examining critical legal questions related to private property rights and impact; and incorporating the input of federal and state partners in key permitting and management decisions related to construction and operation. Ideally, all of these socioeconomic factors would also consider the consequences of a no-action alternative.

### *What baseline data should be collected that isn't currently?*

*Fisheries and community data*.
The group generally agreed that in the case of some fisheries (e.g. oysters), legal disputes should be expected, and thus a thorough review of lease tenure and related policy would be prudent. For other fisheries, there's a need to identify existing reports and commission new studies at the community and industry levels. Such information might include quantitative and qualitative analyses of resource dependence, community resilience, and cost-earning studies developed for key commercial species. For the recreational for hire sector, inshore guides and marinas should be identified and geocoded.

*Breadth and systematic focus*
It was agreed that socioeconomic discussions at the workshop were disproportionally focused on fisheries impacts. Other sectors and issues that will warrant data collection and assessment include navigation (draft, velocity concerns), oil and gas, real estate (takings and easements), protected species (critical habitat) as well as non-protected wildlife species (opportunity and productivity), historical lands, environmental justice concerns with minority populations, communities and infrastructure (vulnerability to coastal flooding and storm surge) and other services of coastal wetlands. It was noted that much of the current effort appears centered on the use of existing socioeconomic data to make big predictions. A more realistic goal might be to establish new mechanisms for collecting socioeconomic data continuously for issues of concern. This would allow more targeted pre- and post-project monitoring and adaptive management of project operations.

*Water Issues*
There was extensive discussion on the need for sufficient inventorying of the state's fresh water resources, and the historic and future uses of that resource. Additional tracking is needed to develop a state water budget in terms of the traditional demands for drinking water, irrigation, and navigation; and to examine how that allocation might change given growing regional demand for water in economic development, and the state's coastal needs for water in ecological restoration. Ultimately, any assessments related to water will hinge on having access to the most recent hydrodynamic projections available. CPRA indicated that projections for the four sediment diversions currently under feasibility study would become publically available in the coming weeks. Release of these preliminary maps will help to spur additional socioeconomic questions and data for consideration.

## Objective 3: Outline a broad work plan to achieve the future consensus goal with the current state of the science as a starting point.

### *How do we bridge the gap between current and intended capacities?*

The group discussed the merits of forming a socioeconomic advisory board that could work with CPRA, NOAA and other partners to inventory additional data, identify information gaps, and help identify and prioritize additional social science assessments. Given the plethora of committees currently in place for coastal planning, it was agreed that such a body might best be developed as an informal, *ad hoc* working group. One mechanism for convening such a group is to rely on the planning committees of the 2014 and 2015 NOAAA/CPRA socioeconomic workshops. A primary short run goal (1-6 months) identified was to "keep the dialogue going" – potentially via dedicated workshops and sessions at upcoming conferences such as 2016 Center for Natural Resource Economics and Policy (CNREP)[6] and State of the Coast[7] conferences. Utilizing these meetings to hone discussions would be an efficient way to recruit capacity while ensuring that current and future socioeconomic assessments benefit from a wide array of peer involvement in the social and biophysical sciences.

# ADAPTIVE MANAGEMENT DISCUSSIONS

October 6-7, 2015

## Objective 1: Establish a common goal for the intent and need for adaptive management of diversion projects.

### *Why adaptively manage diversion projects?*

*Authorization and management*

The second half of the workshop began with overview presentations by Erin Plitsch and Brad Miller (CPRA) on the monitoring and adaptive management of the Caernarvon and Davis Pond Freshwater Diversions and the proposed Maurepas Freshwater Diversion, respectively (page 19). These presentations described the biophysical and socioeconomic considerations that are taken into account within the overarching project goals set forth during authorization. It was noted that authorization wording (federal or state) has a profound effect on the timing and flow rate of a given diversion. Whereas existing structures such as Caernarvon and Davis Pond are authorized to operate within specific receiving-basin salinity targets, the authorization goal the proposed Maurepas diversion would be a more flexible intent to: "*Restore the connection between the Mississippi river and the Maurepas swamp to increase ecosystem health and function*".

*Optimizing sediment diversions*

Workshop participants seemed to agree that the rationale for adaptive management (AM) was basically to maximize project benefits and minimize project impacts. As with any optimization challenge, this requires having a clearly stated goal (objective function) subject to specific constraints. While the initial presentations by Plitsch and Miller provided valuable insight into the challenges of smaller scale projects, it was noted that the sediment diversions proposed in the 2012 Master Plan are considerably larger, and have a different objective function. As currently envisioned, these projects would have a maximum

[6] http://www.cnrep.lsu.edu/2016/abstracts.html

[7] http://stateofthecoast.org/general-information/general-information.html

discharge volume (35,000-75,000 cfs) larger than any diversion project previously authorized for coastal restoration (the largest controlled diversion being the Davis Pond Freshwater Diversion at 10,700 cfs, and the largest uncontrolled diversion being the West Bay Sediment Diversion at 20,000 cfs). Moreover, the stated goal[8] for these larger projects is to: *"Use water and sediment form the Mississippi River to sustain and rebuild land. Sustain a diversity of coastal habitats including cypress swamps, marshes, ridges, and barrier islands."* Thus, the aim of AM for these projects would be to collect and analyze data that would; 1) inform decisions to help maximize land building and habitat diversity, while 2) minimizing negative impacts to biota and socioeconomic interests.

### *What will guide the adaptive management of current and proposed diversions?*

*Data collection and analysis*
Several participants commented on the need for robust monitoring to guide adaptive management and ensure project goals are being met. It was widely asserted that without a strategically identified set of project relevant metrics - and a sufficient budget for monitoring those metrics - there could be no meaningful feedback to guide decision-making. Distinctions were made between passive AM (looking back at what we have learned from previous projects) versus active AM (looking forward to the data needs of future projects). Given the unprecedented scale of sediment diversions, there is considerable uncertainty on the extent to which a proposed project will meet its intended goals. It was noted that this uncertainty ultimately becomes the primary driver through which AM is implemented, and through which scientific analysis continues to provide a critical feedback loop to inform operational decisions. Finally, it was noted that active AM would be the only objective mechanism for refuting or confirming external challenges related to project impacts.

## Objective 2: Determine the relevant data that will inform diversion project adaptive management

### *What biophysical and socioeconomic data currently exists?*

*Biophysical modeling*
Ehab Meselhe (TWIG) provided an overview of efforts to model geomorphic and hydrologic effects of sediment diversion projects (page 19). Commissioned by CPRA in support of the Mississippi River Hydrodynamic and Delta Management (MRHDM) Feasibility Study, this Delft3D-based model simulates land gain and loss, and water quantity and quality changes. These simulations also provide the biophysical input needed to run the aforementioned CASM and EwE fisheries models for estimating productivity.

*Biophysical data*
Rick Raynie (CPRA) provided an overview of the genesis and implementation of a System-Wide Assessment and Monitoring Plan (SWAMP; page 19). This monitoring effort is a multi-agency collaboration to track a wide range of parameters related to coastal change. Parameters are organized under nine SWAMP categories: atmospheric, land, surface water, ground water, fish and wildlife, river, intermediate response, flooding and flood protection infrastructure, and strategic infrastructure and commercial assets. The SWAMP platform contains numerous types of diversion-relevant data and is actively pursuing additional parameters and sampling locations that would help assess diversion performance. The ultimate goal is to integrate these data into a publically-accessible information management system.

[8] http://coastal.la.gov/a-common-vision/2012-coastal-master-plan/

*Socioeconomic data*
From a socioeconomic standpoint, it was noted that this question was somewhat redundant to the data gaps identified in the previous portion of the meeting on October held on 5th and 6th. Nevertheless, many of the parameters to be tracked via SWAMP will ultimately provide the biophysical linkages needed to understand socioeconomic dynamics, such as those being archived in TWIG's Gulf Coastal Atlas.

### *What biophysical and socioeconomic data do we need to collect?*

Meeting attendees identified an initial list of data needs to support both modeling and monitoring of diversion projects.

*Modeling:*

- Refinement of hydrodynamic modeling to consider effects of additional flow constraints, and
- Refinement of ecosystem response modeling to address variable projections of fisheries and vegetation.

*Monitoring:*

- Additional detail on river shoaling and dredging activities,
- More comprehensive bathymetry mapping of diversion receiving basins,
- Basin-scale sediment dynamics (subaerial and subaqueous deposition and loss),
- Additional geologic data (subsidence rates and known faults),
- Benthic sampling within and adjacent to receiving basins (possibly could be collected during fisheries independent sampling by LDWF),
- Compliance monitoring for threatened and endangered species (population sampling and critical habitat assessment),
- Additional fisheries-independent data (e.g. more oyster sampling),
- Additional fisheries-dependent data (e.g. add-ons to existing license-holder surveys),
- Private property boundary mapping (terrestrial and subaqueous), and
- Project-specific costs (fully-funded, operation and maintenance, and monitoring).

## Objective 3: Recommend the management structure within which data will be analyzed

### *Who will analyze the data and how to determine effects of operations?*

Although SWAMP is coordinated by CPRA, much of the data is collected and analyzed by state and federal partners, including LDWF, USGS, LDWF, NMFS, NOAA, TWIG, USFWS, GCOOS, DEQ, DHH, EPA, and public and private universities. Participants from NOAA and USFWS emphasized the need for a formal process for evaluating monitoring results to determine if the project goals are being met, and to provide an objective feedback mechanism for operations.

### *What best practices can be incorporated from other geographies?*

Chris Kelble (NOAA) provided a call-in presentation on the evolution of AM in the Comprehensive Everglades Restoration Program (CERP; page 20). Some primary take away points from the presentation included:

*Time*

- AM is a protective measure. Project implementation should be done at a slow enough pace to allow for adaptation.
- Response curves for some critical parameters may be insignificant during the initial years of monitoring, then later show significant lagged effects and/or interactions. Plan on tracking parameters for as long as possible.

*Costs*

- Monitoring is expensive and almost always under-budgeted.
- The CERP monitoring budget was recently cut by 50%, forcing a reprioritization of data collection with consideration of costs vs. benefit.
- Diversify funding for monitoring among partners. Some partners have better resources for monitoring specific parameters. As well, diversification of funding insulates the adaptive management process from cuts to any one agency's budget.
- Coordination of all agencies involved is key for funding. Find more stable funding
- Invest in modeling to make monitoring a lot better.

*Modeling*

- Need to put substantial resources towards pre-project modeling. Plan for a systematic, peer review of modeling on an annual basis.
- Having good modeling may allow you to reduce some of the monitoring, and to reallocate monitoring to address remaining model uncertainties
- It is important to employ multiple models to provide a range of output to work with.

*Flexibility*

- Elaborate AM plans were developed for CERP, but some ended up being so overly prescriptive that there was a need to pull back. Flexibility is important.
- "Getting the water right" implies that you are getting it right for a particular interest or target. Interpretation of that target as historic conditions has evolved as scientific and programmatic realities have set in for CERP. It is difficult go back to some imaginary point on a slope.
- Expect disagreement and miscommunication. Have a formal process for resolving disputes
- Resolution doesn't always mean a win-win for everyone. Be open and honest about negative impacts.

## Objective 4: Recommend how management could optimize diversion operations

### *How do we consider constraints in planning and operating diversion projects?*

It was noted that the land-building projections provided by the MRHDM study are currently based on hypothetical regimes in which the sole constraints to operation are river stage and diversion size. Numerous additional constraints might ultimately reduce the timing and volume of diversion flows. Identifying, assessing, and potentially mitigating those constraints was the subject of a lengthy discussion. Some primary points of that discussion include:

*Mitigation questions*

Participants agreed on the need for expanded response assessments during the E&D phase, particularly to address near term project-related impacts to key commercial sectors (e.g., fisheries and navigation). There was no consensus; however, on the scale at which such analyses would be undertaken (e.g. individual vs. industry), nor on the associated obligation for the state to mitigate any negative impacts. Yet, it was noted that approximately 80% of coastal Louisiana is private property, and that any public project that negatively affects private property would likely require some form of compensation.

Moreover, there was a need identified to learn what level of inundation would be acceptable for communities outside the flood protection system, such as Lafitte. Some participants pointed out that, under the no action scenario, a large portion of Lafitte will be inundated anyway. Still others pointed out that there are differences in the mitigation required for an act of God, versus an act of Congress. Potential options discussed for mitigating project-related impacts included expropriation, buyouts, and transition assistance. Some participants felt that these discussions were premature, while others called for the front-loading of these challenges, equating it to the "policy equivalent of Lipitor".

*Threatened, Endangered and Protected Species*
A question was raised about the extent to which threatened and endangered species (TES) and other policy-protected species have been addressed during the planning phase of sediment diversions. Examples of TES and other protected species of concern include the Gulf Sturgeon (*Acipenser oxyrinchus*), Pallid Sturgeon (*Scaphirhynchus albus*), Piping Plover (*Charadrius melodus*), Kemps Ridley Sea Turtle (*Lepidochelys kempii*), Diamondback Terrapin (*Malaclemys terrapin*), and Bottlenose Dolphin (*Tursiops truncates*). NOAA representatives indicated that some of these species have been the subject of agency-level consultations with USACE and CPRA. Potential mechanisms for monitoring addressing impacts to these species include seasonal bird counts, and critical habitat and prey monitoring by state and federal agencies. The ultimate goal would be to identify species of concern and develop best management practices for avoiding or reducing negative impacts. Moreover, it was noted that under the Endangered Species Act (ESA) some leeway is afforded for restoration activities designed to improve the habitat for a threatened or endangered species.

*Cost signals*
Project-specific costs were discussed as a constraint, given the budget for restoration and restoration monitoring has historically been insufficient. Participants inquired as to how changing costs signals would feed back into decisions on construction and operation. It was noted that AM is more than turning a diversion off and on. Long-term adaptive management might need to include contingencies for unexpected expenses (e.g. structural repair and maintenance, dredging of source and outfall areas, etc.). Representatives of CPRA agreed that such contingencies are of concern, but are not currently factored into project cost and benefit projections within the 50-year time frame. While these factors will receive additional scrutiny during E&D, there is some limit as to how much budgeting can be justified for predicable vs. non-predictable outcomes.

## ***What subsequent operations can be changed based on recognized operational effects and how?***

*Targets and Triggers*
Workshop participants pointed out that parameters collected under SWAMP lack the specific target ranges needed to inform specific AM decisions. It was stated by CPRA that SWAMP was not developed specifically as the AM monitoring platform for diversions. Nevertheless, they agreed that both AM-based modeling and monitoring will require specific triggers or thresholds to actuate future management decisions. For example, the tracking of in-channel discharge (based on monitored water level) has traditionally been recognized as the best way to capture mobilized sediments at certain benchmark flows. It was noted; however, that the relationship between flow rate and total suspended solids (TSS) doesn't always look the same on hydrographs. Ultimately, a TSS-based threshold might be a more optimal trigger for determining diversion operations – given that sediment availability is the primary driver of these projects. This is just one example of operationally-relevant criteria that must be formally identified within an AM implementation plan. A draft plan is needed to assess the validity of all operationally-relevant parameters, their target response ranges, and to identify appropriate management actions within those ranges.

*Trade-offs*

Considering all the various concerns and potential impacts, it is important that AM doesn't become a process through which projects benefits are diminished beyond the point of feasibility. Optimization is an iterative exercise, but as mentioned several times during the workshop, there will be trade-offs between ecosystem services. The methods through which these trade-offs are identified and managed is an extremely important consideration. Some participants questioned how realistic it is to meet the land-building goals of sediment diversion with so many hands on the valve (institutional players and stakeholders). Representatives of CPRA indicated that operations are ultimately a question of acceptability. If something turns out to be unacceptable to a certain group, there must be a mechanism in place for objectively addressing the validity and mitigation of that impact that is consistent with the overall goal of the project to underlie decisions on any alterations to operational regimes.

## NEXT STEPS

1. Initiate an informal socioeconomic working group to identify data gaps, additional analysis needs, and the temporal and spatial scales needed for analysis

2. Utilize the upcoming 2016 Center for Natural Resource Economics and Policy (March 20-22) and State of the Coast (June 1-3) conferences to present socioeconomic study updates and identify expanded studies for socioeconomic impact analysis.

3. Initiate the development of a draft work plan for socioeconomics by early calendar year 2016. Plan should be developed in parallel with a draft plan for adaptive management.

4. Begin a multi-agency effort to develop a recommended framework for identifying adaptive management metrics and evaluating monitoring results to determine if the goals are being met.

5. Develop a draft adaptive management processes for model refinement and dispute resolution.

6. Review adaptive management protocols for other restoration plans and outline what data might be missing from the state's System-Wide Assessment and Monitoring Program.

7. Examine the range of National Environmental Policy Act compliance questions that will be needed and initiate responses to these questions.

## MEETING AGENDA, GOALS AND OBJECTIVES

**Goals and Objectives, and Agenda, for**
**NOAA/CPRA Working Meeting on Proposed River Diversion Project**
**Socio-Economics Analyses and Adaptive Management Plan Development**

Monday-Wednesday, 5-7 October 2015
Abell Boardroom, Lod Cook Alumni Center,
LSU Campus, Baton Rouge, Louisiana

**Theme 1: Socio-Economic Data and Predictive Analyses of Proposed Diversion Projects**

Goal: Establish how best to consider socio-economic data in diversions project implementation

Objectives:

1. Determine the state of the science (current and immediate-term) regarding socio-economic data development in south Louisiana
    - *[Guiding Question: What socioeconomic baseline data currently exists and what can we do with it?]*
    - *[Guiding Question: What are the appropriate linkages for socioeconomic analysis?]*
    - *[Guiding Question: What are the appropriate time frames for estimating socioeconomic impacts?]*
2. Establish a consensus goal for future socio-economic data development and predictive modeling
    - *[Guiding Question: What are our goals for applying socioeconomic data and tools to diversion project decision-making?]*
    - *[Guiding Question: What baseline data should be collected that isn't currently?]*
3. Outline a broad work plan to achieve the future consensus goal with the current state of the science as a starting point
    - *[Guiding Question: How do we bridge the gap between current and intended capacities?]*

*Outcome:* *A multi-agency strategy for the development of socio-economic data and tools needed to assist project decision-making and adaptive management of diversion operations.*

**Theme 2: Adaptive Management of Existing and Proposed River Diversions**

Goal: Establish how best to build a science-based adaptive management decision-making framework for diversion project implementation

Objectives:

1. Establish a common goal for the intent and need for adaptive management of diversion projects.
    - *[Guiding Question: Why adaptively manage diversion projects?]*
    - *Guiding Question: What will guide the adaptive management of current and proposed diversions?]*
2. Determine the relevant data that will inform diversion project adaptive management
    - *[Guiding Question: What biophysical and socioeconomic data currently exists?]*
    - *[Guiding Question: What biophysical and socioeconomic data do we need to collect?]*
3. Recommend the management structure within which data will be analyzed
    - *[Guiding Question: Who will analyze the data and how to determine effects of operations?]*
    - *[Guiding Question: What best practices can be incorporated from other geographies?]*
4. Recommend how management could optimize diversion operations
    - *[Guiding Question: How do we consider constraints in planning and operating diversion projects?]*
    - *[Guiding Question: What subsequent operations can be changed based on recognized operational effects and how?]*

*Outcome: Recommendations to consider in the development of adaptive management plan development and implementation for river diversion projects.*

## AGENDA

### Monday, 5 October 2015
### Morning

*Note: All time slots for speakers include Q&A for specific talks*

| *Time* | *Discussion Point* |
|---|---|
| 8:30 – 8:45 am | Welcome and Introductions<br>*Lead: Melissa Trosclair Daigle and Katie Lea, Louisiana Sea Grant, and Kristen Laursen, NOAA, Facilitators* |
| ***Initial Considerations and Results from Past Meetings*** | |
| 8:45 – 9:00 am | Opening Considerations: NOAA<br>*Speaker: Rusty Swafford, NOAA* |
| 9:00 – 9:15 am | Opening Considerations: CPRA<br>*Speaker: Bren Haase, CPRA* |
| 9:15 – 9:30 am | Summary and Implications of Socio-economic Discussions during the 5th Annual NOAA/NGI Hypoxia Research Coordination Workshop, 14-16 July 2014<br>*Speaker: Alan Lewitus, Ph.D., and Kristen Laursen, NOAA* |
| 9:30 – 10:00 am | Open Discussion of Session Presentations and Begin Development of a Consensus Goal for Future Socio-economic Data Development and Predictive Modeling ***(Objective 2)***<br>*Lead: Melissa Trosclair Daigle and Katie Lea, Louisiana Sea Grant, and Kristen Laursen, NOAA, Facilitators* |
| *10:00 – 10:15 am* | *Break* |

**Note that PDFs of all presentations and some reference documents can be found at*
ftp://ftp.coastal.la.gov/5-7%20October%20NOAA-CPRA%20Meeting%20Materials/

## AGENDA

## Monday, 5 October 2015
## Morning (continued)

| *Time* | *Discussion Point* |
|---|---|
| ***Past and Ongoing Socio-economic Data Development Projects*** | |
| 10:15 – 10:45 am | Socio-Economic Data, Metrics, and Stakeholder Engagement for the 2012 and 2017 Coastal Master Plans<br>*Speaker: Melanie Saucier, CPRA* |
| 10:45 – 11:00 am | The Water Institute of the Gulf Coastal Atlas<br>*Speaker: Scott Hemmerling, Ph.D., The Water Institute of the Gulf* |
| 11:00 – 11:30 am | Economic Evaluation of Coastal Land Loss in Louisiana / Coastal Fisheries Study<br>*Speaker: Stephen Barnes, Ph.D., LSU* |
| 11:30 am - noon | Open Discussion of Session Presentations and Begin Framing the State of the Science (Current and Immediate-term) Regarding Socio-economic Data Development in South Louisiana ***(Objective 1)***<br>*Lead: Melissa Trosclair Daigle and Katie Lea, Louisiana Sea Grant, and Kristen Laursen, NOAA, Facilitators* |
| *Noon – 1:00 pm* | *Lunch (provided)* |

**Note that PDFs of all presentations and some reference documents can be found at*
ftp://ftp.coastal.la.gov/5-7%20October%20NOAA-CPRA%20Meeting%20Materials/

## AGENDA

## Monday, 5 October 2015
## Afternoon

| *Time* | *Discussion Point* |
|---|---|
| ***Past and Ongoing Socio-economic Data Development Projects (continued)*** | |
| 1:00 – 1:30 pm | Diversion Socio-Economic Analysis Scoping Report for the Basin-wide Socio-economic Analysis<br>*Lead: Mitch Andrus, Royal Engineering* |
| 1:30 – 2:30 pm | Open Discussion of Session Presentations and Continue Framing the State of the Science (Current and Immediate-term) Regarding Socio-economic Data Development in South Louisiana ***(Objective 1)***<br>*Lead: Melissa Trosclair Daigle and Katie Lea, Louisiana Sea Grant, and Kristen Laursen, NOAA, Facilitators* |
| *2:30 – 2:45 pm* | *Break* |
| 2:45 – 5:00 pm | Continue Development of a Consensus Goal for Future Socio-economic Data Development and Predictive Modeling ***(Objective 2)*** and Begin Outlining a Broad Work Plan to Achieve the Future Consensus Goal with the Current State of the Science as a Starting Point ***(Objective 3)***<br>*Lead: Melissa Trosclair Daigle and Katie Lea, Louisiana Sea Grant, and Kristen Laursen, NOAA, Facilitators* |
| *5:00 pm* | *Adjourn Until Day 2* |

**Note that PDFs of all presentations and some reference documents can be found at*
ftp://ftp.coastal.la.gov/5-7%20October%20NOAA-CPRA%20Meeting%20Materials/

## AGENDA

## Tuesday, 6 October 2015
## Morning

| *Time* | *Discussion Point* |
|---|---|
| 8:30 – 9:00 am | Welcome Back, Introductions, and Summary of Day 1 Conversations<br>*Lead: Melissa Trosclair Daigle and Katie Lea, Louisiana Sea Grant, and Kristen Laursen, NOAA, Facilitators* |
| ***Developing a Work Plan to Link Current Data and Tools to Future Objectives*** | |
| 9:00 – 9:30 am | Socio-Economic Data Development Conducted during the LCA Mississippi River Hydrodynamic and Delta Management Feasibility Study<br>*Speaker: William Klein, Jr., Ed.D., USACE, for Gigi Coulson, USACE* |
| 9:30 – 10:15 am | Revisit if Necessary Framing the State of the Science (Current and Immediate-term) Regarding Socio-economic Data Development in South Louisiana ***(Objective 1)*** Based on the Morning Presentation and Continue Outlining a Broad Work Plan to Achieve the Future Consensus Goal with the Current State of the Science as a Starting Point ***(Objective 3)***<br>*Lead: Melissa Trosclair Daigle and Katie Lea, Louisiana Sea Grant, and Kristen Laursen, NOAA, Facilitators* |
| *10:15 – 10:30 am* | *Break* |
| 10:30 am – Noon | Overlap Session with Adaptive Management Experts:<br>Summarize key socioeconomic findings from workshop and the Work Plan Outline<br>Obtain input on key socioeconomic needs for adaptive management<br>*Lead: Melissa Trosclair Daigle and Katie Lea, Louisiana Sea Grant, and Kristen Laursen, NOAA, Facilitators* |
| *Noon – 1:30 pm* | *Working Lunch (provided)*<br>Intersections between socioeconomic information and adaptive management<br>• What are the appropriate linkages for socioeconomic analysis?<br>• Are there key thresholds or decisions where socioeconomic information is most useful?<br>• "What are appropriate timeframes for effective inclusion of socioeconomic analysis?<br>*Lead: Melissa Trosclair Daigle and Katie Lea, Louisiana Sea Grant, and Kristen Laursen, NOAA, Facilitators* |

**Note that PDFs of all presentations and some reference documents can be found at*
ftp://ftp.coastal.la.gov/5-7%20October%20NOAA-CPRA%20Meeting%20Materials/

## AGENDA

## Tuesday, 6 October 2015
## Afternoon

| *Time* | *Discussion Point* |
|---|---|
| ***Adaptive Management of Existing River Diversion Projects*** | |
| 1:30 – 2:00 pm | Monitoring and Adaptive Management of the Caernarvon and Davis Pond Freshwater Diversions<br>*Speaker: Erin Plitsch, CPRA* |
| 2:00 – 2:30 pm | Development of an Adaptive Management Plan for the Maurepas Freshwater Diversion<br>*Speaker: Brad Miller, CPRA* |
| 2:30 – 3:00 pm | Open Discussion of Session Presentations and Establishing a Common Goal for the Intent and Need for Adaptive Management of Diversion Projects<br>*Lead: Melissa Trosclair Daigle and Katie Lea, Louisiana Sea Grant, and Kristen Laursen, NOAA, Facilitators* |
| *3:00 – 3:15 pm* | *Break* |
| ***Future Sources of Data for Adaptive Management of River Diversion Projects*** | |
| 3:15 – 3:35 pm | Project Effects Modeling in the LCA Mississippi River Hydrodynamic and Delta Management Feasibility Study<br>*Speaker: Ehab Meselhe, Ph.D., The Water Institute of the Gulf* |
| 3:35 – 4:00 pm | Development of the System-Wide Assessment and Monitoring Plan<br>*Speaker: Richard Raynie, CPRA* |
| 4:00 – 5:00 pm | Open Discussion of Remaining Gaps in Modeling and Monitoring and Begin Determining the Relevant Data that will Inform Diversion Project Adaptive Management<br>*Lead: Melissa Trosclair Daigle and Katie Lea, Louisiana Sea Grant, and Kristen Laursen, NOAA, Facilitators* |
| *5:00 pm* | *Adjourn Until Day 3* |

**Note that PDFs of all presentations and some reference documents can be found at*
ftp://ftp.coastal.la.gov/5-7%20October%20NOAA-CPRA%20Meeting%20Materials/

## AGENDA

## Wednesday, 7 October 2015

| *Time* | *Discussion Point* |
|---|---|
| 8:30 – 9:00 am | Welcome Back, Introductions, and Summary of Day 2 Conversations<br>*Lead: Melissa Daigle and Katie Lea, Louisiana Sea Grant, and Kristen Laursen, NOAA, Facilitators* |
| ***External Perspectives on Adaptive Management*** | |
| 9:00 – 9:30 am | Adaptive Management in the Comprehensive Everglades Restoration Program<br>*Speaker: Chris Kelble, Ph.D., NOAA* |
| 9:30 – 10:15 am | Open Discussion of Best Practices for Incorporation into an Adaptive Management Program and Develop Recommendations of the Management Structure within which Data Will Be Analyzed<br>*Lead: Melissa Trosclair Daigle and Katie Lea, Louisiana Sea Grant, and Kristen Laursen, NOAA, Facilitators* |
| *10:15 – 10:30 am* | *Break* |
| 10:30 am – noon | Open Discussion of Best Practices and Recommendations for Optimizing Diversion Operations<br>*Lead: Melissa Daigle and Katie Lea, Louisiana Sea Grant, and Kristen Laursen, NOAA, Facilitators* |
| *12 noon – 1:00 pm* | *Lunch* |
| 1:00 – 5:00 pm | Open Discussion of Best Practices and Outline Recommendations for Optimization of Diversion Operations<br>• Additional Questions for Presenters<br>• Identify Remaining Gaps in Data and Tools<br>• Discussion of 'guiding' questions based on Sessions<br>• Outline Work Plan to Incorporate Best Practices and Social and Economic Analyses into Adaptive Management Plan Development and Implementation<br>• Initial ideas for next steps<br>*Lead: Melissa Trosclair Daigle and Katie Lea, Louisiana Sea Grant, and Kristen Laursen, NOAA, Facilitators* |
| *5:00 pm* | *Adjourn Meeting* |

**Note that PDFs of all presentations and some reference documents can be found at*
ftp://ftp.coastal.la.gov/5-7%20October%20NOAA-CPRA%20Meeting%20Materials/

**ATTENDEES**

## Attendees

| Name | Affiliation and/or Role | Email Address |
|---|---|---|
| Mitch Andrus | Royal Engineering, *Project Manager for CPRA Socio-economic Study* | mandrus@royalengineering.net |
| Steve Ashby, Ph.D. | Northern Gulf Institute, Co-Director | sashby@gri.msstate.edu |
| Stephen R. Barnes, Ph.D. | Louisiana State University, Department of Economics, *Principal Investigator for CPRA Fisheries and Land Loss Studies* | barnes@lsu.edu |
| Steve Beck | Louisiana Department of Wildlife and Fisheries, *LCA Mississippi River Delta Management Study Project Delivery Team Memb*er | sbeck@wlf.la.gov |
| Karim Belhadjali | CPRA, Planning & Research Division, Strategic Planning Branch Deputy Chief | karim.belhadjali@la.gov |
| Kent Bollfrass | CPRA, Planning & Research Division, Studies & Environmental Branch, Feasibility Studies Section, *Lower Barataria and Lower Breton Sound Sediment Diversions Feasibility Studies Manager* | kent.bollfrass@la.gov |
| Bill Boshart | CPRA, Operations Division, New Orleans Field Office, Biologist Supervisor | bill.boshart@la.gov |
| Cathy Breaux | U.S. Fish & Wildlife Service, Louisiana Ecological Services Office, Civil Works and Coastal Restoration Biologist, *LCA Mississippi River Delta Management Study Project Delivery Team Memb*er | catherine_breaux@fws.gov |
| Rex Caffey, Ph.D. | LSU AgCenter, Department of Agricultural Economics and Agribusiness, Professor / Louisiana Sea Grant, Director of Marine Extension | rcaffey@agctr.lsu.edu |
| Craig Colten, Ph.D. | LSU, Department of Geography and Anthropology, Professor | ccolten@lsu.edu |
| Micaela Coner | CPRA, Project Management Division, *Mid-Barataria Sediment Diversion Project Manager* | micaela.coner@la.gov |

**Attendees *(continued)***

| Name | Affiliation and/or Role | Email Address |
|---|---|---|
| Christopher Dalbom, J.D. | Tulane University Law School, Program Manager, Institute on Water Resources Law and Policy | cdalbom@tulane.edu |
| Dawn Davis | NOAA NMFS Southeast Region, Habitat Conservation Division, Gulf Branch, Baton Rouge Office | dawn.davis@noaa.gov |
| Mark Davis, J.D. | Tulane University Law School, Senior Research Fellow and Director of the Institute on Water Resources Law and Policy | msdavis@tulane.edu |
| Austin Feldbaum | CPRA, Planning & Research Division, Studies & Environmental Branch, Feasibility Studies Section, *Increase Atchafalaya Flow to Terrebonne Freshwater Diversion Study Manager* | austin.feldbaum@la.gov |
| Steven Giordano, J.D. | NOAA NMFS Southeast Region, Gulf Restoration Program Manager | steve.giordano@noaa.gov |
| Bren Haase | CPRA, Planning & Research Division Administrator | bren.haase@la.gov |
| Rick Hartman | NOAA NMFS Southeast Region, Habitat Conservation Division, Gulf Branch, Baton Rouge Office, *LCA Mississippi River Delta Management Study Project Delivery Team Member* | richard.hartman@noaa.gov |
| Scott Hemmerling, Ph.D. | The Water Institute of the Gulf, Associate Director of Human Dimensions | shemmerling@thewaterinstitute.org |
| Annie Howard | CPRA, Planning & Research Division, Studies & Environmental Branch, Environmental Section Supervisor, *LCA Mississippi River Delta Management Feasibility NEPA Lead* | ann.howard@la.gov |

**Attendees *(continued)***

| Name | Affiliation and/or Role | Email Address |
|---|---|---|
| Jack Isaacs, Ph.D. | Louisiana Department of Wildlife and Fisheries, Socioeconomic Research and Development | jisaacs@wlf.la.gov |
| Elizabeth Jarrell | CPRA, Planning & Research Division, Studies & Environmental Branch, Feasibility Studies Section, *LCA Mississippi River Delta Management Feasibility State Study Manager* | elizabeth.jarrell@la.gov |
| Damia Jackson | USACE, New Orleans District, Project Management Division | damia.l.jackson@usace.army.mil |
| Michael Jepson, Ph.D. | NOAA, NMFS, Southeast Regional Office, Sustainable Fisheries Division | michael.jepson@noaa.gov |
| Walter Keithly, Ph.D. | LSU CNREP, Department of Agricultural Economics, Resource Economist/Associate Professor | walterk@lsu.edu |
| Chris Kelble, Ph.D. | NOAA, OAR, Atlantic Oceanography and Meteorology Laboratory | chris.kelble@noaa.gov |
| Bill Klein, Jr., Ed.D. | USACE, New Orleans District | william.p.klein.jr@usace.army.mil |
| Kristen Laursen | NOAA, Gulf of Mexico Regional Coordinator, *Meeting Co-Facilitator* | kristen.r.laursen@noaa.gov |
| Katie Lea | Louisiana Sea Grant, *Meeting Co-Facilitator* | klea@lsu.edu |
| Alan Lewitus, Ph.D. | NOAA, National Ocean Service, Ecosystems Stressors Research Branch, Branch Chief | alan.lewitus@noaa.gov |
| Brad Miller | CPRA, Project Management Division, *Maurepas Diversion Project Manager* | brad.miller@la.gov |
| James Pahl, Ph.D. | CPRA, Planning & Research Division, *Studies & Environmental Branch Senior Scientist* | james.pahl@la.gov |

**Attendees *(continued)***

| Name | Affiliation and/or Role | Email Address |
|---|---|---|
| Carol Parsons Richards | CPRA, Planning & Research Division, Studies & Environmental Branch, River Studies Manager, *Project Adaptive Management Lead* | carol.richards@la.gov |
| Dan Petrolia, Ph.D. | Mississippi State University, Department of Agricultural Economics | d.petrolia@msstate.edu |
| Erin Plitsch | CPRA, Operations Division, New Orleans Regional Office, *Caernarvon and Davis Pond Freshwater Diversions Project Scientist* | erin.plitsch@la.gov |
| Cherie Price | USACE, New Orleans District, Regional Planning & Environmental Division, *LCA Mississippi River Hydrodynamic and Delta Management Feasibility Study Federal Plan Formulator* | cherie.price@usace.army.mil |
| Richard Raynie | CPRA, Executive Division, *Adaptive Management and SWAMP Program Chief* | richard.raynie@la.gov |
| Lawrence Rozas, Ph.D. | NOAA, NMFS, Southeast Fisheries Science Center, Galveston Laboratory | lawrence.rozas@noaa.gov |
| Melanie Saucier | CPRA, Planning & Research Division, Strategic Planning Branch, Plan Development Section Supervisor / *Socio-Economic Studies Task Manager* | melanie.saucier@la.gov |
| Jason Shackelford | LSU, Center for Natural Resource Economics and Policy | jshackelford@ramboll.com |
| Greg Steyer, Ph.D. | USGS, National Wetlands Research Center, Coastal Restoration Assessment Branch, Branch Chief | gsteyer@usgs.gov |
| Charles Sutcliffe | Louisiana Governor's Office of Coastal Activities, *RAND/LSU Land Loss Study Task Manager* | charles.sutcliffe@la.gov |
| Rusty Swafford | NOAA NMFS Southeast Region, Habitat Conservation Division, Gulf Branch Supervisor | rusty.swafford@noaa.gov |

**Attendees *(continued)***

| Name | Affiliation and/or Role | Email Address |
|---|---|---|
| Maryam Tabarestani | Louisiana Department of Wildlife and Fisheries, Socioeconomic Research and Development, Resource Economist | mtabarestani@wlf.la.gov |
| Melissa Trosclair Daigle | LSU, Louisiana Sea Grant Law & Policy Program, Research Associate & Resiliency Specialist, *Meeting Facilitator* | mtrosc2@lsu.edu |
| Robert Twilley, Ph.D. | Louisiana Sea Grant, Executive Director | rtwilley@lsu.edu |
| David Walther | U.S. Fish & Wildlife Service, Louisiana Ecological Services Office, Supervisory Biologist for Civil Works and Coastal Restoration Projects | david_walther@fws.gov |
| Hua Wang | LSU, Center for Natural Resource Economics and Policy | hwang23@tigers.lsu.edu |
| James G. Wilkins, J.D. | Louisiana Sea Grant, Louisiana Sea Grant Legal Program, Legal Advisory Service, *Director* | jwilkins@lsu.edu |
| Pat Williams | NOAA NMFS Southeast Region, Habitat Conservation Division, Gulf Branch, Baton Rouge Office, *LCA Mississippi River Delta Management Study Project Delivery Team Memb*er | patrick.williams@la.gov |