# EXPERT PANEL ON DIVERSION PLANNING AND IMPLEMENTATION

## Report #7

October 2016

*Submitted to:*
*Coastal Protection and Restoration Authority*

## EXECUTIVE SUMMARY

The seventh meeting of the *Expert Panel on Diversion Planning and Implementation (the Panel)* focused on results of new simulations of the effects of sediment diversions on receiving basins, and on operational plans and adaptive management. Presentations and discussions (1) updated the Panel on recent Coastal Protection and Restoration Authority (CPRA) activities and provided a response to the recommendations in the Panel's sixth report, (2) provided the Panel with results of extensive new simulations in the areas of land building and landscape change, (3) introduced the approach to operations, adaptive management, and the decision-making process, (4) updated the Panel on vegetation response to inundation, and (5) informed the Panel of an evolving issue with Bottlenose Dolphins, a protected species in the Barataria Bay. The seventh report summarizes our findings and offers several recommendations, embedded in the responses to the Panel's three-part charge, to more effectively advance the diversion planning process as it moves through and beyond the *2016 Decision to Implement*. Recommendations were in the broad areas of (1) operations and adaptive management, (2) wetland response to flooding, and (3) future science input as the process moves fully into the engineering and design phase. In addition to the recommendations stemming from the Panel's charge, the report offers numerous suggestions for applying the recommendations, and ends with a specific recommendation for elevating and advancing socio-economic considerations to a level appropriate for a restoration program of this magnitude.

## 1.0 INTRODUCTION AND BACKGROUND

The Panel held its seventh public meeting at the Hilton Baton Rouge Capital Center on August 31, 2016 with follow-up discussions on September 1, 2016 at The Water Institute of the Gulf (the Institute). The Panel was established to provide expert advice and guidance on key issues that pertain to river diversions in recognition that diversions are an essential restoration tool in coastal Louisiana. As noted in previous Panel reports, Louisiana's 2012 Comprehensive Master Plan states (p. 106) that "…sustainable restoration of our coast without sediment diversions is not possible". The Panel's official charge was thus to *provide technical input, review and guidance as plans are refined on diverting freshwater and sediment from the Mississippi and Atchafalaya rivers into adjacent estuarine basins to build, maintain, and sustain coastal wetlands.*

The Panel, convened by the Institute, is comprised of 12 members with backgrounds in a broad range of physical and biological sciences, social science, economics, and engineering. The extensive experience of Panel members in other restoration programs, together with the particular blend of Panel expertise, was considered important for advancing our understanding of river diversions. The Panel recognizes that there is an expectation that they remain independent and objective, and that their role is advisory in nature. As such, the Panel is not in a position to make policy or implementation decisions. More information on the Panel, including the list of members and their professional expertise, is given in Appendix 1.

The Panel was established to consider a number of issues including: (1) evaluation of critical scientific and technical uncertainties; (2) identification of research that will be needed to reduce uncertainties; and (3) review and comment on program design and implementation, technical reports, model outputs, and other aspects of project development identified by the Panel or by CPRA. Topics for consideration varied from meeting to meeting, and Panel members have remained engaged through webinars between formal meetings. The agenda for the public part of the seventh meeting is given in Appendix 2.

The Panel also met privately to discuss findings and recommendations, which are summarized below in Sections 3 and 4 of this report.

## 2.0 FOCUS OF MEETING #7

Meeting #7 occurred near the end of the third year of the three-year period over which the Panel was originally convened. The importance of this meeting was twofold. First, it was the final opportunity for the Panel to meet prior to the scoping process for the upcoming Environmental Impact Statement (EIS), and to receive updates on the modeling and preliminary plans for operational decision-making. Second, the meeting provided the last formal setting for furnishing comments on the primary subject areas of Panel engagement (land building and landscape change, vegetation and fate of nutrients, fish and shellfish communities, and socio-economics analysis) prior to transition into the full engineering and design phase. The Panel recognizes that these topics of discussion will continue throughout the EIS process and will thus be undertaken simultaneously with the engineering and design work that will soon be underway.

The primary focus of presentations to the Panel during the seventh meeting was to (1) update the Panel on CPRA activities and provide a response to recommendations from the Panel's sixth report, (2) provide the Panel with results of modeling simulations for land building and landscape change, (3) discuss the approach to operations and factors important in the decision-making process, (4) update the Panel on vegetation response to inundation, and (5) introduce the evolving issue of Bottlenose Dolphins in the Barataria Bay. With the exception of #5, the above topics have been the subject of Panel discussions and recommendations in previous reports and will continue to be essential topics as CPRA moves into and beyond the *2016 Decision to Implement*.

The Panel, during the second day of the meeting, discussed specific charge questions that were framed in advance of the meeting (Appendix 3), and discussed at length how best to furnish advice and guidance to CPRA that would inform the next steps as the diversions move into engineering and design. The findings and recommendations in this report (in italics), as in previous reports, have their origin in the discussions of uncertainty, monitoring, modeling, and conceptual approach from earlier Panel meetings. Given the complexity of the science and engineering associated with the design and operation of major freshwater and sediment diversions, it became clear that uncertainty and prediction from modeling were highly relevant and pressing topics that would form the underpinnings of virtually every future decision. Earlier findings and our nearly 50 previous recommendations spread among our six previous reports are still relevant. The Panel compliments CPRA staff for their action on many of these recommendations.

## 3.0 RESPONSE TO THE CHARGE

### 3.1 Charge Question #1: Operations and Adaptive Management

Many other ecosystem restoration projects have adopted an adaptive management approach, and the Panel has frequently referenced the importance of this approach to sediment diversions. Operational decisions will need to be made to respond to changing conditions while maximizing achievement of restoration goals. Does the Panel have recommendations on approaches to decision making in this context that can be nimble and responsive while still ensuring sediment delivery to the estuary, land loss prevention, and land building? Are there any key lessons that can be learned from operational management of ecosystem restoration projects in other systems regarding decision making?

First, the Panel applauds CPRA's initial thoughts on diversion operations and how those operations can be revised over time. The Panel encourages the refinement of those ideas, supported by modeling studies and ongoing discussions with expert working groups such as that led by the Environmental Defense Fund and the Restore the Mississippi River Delta Coalition. The panel found the discussion of tradeoffs in the operation of diversions to maximize sediment load and minimize adverse effects to be a great example of the anticipated dialog between CPRA and independently-funded scientific workgroups over sponsored modeling and synthesis. The Panel is also enthusiastic about the development of the forecasting model and sees enormous potential for this model to support discussions of operations management. The Panel thinks that historical data, in tandem with forecast model output in the hindcast mode, can be used to define potential scenarios of river hydroperiod, weather, receiving basin water level, and salinities to inform the development of diversion operation guidelines and representative flow diagrams in decision making.

The Panel notes, however, that defining the management framework to operate a diversion does not, in and of itself, constitute "adaptive management". Generally defined, adaptive management is a process to use the best available knowledge to design and implement management plans, while establishing an institutional structure and process that enables learning from a data-driven discussion of diversion outcomes and related drivers to improve decision making. The Panel recommends that CPRA develop an adaptive management plan for diversions that specifies the objectives, lays out the key indicators, the monitoring data and model output needed to make decisions, and the process to adaptively manage diversions.

**Adaptive Management: The Missouri River Restoration.** To take on this task, CPRA may benefit from, for example, the very recent experiences with developing an adaptive management plan for the recovery of the Missouri River. In the Missouri River case, the U.S. Army Corps of Engineers (USACE) is approaching the completion of an extensive adaptive management and monitoring plan in a public process that exhibited an iterative approach with particular attention to potential weaknesses that might be legally challenged. The very deliberative approach has resulted in a detailed statement of general philosophy and exacting detail for the plan, and because it has gone through several versions, many potential problems have been addressed in the process.

The public has been extensively involved in the creation of the adaptive management and monitoring plan for the Missouri River. Public meetings have provided forums for discussing the plan, and recent draft versions have been publicly available to an active and engaged group of diverse and numerous stakeholders. It has taken some time for the stakeholders to learn how best to interact with each other and with the authors of the plan, yet the general result is a sense of community that is working well. Meetings between science advisors and authors of the plan take place in public, which further builds confidence and transparency. After nearly two years of effort, the document, now more than 400 pages long, is approaching its sixth and final draft version. The emerging result is a document likely to be highly useful in integrating science, engineering, and management in a plan that can be understood by its users and the public.

The Panel highlights that the authors of the Missouri River adaptive management and monitoring plan have taken special care to anticipate potential problems with legal challenges to their document. Using published academic research and advice from their independent science advisory panel, the authors have sought to avoid three of the most common weaknesses that have resulted in successful court challenges against adaptive management and monitoring plans in other projects. Courts have remanded plans without clear objectives; therefore, the Missouri River authors have created a very simple, direct

statement of plan objectives, similar to the professed objective for the diversion projects. Courts have not supported plans that lack clear monitoring and modeling parameters with specific trigger values to indicate system changes that are damaging to achievement of the objectives. The third most common reason Courts find plans unacceptable is that they do not specify the consequences when monitoring parameters transgress trigger values. The Missouri River authors are now in final revisions of their plan to address this issue.

**Specific Recommendations for Adaptive Management of Mississippi River Diversion Projects.** *As noted in the case of the Missouri River restoration, an adaptive management plan should feature a clearly stated objective and a conceptual model that identifies indicators that will be monitored and assessed in adaptively managing the diversion.* The Panel notes that these indicators should include physical, ecosystem, and socio-economic changes, focusing not only on desired outcomes (e.g., land built) but also potentially adverse outcomes (e.g., impacts on marine mammals, fisheries, affected communities, or socio-economic sectors).

*CPRA should then identify the data or tools that will be used in those assessments and ensure that baseline data collection is already occurring, or will begin as soon as possible, in order to support these assessments.* Lack of socio-economic data is the most pressing need. The Panel feels strongly that socio-economic impacts should be evaluated on an ongoing basis to support adaptive management of diversions. The assessment can help avoid creating inequities among community groups as well as encouraging the positive impacts associated with the development. Such an assessment should track indicators such as: (1) changes in community **demographics**, (2) results of retail/service and housing **market analyses**, (3) demand for **public services**, (4) changes in **employment** and **income levels**, and (5) changes in the **aesthetic quality** of the community, including perceptions of community members about how the diversion is affecting their lives. It is critically important to focus data collection on vulnerable segments of communities, either due to proximity to the diversion or by the sector impacted. The assessment methodology and supporting data can be refined in the course of work to support the Environmental Impact Report/Environmental Impact Statement (EIR/EIS).

*The models being developed are crucial for adaptive management and informed decision-making, and the Panel strongly recommend continued investments in model refinement.* The apparent progress in refining and improving the Delft3d model through additional data collection and validation was encouraging. While the Delft3d model and its forecasting complement are clear priorities for such investments, other models are needed as well. Despite the uncertainty apparent in the fishery and ecosystem model results, the Panel recommends ongoing refinement of this modeling effort, perhaps at some reduced level. Independent peer review of the ecosystem models should be used to determine whether one of these modeling approaches has more potential to be useful in examining impacts of river diversions. *This independent review should also provide valuable information in determining how the models can be improved. In particular, some additional effort should be made to validate the models with independent data collected in the system.* In the near term, the Habitat Suitability Indexes (HSIs) have the potential to be useful in assessing general system impacts on target species in a much shorter time frame, perhaps being more useful for adaptive management decisions. HSIs should be run, and results from these analyses compared with the ecosystem model results, with validation and ongoing refinements supported by Louisiana's System-Wide Assessment Monitoring Plan (SWAMP) data collection.

*In addition to specifying assessment indicators and the monitoring and modeling used to generate them, the adaptive management plan should describe the process for adaptive management, identifying*

*specifically the agencies that will be involved, specific skills sets that are required, as well as the frequency with which this review should occur*. This strategy should recognize the eventuality that adverse events that may in fact have no connection with diversion operation (e.g., fish kills, flooding, and poor harvest) could be mistakenly attributed to the operation of the diversion. Therefore, it is critical that the process specify that public concerns be addressed in such a manner that the operations are not unnecessarily crippled. Towards this end, the Panel encourages the use of independent science review to provide ongoing advice and peer review of critical analyses and interpretation of monitoring data and model output.

Finally, the Panel recognizes that diversion operations will be a highly scrutinized and regulated process and that permits are not good tools to provide the flexibility needed to readily support adaptive management. Such permits will likely specify the major requirements for operations (e.g., flow trigger and seasonal restrictions), but they should also identify a process for adaptively managing diversion operations without additional regulatory review. Operational plans should be capable of modification, with input from adaptive management, on an ongoing basis as living documents. *Triggers for emergency response should also be clearly specified.*

## 3.2 Charge Question #2: Wetland Response

*Research on wetland plant response to flooding has frequently focused on understanding the effects of sea-level rise rather than seasonal or shorter-term inundation of various depths. Sediment diversions are expected to increase water levels within the receiving wetlands when operating at high capacity for periods of weeks to months depending on operations and basin hydrology. In some wetland types this change in water level may also be associated with changes in salinity, e.g., brackish wetlands may be subject to periodic freshening. Given that specific studies on wetland plant response, in terms of productivity/mortality or root: shoot allocations will take several years to provide specific information, what types of assumptions would the Panel suggest be used in estimating the influence of increased inundation on wetland plants? Does the approach currently adopted seem reasonable?*

The Panel finds that the current vegetation modeling approach is reasonable. The Panel felt that CPRA is wise to continue their efforts to refine vegetation modeling based on their preliminary finding that land building rates are very sensitive to flooding stress. Uncertainty analysis on the critical flooding depth relative to stem height was essential to identifying this issue, so uncertainty analysis on other vegetation parameters seems warranted as well. *Given that specific studies on vegetation response to short-term flooding (days-months) would take years to complete, the Panel recommends that the modeling rely on expert opinion and literature review, perhaps including a workshop of subject-matter experts to help guide the vegetation modeling approach and parameterization.*

There is a growing body of scientific literature indicating that some marsh species could benefit from moderate enhanced flooding on interannual timescales, particularly if accompanied by freshwater that alleviates salinity stress. Continued sensitivity analyses will help to efficiently identify the specific vegetation parameters that have the most impact on land building, and will allow the presentation of a range of possible model outcomes. Another possible approach would be to compare model output to sediment cores that were collected after previous seasonal floods; if the model can correctly predict changes in accretion rates, then the vegetation parameterization may already be sufficient.

*The Panel recognizes that it will be impossible to fully parameterize responses of submerged aquatic vegetation and the seven emergent plant species to flooding, nutrient, and salinity stress interactions, and therefore recommends that the modeling approach take advantage of useful simplifications and*

*assumptions.* For example, it may be helpful to assume that species that are resilient to longer-term flooding (e.g., *Sagittaria lancifolia*) will also be resilient to the range of short-term flooding durations expected with diversions. Other marsh models consider the response of plant communities or broad marsh types rather than attempting to fully parameterize the growth of each individual species separately. Thus, it may be helpful to prioritize model refinement to focus on certain species or communities that are most likely to influence land building itself. Interactive stressors in marshes of higher elevation may influence species composition, diversity, and growth rates, but the same stressors may determine the very presence or absence of vegetation at lower elevations. Given the goal of building land, it may be more useful to focus on understanding the limits of vegetation growth at very low elevations than to fully understand the processes that govern growth at higher elevations.

### 3.3 Charge Question #3: External Input

*As sediment diversions move into the engineering and design phase, many technical challenges will need to be confronted. Given the experience of this Panel and Panel member's knowledge of other technical and advisory/review processes, can you make any recommendations to CPRA on how they should ensure appropriate and timely input is provided from those outside the teams as the work proceeds?*

Useful and timely science input from external technical and advisory processes can provide valuable support for CPRA for sediment diversion projects by tapping into a large pool of expertise and experience. Three general concepts offer the promise of importing the best available scientific data and explanations into the project: (1) direct advice can be furnished from high-level groups organized and given a charge by CPRA, (2) science inputs can also come from individuals and organizations, including stakeholders who have particular interests in the outcomes, and (3) individual researchers or groups of scientists who are able to publicly access CPRA research processes and data can offer independent insight on specific questions.

Direct advice from science and engineering advisors organized by CPRA to draw upon expertise from outside the diversion project will be important as diversion projects proceed. There are several options for how this might work. CPRA might arrange external peer review and advice from individual researchers who are otherwise not connected to the diversion project. Such an individual with relevant experience either in Louisiana or elsewhere could provide insight for a specific, limited issue over a short period of time (a month or so). A brief letter report would be the final product of this individual reviewer and would likely be addressed in technical language to specialists who populate a CPRA working group organized around a particular issue or subject. An example of an individual advisor might be a person with specialized engineering experience to help provide fresh ideas for solution of an infrastructure problem, or might be a specialized economist to review economic assessments of the effects of various operating strategies.

A special case of an individual advisor is that of a chief scientist, should CPRA appoint one. This person is a full-time appointee within CPRA, yet is one who pays particular attention to bringing outside knowledge and experiences into the restoration effort. An example is the adaptive management program for the Colorado River below Glen Canyon Dam in Grand Canyon. In the formative years of the program, the Bureau of Reclamation hired a broadly based, experienced researcher to assume the role of chief scientist. Eventually this individual developed a small advisory panel, while instrumental in the restoration start-up.

CPRA could arrange external review and input for more extensive issues related to science and engineering for a diversion project using a small team of perhaps three or four members, a grouping

that might include narrowly-defined specialists as well as a generalist. An eclectic team could import ideas from other projects outside Louisiana, but could also address a specific, somewhat narrowly-defined topic. Such a small team might operate for two or three months and produce an extensive letter report addressed to an audience of researchers and managers in a formal way. The Missouri River Recovery Project of the (USACE) employs an example of this small committee approach. Its Independent Science Advisory Panel is constantly available for review and comment on both small initiatives exemplified by fish-related original research and by major documents such as the formal adaptive management plan for the Missouri River. The small panel has six members and reports with formal documents about 30 pages in length. As a variation, such small panels might be assembled for a brief period of a month or two, and then cycle out of business after addressing a limited charge.

CPRA could also engage a larger group of experts, perhaps eight to 10 in number, to provide science and engineering advice on a major process, decision, or document. This larger review group, active for six months to a year, would report in a significant, formal document the results of its deliberations, and would interact extensively with project personnel. A large group such as this might advise CPRA on projects and documents the magnitude of the EIS that is now on the horizon. Large, formal advisory groups such as these, in some cases patterned after National Academy committees, have proven successful in advising Texas on its adaptive management of the Edwards Aquifer, as well as providing advice on science issues related to the complex Florida Everglades restoration.

Frequently, external advisory groups regardless of their size, formality, and reporting process operate closely with internal working groups; therefore, there is communication between the two groups with specific information flowing out and general advice and experience flowing in. External review is often triggered when the agency (in this case CPRA) senses the need for additional confidence in controversial research or when there is a need to expand the range of experience in dealing with planning, science, and engineering questions. There is no one best answer for the structure of the advisory group, yet there is a range of possibilities as outlined above.

An important general principle in accessing external science and engineering input for CPRA's diversion projects is to ensure that individual researchers and stakeholder groups have access to publicly-available data from modeling activities, CPRA internal data collection, and on-going collections of monitoring data. The overall transparency of diversion projects is highly dependent on having the project data available easily to other users, and to have a central portal for users. Such a single portal makes the data and research processes available to the public. It also allows CPRA to exert control over access and to monitor data management processes.

CPRA should have institutional mechanisms to utilize the results of any relevant scientific and engineering research accomplished by external practitioners and should insofar as possible determine protocols to assess the accuracy and reliability of the externally generated products. Valid investigations and measurements made by others can extend CPRA's reach of knowledge about the diversions, their performance, and their potential effects on human considerations and species responses.

## 4.0 CLOSING COMMENTS

To date, CPRA has undertaken relatively little analysis of the social benefits and impacts of diversions. Despite the state's initial forays into social analysis, slow progress in this area has led the Panel to focus almost exclusively on biophysical diversion modeling and outcomes, and the Panel has had only limited engagement with CPRA on the purposes and potential benefits of social analysis for the Agency. The

Panel notes that four of the five objectives in the 2012 Coastal Master Plan reference social, economic, and cultural impacts.

*Thus, the panel highly recommends that going forward CPRA establish a "social outcomes advisory group" to do the following:*

- *Debate and discuss strategies with CPRA for social outcome assessment with an eye toward practical considerations.* Among those practical considerations are (1) the unfolding EIS and permit approval processes, (2) recognition that there could be a need for legal advice resulting from legal challenges to diversions, and (3) the Master Plan's "Providing for Transitions" principle, which calls on the state to show "sensitivity and fairness…to those whose homes, lands, livelihoods, and ways of life may be affected, in the near-term and long-term, by master plan projects or by continued land loss and flooding".
    - Because social outcomes analysis can take many different forms and be applied in many different ways, this strategic conversation with CPRA is particularly important.
    - The advisory group should be established and conducted in a way that does not *presume* the need for social outcomes analysis. Rather, it should initially feature discussion of how social analysis has contributed to comparable environmental projects nationwide.
- *Advise CPRA on the strengths and limitations of different approaches to social analysis (e.g., methods, tools, and data) so that the most useful approaches can, if warranted, be deployed.*
- Should those discussions with CPRA identify desirable social outcome analyses, the advisory group could provide review and guidance on specific social analysis projects, RFPs, relevant expertise, methods, and outputs.

The advisory group should be composed primarily of social science experts (e.g., economists, policy experts, planners, and anthropologists) who have applied social analysis to large-scale environmental projects. Ideally, it would also include several natural scientists (e.g., ecologists and biologists) who have worked at the boundary of science and policy making. Natural science participation is also desirable in order to ensure that appropriate biophysical data and results are available to support any social analysis undertaken.

# Appendix 1

## About The Expert Panel on Diversion Planning and Implementation

The Expert Panel on Diversion Planning and Implementation (the Panel) was established to provide independent advice as plans for implementing sediment diversion projects along the Mississippi and Atchafalaya rivers that support coastal restoration are refined.

This independent panel is expected to meet approximately three times per year. It will identify critical scientific and technical uncertainties; suggest specific research to reduce uncertainty; and review and comment on technical reports, model outputs, and other aspects of project development. Given the issues surrounding the complexity of the design and operation of a major sediment diversion, the Panel's recommendations will be in an adaptive management context. Meetings of the panel will be structured to ensure key input is received from a variety of local experts, stakeholders, and citizens. Panel reports will be presented at meetings of the CPRA Board.

The Panel was formed at the request of CPRA, which is also funding the effort. The Water Institute of the Gulf provides staff and logistical support to the panel.

### MEMBERS

| Member | Affiliation | Expertise |
|---|---|---|
| **Dr. John T. Wells** | Virginia Institute of Marine Science (Panel Chair) | Deltaic Processes |
| **Dr. Loretta Battaglia** | Southern Illinois University | Restoration Ecology and Climate Change |
| **Dr. Philip Berke** | Texas A&M University | Urban Land Use and Environmental Planning |
| **Dr. James Boyd** | Resources for the Future | Economics and Environmental Policy |
| **Dr. Linda Deegan** | Marine Biological Laboratory | Fish Ecology, Biogeochemical Cycling and Nutrient Delivery |
| **Dr. William Espey Jr** | Espey Consultants Inc | Civil/Coastal Engineering and Water Resources |
| **Dr. Liviu Giosan** | Woods Hole Oceanographic Institution | Morphodynamics and Sedimentation |
| **Dr. William Graf** | University of South Carolina (Emeritus) | Rivers and Water Resources Management |
| **Dr. Matt Kirwan** | Virginia Institute of Marine Science | Coastal Landscapes and Sea Level Change |
| **Dr. Tom Minello** | NOAA Southeast Fisheries Science Center | Fisheries Ecology |
| **Dr. Martha Sutula** | Southern California Coastal Water Research Project Authority | Water Quality Management, Systems Ecology |
| **Dr. John Teal** | Woods Hole Oceanographic Institution (Emeritus) | Coastal Wetlands Ecology |

# Appendix 2
## MEETING #7 AGENDA

**August 31, 2016**
**Hilton Baton Rouge Capital Center**
**Baton Rouge, LA**

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|---|---|---|
| **10:00** | Welcome and Panel Introductions | Dr. John Wells (Panel Chair)<br>*Virginia Institute of Marine Science* |
| **10:15** | Diversions Update | Mr. Bren Haase and Mr. Bradley Barth<br>*Coastal Protection and Restoration Authority* |
| **11:15** | Land Change and Hydrodynamics Modeling Update | Dr. Ehab Meselhe<br>*The Water Institute of the Gulf* |
| **12:15** | Lunch Break | |
| **1:30** | Options for Operations | Ms. Natalie Peyronnin<br>*Environmental Defense Fund* |
| **2:15** | Toward Adaptive Management: Monitoring and Decision Making | Mr. Brian Lezina<br>*Coastal Protection and Restoration Authority* |
| **2:45** | Real Time Forecasting for Existing Freshwater Diversions | Dr. Ehab Meselhe<br>*The Water Institute of the Gulf* |
| **3:15** | Break | |
| **3:35** | Understanding and Predicting Wetland Vegetation Response to Inundation | Ms. Elizabeth Jarrell<br>*Coastal Protection and Restoration Authority*<br>Panel:<br>Dr. Gregg Snedden, *US Geological Survey*<br>Dr. Jenneke Visser, *UL Lafayette* |
| **4:15** | Common Bottlenose Dolphins and Proposed Mississippi River Sediment Diversions | Mr. David Muth<br>*National Wildlife Federation* |
| **4:45** | Public Comment | |
| **5:00** | Adjourn | |

# Appendix 3

## CHARGE FOR MEETING #7

### CHARGE QUESTIONS

(1) Many other ecosystem restoration projects have adopted an adaptive management approach and the Panel has frequently referenced the importance of this approach to sediment diversions. Operational decisions will need to be made to respond to changing conditions while maximizing achievement of restoration goals. Does the Panel have recommendations on approaches to decision making in this context that can be nimble and responsive while still ensuring sediment delivery to the estuary, land loss prevention, and land building? Are there any key lessons that can be learned from operational management of ecosystem restoration projects in other systems regarding decision making?

(2) Research on wetland plant response to flooding has frequently focused on understanding the effects of sea-level rise rather than seasonal or shorter-term inundation of various depths. Sediment diversions are expected to increase water levels within the receiving wetlands when operating at high capacity for periods of weeks to months depending on operations and basin hydrology. In some wetland types this change in water level may also be associated with changes in salinity, e.g., brackish wetlands may be subject to periodic freshening. Given that specific studies on wetland plant response, in terms of productivity/mortality or root: shoot allocations will take several years to provide specific information, what types of assumptions would the Panel suggest be used in estimating the influence of increased inundation on wetland plants? Does the approach currently adopted seem reasonable?

(3) As the sediment diversions move into the engineering and design phase many technical challenges will need to be confronted. Given the experience of this Panel and Panel member's knowledge of other external technical advisory/review processes, can you make any recommendations to CPRA on how they should ensure appropriate and timely input is provided from those outside the teams as the work proceeds?