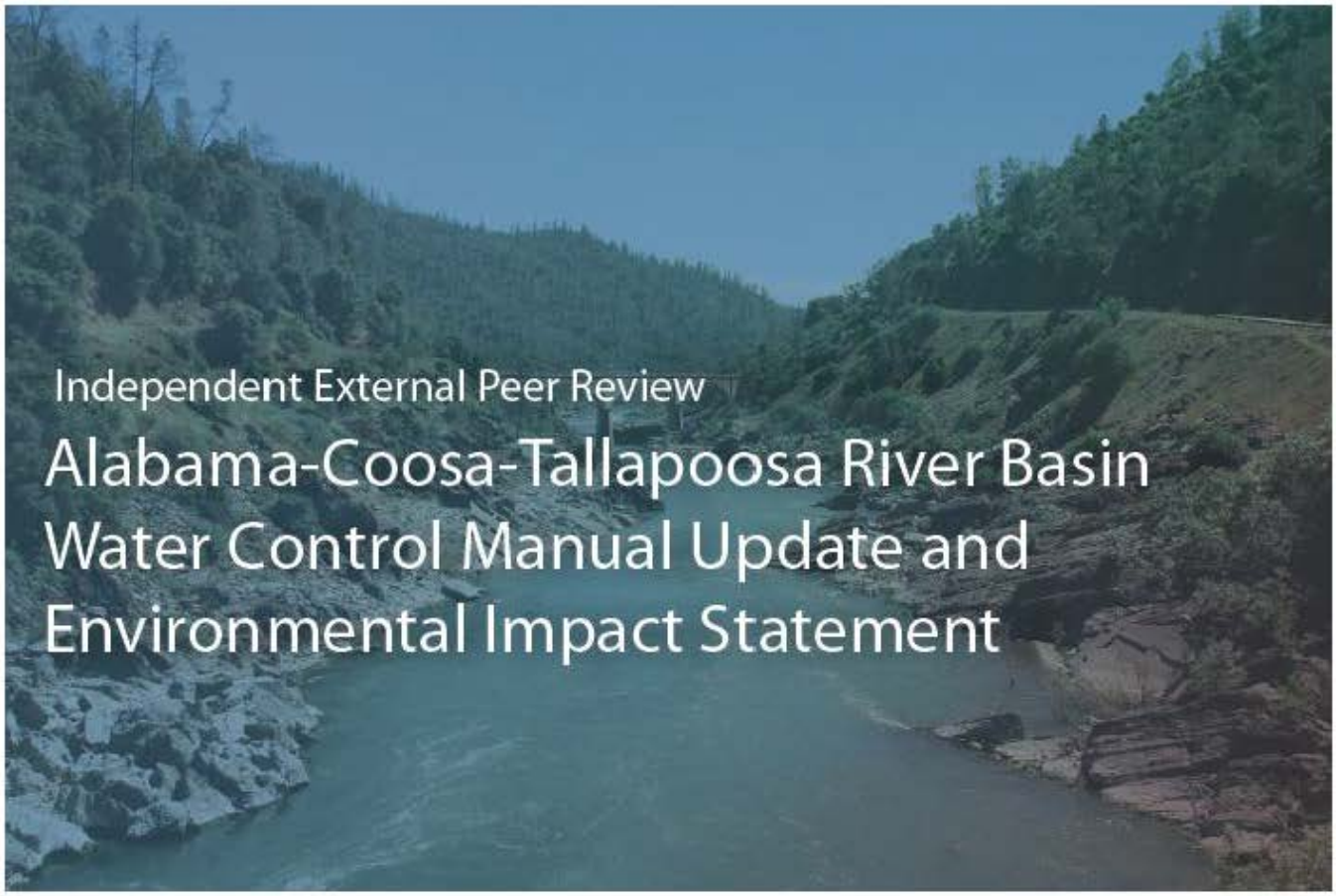

Independent External Peer Review

Alabama-Coosa-Tallapoosa River Basin Water Control Manual Update and Environmental Impact Statement

Contract No. W912HQ-11-D-0002, Order No. 0009

2 July 2013

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For the best of reasons

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List of Acronyms

ACF	Apalachicola-Chattahoochee-Flint
ACT	Alabama-Coosa-Tallapoosa
APC	Alabama Power Company
CEQ	Council on Environmental Quality
COI	conflict of interest
DEIS	Draft Environmental Impact Statement
DFWCAR	Draft Fish and Wildlife Coordination Act Report
DO	dissolved oxygen
EA	Environmental Assessment
EC	Engineer Circular
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
IEPR	Independent External Peer Review
ISO	International Organization for Standardization
NAA	No Action Alternative
NED	national economic development
NEPA	National Environmental Policy Act
OMB	Office of Management and Budget
PAA	Proposed Action Alternative
PAL	Planning Aid Letter
PDF	Portable Document Format
PDT	Project Delivery Team
PWS	Performance Work Statement
QA/QC	quality assurance/quality control
RCHARC	Riverine Community Habitat Assessment and Restoration Concept
SME	subject matter expert
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WCM	Water Control Manual

Executive Summary

Noblis has performed an Independent External Peer Review (IEPR) for the Alabama-Coosa-Tallapoosa (ACT) River Basin Water Control Manual (WCM) Update and Draft Environmental Impact Statement (DEIS) for the U.S. Army Corps of Engineers (USACE). The purpose of the IEPR is to analyze the adequacy and acceptability of methods, modeling, data, and analyses to develop documents for the WCM Update and EIS.

Noblis performed this IEPR in accordance with the procedures described in the Department of the Army, USACE Engineer Circular (EC) No. 1165-2-214, *Water Resources Policies and Authorities*, dated 15 December 2012. The review was conducted by a panel of subject matter experts (SMEs) with relevant expertise and experience in river operations, water resources engineering, environmental science or planning, and economics. The panel was "charged" with providing a broad technical evaluation of the overall project.

Noblis provides impartial, conflict of interest (COI)-free, independent assistance to organizations throughout the federal government and has extensive experience with conducting independent peer reviews, including IEPRs. Noblis and the IEPR panel for this effort have not been involved in any capacity with the ACT River Basin project. In addition, Noblis has not performed or advocated for or against any federal water resources projects and has no real or perceived COI for conducting IEPRs. For these reasons, Noblis was suitable for upholding the principles of independence in all aspects of managing the IEPR.

The IEPR Panel (the panel) reviewed the ACT River Basin WCM Update DEIS along with its associated appendices. The panel recognizes the significant amount of work that went into the development of the documents and applauds the USACE for looking at water management issues collectively as a system, considering affects to the entire basin. It is clear from the information presented that careful management of water resources within the system will continue to be important, and that updating of the WCMs is critical to system-wide management.

The following paragraphs provide a summary of the panel's recommendations in environmental, technical, and economic areas.

With respect to environmental aspects, the ACT WCM Update DEIS included some appropriate methods for analyzing project impacts. However, certain project operational concerns and aspects of the impacts associated with operation and management of the ACT system were not included or adequately discussed. Particularly, the panel raised issues associated with alternatives formulation, analysis, and selection of the preferred alternative. The documentation did not fully identify project impacts in terms of quantifiable habitat functions and values, and subsequently did not appear to conclusively identify the preferred alternative as the national economic development (NED) alternative. In addition, specific issues with regard to biologic monitoring coupled with the proposed operational changes, range of instream conditions modeled as part of the alternatives analysis, and methods to improve downstream water quality were not adequately described in the materials provided for review. The panel recognizes that additional coordination with the U.S. Fish and Wildlife Service (USFWS) regarding threatened and endangered species will be conducted.

In developing the proposed updated WCMs, USACE has performed a detailed and mostly thorough technical review in an effort to revise and refine operating procedures to meet updated general and drought management requirements. USACE has developed, analyzed, and evaluated

several reservoir operating proposals before selecting the recommended alternative. However, due to the fact that USACE reservoirs only control a small part of the ACT operating storage and that USACE has limited authorization to consider wider changes of operating alternatives, the preferred alternative may not be the best overall strategy to regulate the system at this stage. The DEIS should mention those limitations up front. Additional support for the recommended alternative could be gained by using modeling techniques to expand the range of hydrologic conditions examined by including wetter and drier scenarios than those in the historic records and including the results in discussion of the alternatives. Similarly, including sensitivity analysis of key parameters would provide an idea about the range of errors associated with model predictions and strengthen conclusions reached through modeled results. While the USACE analysis purports that the preferred alternative results in system-wide benefits, modeling and analysis of current project operations, including those that may have negative impacts on the riverine environment, is important to the credibility and value of the EIS for the ACT WCMs. Additional discussion of the benefits of peaking power operations, and analysis of impacts of those current peaking power operations on the riverine environment should be included and weighed against each other.

The USACE has performed an economic analysis of various alternatives that is generally qualitative in nature. For each alternative analyzed, the economic analysis concentrated on the percent change in key elements, such as the percent of time the 9.0-foot or 7.5-foot navigation channel would be available or percent of time surface water levels exceeded three impact elevations. Hydropower impacts were the only area for which quantitative data were presented. It is important that quantitative data be included for the other areas impacted by each alternative. In addition, economic values associated with improvement to aquatic habitat should be considered in the economic analysis. Such quantification may not be applicable because of the level of detail required for studies such as the ACT WCM or because of USACE policy. Regardless, such quantification should be included, or the reasons for omitting such detail, as suggested by the panel, should be addressed.

1 Introduction

1.1 Introduction and Report Overview

This Independent External Peer Review (IEPR) Report provides a description of the IEPR conducted for the Alabama-Coosa-Tallapoosa (ACT) River Basin Water Control Manual (WCM) Update and Draft Environmental Impact Statement (DEIS) for the U.S. Army Corps of Engineers (USACE). This report includes a description of the IEPR objectives and process, overview of the ACT project, summary of the IEPR panel members' expertise, and discussion of observations and comments by the IEPR panel.

Section 1 of the IEPR Report provides a description of the objectives of this effort and general background information on the IEPR, as well as a brief introduction to Noblis, the contractor managing this effort. Section 2 provides an overview of the ACT River Basin project. Section 3 presents the overall process followed in performing the IEPR. Section 4 describes the panel composition and the panel members' expertise. Section 5 discusses the conclusions and observations of the IEPR, including a description of the IEPR comments. References are listed in Section 6. Appendix A of this IEPR Report lists the final IEPR comments, as well as editorial comments identified by the IEPR panel. Appendix B provides a description of the IEPR panel and the panel members' résumés. Appendix C includes the "charge" provided to the panel for the IEPR of the ACT River Basin project. Appendix D provides Noblis' completed USACE Conflicts of Interest (COI) Questionnaire for the ACT River Basin project.

1.2 IEPR Overview

The USACE lifecycle review strategy for Civil Works products provides for a review of all Civil Works projects from initial planning through design, construction, and Operation, Maintenance, Repair, Replacement and Rehabilitation (OMRR&R). It provides procedures for ensuring the quality and credibility of USACE decision, implementation, and operations and maintenance (O&M) documents and work products. Peer review is one of the important procedures used to ensure that the quality of published information meets the standards of the scientific and technical community. Peer review typically evaluates the clarity of hypotheses, the validity of the research design, the quality of data collection procedures, the robustness of the methods employed, the appropriateness of the methods for the hypotheses being tested, the extent to which the conclusions follow from the analysis, and the strengths and limitations of the overall product.

1.3 IEPR Objective

The objective of the work was to perform an IEPR on the ACT River Basin WCM and EIS, in accordance with the procedures described in the Department of the Army, USACE Engineer Circular (EC) No. 1165-2-214, *Water Resources Policies and Authorities*, dated 15 December 2012. The purpose of the IEPR is to analyze the adequacy and acceptability of methods, modeling, data, and analyses to develop documents for the WCM Update and DEIS. The review will be limited to technical review and will not involve policy review, including the USACE's internal decision-making processes. The IEPR will be conducted by a panel of subject matter experts (SMEs) with extensive experience in engineering, economics, and environmental analyses as well as operations of large, multipurpose river basin systems. The panel will be

"charged" with responding to specific technical questions as well as providing a broad technical (e.g., engineering, economic, and environmental) evaluation of the overall study.

The independent expert reviewers identified, recommended, and commented upon assumptions underlying the analyses as well as evaluated the soundness of models and planning methods. They evaluated data, the use of models, analyses, assumptions, and other scientific and engineering methodologies. The reviewers offered opinions as to whether there are sufficient technical analyses upon which to base the ability to implement the project.

1.4 Noblis is Conflict-of Interest Free (COI) in Water Resources Projects

Noblis, the contractor leading this effort, is a nationally recognized leader in systems analysis and analytical support to the federal government. As a nonprofit science, technology, and strategy organization, Noblis solves complex systems, process, and infrastructure problems in ways that truly benefit the public. Noblis staff includes accomplished engineers, scientists, analysts, researchers, technical specialists, and management experts with extensive multi-disciplinary and multi-sector experience. Since Noblis has no commercial interests to advance, no vendor alliances to protect, and no sponsors or shareholders to represent, it is fully independent. Noblis provides impartial, COI-free, independent assistance to organizations throughout the federal government. Noblis has documented experience with peer review oversight. Noblis and the selected IEPR panel have not been involved in any capacity with the ACT River Basin project. (See Appendix D for Noblis' completed COI Questionnaire.) In addition, Noblis has not performed or advocated for or against any federal water resources projects.

Noblis has been recognized, for the fifth time, as one of the World's Most Ethical Companies by the Ethisphere Institute. This award honors companies that demonstrate "real and sustained ethical leadership in their industries." Noblis was one of three companies worldwide to be listed in the Professional, Scientific and Technical Services category. The Ethisphere Institute is a think-tank dedicated to the creation, advancement, and sharing of best practices in business ethics, corporate social responsibility, anti-corruption, and sustainability.

Noblis clients and the public deserve nothing less than work that meets the highest standards of excellence, conducted in an environment where objectivity and integrity are the hallmarks. Noblis achieves this through the development, implementation, maintenance, and continual improvement of its International Organization for Standardization (ISO) 9001:2008 Compliant Quality Management System.

2 ACT River Basin Project Description

The ACT River Basin provides water resources for multiple purposes from just north of the Tennessee-Georgia border, extending into central north Georgia, crossing the Georgia-Alabama state line into north Alabama, continuing across central and south Alabama before terminating in Mobile Bay. The basin covers 32 counties in Alabama, 18 counties in Georgia, and 2 counties in Tennessee. The basin drains 22,800 square miles, extending approximately 320 miles.

There are three main rivers in the ACT basin: the Alabama, Coosa, and Tallapoosa rivers. The Coosa and Tallapoosa join to form the Alabama River about two-thirds of the way downstream in the basin. The Coosa and Tallapoosa rivers have numerous smaller tributary rivers.

The USACE (or Corps) South Atlantic Division Mobile (SAM) District operates five projects in the ACT Basin: Allatoona Lake, Georgia; Carters Lake project, Georgia (includes both Carters Dam and Carters Reregulation Dam [which function as a single system]); Robert F. Henry Lock and Dam and R.E. "Bob" Woodruff Lake, Alabama; Millers Ferry Lock and Dam and William "Bill" Dannelly Lake, Alabama; and Claiborne Lock and Dam and Lake, Alabama. The Corps must operate and manage those projects as a system to meet their authorized purposes.

Water Control Manuals (WCMs) are required for four of the Alabama Power Company's projects that have flood control (flood damage reduction) purposes. On June 28, 1954, the 83rd Congress, second session, enacted Public Law 436, which suspended the authorization under the River and Harbor Act of March 2, 1945, insofar as it concerned federal development of the Coosa River for the development of electric power, to permit development by private interests under a license to be issued by the Federal Power Commission (Federal Energy Regulatory Commission). The law stipulates that the license must require the provision of flood control storage and further states that the projects will be operated for flood control and navigation in accordance with reasonable rules and regulations of the Secretary of the Army; thus, the WCM requirement for the four dams: Weiss, Neely H. Henry, Logan Martin, and Harris.

The Corps operates projects in the ACT Basin for various purposes. Federal legislation authorizing project purposes in the ACT Basin has occurred over time. Section 2 of the River and Harbor Act of 1945 (P.L. 79-14) approved the plan for developing flood risk management, hydropower, and navigation on the ACT rivers. Other operational objectives derive from authorities that generally apply to all Corps reservoirs, such as fish and wildlife conservation (Fish and Wildlife Coordination Act of 1958 [P.L. 85-624] and Endangered Species Act of 1973 [P.L. 93-205]), recreation (Flood Control Act of 1944 [P.L. 78-534]), water quality (Water Pollution Control Act Amendments of 1972 [P.L. 92-500]), and water supply (Water Supply Act of 1958 [P.L. 85-500]). The purposes for which the various projects may be operated are the following:

- Flood risk management
- Hydropower
- Navigation
- Fish and wildlife conservation
- Recreation
- Water quality
- Water supply

Project operations at each reservoir in the ACT basin are described in the WCM. The manuals typically outline the operating criteria, guidelines, and rule curves, as well as specifications for storage and releases from the reservoirs. The WCMs also outline the coordination protocol and data collection, management, and dissemination associated with routine and specific water management activities (such as flood damage reduction operations or drought contingency operations). Updates to the WCMs are integrated with the National Environmental Policy Act (NEPA) public involvement and documentation process. The EIS will address updated operation criteria and guidelines for managing water control actives under federal authority within the ACT Basin.

The updated WCMs will capture the following:

- Project/system operations refined over the years because of changes in basin hydrology and withdrawals/consumption that resulted from years of growth/development
- Drought contingency requirements to account for new data and operational changes
- Updated data reflecting current basin conditions
- New/rehabilitated project structural features
- Environmental requirements for endangered species and fish spawns
- Procedures for capturing/using real-time data provided by additional gages and monitoring devices installed since last manual updates
- Latest computer models and techniques to evaluate and establish guidelines for project operations
- Improved and streamlined methods for data exchange between the Corps and other agencies

Updated WCMs are needed to enable managers to operate the projects to meet the many purposes and demands. Without a comprehensive updated WCM, the Corps runs the risk of, among other things, not providing sufficient water where needed (when needed to meet the authorized project purposes and the needs of stakeholders, whether domestic, municipal, or industrial); adversely affecting endangered species; expending water resources too early, which reduces the ability to maintain the system to meet project purposes and the needs of stakeholders; and flooding people and facilities that are now within flood plains. This risk is due to changing conditions within the basin and at federal reservoirs which, if not accounted for, can affect water management decisions.

In 1989, proposals by the Corps to reallocate storage to municipal and industrial (M&I) water supply at Carters Lake and Allatoona Lake in the ACT Basin and Lake Lanier in the Apalachicola-Chattahoochee-Flint (ACF) Rivers Basin, and by Georgia to develop a regional reservoir in the Tallapoosa River Basin near the Alabama state line (West Georgia Regional Reservoir) caused controversy among water user groups, Alabama and Florida, and various federal agencies. A draft Reallocation and Post-Authorization Report and draft Environmental Assessment (EA) were prepared for the Lake Lanier proposal. A draft ACF Basin Water Control Plan, dated October 1989, was included as an appendix to the post-authorization change report. A final Water Supply Reallocation Report and final EA were also prepared for the Carters Lake and Allatoona Lake proposals and submitted to the South Atlantic Division for approval in May 1990. Alabama filed a lawsuit against the Corps in June 1990 to halt those proposed actions. As a result of the litigation, the proposed revisions to the ACF Basin WCM were deferred while the parties negotiated. After a period of negotiation, the governors of Alabama, Florida, and Georgia and the Assistant Secretary of the Army for Civil Works (ASA[CW]) addressed the issues of concern by signing a Memorandum of Agreement (MOA) on January 3, 1992.

Compact negotiations began in early 1998. The state commissioners (governors of each state) were unable to reach an agreement on an equitable apportionment of the waters in either basin, and the compacts were allowed to expire in August 2003 (ACF Basin) and in July 2004 (ACT Basin). Upon expiration of the ACT and ACF compacts, Alabama and Florida reactivated their

previous litigation and filed new litigation, resulting in a stay of any action by the Corps related to implementation of any new water supply contracts or changes in reservoir storage or water control operations.

In June 2012, Judge Bowdre of the Northern District of Alabama dismissed nine of the ten claims and on October 19, 2012, the Plaintiffs agreed to dismiss the last remaining claim with prejudice. The Corps is currently continuing its ACT WCM update.

3 IEPR Process

3.1 Planning and Schedule

Noblis developed a schedule that would meet USACE's goal of completing the IEPR as efficiently as possible in accordance with the Performance Work Statement (PWS). The schedule of activities was agreed upon by Noblis and USACE. Table 1 shows the major milestones and deliverables for the IEPR.

Table 1. ACT River Basin Project Milestones

TASK	MILESTONES
1. Prepare Work Plan to Conduct IEPR	Draft Work Plan submitted
	USACE provides comments on Draft Work Plan
	Final Work Plan submitted
2. Recruit and Select IEPR Panel Members	Draft COI Questionnaire submitted
	USACE provides comments on COI
	Recruit and screen candidate panel members; prepare summary information
	Submit list of selected Panelists
	USACE provides comments on selected Panelists
	Complete subcontracts for Panelists
	Review documents sent to Panelists
3. Charge	USACE provides Draft Charge
	Noblis provides comments on Draft Charge and finalizes them
4. Meetings	Initial Kickoff meeting with USACE and Noblis
	Final Kickoff meeting with USACE and Noblis
	Kickoff meeting with Noblis and IEPR Panel
	USACE provides review documents
	Basin Overview Meeting – Mobile, AL

TASK	MILESTONES
5. Conduct IEPR	IEPR Panel completes their review
	IEPR midpoint teleconference with USACE
	Draft final panel comments developed
	Noblis/Panel consensus meeting
6. IEPR Report	Submit final IEPR Report
7. Responses to IEPR Final Panel Comments	USACE Project Delivery Team (PDT) provides draft evaluator responses (for information only) and clarifying questions to Noblis
	Teleconference between USACE, Noblis and the panel to discuss final panel comments, draft responses and clarifying questions
	USACE submits final evaluator responses via email
	IEPR Panel completes backcheck comments
	PDF of final record of final comments, responses and back check submitted

NOTE: This report includes the results from execution of Tasks 1 through 6. Task 7 activities will be completed subsequent to the completion of this report.

To manage this effort and meet the project schedule, Noblis prepared a draft and final Work Plan to define and manage the process for conducting the IEPR, including the screening and selection of peer reviewers, communication and meetings with the USACE project team, project schedule and quality control, and compilation and dissemination of peer reviewers' comments. The final Work Plan included the charge to the panel.

Noblis also provided USACE with Project Status Reports on a monthly basis to communicate the current status of the project. The Project Status Reports included details of each task and noted any schedule changes. Noblis performed the requirements of this contract in accordance with its Quality Management System, which is compliant with ISO 9000.

3.2 Selection of Panel

Reaching out to its various pools of experts, Noblis identified experts who met and exceeded the technical expertise and requirements of this IEPR. Noblis provided potential candidates with a copy of the Scope of Work, including the required expertise and project schedule, and conducted informal and formal discussions to identify any technical competency concerns or potential COI issues. Consistent with the guidelines of the Office of Management and Budget (OMB), the following were considered in the screening of the candidates:

- Expertise: Ensuring the selected reviewer has the knowledge, experience, and skills necessary to perform the review.
- Independence: The reviewer was not involved in producing the documents to be reviewed.
- COI: Identification of any financial or other interest that conflicts with the service of an individual on the review panel because it could impair the individual's objectivity or could create an unfair competitive advantage for a person or organization.

- Availability: Candidates' availability to meet the project schedule.

After screening candidates to exclude those with inadequate expertise or potential COI issues in accordance with the requirements and guidelines of the National Academy of Sciences and OMB, several candidates were selected for further screening and evaluation to ensure they met or exceeded the requirements of this task. The list was then narrowed down to identify the most qualified candidates that would be available to serve on the ACT River Basin IEPR panel. Noblis provided the list of selected panelists along with their detailed résumés to USACE to identify any outliers who may have a potential COI based on USACE knowledge of the individual's past involvement with the ACT River Basin project. USACE acknowledged the proposed panel members' experience relative to the requirements of the IEPR and that there are no perceived COI issues. A description of the panel is provided in Section 4.

3.3 Preparation and Charge for Peer Review Panel

USACE made available necessary project documents to Noblis, which were provided to the IEPR panel members. Noblis communicated to the panel via email and held a kickoff meeting outlining the steps of the IEPR process, identifying the overall schedule and deadlines, and instructing the IEPR panel members how to access the documentation and undertake the review. Noblis requested panel members to review the documents for which USACE had requested comments, and noted additional supporting documents as background material for their reference.

Subsequent to a cursory review of the documents by the panel but prior to the actual detailed IEPR, a Basin Overview meeting was held in Mobile, Alabama with USACE to familiarize the IEPR panel members with the technical aspects of the project and the specific objectives of the review. As part of this meeting, USACE provided a detailed project briefing, reviewed project features and requirements, and provided the opportunity for the exchange of technical information between the panel and USACE technical staff. Noblis met with the panel members following the meeting with USACE to refine roles and responsibilities of the IEPR panel members, including providing them with general instructions and guidance for preparing their comments to ensure proper coverage of all important issues and consistency in the development of the IEPR comments. Noblis remained as the conduit for information exchange between the panel and USACE throughout the project in order to ensure a truly independent IEPR.

The final charge developed and approved by USACE established the general boundaries for the IEPR. The charge questions are detailed in Appendix C.

3.4 Performing the IEPR

After the panel was oriented with the general scope and background information of the project, the panel initiated a detailed review of the requested documents and supporting documentation. The ACT River Basin IEPR involved conducting an independent technical peer review to analyze the adequacy and acceptability of environmental and engineering methods, models, data, and analyses presented in the documents. The review was limited to a technical review and was not involved with policy issues. The IEPR panel identified, recommended, and commented on the information presented in the documents relative to the charge.

Noblis coordinated a teleconference with all panel members and the USACE at the approximate midpoint of the review process, in order to allow panel members to ask clarifying questions of

the PDT to assist in the development of comments. Many of the panel questions and concerns were addressed.

Noblis communicated to the panel all relevant project information, instructions and required actions, and deadlines. Any identified information or documents that the panel required to support its review were noted. Noblis used internal tools to track comments, issues, and information requests by the panel members during the evaluation process. Noblis facilitated information exchange and discussions between the panel and USACE in order to meet the needs of the panel and project objectives.

3.5 Panel Consensus Discussion and Finalization of IEPR Comments

After the IEPR review period ended and comments were submitted by the panel members, Noblis collated the panel comments and ensured they were complete and responsive to the charge. Noblis ensured the panel focused on performing a technical review of the documents and avoided commenting on policy-related issues. Noblis convened a group consensus meeting via teleconference and WebEx with the panel members to discuss the panel's comments. This meeting provided a forum for reviewers to reach consensus on the comments, identify any overlapping comments, and resolve any contradictions. Further refinement and consolidation of the comments occurred via email exchange following the meeting. The panel discussion resulted in the final IEPR comments that were submitted to USACE in a Microsoft Word file ("Comment Tracking Form"). The final IEPR comments are presented in Appendix A.

Each comment was formatted into four parts: (1) a clear statement of the concern ("Comment"), (2) the basis for the concern ("Basis for Comment"), (3) the significance of the concern (the importance of the concern with regard to project implementability) ("Significance"), and (4) the recommended actions necessary to resolve the concern to include a description of any additional research that would appreciably influence the conclusions ("Recommendation[s] for Resolution"). Comments were rated as "high," "medium," or "low" to indicate the general significance the comment has to project implementability. Noblis identified overall themes that were presented by multiple peer reviewers or repeated by one reviewer, comments that indicated conflicting peer review opinions, and other noteworthy comments.

Minor editorial changes were not included in the final set of comments unless they affected the understanding of the technical content. Noblis provided these minor editorial comments to USACE under a separate cover letter.

3.6 Responses to IEPR Comments

This report summarizes the results of implementation of activities under Task 1–6 of this effort. Following the submittal of this IEPR report, Noblis will hold a teleconference with USACE to discuss the process for clarifying the final IEPR comments, delivering the final evaluator responses, and providing the concluding backcheck comments. Noblis will conduct a teleconference with USACE and the IEPR panel to seek any needed clarification on the IEPR comments as well as discuss the USACE draft evaluator responses.

Following the teleconference, USACE will submit the final evaluator responses to the IEPR comments. In response to the IEPR panel recommendation for resolution, USACE will include a statement to "adopt" or "not adopt" for each recommendation, along with a response describing where documentation will/will not be expanded, revised, or changed. After the submittal of the final evaluator responses, Noblis will meet with the panel to discuss the responses and the

approach for preparing the concluding backcheck comments, which are to provide concurrence or non-concurrence with the USACE responses on whether the responses adequately address the identified concerns.

After the panel inputs the panel backcheck comments to each USACE evaluator response, Noblis will provide USACE with a Portable Document Format (PDF) of the final IEPR comments, the final USACE evaluator responses to those comments, and the panel's concluding backcheck comments.

4 Panel Organization

Noblis assembled a panel of experts to conduct the IEPR, responsible for reviewing and providing comments on ACT River Basin draft documents. Noblis guided communications between the panel and USACE to complete the IEPR project.

4.1 Panel Description

Noblis selected four panel members providing expertise in the required areas of river operations manager or planner, water resources engineer (with HEC-ResSim and HEC-5Q experience), environmental scientist or planner, and economist. All panel members met and exceeded the minimum requirements for each of the specified areas of expertise. The panel represented a well-balanced mix of individuals from academia and individual consultant firms.

Figure 1 outlines the members of the IEPR Team. Table 2 presents the list of IEPR panel members and associated qualifications to participate in this IEPR. Panel member résumés are included in Appendix B.

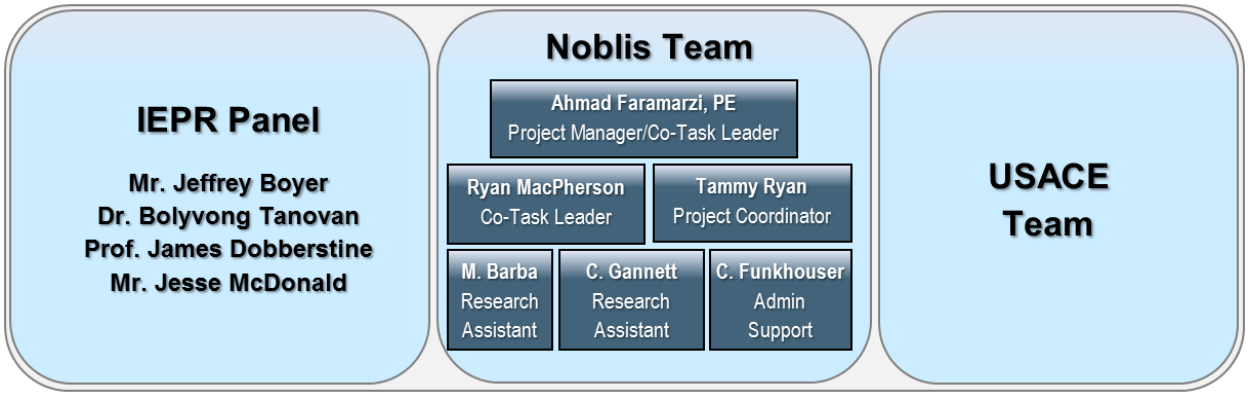

Figure 1. IEPR Team

4.2 IEPR Panel Members

Jeffrey Boyer
Role: River Operations Manager
Affiliation: Economist/Water Resources Planner Consultant

Mr. Boyer is a hydrologist with over 30 years' experience in operations hydrology. Currently, he is completing a lengthy project as the Planning Coordinator for a major proposed river and reservoir re-operation plan in Nevada and California, known as the Truckee River Operating Agreement (TROA). Previously Jeff served as Deputy Federal Watermaster on the Truckee

River in Nevada. Jeff also worked as Hydrologist/Hydrographer in the Hydro Generation Department of Pacific Gas & Electric in California, from 1983 to 1988. Jeff earned an MS degree in hydrology from Colorado State University in 1981, and a BS degree in forestry from University of California, Berkeley, in 1974.

Bolyvong Tanovan
Role: Water Resources Engineer
Affiliation: Engineering Consultant (hydrology, hydraulics, water resource management)

Dr. Tanovan has spent over 45 years in water resources engineering in Switzerland, Laos, Thailand, and the United States. Dr. Tanovan retired from the USACE in November 2008, after 26 years of service dedicated to the management of the Federal Columbia River System. While with the USACE, Dr. Tanovan lead annual operational planning for the 31 major USACE and other Treaty dams on the Columbia River System, maintaining regional coordination with federal and nonfederal project owners and operators in the Pacific Northwest, and managing the Hydropower Analysis Center of expertise tasked with performing hydropower studies for USACE projects across the nation, and for hydro projects in several foreign countries. He also served as Chief of the Fish and Water Quality Section, and member of the USACE National Water Quality Committee. Prior to the USACE, Dr. Tanovan worked on basin and land use planning; flood insurance studies for the Federal Emergency Management Agency; and watershed and dam-break modeling for Oregon counties. He also developed basin-wide SSARR-based Upper Mekong flood forecast model, and SOGREAH-based Mekong Delta model, and prepared long-term indicative hydropower basin development plans. Dr. Tanovan holds a PhD in hydrologic engineering and a Masters in civil engineering from the Federal Institute of Technology, Lausanne, Switzerland.

James Dobberstine
Role: Environmental Scientist
Affiliation: Lee College

Prof. Dobberstine is a long-time advocate of Galveston Bay and his 18-year professional career is increasingly focused on strengthening the connections between science, policy, and public awareness. He currently teaches environmental science and biology at Lee College, in Baytown, Texas. He has extensive experience as an environmental scientist and regulatory specialist, focusing on wetlands and other aquatic habitats. Prof. Dobberstine has enjoyed working on a number of successful projects linking science to policy. He has experience developing and evaluating USACE permits, and is experienced with the complex regulatory framework affecting projects that potentially impact coastal habitat. He has also worked in the area of habitat conservation, and has experience with conservation easements, fee-simple acquisitions, and development of habitat assessments, project cost models, and easement contracts. He has leadership experience on aquatic habitat restoration projects aiding in project development, permit acquisition, safety and toxicity issues, fundraising/grant development, and project implementation. He has also served on the IEPR of the Engineering, Economic, and Environmental Evaluation of the Geotechnical, Hydrological, Hydraulic, and Economic Aspects of the Dam Safety Modification Study Report for Rough River Dam, Kentucky. Prof. Dobberstine has served on subcommittees of the Galveston Bay Council of the Galveston Bay Estuary Program, formerly as Vice-Chair of the Public Participation and Education Subcommittee, and currently as a member of the Monitoring and Research Subcommittee. He

also serves on the Boards of Directors of the Texas Association of Environmental Professionals (as President 2010–2011), the South Central Regional Chapter of Society of Environmental Toxicology and Chemistry (SETAC), and the Galveston Bay Foundation. Prof. Brown has a Ph.D. in civil engineering from the University of Florida, and is a Certified Professional Engineer for the states of Florida and Pennsylvania.

Jesse McDonald
Role: Economist
Affiliation: Economist/Water Resource Planner Consultant

Mr. McDonald holds bachelors and master's degrees in agricultural economics from Mississippi State University and a master's degree in urban and water resource planning from Georgia Tech. He spent 31 years with the USACE conducting, reviewing, supervising, and managing economic and financial analyses on an assortment of water resource development projects. During this time, he had extensive experience in the economic analyses of agricultural and urban flood control, shallow- and deep-draft navigation, and agricultural water supply projects. His broad experience and training in a wide array of water resource development projects provide him with the ability to link hydrology and economics and to quickly identify any possible weaknesses in the analyses. Mr. McDonald retired in January 2000, and since then has been involved as a consultant in the economic analyses of numerous water resource projects to include cost allocation, financial analyses, and the analysis of environmental preservation/restoration projects.

Table 2. ACT River Basin IEPR Panel

		Mr. Jeffrey Boyer	Dr. Bolyvong Tanovan	Prof. Jim Dobberstine	Mr. Jesse McDonald
	Highest Degree	M.S.	Ph.D.	M.S.	M.S.
	Years of Experience	40	35	20	40
	Past Experience with COE Projects	●	●	●	●
River Operations Manager or Planner	≥ 15 years demonstrated experience in their area of expertise	●			
	Familiar with large, complex civil works projects with high public and interagency interests	●			
	Experienced in planning and/or managing the operations of multi-project river systems for purposes of flood control, hydropower, water supply, water quality, recreation, navigation, and fish and wildlife	●			
	Experience working with or for federal or state river basin authorities, planning commissions or hydropower utilities in senior planning or engineering roles	●			
	Experience working in an area under riparian water rights law.	●			
Water Resources Engineer	≥ 15 years demonstrated experience in their area of expertise		●		
	Familiar with large, complex civil works projects with high public and interagency interests		●		
	Licensed or registered Professional Engineer and has experience building and using rules-based reservoir simulation models such as HEC-ResSim or RiverWare to analyze alternatives for operation of multi-project and multipurpose river systems		●		
	Demonstrate understanding or experience of hydropower and water quality operations and analyses		●		

		Mr. Jeffrey Boyer	Dr. Bolyvong Tanovan	Prof. Jim Dobberstine	Mr. Jesse McDonald
	Highest Degree	M.S.	Ph.D.	M.S.	M.S.
	Years of Experience	40	35	20	40
	Past Experience with COE Projects	●	●	●	●
	Demonstrate an understanding of, and experience using water quality models such as HEC-5Q or similar tools to analyze water quality interactions in both lake and river systems.		●		
Environmental Scientist or Planner	≥ 15 years demonstrated experience in their area of expertise			●	
	Familiar with large, complex civil works projects with high public and interagency interests			●	
	Must have experience preparing an EIS in accordance National Environmental Policy Act (NEPA) and Endangered Species Act (ESA) requirements			●	
	Experience in studies related to operational changes in multipurpose lake and river systems			●	
	Experience in studies that involved impacts to riverine and lacustrine aquatic ecologic systems, to include considerations of warm-water fish species			●	
	Experience related to rivers and lakes in the Southeastern United States			●	
Economist	≥ 15 years demonstrated experience in their area of expertise				●
	Familiar with large, complex civil works projects with high public and interagency interests				●
	Experience in evaluating resource conditions and impacts related to municipal and industrial water supply				●
	Experience with National Economic Development (NED) analysis procedures, particularly as they relate to calculation of hydropower costs and benefits.				●
	Experience with the USACE guidelines for testing the financial feasibility of water storage reallocation as outlined in ER-1105-2-100, Planning Guidance Notebook				●
	Experience evaluating the impacts of operational changes in lakes and river basin systems to inland navigation and lake recreation				●

4.3 Noblis Team

The Noblis Project Management Team (as outlined in Figure 1) included the following members:

Mr. Ahmad Faramarzi, PE, PMP, Project Manager/Co-Task Leader, supervised project personnel and communicated policies, procedures, and goals to these employees, and maintained regular contact with the USACE. Mr. Faramarzi was responsible for the overall project plan, project performance, and contractual obligations on project tasks.

Mr. Ryan Macpherson, Co-Task Leader, developed the Work Plan and Report and provided technical leadership in managing the IEPR activities.

Ms. Tammy Ryan, Project Coordinator, supported the Project Manager on all IEPR tasks, including the identification and recruitment of candidates for the expert panel. Ms. Ryan also supported Mr. MacPherson in coordinating IEPR activities.

Ms. Christina Gannett and Mr. Michael Barba, Research Assistants, supported the IEPR activities on an as-needed basis.

Ms. Carolina Funkhouser provided Administrative Support for the project.

5 Conclusions and Observations

The IEPR Panel (the panel) reviewed the ACT River Basin WCM Update DEIS along with its associated appendices. The panel recognizes the significant amount of work that went into the development of the documents and applauds the USACE for looking at water management issues collectively as a system, considering affects to the entire basin. It is clear from the information presented that careful management of water resources within the system will continue to be important, and that updating of the WCMs is critical to system-wide management.

The following paragraphs provide a summary of the panel's recommendations in environmental, technical, and economic areas.

With respect to environmental aspects, the ACT WCM Update DEIS included some appropriate methods for analyzing project impacts. However, certain project operational concerns and aspects of the impacts associated with operation and management of the ACT system were not included or adequately discussed. Particularly, the panel raised issues associated with alternatives formulation, analysis, and selection of the preferred alternative. The documentation did not fully identify project impacts in terms of quantifiable habitat functions and values, and subsequently did not appear to conclusively identify the preferred alternative as the NED alternative. In addition, specific issues with regard to biologic monitoring coupled with the proposed operational changes, range of instream conditions modeled as part of the alternatives analysis, and methods to improve downstream water quality were not adequately described in the materials provided for review. The panel recognizes that additional coordination with the USFWS regarding threatened and endangered species will be conducted.

In developing the proposed updated WCMs, USACE has performed a detailed and mostly thorough technical review in an effort to revise and refine operating procedures to meet updated general and drought management requirements. USACE has developed, analyzed, and evaluated several reservoir operating proposals before selecting the recommended alternative. However, due to the fact that USACE reservoirs only control a small part of the ACT operating storage and that USACE has limited authorization to consider wider changes of operating alternatives, the preferred alternative may not be the best overall strategy to regulate the system at this stage. The DEIS should mention those limitations up front. Additional support for the recommended alternative could be gained by using modeling techniques to expand the range of hydrologic conditions examined by including wetter and drier scenarios than those in the historic records and including the results in discussion of the alternatives. Similarly, including sensitivity analysis of key parameters would provide an idea about the range of errors associated with model predictions and strengthen conclusions reached through modeled results. While the USACE analysis purports that the preferred alternative results in system-wide benefits, modeling and analysis of current project operations, including those that may have negative impacts on the riverine environment, is important to the credibility and value of the EIS for the ACT WCMs. Additional discussion of the benefits of peaking power operations, and analysis of impacts of those current peaking power operations on the riverine environment should be included and weighed against each other.

The USACE has performed an economic analysis of various alternatives that is generally qualitative in nature. For each alternative analyzed, the economic analysis concentrated on the percent change in key elements, such as the percent of time the 9.0-foot or 7.5-foot navigation channel would be available or percent of time surface water levels exceeded three impact

elevations. Hydropower impacts were the only area for which quantitative data were presented. It is important that quantitative data be included for the other areas impacted by each alternative. In addition, economic values associated with improvement to aquatic habitat should be considered in the economic analysis. Such quantification may not be applicable because of the level of detail required for studies such as the ACT WCM or because of USACE policy. Regardless, such quantification should be included, or the reasons for omitting such detail, as suggested by the panel, should be addressed.

6 References

Department of the Army. 2012. USACE Engineer Circular (EC) No. 1165-2-214, *Water Resources Policies and Authorities*, 15 December.

U.S. Army Corps of Engineers Mobile District. 2013. *Final Draft Master Water Control Manual Alabama-Coosa-Tallapoosa (ACT) River Basin, Alabama, Georgia*. March.

U.S. Army Corps of Engineers Mobile District. 2013. *Draft Environmental Impact Statement Update of the Water Control Manual for the Alabama-Coosa-Tallapoosa (ACT) River Basin, Alabama, Georgia*. March

Appendix A – IEPR Comments

A.1 Final IEPR Comments

This Appendix provides the IEPR comments on the ACT River Basin IEPR project documents. The comments cover a range of issues that pertain to the technical aspects of the documents reviewed. Each comment is formatted into four parts that include the following: (1) a clear statement of the concern, (2) the basis for the concern, (3) the significance of the concern (the importance of the concern with regard to project implementability), and (4) the recommended actions necessary to resolve the concern to include a description of any additional research that would appreciably influence the conclusions. Comments are rated as "high," "medium," or "low" to indicate the general significance the comment has to the project implementability. The significance ratings are applied using the following criteria:

- High = Comment describes a problem fundamental to the overall goals and objectives of the project study that could affect the ability to implement aspects of the project that the documentation supports.
- Medium = Comment describes a problem that affects the completeness or overall understanding of the project study and its conclusions.
- Low = Comment relates to the technical quality and presentation of technical information in the documentation that could confuse the reader or be considered misleading, but there is limited effect on the overall project conclusions.

The comments are arranged in order of significance. Of the final 15 comments, 9 were identified as having high significance, 4 were identified as having medium significance, and 2 were identified as having a low level of significance.

A.2 Summary of Comments

Following is a listing of the final comments submitted in the Comment Tracking Form.

Table A-1. Overview of Final Comments Identified by IEPR Panel

Significance – High	
1	The Allatoona Water Control Manual (WCM) should include discussion of the impacts of the current peaking power operation at Allatoona Dam and the extreme daily fluctuation in flows below the Dam.
2	The DEIS should better specify the rationale for the inclusion/exclusion of specific economic benefits for the alternatives analysis.
3	The objectives for the WCM update should specify the goal to improve conditions for fish and wildlife conservation downstream of each USACE dam.
4	Monitoring of aquatic ecologic/biologic communities should be conducted in support of the WCM updates, or rationale for excluding biologic monitoring must be better explained in the EIS.
5	Alternatives including variable continuous flow or other more natural (unimpaired) flow regimes at USACE projects do not appear fully considered in the DEIS.

6	There is limited direct discussion on impacts of preferred alternative(s) in known areas of interest.
7	There is lack of direct input from APC.
8	There is an absence of potentially helpful studies that would provide greater insight into the implications of the ACT DEIS.
9	There is no mention of limitations of USACE actions.
Significance – Medium	
10	Given the importance and uncertainty of current climate change discussions in scientific and public communities, techniques other than historic data analysis could be used to benefit this project.
11	Greater reliance on forecasts in short-term reservoir operating decisions may become more important in the future as the technology and science of meteorologic and hydrologic forecasting advances.
12	USACE response to public scoping comments identified in the DEIS frequently do not appear to fully address the expressed concern.
13	There are limited discussions on the ranking of alternatives and the role of operation impacts on intangibles (e.g., impacts on cultural resources, quality of life, historical heritage, etc.) in that ranking.
Significance – Low	
14	It is unclear what, if any, procedures the USACE uses to perform quality assurance (QA)/quality control (QC) on the data that is received directly from sensors in the field
15	The period of time that dredging is effective in reducing the flow required to maintain various depths of channel for navigation is suspect, or, at best, confusing.

The following pages outline the final IEPR comments in detail, including the four-part analysis. The comments are sorted based on their designated significance.

Comment #: 1
The Allatoona Water Control Manual (WCM) should include discussion of the impacts of the current peaking power operation at Allatoona Dam and the extreme daily fluctuation in flows below the Dam.
Basis for Comment:
Alabama-Coosa-Tallapoosa (ACT) River Basin WCM Appendix A, Figures 8-1 and 8-2 on p 8-7. WCM updates and Draft Environmental Impact Statement (DEIS) go to great lengths to discuss and document environmental impacts of relatively minor changes in storage levels and impacts on river flows under various alternatives. Impacts on recreation, fish and wildlife, water supply, and economics are well developed. The impacts discussed are generally concluded to be minor or insignificant. Although the new WCM for Allatoona does not include changes to the peaking power operation or minimum releases, lack of explanation of why changes to this operation are not considered in the WCM or DEIS, or discussion of the economic benefits along with environmental impacts of this extreme operation, weakens the thorough environmental analysis in the rest of the WCM and DEIS.
Significance:
High – Discussion of the impacts of the current peaking power operation at Allatoona Dam is critical in strengthening the overall analysis.
Recommendation for Resolution:
Impacts of the Allatoona peaking power operation on downstream reaches should be analyzed and described in more details. Use of downstream facilities, if any, to mitigate the impact of the extreme daily fluctuations in release and river flow should be highlighted. Changes in reservoir releases needed to reduce hydropower generation during drought periods should also be explained more clearly, using graphical presentations. If that cannot be analyzed as part of the ACT WCM updates, the general impacts and benefits should at least be pointed out and discussed in the final EIS. This will help develop trust with readers of the documents and support the thorough, unbiased nature of the EIS. If Allatoona operation is not going to be affected by the Drought Management Plan, a footnote explaining this should be included in the WCM and EIS discussion for each of the Alternative Actions.
USACE Evaluator Response:

Comment #: 2
The DEIS should better specify the rationale for the inclusion/exclusion of specific economic benefits for the alternatives analysis.
Basis for Comment:
Improvements to fish and wildlife habitat and water quality associated with the ACT river basin would likely provide substantive economic benefits to the entire region (across three states) in terms of recreational activities and fisheries dollars spent, in addition to possible cost-avoidance associated with services provided by biologic organisms toward water quality and other ecosystem services. The DEIS does not appear to explore this economic component in the alternative evaluation, nor does it give sufficient explanation for not having done so. The Planning Guidance Notebook (ER1105-2-100 Section 6) states, "*A plan recommending Federal action is to be the alternative plan with the greatest net economic benefit consistent with protecting the Nation's environment (the NED plan), unless the Secretary of the department or head of an independent agency grants an exception to this rule*." It is not fully clear how the USACE has arrived at the conclusion that the Proposed Action Alternative (PAA) would provide the greatest net economic benefit based on the information provided in the DEIS. The DEIS studies appear based primarily on the output of the HEC-ResSim and HEC-5Q modeling that provide no information on direct economic impacts of reservoir operations in the basin. Impacts on other river uses do not appear to be model-predicted. There also seems to be limited financial data provided on the economic impacts to fish and wildlife, navigation, recreation, and other environmental considerations. It appears that all of the likely economic benefits have not been fully considered. Some presentation of economic benefits associated with hydropower and flood reduction are presented in the DEIS, but economic benefits associated with recreation, fishing, and/or tourism are not presented clearly. Data for many of these benefits is quantifiable monetarily, and should be considered in the national economic development (NED) account. For example, data on the economic impact of recreational fishing in Alabama is available from sources including the Alabama Department of Natural Resources. It is suggested that economic valuation of any fishery should include direct, indirect, induced, and total economic impacts. Hunting and recreational fishing are estimated to provide more than $3 billion annually in benefits to the Alabama state economy. Consideration of other direct economic benefits could affect the alternatives analysis and may suggest the need for consideration of additional alternatives. Direct economic benefits might include those resulting from regional income generated by an improved fishery, or costs avoided through improved water quality, which appear to be quantifiable benefits as identified in ER 1105-2-100 Appendix D-2 (in other words, they can be monetized and should be included in the NED account). This exclusion of analysis could affect the overall consideration and selection of alternatives and appears somewhat inconsistent with the guidance provided in ER1105-2-100. Failure to fully evaluate economic impacts and benefits could have the effect of justifying fewer, less diverse alternatives, undermining the intent of NEPA. There is a substantial amount of information about how to calculate the economic value of environmental services provided in Appendices D and E of the Planning Guidance Notebook. Some additional examples include:

- www.csc.noaa.gov/digitalcoast/_/pdf/economics.pdf
- www.iwr.usace.army.mil/docs/iwrreports/97r01.pdf
- www.ecosystemvaluation.org/default.htm

Further, in addition to being consistent with the leading science, inclusion of these ecosystem service benefits would be consistent with Council on Environmental Quality (CEQ) and USACE efforts under the developing updates to the Principles and Guidelines (see the project "Improving Principles and Guidelines for Federal Water Resources Planning" PIN: WSTB-U-08-03-A), which is part of these agencies' efforts to require the development of water resources projects to be based on sound science, increased consideration of both monetary and non-monetary benefits to justify and select a project, improved transparency, etc.

Significance:

High – Additional significant economic, social, or environmental information should be considered to demonstrate techniques that yield complete and acceptable analyses of an adequate array of possible measures considered in the development of alternatives, identify meaningful differences between alternatives, and support the conclusions drawn from the planning models.

Recommendation for Resolution:

Consider the value of ecosystem services and benefits fully in the alternatives formulation and analysis in the EIS, or provide a more substantive discussion of why this evaluation was not fully considered in the EIS.

USACE Evaluator Response:

Comment #: 3
The objectives for the WCM update should specify the goal to improve conditions for fish and wildlife conservation downstream of each USACE dam.
Basis for Comment:
Section 4 of the Draft EIS (DEIS), p 4-1 through 4-3 notes that "*Problems and challenges were identified by the scoping process (stakeholder comments) and by an internal review by Corps Water Management staff with experience gained operating under the draft 1951 Master WCM. On the basis of the results of those efforts, the following challenges were identified,*" and goes on to note that, "*Coordination with USFWS in 2003 yielded a recommendation to revise releases from the Carters Reregulation Dam to mimic a more natural flow regime to benefit the aquatic ecosystem in the Coosawattee River downstream of Carters Reregulation Dam.*" The DEIS then states, "*From those challenges, several objectives for the WCM update were developed. In the context of this EIS, an objective is a statement of what the Corps should try to achieve with the updated WCM. Accordingly, the following objectives have been developed,*" and then goes on to note that the USACE should attempt to "*Improve conditions downstream of Carters Reregulation Dam for fish and wildlife conservation, including threatened and endangered species.*" The objectives for the WCM appear to underrepresent the full range of coordination with the U.S. Fish and Wildlife Service (USFWS), which has called for more extensive attempts at downstream aquatic habitat improvements than suggested in the referenced statement in the DEIS. In addition to the referenced 2003 USFWS written comments specific to Carters Reregulation Dam, the USFWS provided written comments during the public scoping process in 2008, an extensive Planning Aid Letter (PAL) in 2010, and the 2012 Draft Fish and Wildlife Coordination Act Report (DFWCAR) for the proposed WCM updates for the ACT River Basin. These scoping and coordination letters are included in the Appendices for public review, and clearly indicate the need for more extensive improvements than specified in the objectives of the DEIS. Further, the ACT Master WCM (Section 7-08) states, *"Fish and wildlife conservation is an authorized purpose of the reservoirs in the ACT Basin in accordance with P.L. 85-64 (Fish and Wildlife Coordination Act of 1958). All the Corps reservoirs in the ACT Basin support important fisheries and are operated accordingly, consistent with other project purposes."* The WCM should include in the objectives the aim to improve conditions downstream of each dam for fish and wildlife conservation, including threatened and endangered species, rather than just Carters Reregulation Dam. Revising this objective would also appear to support the requirement that any measure (or alternative) should support operations of the projects in the ACT Basin as a system, and any measure (or alternative) that violates the USACE's responsibilities under the Endangered Species Act (ESA) will not be considered (p ES-4). While the preferred alternative appears to attempt not to worsen instream conditions substantially over the No Action Alternative (NAA), the project alternatives analysis offers the opportunity to consider whether options exist that might improve those conditions. There is considerable literature suggesting environmental flows (water and sediment) downstream of dams are of significant value to downstream communities (Richter et al. "Lost in Development's Shadow: The Downstream Human Consequences of Dams." *Water Alternatives* 3[2]. 2010). Efforts are being made throughout the United States and globally to assess environmental flow requirements and initiate water management strategies to this end. The USACE has partnered in these

initiatives previously with noted success, including in the Green River system in Kentucky (Postel, S. and Richter, B. *Rivers for life: Managing water for people and nature*. Washington, DC, US: Island Press. 2003.; see also The Nature Conservancy Sustainable Rivers Project. Accessed June 21, 2010. www.nature.org/ourinitiatives/habitats/riverslakes/sustainable-rivers-project.xml).

It would appear consistent with guidance at ER1110-2-8154 and EM 1110-2-3600 that alternatives might consider either design or operational features that reflect consideration of natural environmental flows (see Krchnak et al. "Integrating Environmental Flows into Hydropower Dam Planning, Design, and Operations." *Water Working Notes*; Note No. 22. November 2009).

While the USACE may not control the majority of the volume of water in the basin, and operational changes under the WCM update alone may not achieve substantive improvements, the USACE has the responsibility to at least identify what actions should be considered to address improved conditions for fish and wildlife downstream of their projects. The objectives of the WCM should reflect this responsibility fully, as the WCM represents the central document addressing water quality and instream conditions throughout the basin. As such, it makes sense to note these needs in the EIS or perhaps the WCM itself, rather than assume that they might be addressed separately through independent actions associated with the individual projects (which seems unlikely).

Significance:

High – Information provided does not give adequate consideration to beneficial uses and habitat at, and downstream of, projects through enhancement and non-degradation of water quality, nor are implementation responsibilities and requirements, including environmental commitments, of the USACE sufficiently described.

Recommendation for Resolution:

Revise the objectives for the WCM Update to specify the goal to improve conditions downstream of each USACE dam for fish and wildlife conservation or revise the discussion of objectives in the EIS to better explain why this is not feasible.

USACE Evaluator Response:

Comment #: 4
Monitoring of aquatic ecologic/biologic communities should be conducted in support of the WCM updates, or rationale for excluding biologic monitoring must be better explained in the EIS.
Basis for Comment:
The USFWS has repeatedly called for biologic monitoring by the USACE throughout the basin as part of its WCM update (Appendix B). In response, the USACE has repeatedly stated that these efforts would be outside of the scope of the WCM update, or that "*The Corps will consult with USFWS under section 7 of the ESA regarding threatened and endangered species.*" However, in ER 1110-2-8154, the USACE states, "*Biological monitoring programs are encouraged. Biological data are often the most important component of a water quality data collection effort, are especially useful in identifying pollution spikes or other forms of environmental stress, and often are more cost effective than more conventional chemical and physical data.* ***In most cases an integration of physical, chemical, and biological data is needed to understand the performance and behavior of a project****. A component of a monitoring program should be determining if threatened or endangered species may be adversely affected or if there are opportunities to improve the habitat of these species."* (Section 9c) EM1110-2-3600 (Section 2-7 b 4) notes, "*While the structural design of the project may limit the flexibility of regulation strategies, water control managers are tasked with the challenge of trying to meet fishery management objectives. Because of their understanding of the projects' water quality characteristics and resulting effects on reservoir or downstream fisheries, the water control manager can be in a unique position to recommend evaluation of structural modifications, possible reallocations of project storage, or modifications to regulating plans."* Further, ER 1110-2-8154 states, "*As steward of project resources, the Corps will not allow degradation of the aquatic resource except as noted in paragraph 6a above. In cases where degradation has occurred, it is the Corps' policy to restore the resource to a biologically productive, diverse, and ecologically robust condition… It is Corps policy to develop and implement a holistic, environmentally sound water quality management strategy for each project… Environmental success will not be measured by production of single or limited numbers of species, or enhanced recreational opportunities, but by expertise in reestablishing flow regimes, rehabilitating wetlands and riparian areas, managing sediment delivery, controlling the chemical and physical aspects of the aquatic systems, and overall ability to restore a dynamic, self sustaining aquatic ecosystem…* ***These objectives will be included in the project water control plans.*** *These plans must be reviewed and updated as needed but not less than every 10 years. The plans must achieve environmentally sustainable overall use of the resource. The water quality management plans should be scoped to include all areas influencing and influenced by the project.*" Water management decisions can have a substantive effect on aquatic habitats and organisms, as stated by the USACE's own guidance documents. Reluctance by the USACE to include monitoring as a component of the operational changes proposed for the ACT WCM update appears to be predicated on the HEC-5Q modeling determination that water quality impacts of the preferred alternative (PAA) would not deviate significantly from the NAA (while acknowledging that the system is impaired as a result of construction and operation of the dams

and reservoirs on the system). The USFWS makes a good point in their Dec. 2012 DFWCAR, stating that the modeling data signify the system-wide impact of the dams, and reinforce that the current proposals (including the PAA) would preserve current impairments of instream conditions, rather than take significant steps to address them.

ER 1110-2-8154 seems to suggest that the USACE has a responsibility to conduct or otherwise facilitate biologic monitoring and develop datasets that assist in protecting and improving aquatic habitats for threatened and endangered species. Monitoring after making operational changes to a system makes sense from a resource management perspective, and is a typical element of project planning to ensure project success. The response of the USACE in the ACT DEIS appears to attempt to deflect this responsibility in this circumstance. The USACE notes, *"…dedicated studies to address the impacts of the proposed operational changes on protected species are not available and are beyond the scope of this effort.*" (DEIS Section 6.5.4.2.5, p 6-157, and elsewhere). This seems to be a brush-off of the ecologic issues associated with instream flows, freshwater inflows, and species management. Considering that the WCM update is the first in many years for most of the system projects (since 1951 for the Master WCM), there appears to be a prime opportunity to build in meaningful ecologic monitoring to evaluate changes to the WCM over time that would allow for a better understanding of the effects (direct, indirect, and cumulative) that even supposedly minor changes may have to the system as a whole, which would better support adaptive management of WCM updates in the future.

For example, the DEIS notes slightly reduced dissolved oxygen (DO) in some reaches of the project area should the PAA be implemented. While the USACE suggests that they do not expect these reductions in DO to have a substantive impact on biologic populations, there appears to be little direct, gathered evidence to suggest that should the next update to the WCM be ten or more years (or 62 years!), that these small impacts would not have a more substantial cumulative effect than anticipated. This is especially concerning coupled to other stressors associated with climate change and basin development, potentially resulting in additional impacts to threatened and endangered species, water quality, and other elements of the basin that could in turn result in increased costs or reduced benefits associated with use of the system across time. Biologic monitoring should be required to observe these effects, and appears to be supported by the USACE guidance documents on that subject.

Additionally, the Master WCM states that *"…the objective of water quality sustainability of the ACT River Basin mainstem streams is a goal through specific continuous minimum releases and other incidental releases that provide benefits to water quality in the basin. Water releases made during hydropower generation from Allatoona Dam provide Etowah River flows beneficial for downstream water uses. Allatoona Dam and Carters Reregulation Dam provide benefits to water quality by providing continuous minimum flow releases*" (MWCM Section 8-05, p 8-3). Also, *"Minimum flow requirements of 240 cfs below the Allatoona Lake and Carters Lake projects for water quality purposes also support fish and wildlife conservation downstream of the projects, particularly during periods of extremely dry weather… APC's minimum flow targets at Montgomery, Alabama (at the headwaters of the R.E. "Bob" Woodruff Lake), while principally intended to support downstream navigation, also provides sustained flows for water quality needs, fish and wildlife conservation and environmental flow benefits for threatened and endangered species and their critical habitat."* (MWCM Section 8-06, p 8-3). Is there monitoring data to support that these statements are accurate? In other words, do the hydropower releases and minimum flows act to, in net effect, support fish and wildlife based on modeling and

monitoring data? If so, relative to what? Further, is there monitoring data regarding the effectiveness of fish passage efforts through the locks? These data are important in determining the range of alternatives, differentiating those alternatives, and adaptively managing the system sustainably in the future. The issue of biologic monitoring should be more clearly addressed and resolved in the EIS. The current treatment in the DEIS gives the impression that the USACE is deflecting this issue rather than addressing it clearly and substantively.
Significance:
High – This omission represents a fundamental problem with the project that could affect the recommendation or justification of the project alternatives, assumptions made for use in developing the future conditions for each alternative may not be reasonable, and the proposed plan of operations does not provide for gathering of ongoing effects data to inform adequate response and flexibility to address uncertainty in future conditions.
Recommendation for Resolution:
Better address long-term biologic monitoring following operational changes to the ACT system to measure effects of operational changes and provide a data-driven basis of response for adaptive management of the system as conditions warrant, or present a more detailed justification in the EIS why such monitoring would not be conducted.
USACE Evaluator Response:

Comment #: 5
Alternatives including variable continuous flow or other more natural (unimpaired) flow regimes at USACE projects do not appear fully considered in the DEIS.
Basis for Comment:
It seems like the DEIS for the WCM updates should make a better effort to protect and enhance aquatic habitat in general, and critical habitat for endangered species in the areas where the USACE has the ability to do so. The USACE states that they do not prioritize project purposes (DEIS, p ES-10), but the overall appearance of the proposed updates appears to prioritize navigation, hydropower generation, and flood protect/water storage above all other authorized purposes. The DEIS notes at length the unique biologic species distributions in the affected environment, highlighting threatened and endangered endemic species and the impact of the changes to the watershed by the implementation and operation of the dams. However, the DEIS does not appear to consider a range of alternatives that would substantively address this important issue across the system, nor does the DEIS make note of any potential solutions that could be implemented that, in combination with the revised WCMs, could achieve better results for aquatic habitat. EM1110-2-3600 (Section 2-7 b 4) notes, "*While the structural design of the project may limit the flexibility of regulation strategies, water control managers are tasked with the challenge of trying to meet fishery management objectives. Because of their understanding of the projects' water quality characteristics and resulting effects on reservoir or downstream fisheries,* ***the water control manager can be in a unique position to recommend evaluation of structural modifications, possible reallocations of project storage, or modifications to regulating plans****."* Further, ER 1110-2-8154, states, "*As steward of project resources, the Corps will not allow degradation of the aquatic resource except as noted in paragraph 6a above. In cases where degradation has occurred, it is the Corps' policy to restore the resource to a biologically productive, diverse, and ecologically robust condition… It is Corps policy to develop and implement a holistic, environmentally sound water quality management strategy for each project. This strategy must be developed in concert with other authorized project purposes. However, the environment will be addressed as equal in value and importance to other project purposes when developing or carrying out management strategies* (section 6b)… *Environmental success will not be measured by production of single or limited numbers of species, or enhanced recreational opportunities, but by expertise in reestablishing flow regimes, rehabilitating wetlands and riparian areas, managing sediment delivery, controlling the chemical and physical aspects of the aquatic systems, and overall ability to restore a dynamic, self sustaining aquatic ecosystem… These objectives will be included in the project water control plans. These plans must be reviewed and updated as needed but not less than every 10 years. The plans must achieve environmentally sustainable overall use of the resource. The water quality management plans should be scoped to include all areas influencing and influenced by the project.* (Section 7)" As an example, while the fish pass operations on the lower dams is important to the biologic life cycle of mussels, water quality and flow regimes are also critical to these species and the biologic communities of which they are a part. Mussels and other aquatic organisms can be highly valuable in reducing instream nutrient and pollutant loads (such as nitrogen), thereby improving water quality and avoiding water treatment, fishery impacts, and other costs

downstream. One of the values of analyzing the natural flow regime as part of the environmental scoping is the value added insight that the additional information may provide in terms of timing and volumes for flow management, and a better overall assessment of strategies for achieving the maximum net economic benefit.

Section 2.1.1.1.4.3 of the DEIS on Weiss Lake notes that as part of the ongoing Federal Energy Regulatory Commission (FERC) relicensing process for the Coosa River Project, Alabama Power Company (APC) has proposed modifications to operations at Weiss Lake, including: "*Release a variable continuous minimum flow into the bypassed river reach downstream of the spillway at the Weiss Lake project to enhance aquatic habitat and water quality for aquatic organisms as part of a comprehensive adaptive management plan. The continuous minimum flow would range from 4 to 9 percent of the flows occurring at the upstream Mayo's Bar gage (USGS gage no. 02397000), depending on the month, with an adjustment of that flow twice per week according to the actual flow occurring at the Mayo's Bar gage. While the details of this proposal could change somewhat in the relicensing process, some plan for a continuous minimum flow below into the Weiss Lake bypassed reach is highly likely*." Could a similar strategy with adaptive components and flow variability be made available for the USACE projects?

This would appear to represent the type of adaptive management that the USFWS called for in their comments, appears to be consistent with USACE regulations noted throughout the DEIS, and supports the criteria that "*A measure (or alternative) should be consistent with the contemporary water resource needs of the basin to the extent practicable. Engineering Manual (EM) 1110-2-3600(2)(1)(b) and (3)(1)(b) state than an overarching goal of water control plans is to account for changing local conditions and needs in the basin*."

Is there any data or modeling on natural (unimpaired) flow regimes to compare against? The 2008 PAL and 2012 DFWCAR from USFWS recommend that the proposed flow regime be compared to an alternative that more closely mimics a natural flow regime, and that the relative effects to downstream biota be analyzed. It is not clear whether this analysis has been conducted. The DFWCAR also states that the modeling data show the impact of the dams and reinforce that the current proposals would preserve those shortcomings, rather than take significant steps to address them. Comparative modeling showing the natural (unimpaired) condition would certainly give a better sense of optimal instream conditions against which to compare current and future conditions resulting for operational changes to the system. It would be beneficial to conduct this analysis to develop a better overall understanding of the No Action Alternative, and the preferred alternative, potentially leading to additional alternative formulation and unforeseen opportunities for recovery within segments of the affected area.

Significance:

High – Information provided does not give adequate consideration to beneficial uses and habitat at, and downstream of, projects through enhancement and non-degradation of water quality.

Recommendation for Resolution:

Better explain how the range of alternatives addresses protection and restoration of endangered species and critical habitat, or why such consideration is not possible in the current alternative analysis, while also making recommendations of what would need to happen for those issues/alternatives to be considered.

Comment #: 6
There is limited direct discussion on impacts of preferred alternative(s) in known areas of interest.
Basis for Comment:
In 2003, the USFWS expressed their concern "*with the effects of the current operation of the (Carters) dam (minimum flow, ramping, and water temperature) and the future effects of hydropower generation at the dam (dissolved oxygen) on downstream species."* In 2008, they commented that, "*current dam operations at Lake Allatoona have detrimental effects on water quality and the natural flow regime in the Etowah River downstream of Allatoona Dam."* In 2010, the USFWS indicates that water quality below several USACE dams… do not meet State Water Quality standards. In 2012, they urged the USACE to "*consider additional alternatives for analysis that would address (their) concerns about water quality in project tailraces, alterations of flow regimes.*" Other original public comments were related to water resources (maintain and protect public water supplies and water storage allocations, maintaining higher lake level in the fall and winter, ensuring adequate flood risk management if winter pool levels are increased), economic resources (flood risk management , hydropower, navigation, and recreation), ecological resources (ensure sufficient quality and quantity of water to resemble natural riverine flow regime for aquatic habitat), and other resources (water level, return flows, etc.). The current DEIS write-up does not directly comment on how and to what extent some of the issues raised would be improved by implementation of Plan G. In regard to methods described by the USFWS to improve DO, (i.e., surface water pumps, low-pressure aerators, etc.), it is not clear why these would be outside of the scope of the manual update (or associated EIS), as suggested by the USACE. It appears likely that these methods could be effective, and that implementation would be rather straightforward based on their examples. Why would it not make sense to acknowledge in the WCM or EIS that additional means beyond operational changes may be necessary to address the water quality concerns at this stage? It seems less efficient in the big picture to wait to address this need at a later date. At the very least, the EIS could recommend that structural or other methods should be considered beyond the WCM as part of the finding in an effort to enhance and protect water quality and aquatic habitat. EM1110-2-3600 (Section 2-7 b 4) notes, "*While the structural design of the project may limit the flexibility of regulation strategies, water control managers are tasked with the challenge of trying to meet fishery management objectives. Because of their understanding of the projects' water quality characteristics and resulting effects on reservoir or downstream fisheries, the water control manager can be in a unique position to recommend evaluation of structural modifications, possible reallocations of project storage, or modifications to regulating plans."* The WCM represents the central document addressing water quality and instream conditions throughout the basin. As such, it makes sense to note these needs in the EIS or perhaps the WCM itself, rather than assume that they might be addressed separately in independent actions associated with the individual projects (which seems unlikely).

Significance:
High – Information provided does not give adequate consideration to beneficial uses and habitat at, and downstream of, projects through enhancement and non-degradation of water quality.
Recommendation for Resolution:
Provide some details on how Plan G would affect/address/improve the issues raised at the start of the DEIS, and provide more robust discussion of other potential solutions to addressing water quality issues, including structure methods.
USACE Evaluator Response:

Comment #: 7
There is lack of direct input from APC.
Basis for Comment:
While it is understood that the USACE has an open and inviting relationship with any stakeholders in the ACT Basin, and that all organizations influenced by the operations of the river systems within ACT are equal in the eyes of USACE, there was no or limited direct input from APC, a large player in the region, reported in the DEIS. Since APC reservoirs account for 77% of the basin's water storage and their hydropower plants account for 62% of the ACT power capacity (1,410 MW out of 2,264 MW per Table 3.1-1, DEIS Vol. I, p 412), any comments from APC would have been interesting to the public at large and help support the acceptability of the DEIS conclusions.
Significance:
High – The relationship of APC with USACE in the ACT river basin influences the operations of the rivers to an extent. Excluding a review and input by APC or other direct stakeholders limits the understanding of this project and its operational complexity.
Recommendation for Resolution:
Recommend requesting and, once received, incorporating written pertinent comments from APC on the DEIS, especially on hydropower generation and flood risk management. APC might also be able to share results generated from other comparable models that would directly or indirectly support DEIS findings, including identifying areas needing additional review.
USACE Evaluator Response:

Comment #: 8
There is an absence of potentially helpful studies that would provide greater insight into the implications of the ACT DEIS.
Basis for Comment:
Some studies normally used in other comparable EIS that could have provided additional insights on the impacts of reservoir operations on the competing uses of the river were not performed for the ACT DEIS. Examples include: (1) global warming that reflects seasonal variations of precipitations and flood events (e.g., late or early flood) (2) Monte Carlo simulations (probabilistic approach to reflect model uncertainties) (3) qualitative assessment for intangibles (4) cost impacts (5) Shared Vision Planning (facilitates a common understanding of a natural resource system and provides a consensus-based forum for stakeholders to identify tradeoffs and new management options). Like other river systems, the ACT must meet several conflicting river uses. In this case, it is at times helpful to develop (1) an alternative that would represent the near-optimum operation for their river uses, (2) one or more less ideal alternative that would provide an acceptable environment for their river use, and (3) one alternative that relies on meeting normal flow conditions. These extreme alternatives help define optimal conditions by exposing the operating relationship, defining which uses are compatible and which ones conflict, and identifying under what conditions and to what extent conflicts occur. An example where this has been done in the past is the Columbia River System Operation Review conducted during 1990–1994.
Significance:
High – Including studies such as those mentioned above provide additional insights on the impacts of reservoir operations in a multi-purpose environment. When not discussed, readers (especially those who are focused on single-purpose reservoir operations) may question the validity of the results and/or not fully understand the compromise needed when making reservoir operational decisions.
Recommendation for Resolution:
Make references to the studies mentioned above that were left out of this WCM update and associated EIS and explain why, if applicable, they were beyond the scope of this project.
USACE Evaluator Response:

Comment #: 9
There is no mention of limitations of USACE actions.
Basis for Comment:
It should be recognized up front that this is not an open-ended EIS that looks at every possible alternative with potential to improve one or more weaknesses of the ACT system. This DEIS is not designed to maximize the system—just to address some of the identified weaknesses that require only solutions that are within the USACE's authorities. The USACE ought to recognize the limited storage capability of its projects in controlling ACT basin-wide flow issues. USACE headwater projects have only 18% of the system's conservative storage (Allatoona, 12%; and Carters, 6%) while APC projects contain about 77% of the basin reservoir storage. Finally, it should be mentioned that APC has full control over the operations of their projects—per FERC licensing—except for flood risk management. The USACE did use well-defined criteria to select alternatives (see the nine criteria listed in the executive summary). Other limitations to consider discussion around: USACE does not prioritize project purposes, cannot add buoys, construct additional training works, and maintain tributaries. Using flood storage for other purposes was not considered. There is no reallocation of storage for water supply. There is no raising flood control to 842 feet and winter pool to 823 feet at Allatoona, no storage reallocation for water supply at Allatoona, no recycling, no additional basin transfer, no dredging, no desalination, no conservation measures, no surcharge on water supply storage for use outside the ACT basin, no change in minimum release and minimum flow, no significant reduction in peak flows, and no change in minimum release during winter for hydropower generation – because hydropower is a congressionally authorized purpose. There is no mitigation for habitat degradation and/or construction of projects. There are no changes in APC project operations. USACE did consider: navigation improvements (develop relationship between flows and river depth, and dredging impacts) and drought management (reduce hydro production at Allatoona and Carters, reduce navigation flows, and coordinate with APC).
Significance:
High – Additional discussion on the limitations of USACE actions, while beneficial in providing clarity and context to the project scope, do not alter the selection of the preferred alternative. Reference to the limitations of USACE actions provides clarity and context to the project scope, and justification for the selection of the preferred alternative. Absent those limitations, other alternatives would have been considered and possibly selected.
Recommendation for Resolution:
Need to clearly emphasize the limitations of USACE actions in order to provide greater insight into the project scope.

Comment #: 10
Given the importance and uncertainty of current climate change discussions in scientific and public communities, techniques other than historic data analysis could be used to benefit this project.
Basis for Comment:
The ACT WCMs are being updated for several reasons, one of which is to provide new/refined water management procedures to improve water supply in drought conditions. Reported modeling results used for the EIS and updated WCMs was based only on approximately 69 years of historic hydrologic data (1939–2008). Given the importance and uncertainty of current climate change discussions in scientific and public communities, techniques other than historic data analysis could be used to benefit this project. 1. Use of stochastic generated hydrology could benefit the analysis used to develop and analyze the proposed new procedures, including adjusted "Action Zones" for the reservoirs. Extending the hydrologic or even the meteorologic records using stochastic and sensitivity analysis techniques would strengthen the analysis, possibly change the conclusions, but at least provide a good feel for the range of expected errors and accuracies of the predicted changes. 2. Alternatively, adjusting historic hydrologic data, upward and downward, shifted earlier and later in time by simple percentage adjustment could also benefit the project in the same way. 3. Most difficult but likely most beneficial approach would be to couple a "climate change model" in the analysis. Additional sensitivity analysis of key parameters would also strengthen many of the individual conclusions in the DEIS that state that there is no significant difference between the preferred action and other action alternatives. Development of the new WCMs and procedures is a lengthy, expensive, and important effort. Using a longer data set, especially one that included better estimates of likely futures, could result in a more effective and possibly longer lasting plan. Similarly, without performing and reporting results of sensitivity analysis on key parameters, the often stated conclusion that there is little or no difference in the impact of the preferred alternative and other examined alternatives weakens the reported conclusions.
Significance:
Medium – Insight into the sensitivity analysis of key parameters done in the background, while unlikely to alter the outcome of the preferred alternatives selection, provides clarity and reassurance to audiences that a reasonable range of possible errors were considered.
Recommendation for Resolution:
Perform additional analysis or justify reliance on historic data and the reason for not reporting results of sensitivity analysis. If additional hydrologic and sensitivity analysis was done, but not included in the DEIS, results of the analysis should be reported in the Final EIS or an explanation of why the analysis was not included should be added to the Final EIS.

Comment #: 11
System Operators rely on "precipitation on the ground," or measured flows, and calculated inflows when making reservoir release decisions in the ACT river basin. Forecasting is used for short-term preparations, planning, and for public warnings. Greater reliance on forecasts in short-term reservoir operating decisions may become more important in the future as the technology and science of meteorologic and hydrologic forecasting advances.
Basis for Comment:
ACT Master WCM, Section VI – System Hydrologic Forecasts. The "precipitation on the ground" is compatible with current standards for operations in most systems, but there is implication of some conflict with this statement in the WCM, "Allatoona Dam and Lake Allatoona, Section VI – Hydrologic Forecasts," lines 8–10. Possible benefits/impacts of improved forecasting of inflow and operations are very significant and should be discussed. There is benefit to keeping managers aware of the topic. In the future, reduced uncertainty in short-term forecasts may allow for major improvements in reservoir operating procedures and might eventually support another round of updates to operating procedures and WCMs.
Significance:
Medium - While the discussion on forecasting will not alter the actions proposed by USACE today, opening the dialogue now could pay large dividends in the future for operators of ACT by reducing overall risk.
Recommendation for Resolution:
Current limitations and emerging trends in meteorologic and hydrologic forecasting improvements should be briefly discussed in the EIS and the Master WCM, Section VI – "System Hydrologic Forecasts" and Appendix A "Allatoona Dam and Lake Allatoona, Section VI – Hydrologic Forecasts." The discussion could include the potential for improved forecasts and how they could be used for actual reservoir operation decisions in the future.
USACE Evaluator Response:

Comment #: 12
USACE response to public scoping comments identified in the DEIS frequently do not appear to fully address the expressed concern.
Basis for Comment:
ER 1110-2-8154 states, "*As steward of project resources, the Corps will not allow degradation of the aquatic resource except as noted in paragraph 6a above. In cases where degradation has occurred, it is the Corps' policy to restore the resource to a biologically productive, diverse, and ecologically robust condition. Corps management responsibilities extend throughout the area influenced by and influencing the water we manage. Because the management of our projects affects environments distant from our property boundaries and is influenced by actions of others also distant from our properties, the Corps must actively pursue a management philosophy committed to partnering with a wide range of resource organizations and interested individuals. It is Corps policy to develop and implement a holistic, environmentally sound water quality management strategy for each project. This strategy must be developed in concert with other authorized project purposes. However, the environment will be addressed as equal in value and importance to other project purposes when developing or carrying out management strategies."* (Section 6b). *Consequently, Corps projects determine or significantly influence the ecological integrity of a large percentage of the riverine and estuarine environment in the United States… The water quality program and the Corps are committed to holistic watershed ecosystem based resource management… Environmental success will not be measured by production of single or limited numbers of species, or enhanced recreational opportunities, but by expertise in reestablishing flow regimes, rehabilitating wetlands and riparian areas, managing sediment delivery, controlling the chemical and physical aspects of the aquatic systems, and overall ability to restore a dynamic, self sustaining aquatic ecosystem… **These objectives will be included in the project water control plans.** These plans must be reviewed and updated as needed but not less than every 10 years. The plans must achieve environmentally sustainable overall use of the resource. The water quality management plans should be scoped to include all areas influencing and influenced by the project."* (Section 7) In response to public comments ER 1 and 3 in regard to water quality, quantity, and flow condition in Section 1.4.4.7 of the DEIS, the USACE appears to discount the expressed concerns contrary to the spirit of ER 1110-2-8154. The USACE states, *"However, the purpose and need of the proposed federal action is to update the water control plans and manuals to determine how the federal projects in the ACT Basin should be operated for their congressionally authorized purposes, in light of current conditions and applicable law, rather than to restore the ACT Basin to pre-project conditions. Any reasonable alternative must satisfy this purpose and need."* The panel believes that the USACE is attempting to comply with the guidance set forth in ER 1110-2-8154, and has provided some evidence of this in its scoping coordination with the USFWS. This statement, while technically accurate, gives the sense that the USACE is perhaps not considering these concerns fully, and may not be weighting the authorized purposes equally. The response could be improved by providing some example of alternatives that would meet the public concern, a brief example of why alternatives that would meet the public concern might not be viable, or perhaps simply remove this statement from the response. Further, table ES-2 in the DEIS, "<u>Major projects on the mainstem rivers in the ACT basin</u>"

indicates clearly for the public that fish and wildlife conservation is a congressionally authorized purpose for Carters Lake and Allatoona Lake, which would appear to contradict Table 1.4-8, "Summary of ecologic resource comments" that indicates the actions proposed in ER 1, 2, and 3 are not congressionally authorized. Further, the ACT Master WCM (Section 7-08) states, *"Fish and wildlife conservation is an authorized purpose of the reservoirs in the ACT Basin in accordance with P.L. 85-64 (Fish and Wildlife Coordination Act of 1958). All the Corps reservoirs in the ACT Basin support important fisheries and are operated accordingly, consistent with other project purposes.*" This apparent contradiction should be better addressed in the DEIS, preferably in Section 1 of the DEIS, "Purpose and Need."

Further, the responses/analyses presented in Section 1.4.4, "Analysis of Public Comment" are frequently too brief to be meaningful, and do not contribute to the document substantively. While it is understood that the USACE was endeavoring to be concise, it would be helpful in the response to public concern if the comment would refer the reader to the appropriate place in the DEIS that elaborates on the response for more robust discussion of the issue. For example, Comment FS4 (Section 1.4.4.8) states that Riverine Community Habitat Assessment and Restoration Concept (RCHARC) has been determined to be inappropriate for evaluating flow regimes in the ACT Basin, but does not give any indication why, nor does it refer the reader to the appropriate section in the document where that information might be available.

Additionally, repeated, single-sentence responses in this section of the document appear disingenuous, and should be revised to more fully reflect the concern, which is important to consider in the public document in keeping with the opening statement in Section 1.4, *"Public participation in the NEPA process promotes both open communications between the public and the Corps and better decision making"* (p 1-3). Such responses in the DEIS may also serve to discourage meaningful public comment during future USACE public notices. For example, in regard to the expressed concern, the responses to TE 1, 2, and 4 (Section 1.4.4.9) state, *"The Corps will consult with USFWS under section 7 of the ESA regarding threatened and endangered species."* Conversely, the response to TE 3 (which includes this statement) adds the line, *"A mollusk survey will be conducted in the upper Coosa River Basin,"* which ties the response directly to the expressed concern in a meaningful, yet concise manner. We suggest the latter is a more appropriate approach to responding to concerns in the EIS, and recommend the latter as a model for revision.

Significance:

Medium – This is important to ensure project success toward assuring that the public and stakeholders are adequately engaged in the scoping of issues, concerns, and potential remedies, and that expressed concerns are adequately addressed.

Recommendation for Resolution:

Responses to public comments should be more robust, promoting open dialog and better decision-making.

USACE Evaluator Response:

Comment #: 13
There are limited discussions on the ranking of alternatives and the role of operation impacts on intangibles (e.g., impacts on cultural resources, quality of life, historical heritage, etc.) in that ranking.
Basis for Comment:
How to deal with tangible and intangible impacts has always been a challenge in EISs. And, because impacts in some river uses are hard to rank numerically, ranking of alternatives using the results of multi-objective assessment has been difficult. Therefore, some EISs chose to rank alternatives by unique purpose first, and then look at a comprehensive (multi-purpose) ranking next. There appears to be limited discussions on this subject.
Significance:
Medium – Alternative rankings based on intangibles demonstrate that the full range of beneficial alternative analysis was performed in the DEIS.
Recommendation for Resolution:
Address the procedure and criteria used in alternative ranking and explain how intangible impacts were (or why they were not, if applicable) applied. It also would be helpful to look at specific high-, average-, and low-flow year's results and specific seasons during those years (in addition to the average for the simulation period). While some of that was done in water quality modeling, bringing narrative to it and other areas enhances clarity.
USACE Evaluator Response:

Comment #: 14
It is unclear what, if any, procedures the USACE uses to perform quality assurance (QA)/quality control (QC) on the data that is received directly from sensors in the field
Basis for Comment:
ACT Master WCM, Section V – Data Collection and Communication Networks. During times of emergency, missing or questionable hydrologic data can lead to bad water management decisions. USACE has telemetry equipment to receive river flow, reservoir storage, and precipitation data directly from sites and sensors as well as data from related agency databases. It is unclear what, if any, procedures the USACE uses to perform QA/QC on the data that is received directly from sensors in the field. It is critical that these procedures be documented in the WCMs so that on-duty reservoir operators are aware of the importance and follow the procedures, especially when operators are under stress during high-water events.
Significance:
Low – Providing insight into the data QA/QC procedures used by USACE will help alleviate audience uncertainty but will likely not change the proposed actions themselves.
Recommendation for Resolution:
Add description in WCM's for in-house, USACE real-time data QA/QC procedures. A potential point of inclusion is in Section V – "Data Collection And Communication Networks."
USACE Evaluator Response:

Comment # 15
The period of time that dredging is effective in reducing the flow required to maintain various depths of channel for navigation is suspect, or, at best, confusing.
Basis for Comment:
Information provided on pp 7-11 and 7-12 of ACT Master Manual and pp 4-7 and 4-8 of Volume 1, EIS indicate that dredging occurs from May through August. While the dredging is occurring, the flow required to maintain various navigation channel depths decreases each month. Once dredging is complete, flow requirements remain constant at the annual minimum for September and October. In November, the flow requirements immediately increase to the levels required prior to the beginning of dredging. This does not seem logical.
Significance:
Low – While providing clarity into this issue is helpful in ensuring the material reads cleanly and accurately, its resolution is unlikely to alter the proposed action.
Recommendation(s) for Resolution:
Recommend the explanation be included/expanded to clearly describe the factors causing this apparent phenomenon/inconsistency.
USACE Evaluator Response:

Appendix B – IEPR Panel Members

Noblis selected four panel members to conduct an IEPR for the ACT River Basin project and supporting models for the USACE. Consistent with the requirements of the USACE PWS, the panel members provided expertise in four required areas: river operations manager or planner, water resources engineer (with HEC-ResSim and HEC-5Q experience), environmental scientist or planner, and economist. All panel members met and exceeded the minimum requirements for each specified areas of expertise. The panel represented a well-balanced mix of individuals from academia and individual consultant firms.

B.1 Résumés of panel members

The résumés of the panel members follow.

Jeffrey T. Boyer

Qualifications Summary

- More than 30 years' experience in hydrology and water management in Nevada and California
- Extensive experience with a major river re-operation project, the proposed Truckee River Operating Agreement (TROA)
- Exceptional ability to motivate staff and stakeholders to achieve objectives
- Reputation within the Truckee River Water Master's office and among stakeholders for integrity, consistency, capability, and strong work ethic

Education

- M.S., Watershed Hydrology, Colorado State University
- B.S., Forestry, University of California, Berkeley

Summary of Professional Experience

U.S. District Court Water Master's Office, Reno, NV—*TROA Implementation Planning Coordinator*

The Truckee River Operating Agreement (TROA) is an example of a complex, creative, collaboratively negotiated re-operation of an antiquated river and reservoir operating system to meet objectives of multiple stakeholders.

- 1998 to present: Helped develop complex TROA river and reservoir operating rules and engage the involvement and support of current and future stakeholders.
  - Participated in negotiating sessions, answering questions, and providing background on current operations.
  - Worked with current and future TROA stakeholders, developing an in-depth understanding of their issues, interests, and expectations.
  - Built strong relationships with stakeholders. Their cooperation is essential to achieving TROA's benefits, such as storage security, better water supply and recreation pool, and higher in-stream flow. Many TROA options are voluntary. A benefit to one group may pose a risk to another.
- Led development of TROA Decision Support (DSS) tools: prior to the current planning effort, the US Bureau of Reclamation (USBR) contracted with the US Geological Survey (USGS) to build a TROA operations and accounting model. Four people worked on the project for several years but were not successful. It was a difficult task. The USBR dropped the contract with USGS and I began a similar effort. We chose the RiverWare modeling tool and relied on my hands-on knowledge of TRA operating policy and knowledge of TROA combined with the modeling expertise of RiverWare experts. Under my leadership, we have been successful. TROA parties are happy with the RiverWare operations and accounting models. The tools have been tested successfully and are nearly complete.
  - Conceptualized the tools needed to carry out the complex provisions of the agreement.
  - Wrote more than 25 detailed papers interpreting the complex language of TROA policies to guide development of logic code. Guided and supervised modeling experts in incorporating TROA policies into the models.
  - Worked with a technical committee of TROA stakeholders, consultants, and USBR to design, create, and test tools, including: RiverWare pre-TROA and TROA Operations Models, Hydrologic Database (HDB), and RiverWare Water Accounting System.
  - Contracted with and supported University of Nevada Desert Research Institute researchers in developing cutting-edge systems for TROA. These included a state-of- the art system for evaporation monitoring and an advanced method for determining conveyance loss
- Led comprehensive TROA scheduling and operations exercises.

  - Initiated and funded the Pre-TROA Transition program. During the five-year long program, results from the pre-TROA models were used in monthly operations meetings to improve reservoir operations and water allocation, validating the accuracy of the models.
  - For the past eight months, led the 10-member Technical Committee in monthly Mock TROA Operations exercises. The results of the exercises enabled us to refine the computer models and other tools. The models will be used each month to produce an integrated operating plan to guide daily reservoir operating decisions for the succeeding 15 months.
- Prepared and managed annual budgets of up to $1 million per year and grants of $7.9 million.
  - Developed project plans and estimated consultants' time and other project expenses.
  - Managed projects, staying consistently within budget.
  - Collected payments from five funding agencies.
- Presented five conference papers to state and national organizations.
  - The papers introduced TROA concepts, explained TROA policy, and described the customized RiverWare tools my group had developed.
  - Presented the papers to state and national water resources organizations, the American Society of Civil Engineers, and the 'Dividing the Waters' conference for judges.

U.S. District Court Water Master's Office, Reno, NV—*Deputy Federal Water Master and Hydrologist*

- 1988 to 1998: Administered and enforced water right decrees, interpreting and applying decree provisions, Nevada water law, and historic practices.
  - Was responsible for much of this function during the drought from 1988-94 – the only time in the last 34 years that the Water Master had to enforce drought priority rules on diversions from the Truckee River.
  - Managed public perception of the Water Master's office during the drought.
    - Made careful measurements to be sure rules/limitations were correctly enforced.
    - Spoke in public meetings to answer questions and explain rules to often-angry audiences.
    - Maintained a calm demeanor and professional approach, reassuring stakeholders that the water use limitations were necessary and correctly applied by the rules.
  - Developed tools to increase the accuracy of diversion measurements and bookkeeping records. This upgraded the previous measurement and monitoring program, and was welcomed by both the USGS and water users
  - Implemented a new monitoring and enforcement program.
    - For the first time, diversions matched actual water rights. Helped water users understand the difficult concept that their diversions had been reduced but not their water rights.
    - Worked with the ditch companies to determine how much they could take and when they could take it to make it through the season.
- Initiated the "Water Accounting Era," by developing the spreadsheet system that is still used by the Water Master's Office.
  - Before the accounting era, the Water Master made phone calls every morning to collect flow data. He made daily operating decisions based on that data. The water accounting system allowed more precise operation of the reservoirs. The system documented the correct application of TRA operating policy by the Water Master.
  - The perception that the Water Master made operating decisions based on what or whose interests he thought were important changed to recognition that the rules were taken seriously and followed.
- Applied principles of hydrology and knowledge of TRA policy to efficiently manage reservoirs.
  - Interpreted complex legal agreements, flood control and fishery requirements, as well as runoff forecasts to advise the Water Master on reservoir system operations.
  - Developed a system to disaggregate NRCS seasonal runoff forecasts to monthly and daily forecasts and into forecasts for each of the Truckee Basin's controllable sub- basins.
- Brought flow monitoring and record keeping procedures up to current professional standards for a network of 90 gauging stations.
  - The basic system is still in use today.

  - The changes significantly upgraded the Water Master's traditional methods and increased credibility of the Water Master's office in the eyes of related agencies and water users.
- As Deputy WM during extreme flood of 1997, helped avoid extensive additional flooding in Reno.
  - Flood control reservoirs filled to maximum capacities and Lake Tahoe storage exceeded its legal maximum for the first time in recorded history. With forecasters predicting more storms and the Truckee River in Reno already flowing at the maximum rate allowed by the US Army Corps of Engineers (USACE), I recognized the potential for more flooding.
  - To protect Reno from further damage, recommended Reno public officials request a variance to USACE flood storage release rules. They agreed and pressured the USACE. The USACE agreed to controlled flows exceeding 6000 cfs on the Truckee River, allowing us to release water from the reservoirs to create additional flood control space. The variance helped prevent further serious and expensive flood damage that season.
  - My actions during the 1997 flood demonstrated a willingness to look beyond established policy and bureaucratic rules for the benefit of the community.
- High percentage of recommendations to the Nevada State Engineer accepted re applications for water transfers and changes to place/manner of use.
  - Ensured recommendations continued to protect original decreed water rights and properly regulated water right transfers.
  - The high rate of acceptance contributed to the perception of the Water Master's and TROA Planning offices as competent and capable and helped avoid legal challenges and complaints from water users.

Pacific Gas & Electric Co.—*Hydrologist/Hydrographer*

- 1983 to 1988: Forecasted stream flow in nine major river systems for scheduling of reservoir and hydroelectric operations. Ran a state-of-the-art computer model to optimize system-wide power generation schedules.
  - Advised the Power Control Department on reservoir operations for approximately 25 reservoirs and 70 powerhouses.
  - Interpreted and applied legal agreements, including irrigation, fishery, and recreational requirements, to the optimizing model.
- Performed hydrologic studies to determine feasibility of purchasing land and water rights and evaluate environmental impacts and prospective hydroelectric development projects.
- Evaluated data for compliance with water-related legal agreements.
  - Advised field personnel of legal requirements.
  - Produced stream flow and water quality records, to USGS standards.
- Provided back-up hydrographic support in several other PG&E project areas.

U.S. District Court Water Master's Office, Reno, NV—*Hydrologist/Field Specialist*

- Produced records of stream and canal flows; instructed co-workers in monitoring techniques; performed hydrologic studies to regulate flood control and water supply reservoirs.

Professional Associations

- American Water Resources Association
- Nevada Water Resources Association

Jim Dobberstine

Qualifications Summary

- 20+ years' experience as a biologist and environmental scientist.
- Research experience with many aspects of aquatic and riparian habitats, including water and sediment characterization (toxicity, biotic community, chemistry), and the effects of adjacent land use on in-stream conditions.
- Experience with NEPA impact and cumulative affects assessments on projects with high public and interagency interest within sensitive aquatic habitats, including wetlands and riparian systems.
- Extensive experience developing and evaluating USACE permits applications and related documents. Experienced with the complex regulatory framework affecting projects that potentially impact aquatic habitat (NEPA, ESA, CWA, etc.).
- Habitat restoration featuring beneficial uses of dredge material to restore estuarine marsh and sea grass beds, coupled to coastal marsh preservation. Also habitat restoration in mixed urban/industrial riparian areas where there were potential toxicant/exposure concerns contrasted with significant cultural and environmental benefits including community education and recreation opportunities, and ecosystem enhancement.
- Board member of the Texas Association of Environmental Professionals (TAEP): President of the Board (2010-present) and Education Director (2008- present).
- Board Member of the South Central Regional Chapter of the Society of Environmental Toxicology and Chemistry (SETAC) since 2010: Vice-President (2012-13).
- Galveston Bay Council: current member of the Monitoring and Research Subcommittee of the TCEQ Galveston Bay Estuary Program.
- Board Member of the Galveston Bay Foundation: Advisor on the Land Committee (Conservation Holdings) and the Permit Review Committee (2009- present).
- Served on the Independent External Peer Review of the Engineering, Economic, and Environmental Evaluation of the Geotechnical, Hydrological, Hydraulic, and Economic Aspects of the Dam Safety Modification Study Report for Rough River Dam, Kentucky.

Education

- M.S., Environmental Science, University of Houston Clear Lake
- M.S., Environmental Management, University of Houston Clear Lake
- B.A., Life Sciences, Concordia University Portland

Certifications and Licenses

- Certificate: 40 hour USCOE Wetland Delineation Course. Texas A&M, Texas Seagrant, and the Texas Coastal Watershed Program, 2007.
- Certificate: Constructed Wetlands for Water Quality Improvement. Entrix, Clemson University, and University of Houston Clear Lake, 2004.
- Certificate: Management Development at the American Zoo and Aquarium Association School for Zoo and Aquarium Personnel conducted by North Carolina State University, 1999.
- Completed: GIS Techniques in Environmental Assessment. SETAC short course conducted by the University of North Texas, 2011.
- Completed: Probabilistic Ecological Risk Assessment. SETAC short course conducted by Texas Tech University, 2010.

- Completed: Application of Adaptive Management to Address Climate Change Related Challenges. Restore America's Estuaries (RAE) Special Program conducted by the NOAA Coastal Service Center and the PBS&J Ecosystem Restoration Division, 2010.
- Completed: Benthic Mapping Techniques aboard the Alletta Morris. Benthic mapping techniques including sidescan sonar, underwater video, sediment profile cameras, and soil cores. RAE Special Program conducted by the EPA, USDA-NRCS, and the University of Rhode Island, 2008.
- Completed: Sampling Benthic Sediments: Methods, Analyses, and Judgments. SETAC short course conducted by the University of North Texas, Institute of Applied Sciences, 2006.
- Completed: Conserving Land with Conservation Easements short course, a program of the National Land Trust Alliance's 2006 Land Conservation Leadership Program.

Summary of Professional Experience

Academia

Lee College, Environmental Science and Biology—*Faculty*

- Faculty and lead instructor of environmental science in the Mathematics, Engineering, and Science Division at Lee College. Ongoing research in ecotoxicology and ecosystem function in aquatic estuarine communities, the results of which have been featured through organizations including Restore America's Estuaries (RAE) and the Society of Environmental Toxicology and Chemistry (SETAC). Current grant funded projects include "A functional assessment of created/restored coastal marsh" examining biotic and abiotic elements of estuarine ecosystems (NOAA/TCMP), and "Project TES: Teaching Environmental Sciences", providing funding for equipment (including GC Mass Spec) and materials aimed at developing curricula and skills for education majors interested in teaching in the sciences (US Dept. of Ed.).
- Member of the Stephen F. Austin State University Arthur Temple College of Forestry and Agriculture (ATCOFA) College-level Advisory Council (2012). External Advisor for the University of Houston Environmental Management Program Curriculum Review, April 2007.
- Editor and contributor to Laboratory and Field Exercises in Environmental Science (Lehmberg, 2010).
- Chair, Faculty Screening (Hiring) Committee for Environmental Science/Biology (2012).
- Member on the Professional Development Committee (a subcommittee of the Lee College Faculty Assembly).
- Member of the Faculty Learning Community of Lee College, working to develop improved teaching methods for critical thinking.
- Chair, Faculty Screening (Hiring) Committee for Environmental Science/Biology (2012).
- Member, Screening (Hiring) Committee for the HIS STEM Grant Data Analyst position (2012)
- 2010: Session Chair at the Restore America's Estuaries Conference (Galveston, TX) session titled "Opportunities, Challenges, and Lessons Learned with the Use of Dredged Materials".
- 2009: Session Chair at the Galveston Bay Estuary Program's Ninth Biennial State of the Bay Symposium (Galveston, TX) session titled "The Science of Estuarine Wetlands".
- 2009: Peer reviewer for the TCEQ Galveston Bay Estuary Program's "State of the Bay: A Characterization of the Galveston Bay Ecosystem. Third Edition". Reviewed and commented on Chapter 8: The Bay's Living Resources.
- 2007-2008: Member of the Technical Advisory Committee of the Chambers County (TX) Greenprint Project of the Trust for Public Land.

Grant Funding Acquired

- 2012 Lee College HSI Stem Faculty Mini-grant. $9K to fund a student research project investigating aquatic habitat restoration on private land in cooperation with the Galveston Bay Foundation. Funding four student researchers. The results are proposed for presentation at the 2012 Restore America's Estuaries Conference, Tampa, FL.

- 2011 NOAA/Texas General Land Office (GLO) Coastal Management Program (CMP) grant awarded in partnership with Lee College and the University of Houston Clear Lake. $79K to fund research titled "Science-based Monitoring of Created Wetlands and Restored Habitat within the Galveston Bay System." Project to commence November 2012.
- 2011 US Department of Education Hispanic Serving Institution (HSI) STEM grant awarded to Lee College, including the $162K subcomponent "Project TES: Teacher Education Science", providing funding for equipment (including GC Mass Spec) and materials aimed at developing curricula and skills for education majors interested in teaching in the sciences.

Project Management, Research, and Field Experience

Center for Sustainability: Noblis, Inc.—*Subcontractor*

NEPA and biologist panel member for the following Independent External Panel Reviews:

- USACE Engineering, Economic, and Environmental Evaluation of the Geotechnical, Hydrological, Hydraulic, and Economic Aspects of the Dam Safety Modification Study Report for Rough River Dam, Kentucky
- USACE Limited Reevaluation Report for Design Deficiency Corrections Prairie du Pont and Fish Lake Flood Risk Reduction Project, St. Clair and Monroe Counties, Illinois
- USACE Missouri River Recovery Program (MRRP) National Environmental Policy Act Project

HB EcoGIS: Environmental Consulting and GIS Services—*Vice President*

- 2012: Assisting with all aspects of start-up and operational development of small environmental consulting and services firm.
- Environmental consultant specializing in aquatic habitats, assisting clients with project needs related to USACE (Sec. 404/10) permitting, NEPA compliance, habitat assessment and wetland delineation, impact and risk assessment, and project design/implementation/management.

The Galveston Bay Foundation—*Environmental Scientist*

- Land Programs Manager, working as an environmental scientist and regulatory specialist, focusing on wetlands and other aquatic habitats. Experienced team member on numerous aquatic habitat restoration projects aiding in project design, funding development, safety and toxicity issues, and habitat quality/needs. Projects included numerous aquatic habitat (stream/river, estuarine wetland) restoration projects, stream bank erosion protection, and stream/estuarine aquatic habitat assessments, including lifecycle and habitat needs. Extensive experience developing and evaluating U.S. Army Corps of Engineers permits applications and related documents for the Galveston Bay Foundation. Experienced with the complex regulatory framework affecting projects that potentially impact coastal habitat (NEPA, ESA, CWA, etc.).
- Worked in the area of habitat conservation, overseeing the Foundation's Land Conservation program managing more than 2,500 acres of protected coastal habitat (terrestrial and aquatic). Included conservation easements, fee-simple acquisition, and development of habitat assessments, project cost models, and easement contracts. The management focus of these holdings to protect and enhance important, complex habitats for biologic communities at all trophic levels, including threatened and endangered species.
- Habitat restoration experience at all phases, including project development, permit acquisition, fundraising/grant development, and project implementation. Projects include:
  - Emergent estuarine marsh and seagrass habitat beneficially using dredge material from onsite, coupled to preservation (conservation easement) of associated coastal high marsh and prairie (buffer) habitat in west Galveston Bay and Galveston Island.
  - Emergent estuarine and palustrine marsh within riparian corridors of lower Galveston Bay.
  - Estuarine marsh and correction of erosional losses of shoreline in high wave energy areas of east Galveston Bay.
    - Subsided marsh within mixed urban/industrial areas of upper Galveston Bay and the San Jacinto River where potential toxicant/exposure concerns contrasted with significant cultural and environmental benefits including community education and recreation opportunities, and ecosystem enhancement.

- Project manager for a number of federal grant funded habitat research and educational projects at all phases. This includes fund raising, project design and implementation, reporting, and public outreach. Example projects include:
  - "Science Based Monitoring of Created Wetlands and Restored Habitat within the Galveston Bay System", a joint project in partnership with the University of Houston Clear Lake. This research focused on the functional aspects (biotic community, sediment, and water quality) of multiple wetland habitat restoration sites, generating data regarding the vegetation and faunal uses of created marshes relative to natural ones. The research was framed along the recommendations from "Science-based Restoration Monitoring of Coastal Habitats (NOAA Coastal Ocean Program, Decision Analysis Series No. 23, Volumes 1 and 2). Funding partners included NOAA, the Texas General Land Office Texas (GLO) Coastal Management Program (CMP), and the Galveston Bay Estuary Program (GBEP). Data was collected according to the Quality Assurance Program Plan (QAPP) prepared by Jim Dobberstine and Cynthia Howard to meet EPA and TCEQ requirements for scientific data. Data collected is anticipated to aid habitat restoration managers with the design and implementation of future projects in the lower Galveston Bay watershed.
  - "Discover Galveston Bay Interpretive Sign Project": Two-tier grant funded project placing educational signs on the natural history specific to 40 locations around the Galveston Bay watershed in cooperation with multiple private and public agency partners. Funded by NOAA and the Texas GLO CMP.
- Project manager for a number of successful projects linking science to policy, including:
  - The Galveston Bay Foundation's Wetland Permit Review Program working proactively with citizens, local business, and federal, state and regional policy makers to affect positive change to both individual actions and the underlying policies affecting the Galveston Bay watershed. Coordinated with federal, state, and local agencies to review project proposals within the lower Galveston Bay watershed, providing comments on impacts, alternatives analysis, mitigation requirements, and project design, aimed at reducing any given project's adverse impacts to Galveston Bay. Also conducted rulemaking reviews and comment development, and worked to establish clear links between the relevant science and policy affecting aquatic habitat management within the bay system.
  - The federally funded (USFWS) Living Shorelines programs, assisting local landowners with permitting, fundraising, and project implementation for shoreline restoration and alternative shoreline stabilization on private lands within the bay system to correct habitat losses due to erosion and subsidence.
- GBF representative on citizen advisory panels (CAPs) facilitating communication between local petrochemical industry and neighboring communities, including the Bay Area Citizens Advisory Panel (Baycap) and the Seashore Area Citizens Advisory Panel (Seacap).
- 2005: Public Participation and Education Plenary Session moderator at the GBEP "State of the Bay" Symposium, January 25th, Houston TX.

Grant Funding Acquired

- 2007 NOAA/Texas GLO Coastal Impact Assistance Program (CIAP) grant award to the Galveston Bay Foundation. $71K to fund the GBF Living Shorelines Program.
- 2007 Galveston Bay Estuary Program grant awarded to the University of Houston Clear Lake in partnership with the Galveston Bay Foundation. $10K to supplement the NOAA/Texas GLO Coastal Management Program (CMP) grant for "Science-based Monitoring of Created Wetlands and Restored Habitat within the Galveston Bay System."
- 2006 US Fish and Wildlife Service Coastal Program grant to the Galveston Bay Foundation. $30K to fund the Living Shorelines Program.
- 2006 Fish America Foundation/NOAA Restoration Center grant to the Galveston Bay Foundation. $50K to fund a portion of the coastal habitat restoration at Snake Island Cove.
- 2006 NOAA/Texas GLO CMP grant awarded to the University of Houston Clear Lake in partnership with the Galveston Bay Foundation. $42K to fund a portion of a research project titled "Science-based Monitoring of Created Wetlands and Restored Habitat within the Galveston Bay System." Project to complete Summer 2008.
- 2006 NOAA/Texas GLO CMP grant awarded to the Galveston Bay Foundation. $33K to fund the Drive and Discover Galveston Bay Interpretive Sign Project (Phase 2).

The Houston Advanced Research Center (HARC)—*Contract Consultant*

- Assisted information management, technical communications, and stakeholder facilitation related to the Galveston Bay Freshwater Inflows Group, a program of the Galveston Bay Estuary Program. Required extensive knowledge of stream and estuarine ecology, water quality, and research methods.

The University of Houston Clear Lake (UHCL)—*Graduate Research Assistant*

- Research assistant to Dr. Cindy Howard, working on estuarine habitat assessments (water, sediment, benthic community), sediment toxicity (internship completed with the PBS&J Environmental Toxicology Laboratory, Houston under Dr. Jim Horne), and sediment contaminants (heavy metals, organics).

Public zoo and aquarium field—*Senior Biologist, Aquatic Habitat Specialist*

- Extensive experience working with aquatic organisms, water quality, and aquatic habitats with organisms including fish, birds, and marine mammals.

Related Publications

- 2009-11: Editor and section contributor to Laboratory and Field Exercises in Environmental Science (Lehmberg, 2010; ISBN978-0-578-05921-1).
- 2011: Platform presentation at the 2011 Native Plant Society of Texas Annual Symposium titled "Functional Assessment of Coastal Marsh Communities at Four Restored Sites in the Galveston Bay System. Co-presenter: Cynthia L. Howard, University of Houston Clear Lake.
- 2008: Final Report: Galveston Bay Wetland Restoration Assessment. Contract No. 582-7-84936. Prepared for the Galveston Bay Estuary Program of the Texas Commission on Environmental Quality. C. Howard and J. Dobberstine.
- 2008: Platform presentation at the 4th National Restore America's Estuaries Conference (Providence, RI) on ongoing research titled "*Comparing salt marsh ecosystem responses to different restoration techniques*". Also presented at the 2009 Texas Coastal Conference hosted by the Texas General Land Office (Galveston, TX).
- 2008: Final report: Science-based Monitoring of Created and Restored Habitat within the Galveston Bay System. Prepared for the Coastal Management Program of the Texas General Land Office and the National Oceanic and Atmospheric Administration. Contract No. 07-005-11. J. Dobberstine and C. Howard.
- 2007: Quality Assurance Project Plan (QAPP) for the Galveston Bay Wetland Restoration Assessment. Contract No. 582-7-84936. Prepared for the Texas Commission on Environmental Quality and the U.S. Environmental Protection Agency. J. Dobberstine and C. Howard.
- 2007: Co-author of a research poster presented at the Eighth Biennial State of the Bay Symposium (Galveston, TX) titled "Identifying suitable reference sites for impacted sites along the Houston Ship Channel" (J. Dobberstine, J. Horne, L. Brzuzy, C. Howard). Full paper in the conference proceedings, viewable at http://gbic.tamug.edu/gbeppubs/sobviii/sobviii_rpr.htm#Dobberstine. This work was also presented as a platform at the 2006 Society of Environmental Toxicology and Chemistry National Conference (Montreal, Canada) and at the American Association for the Advancement of Science (AAAS) Southwestern and Rocky Mountain Division Annual Meeting (Clear Lake, TX), April 2007, where it was awarded "Honorable Mention" for outstanding student paper presentation.
- (2007) *"Sediment Triad Approach to Finding a Suitable Reference Bayou for Patrick Bayou and Similar Sites Located on the Houston Ship Channel"*. Master's Thesis, UHCL.
- 2007: Presenter at the Texas Association of Environmental Professionals Environmental Challenges and Innovations Conference; presented a platform titled *"Public Comments and the role of an NGO in the NEPA process; an overview of the Galveston Bay Foundation's volunteer Permit Review Committee."* Also presented at the Society for Wetland Scientists annual conference in June 2007.
- 2007: Co-author of two research posters, *"Functional Assessment of Plant Communities at Four Restored Sites in a Lower Galveston Bay Estuarine Marsh Complex"* (L. Ray, J. Dobberstine, J.C. Whitney, C. Howard) and *"Comparison of Benthic Macroinvertebrate Communities among Native, Restored, and Impacted Salt Marshes in the Galveston Bay System"* (K. Farmer, J. Dobberstine, C. Howard), presented at the Society of Environmental Toxicology and Chemistry National Conference (Milwaukee, WI).

- 2006: Landowner Initiative Final Report. USFWS Agreement No. 1448-20181-02-G917. Prepared for the U.S. Fish and Wildlife Service Texas Coastal Program. J. Dobberstine.
- 2006: Round Table presenter and panelist at the Texas A&M University Chapter of Sigma Xi's Spring Symposium (College Station, TX) on "Sea-level rise, hurricanes, and the future of our coasts".
- 2006: Platform presentation titled *"Successes and Challenges: An overview of community-based coastal marsh restoration in Galveston Bay"* at the 3rd National Restore America's Estuaries National Conference (New Orleans, LA).
- 2005: Co-author of a platform presentation, *"PAHs Environmental Overview: Occurrence in Houston Area Sediments"* (I. Rhodes, J. Dobberstine, L. Brzuzy), presented at the SETAC SW Regional Meeting (Marble Falls, TX).
- 1996: Co-authored paper titled "Hand-rearing Scarlet Ibis (*Eudocimus ruber*) at Moody Gardens". Published in the Animal Keepers' Forum, October 1996. Awarded Certificate of Excellence in Journalism at the American Association of Zookeepers National Conference in October 1997.

Research manuscripts in progress:

- *"An Assessment of Restored Wetlands in the Lower Galveston Bay Watershed"*. Co-Author: Cynthia L. Howard, University of Houston Clear Lake.

Professional Associations

- Texas Association of Environmental Professionals (TAEP): Board member since 2008:
  - *President (2010-present)*
  - *Education Director (2008- present; oversees the association's Chuck Glore Memorial Scholarship program, which awards $1000 scholarships to environmental science and engineering students at several southeast Texas universities)*
  - http://www.taep.org
- South Central Regional Chapter of the Society of Environmental Toxicology and Chemistry (SETAC):
  - *Board Member (2010 to present)*
  - *Vice-President (2012-13)*
  - http://www.setac.org/socentral
- The Galveston Bay Foundation:
  - *Board member 2009-present*
  - *Delegate Trustee representing TAEP*
  - *Advisor for the Land Committee working with conservation land holdings*
  - *Advisor for the Wetland Permit Review Committee reviewing regulatory notices and advising on actions*
  - http://www.galvbay.org
- Galveston Bay Council (Galveston Bay Estuary Program):
  - *Vice-Chair of the Public Participation and Education Subcommittee (2003-2006)*
  - *Member of the Monitoring and Research Subcommittee (2007-present)*
- Member of the Council on Undergraduate Research (2010 to present)

Awards

- 2009 Phi Theta Kappa "Certificate of Appreciation" in recognition of valuable contributions to the 2009 student inductees.
- 2007 "Honorable Mention" for outstanding student paper presentation. "Identifying suitable reference sites for impacted sites along the Houston Ship Channel" at the American Association for the Advancement of Science (AAAS) Southwestern and Rocky Mountain Division Annual Meeting (Clear Lake, TX).
- 2004 Student Scholarship to attend the SETAC 4th World Congress, Portland OR to present a research poster titled "Is there a Suitable Reference Site for Impacted Sites along the Houston Ship Channel?"

- Brown and Root Halliburton Environmental Management Student Scholarship 2002 through 2005.
- Jones Endowment School of Business and Public Administration Student Scholarship 2003/2004.
- Rhome and Haas Environmental Science Student Scholarship 2004/2005.
- 2002 student scholarship for the "State of the Bay" symposium from the Texas Commission on Environmental Quality Galveston Bay and Estuary Program.

Bolyvong Tanovan, Ph.D, P.E.

Qualifications Summary

- River Operations Manager and Planner – 25-years' experience in planning and managing the operations of the Columbia River multi-project river system for flood control, hydropower, water supply, water quality, recreation, navigation, and fish and wildlife. Worked in senior planning or engineering roles (as Corps of Engineers Northwestern Division Water Quality Section chief, 1983-99, and Power Branch chief, 1999-2008), coordinating activities with other federal agencies, state river basin authorities, regional planning commissions and hydropower utilities involved in the large, complex civil works projects in the Columbia River basin with high public and interagency and regional/international interests (challenged by the Endangered Species Act, the Clean Water Act, the Columbia River Treaty with Canada, and the Pacific Northwest Coordination Agreement for hydropower generation). Actively involved in planning and actual daily reservoir system operations in the Columbia River Reservoir Control Center and Inter-Agency Technical Management Team to meet water quality standards and mainstem fish passage survival goal while optimizing system hydropower generation.
- Water Resources Engineer – M.S.C.E. and Ph.D. degrees; licensed/registered P.E. Experienced building and using rules-based reservoir simulation models such as HEC-ResSim (and HEC-5) to analyze alternatives for operation of Columbia River multi-project and multipurpose river systems. Deeply involved in hydropower, anadromous fish passage, and water quality operations and analyses, using HEC-5Q and other water quality models (e.g., CE-QUAL-R1 and R2) to analyze water quality interactions in both lake (e.g., Grand Coulee, Dworshak, and Libby) and river systems (Columbia-Snake Rivers). 25 years of demonstrated experience in system operational planning and managing the water quality and fish passage program for the large, complex Columbia River system civil works projects with high public and interagency interests. Performed as tri-agency Water Quality work group leader in the multi-million dollar Columbia River System's Operation Review; Technical Lead in initial phase of Columbia Treaty Review.

Education

- Ph.D., Hydrologic Engineering, Federal Institute of Technology, Lausanne, Switzerland
- M.S., Civil Engineering, Federal Institute of Technology, Lausanne, Switzerland

Summary of Professional Experience

Current Employment

- Retired from the US Army Corps of Engineers in November 2008. Previously, Chief, Power Branch, Columbia Basin Water Management Division, Corps of Engineers Northwestern Division, Portland, OR
- Part-time engineering consultant (hydrology, hydraulics, water resource management)
- English/Lao Translator for International Translation Service, Minneapolis, MN
- Oral Proficiency Tester for the American Council for the Teaching of Foreign Language (ACFTL), White Plains, NY

U.S. Army Corps of Engineers, Northwester, Division—*Chief*

- Sept. 1999 to Nov. 2008: Chief of Water Management Power Branch, leading annual operational planning for the 31 major Corps and other Treaty dams on the Columbia River System, maintaining regional coordination with federal and nonfederal project owners and operators in the Pacific Northwest, and managing the Hydropower Analysis Center of expertise tasked with performing hydropower studies for Corps projects across the nation, and for hydro projects in several foreign countries.
- Oct. 1983- Sept. 1999: Chief of the Fish & Water Quality Section, and member of the Corps of Engineers' national Water Quality Committee.
- Major accomplishments: (1) established satellite-based Total Dissolved Gas Monitoring system for the Columbia River System, (2) created International USA-Canada Water Quality Work Group, (3) developed real-

time anadromous fish migration (FISHPASS) model for the Columbia/Snake Rivers, (4) developed operational Columbia System water temperature (COLTEMP) model, (5) created website-based study protocols for Corps/BPA/Reclamation water management partnership, Technical Management Team, and Joint Operating Committee, (6) prepared script for the documentary film, "The River of Many Returns", (7) supervised preparation of Columbia River Treaty annual operating plans, (8) redefined role and funding of the Hydropower Analysis Center of Expertise, (9) coordinated construction and operation of Columbia flip lip spillways and Willamette selective withdrawal towers, and (10) coordinated visits to Columbia projects requested by foreign visitors from around the world.

R.E. Meyer Consultants, Inc.—*Manager, Water Resource Department*

- 1976-1983: Worked on basin and land use planning; flood insurance studies for FEMA; and watershed and dam-break modeling for Oregon counties.

United Nations-sponsored Mekong River Committee Secretariat—*System Planner and Program Officer*

- 1967-1976: Developed basin-wide SSARR-based Upper Mekong flood forecast model, and SOGREAH-based Mekong Delta model. Prepared long-term indicative hydropower basin development plans.

U.S. Corps of Engineers, North Pacific Division

- 1965-67: Training in stream flow synthesis and computer applications to system analysis.

Laos Electricity Authority—*Manager, Civil Engineering*

- 1963-1967: Participated in feasibility studies and constructions of the first three Lao dams (Nam-Ngum, Selabam, and Nam Dong).

Professional Associations

- Registered Professional Engineer, Oregon, 1977
- Past-Member, Society of American Military Engineers
- Past-Member, American Society of Civil Engineers

Jesse K. McDonald

Qualifications Summary

- 30 years as US Army Core of Engineers Economist and Water Resource Planner
- 10+ years' consulting experience as Economist/Water Resource Planner
- Experienced in large studies impacting navigation, fish and wildlife, and water supply
- Extensive experience evaluating conditions and impacts to municipal and industrial water supplies

Education

- Graduate, Corps of Engineers Leadership Development Program, 1993
- Graduate, U.S. Army Command General Staff College, 1989
- Graduate, U.S. Army Officers Advanced Engineer School, 1978
- Graduate, U.S. Army Officers Basic Intelligence School, 1975
- M.S., Water Resource and Urban Planning, Georgia Institute of Technology
- M.S., Agricultural Economics, Mississippi State University
- B.S., Agricultural Economics, Mississippi State University

Summary of Professional Experience

Economist/Water Resource Planner—*Self Employed*

- July 2011 to December 2011: Served as an economic consultant to the U.S. Army Engineer District, Vicksburg, developing a "White Paper" detailing the hypoxia problem in the Gulf of Mexico, relating the scope of this problem to the amount of nitrogen and phosphorous entering the Gulf from the Mississippi and Atchafalaya Rivers, and describing the relationship between sedimentation and movement of nitrogen and phosphorous. Various "best management practices" for removing nitrogen and phosphorous from surface water and other possible metrics for quantifying benefits of sediment retention structures were researched and analyzed. Based on the analysis of these metrics, a method of quantifying benefits to these structures from removal of nitrogen and phosphorous was recommended.
- May 2011 to Present: Served as an economic consultant studying the Caño Martín Peña Ecosystem Restoration Project in San Juan, Puerto Rico. Responsible for the Cost Effectiveness/Incremental Cost Analysis of numerous alternatives for restoring natural ecosystem of the area and for providing information for use in selecting a preferred alternative that provides the optimal combination of restoration and park facilities. IWR Planning Suite was used to analyze all alternatives and to identify those alternatives that were cost effective and those that were also "Best Buys." Responsible for preparing sections of the report dealing with economic costs and with plan analysis.
- June 2010 to Present: Served as an economic consultant to the U.S. Army Engineer Division, Mississippi Valley. Proved technical guidance and performed certain analyses regarding socioeconomic planning for various civil works projects. The tasks varied and were identified by MVD Planning Community of Practice staff on a monthly basis. Advised the MVD Planning Staff on resolution of all socio-economic problems and issues arising during the duration of this contract. Responsible for preparing Documentation and Certification Report for the Agricultural Flood Risk Management (AGFRM) model which has just completed revision and will be used in the Districts in the Mississippi Valley Division and in the Sacramento District.
- January 2010 to August 2010: Served as an economic consultant to the U.S. Army Engineering District, Seattle, studying the Seahurst Park, North Seawall Project. Responsible for the Cost Effectiveness/Incremental Cost Analysis of numerous alternatives for restoring natural marine nearshore processes and for providing information for use in selecting a preferred alternative that provides the optimal combination of shoreline habitat restoration, park facilities, and support for ongoing educational programs. IWR Planning Suite was used to analyze all

alternatives and to identify those alternatives that were cost effective and those that were also "Best Buys." Responsible for preparing sections of the report dealing with economic costs and with plan analysis.

- October 2008 to September 2010: Served as an economic consultant to the Lake Ponchatrain Levee District studying the Bayou Manchac, Louisiana. Responsible for data collection and economic analysis of all alternatives for flood control in the project area. . Flood damages for existing conditions and all alternatives were calculated using HEC-FDA and the Marshall and Swift real estate valuation software package. Hydrologic and plan formulation efforts were reviewed for reasonableness and compatibility with the existing and projected economic development of the area.
- May 2008 to August 2009: Served as an economic consultant to the U.S. Army Engineering District, Vicksburg providing quality control to a revision of the Computerized Agricultural Crop Flood Damage Assessment System being conducted by Mississippi State University. These revisions included changing the programming language from Fortran to a Windows based environment using Microsoft Visual SoftPro. Improvements were made to the manner in which the computer program handled various inputs and outputs. A standalone risk analysis program was developed using the Crystal Ball to provide risk analysis for the crop program. Revisions include the ability to read budget data directly from several Budget Generators used by various Land Grant Universities or to input budget data in Spreadsheet format.
- October 2007 to March 2008: Served as an economic consultant to the U.S. Army Engineering District, Sacramento studying the Lower Walnut Creek, California, area. Participated in gathering and organizing data and information based on Contra Costa County Assessor Parcel Rolls and other sources to produce a complete and accurate inventory of all structures/properties and infrastructure that are located within the 500-year floodplain in the study area. Used the Marshall and Swift real estate valuation software package to compare property valuations with the Assessor Parcel Rolls. Interviewed special facilities such as airports, refineries, sewage treatment plants, etc. to determine damage potential from potential floods.
- October 2007 to June 2009: Served as an economic consultant to the U.S. Army Engineer Division, Mississippi Valley. Proved technical guidance and performed certain analyses regarding socioeconomic planning for various civil works projects. The tasks varied and were identified by MVD Planning Community of Practice staff on a monthly basis. Advised the MVD Planning Staff on resolution of all socio-economic problems and issues arising during the duration of this contract. Participated in technical meetings and issue resolution conferences as determined by MVD staff.
- March 2006 to July 2007: Served as an economic consultant to the U.S. Army Engineer Division, Mississippi Valley. Responsible for providing technical guidance and performing certain analyses regarding socioeconomic planning for various civil works projects. The tasks varied and were identified by MVD Planning Community of Practice staff on a monthly basis. Advised the MVD Planning Staff on resolution of all socio-economic problems and issues arising during the duration of this contract. Participate in technical meetings and issue resolution conferences as determined by MVD staff.
- April 2006 to January 2007: Worked with two other consulting firms in support of the Louisiana Department of Natural Resources' (LDNR) development of a Comprehensive Master Plan for Hurricane Protection and Coastal Restoration. JAYMAC was responsible for development of all economic data in support of all alternatives developed as a part of the comprehensive plan. Data included estimates in the areas of damage reduction, reduced emergency costs, impacts on transportation, impacts on area tax base, business losses, etc. Damages were based on information from FEMA's HAZUS-MH Flood Model, Marshall and Swift real estate valuation system, Manheim Used Vehicle Index, agricultural budgets, etc.

Economist/Water Resource Planner-Consultant —*Subcontractor*

- March 2006 to August 2006: Responsible for providing technical support to Vicksburg District economists in the development of revised methodologies and assumptions regarding planting dates, yields, cultural practices, etc. for the Yazoo Backwater Pump Project reanalysis. Responsible for assisting District personnel in developing detailed documentation of all benefit methodologies and in preparing the "Revised Economic Appendix." Will participate in meetings in Washington D.C. with District personnel to meet with EPA, HQUSACE, and other Federal agencies concerning Yazoo Backwater Pumps. Assisted the District in including risk and uncertainty into the economic analysis using Palisades @RISK software.
- July 2004 to March 2006: One of a team of five consulting firms selected by the Louisiana DNR to prepare a feasibility analysis and 30% design for freshwater diversion alternatives from the Mississippi River to Bayou

Lafourche. Had complete responsibility for the quantification of benefits, incremental analysis of alternatives using quantifiable and non-quantifiable benefits (using IWR Plan), cost allocation, and financial analysis for all alternatives. The final report was completed in March 2006.

- July 2005 to February 2006: Performed an independent review of the Economic Appendix of the Reformulation Report for the Yazoo Backwater Pump Project. Reviewed and prepared responses to EPA comments on the Yazoo Backwater Pump Report. Reviewed and prepared a position paper on the technical accuracy and relevancy to application in the Yazoo Backwater of the report "An Approach for Evaluating Nonstructural Actions With Application to the Yazoo River (Mississippi) Backwater Area" by Leonard Shabman and Laura Zepp of VPI. Provided oversight to agricultural economists and agronomists from the Mississippi Agricultural and Forestry Experiment Station in Starkville and Stoneville during the development of data on soybean, corn, and cotton production in the Yazoo Backwater Project area.
- June 2003 to January 2004: Provided hydrologic engineering, plan formulation, and economic analyses of a Section 205, Small Flood Control Project in Lilbourn, Missouri. Collected data on the flood plain and conducted the economic analysis of all proposed alternatives. Flood damages for existing conditions and all alternatives were calculated using HEC-FDA and the Marshall and Swift real estate valuation software package. Reviewed the hydrologic and plan formulation efforts for reasonableness and compatibility with the existing and projected economic development of the area. (Worked with another consultant as part of a project for the Memphis District, U.S. Army Corps of Engineers.)
- September 2002 to January 2004: Louisiana Coastal Area Ecosystem Restoration Feasibility Study –As a part of Phase II of the LCA Study, further developed and described the economic linkages between saltwater marshland and flood control, navigation, national security, recreation, etc. for the New Orleans District, USACE. Quantified economic impacts of coastal erosion on various economic sectors (navigation, agricultural, etc.) of Louisiana and the Nation. Developed information on the importance of the Mississippi River and Tributaries Project to the Nation. (Worked with another consultant for the New Orleans District, U.S. Army Corps of Engineers.)
- May 2002 to September 2003: Involved in the collection of data and development of depth-damage and structure to content relationships for the Donaldsonville to the Gulf study in south Louisiana. (Worked with another consultant for the New Orleans District, U.S. Army Corps of Engineers.)
  - Involved in the collection of data and preparation of a Reconnaissance Study for Mustang Bayou in the vicinity of Alvin, Texas. This report was prepared in accordance with Section 905(b), WRDA 1986. (Worked with another consultant for the Galveston District, U.S. Army Corps of Engineers.)
  - Involved in the collection of data concerning waterborne movements on Chocolate Bayou, Texas, and preparation of an economic analysis of maintenance dredging on the waterway. Transportation rates for barge, truck, and rail were developed using the REEBIE transportation cost models (now Global Insight Transportation Models). This analysis was part of the Dredged Material Management Plan for Chocolate Bayou. (Worked with another consultant for the Galveston District, U.S. Army Corps of Engineers.)
- June 2001 to May 2002: Conducted literature review and made recommendations concerning the economic evaluation of saltwater marshland in south Louisiana as part of Phase I of the Louisiana Coastal Area Ecosystem Restoration Feasibility Study. Reviewed current and past efforts in economic evaluation of ecosystem restoration/preservation and preparation of a report describing these efforts. Developed and described the economic linkages between saltwater marshland and flood control, navigation, national security, recreation, etc. (Worked with another consultant as part of a project for the New Orleans District, U.S. Army Corps of Engineers.)
- June 2001 to April 2002: Collected data and provided information for briefs in a lawsuit involving insurance claims concerning increased corn prices caused by the Great Mid-Western Flood of 1993. (Worked with a law firm from Washington, DC.)
- June 2001 to March 2002: Conducted the agricultural flood control portion of an economic analysis of proposed flood control and water supply alternatives in the area of West Palm Beach, Florida. Assisted in urban flood control, water supply, recreation, etc. (Worked with another consultant as part of a project for the Jacksonville District, U.S. Army Corps of Engineers.)
- June 2001 to December 2001: Worked with another consulting firm in conducting a preliminary analysis of the economic, environmental, and engineering feasibility of deepening the Ports of Iberia and Morgan City, Louisiana, and preparing preliminary Plans of Study for an analysis of each port under the authority of Section

203 of WRDA 1986. (Terminated in favor of a cost-shared feasibility study with the New Orleans District, U.S. Army Corps of Engineers.)

- June 2001 to August 2001: Provided hydrologic engineering, plan formulation, and economic analyses of a Section 205, Small Flood Control Project in Forrest City, Arkansas. Collected data on the flood plain and conducted the economic analysis of all proposed alternatives. Flood damages for existing conditions and all alternatives were calculated using HEC-FDA and the Marshall and Swift real estate valuation software package. Reviewed the hydrologic and plan formulation efforts for reasonableness and compatibility with the existing and projected economic development of the area. (Worked with another consultant as part of a project for the Memphis District, U.S. Army Corps of Engineers.)
- April 2001 to July 2001: Involved in hydrologic engineering, plan formulation, and economic analyses of two Section 205, Small Flood Control Projects located in the urban area of Memphis/Shelby County, Tennessee. Collected data on the flood plains and conducted the economic analysis of all proposed alternatives. Flood damages for existing conditions and all alternatives were calculated using HEC-FDA and the Marshall and Swift real estate valuation software package. Reviewed the hydrologic and plan formulation efforts for reasonableness and compatibility with the existing and projected economic development of the area. (Worked with another consultant as part of a project for the Memphis District, U.S. Army Corps of Engineers.)
- March 2001 to May 2001: Developed a paper on Corps' involvement in riverfront development. Conducted telephone interviews and literature research to determine which completed and ongoing Corps projects included riverfront development. Identified and described strengths and weaknesses of existing authorities under which the Corps could possibly conduct riverfront development studies. Supplied knowledge of current Corps activities, Corps personnel, and sources of information available on the Internet. (Worked with another consultant for the New Orleans District, U.S. Corps of Engineers.)
- August 2000 to January 2001: Conducted a Natural Resource Study for a feasibility study for extending navigation on the Red River from Shreveport, Louisiana, to Index, Arkansas. Collected and analyzed data on the future viability of the forest and forest product industry in the study area. Conducted analysis of the economic viability of transporting products associated with this industry on the proposed waterway. (Worked with another consultant for the Vicksburg District, U.S. Army Corps of Engineers.)
- July 2000 to August 2000: Performed Technical Review of the economic analysis portion of a Flood Control Study of Morganza to the Gulf, Louisiana. (Provided for the New Orleans District, U.S. Army Corps of Engineers.)
- February 2000 to July 2000: Conducted a study on the economic feasibility of deepening the Port at Panama City, Florida. Conducted interviews with shippers, shipping agents, port officials, and others to determine current and potential future commodity movements through the port and determined the level of benefits from various depths at the port. (Worked with another consultant for the Mobile District, U.S. Army Corps of Engineers.)

U.S. Army Corps of Engineers—*Supervisory Regional Economist, Mississippi Valley Region*

- November 1990 to January 2000: Supervised all economic and social aspects of the Mississippi River Commission (MRC)/Mississippi Valley Division (MVD) water resource planning functions, including MVD employees. Coordinated and provided technical assistance for all navigation planning, evaluation, and systems analysis in MVD, including the Upper Mississippi River and Illinois Waterway Navigation Study, Inner Harbor Canal Lock, and Bayou Sorrell Lock. Served on the Inland Navigation System Prioritization Committee. Developed a prioritized list of needed improvements on the inland navigation system. Served as the Division's point of contact with the Inland Waterway Users Board (IWUB) with responsibility for coordination and regional interface with other Corps divisions, the navigation industry, Headquarters USACE, and the Water Resource Support Center. Provided command and control and technical assistance to the six districts within MVD. Made numerous technical presentations to IWUB, Transportation Research Board, Society of American Military Engineers, and other organizations. Served as a member of the Task Force reengineering the Lock Performance Monitoring System. Served as project manager of studies involving 1993 Mid-West Flood and Mississippi River Impacts of Missouri River Reservoir Operations (including the impacts on inland navigation). Ensured all economic and financial analyses and socio-economic studies were in conformance with all Corps policy and legal requirements.

U.S. Army Corps of Engineers—*Regional Economist, Lower Mississippi Valley Region*

- February 1979 to November 1990: Formulated and evaluated water resource studies, including development, application, and review models and procedures for economic and social evaluation. Engaged in coordination and technical assistance for all inland navigation planning and evaluation in the Lower Mississippi Valley Division (LMVD). Served on the Inland Navigation System Prioritization Task Force. Assisted districts with evaluation of urban and agricultural flood control projects and preparation of socio-economic portions of EISs and other pertinent documents. Served as project manager for report on Impacts of 1988 Drought including the impacts on inland and deep draft navigation. Served as Assistant Chief of Branch.

U.S. Army Corps of Engineers—*Regional Economist, Vicksburg District*

- November 1973 to February 1979: Conducted urban studies and comprehensive river basin studies. Served as project manager of the public involvement program for the Pine Bluff, Arkansas, Urban Study and the Mississippi River Backwater Pump Study. Conducted evaluations for flood control, water supply, recreation, and small harbor projects. Prepared socio-economic portions of EISs and other pertinent studies. Served as Assistant Chief of Branch.
- September 1970 to November 1973: Planned and conducted economic base studies and economic evaluations of existing and proposed civil works projects. Assembled and analyzed data based on econometric, statistical, and base data. Prepared reports of findings, including interpretation of data and formulation of conclusions in reports such as the Lower Mississippi River Comprehensive Study. Prepared socio-economic portions for various studies.
- August 1969 to September 1970: Compiled, interpreted, and analyzed economic benefits derived from proposed construction projects and survey investigations. Prepared economic base studies, to include socio-economic characteristics of the study area. Developed waterborne and overland transportation rates and schedules and calculated cost of transportation under “with and without” project conditions for projects such as Vicksburg Harbor.

Department of Agricultural Economics, Mississippi State University—*Graduate Research Assistant*

- June 1968 to August 1969: Assisted department professors in gathering data, performing statistical analyses, and conducting other areas of research while attending graduate school.

United States Army Reserve—*Lieutenant Colonel, Ret.*

- June 1968 to July 1998: Served in the U.S. Army Reserve, retiring as a Lieutenant Colonel from the 412th Engineer Command, Vicksburg, Mississippi. Graduate of the Military Intelligence Officer Basic Course, the Engineer Officer Advanced Course, and Command General Staff College. Served in positions in logistics, operations, intelligence, and comptroller. Involved in numerous war planning exercises in Europe and Korea. As Acting Comptroller, managed the Command’s multi-million dollar budget with an execution rate of 99 percent. Medals include the Meritorious Service Medal with two oak leaf clusters and the Army Commendation Medal with three oak leaf clusters.

Appendix C – Charge for IEPR Panel

The general charge questions provided by the USACE to support the IEPR for the ACT River Basin project are listed below. Additional charge questions may be added subject to USACE concurrence. This charge is provided to the panel to guide its review.

Final Charge Questions

OBJECTIVES

The objectives of this work are to Independent External Peer Review (IEPR) for the Alabama-Coosa-Tallapoosa (ACT) River Basin Water Control Manual (WCM) Update and Environmental Impact Statement (EIS) for the USACE. The IEPR will follow the procedures described in the Department of the Army, U.S. Army Corps of Engineers' guidance Peer Review of Decision Documents (EC 1165-2-214), dated December 15, 2012, and the Office of Management and Budget's Final Information Quality Bulletin for Peer Review, released December 16, 2004.

Peer review is one of the important procedures used to ensure that the quality of published information meets the standards of the scientific and technical community. Peer review typically evaluates the clarity of hypotheses, the validity of the research design, the quality of data collection procedures, the robustness of the methods employed, the appropriateness of the methods for the hypotheses being tested, the extent to which the conclusions follow from the analysis, and the strengths and limitations of the overall product.

This IEPR will analyze the adequacy and acceptability of economic and engineering methods, models, data and analyses employed, and environmental compliance. The independent review will be limited to technical review and will not involve policy review. The peer review will be conducted by subject matter experts with extensive experience in environmental compliance, fisheries biology, sediment engineering, and risk and reliability as specifically related to sediment management in inland navigation, and preparation of programmatic NEPA documents. The subject matter experts will be "charged" with responding to specific technical questions as well as providing a technical evaluation of the overall project.

The subject matter experts (i.e., peer review panel members) will identify, recommend, and comment upon assumptions that underlie the analyses and evaluate the soundness of models, methods, and assumptions. The panel members will evaluate whether the interpretations of analyses and conclusions are technically sound and reasonable, provide effective review in terms of both usefulness of results and of credibility, and have the flexibility to bring important issues to the attention of decision makers. The panel members may offer opinions as to whether there are sufficient technical analyses upon which to base the ability to implement the project. The panel members will address factual inputs, data, and the use of economics and cost engineering models, analyses, assumptions, and other scientific and engineering tools/methodologies to inform decision-making.

CHARGE FOR PEER REVIEW

Members of this peer review panel are asked to determine whether the technical approach and scientific rationale presented in the ACT River Basin WCM Update and EIS are credible and whether the conclusions are valid. The reviewers are asked to determine whether the technical work is adequate, competently performed, properly documented, satisfies established quality requirements, and yields scientifically credible conclusions. The panel is being asked to provide feedback on the environmental and engineering analyses. The reviewers are not being asked whether they would have conducted the work in a similar manner.

GENERAL CHARGE GUIDANCE

Please answer the scientific and technical questions listed below and conduct a broad overview of the ACT River Basin WCM and EIS. Please focus on your areas of expertise and technical knowledge. Even though there are some sections with no questions associated with them, that does not mean that you cannot comment on them. Please feel free to make any relevant and appropriate comment on any of the sections and appendices you were asked to review. In addition, please note the following guidance. Note that the panel will be asked to provide an overall statement related to 1 and 2 below per USACE guidance (EC 1165-2-214; Appendix D).

1. Assess the adequacy and acceptability of the environmental and engineering methods, models, and analysis used.
2. If appropriate, offer opinions as to whether there are sufficient analyses upon which to base a recommendation for construction, authorization, or funding.
3. Evaluate whether the interpretations of analysis and conclusions are reasonable.
4. Please focus the review on scientific information, including factual inputs, data, the use and soundness of models, analyses, assumptions, and other scientific and engineering matters that inform decision makers.
5. Please **do not** make recommendations on whether a particular alternative should be implemented, or whether you would have conducted the work in a similar manner. Also please **do not** comment on or make recommendations on policy issues and decision making.
6. If desired, panel members can contact one other. However, panel members **should not** contact anyone who is or was involved in the project, prepared the subject documents, or was part of the USACE Agency Technical Review.
7. Your name will appear as one of the panel members in the peer review. Your comments will be included in the Final IEPR Report, but will remain anonymous.

GENERAL QUESTIONS

1. Are the assumptions that underlie the environmental and engineering analyses sound?
2. Please comment on the adequacy and acceptability of the models and analyses used, as well as any assumptions made.
3. Are the interpretations of analysis and conclusions based on the analysis reasonable?
4. Please comment on the adequacy of the document as a programmatic EIS.

SPECIFIC QUESTIONS

A. Basin Water Control Manual including Individual Project Water Control Plans (Reference HEC ResSim and HEC-5Q modeling reports)

1. Does the proposed manual reasonably represent the most beneficial plan of regulation to balance operations for all authorized purposes among the federal projects in the basin in a manner consistent with applicable law and prevailing constraints, while insuring the safety of the public and the projects?
    a. Are the authorized project purposes, operational objectives, and any operational priorities clearly explained?

b. Based on your experience with similar activities, was adequate coordination made with other federal, state, regional and local agencies in developing the proposed operational plan for the basin?

c. Were sufficient alternatives considered to reasonably identify the most beneficial plan of regulation for balanced operations and to test the proposed guide curves?

i. Were the models used in the analysis used in an appropriate manner?

ii. Are assumptions and methods used in the analysis consistent with generally accepted practices?

d. Have the effects of, and impacts on, non-Corps projects been considered in appropriate detail?

e. Have minimum stream flow requirements, to include both quality and quantity, been adequately considered and addressed in a manner consistent with the authorized project purposes and legal requirements?

f. Were opportunities and constraints related to modifying the existing plan for regulation of flood events adequately considered in alternatives for regulation of conservation storage?

g. Has adequate consideration been given to beneficial uses and habitat at, and downstream of projects through enhancement and non-degradation of water quality?

h. Do the individual project water control plans and proposed water control diagrams accurately support the proposed plan for regulation in the basin?

2. Does the drought contingency plan adequately identify potential measures that could be implemented to respond to public needs during drought situations within the existing project authorities and legal requirements?

3. Did comparisons of operational plans appropriately consider the likelihood and variability of project performance for the authorized purposes among the alternatives?

4. Does the proposed plan of operations provide adequate flexibility, within existing legal authorities and constraints, to address uncertainty in future conditions?

B. Environmental Impact Statement

1. Background and Scope

a. Are the underlying purposes and needs for the action adequately documented as a basis for the development and analysis of alternatives?

b. Is the geographic and environmental area of interest relevant to the proposed action adequately defined?

i. Are there additional considerations that would indicate the need to expand or contract the definition of the affected area?

ii. Is the area large enough to support analysis at an appropriate level and ensure that alternatives address the cause and effects among affected resources and activities?

c. Are applicable authorities, court orders and policy that affect the scope and development of alternatives clearly presented?

d. Were the public, stakeholders, agencies and Native American tribes adequately engaged in the scoping of issues, concerns and potential remedies?

2. Existing Conditions and Affected Environment

a. Is the analysis of existing resources within the affected area comprehensive and sufficiently complete to support the study analyses?

b. Are there other significant resources or conditions that may be impacted that have not been considered?

3. Definition of the No-Action Alternative

a. Are the future conditions expected to exist in the absence of updating the water control manual logical and adequately described and documented?

b. Are there other outcomes that you would consider equally or more likely?

4. Formulation and Screening of Alternatives

a. Was an adequate array of possible measures considered in the development of alternatives?

b. Do alternatives meet the objectives for regulation of the basin and avoid violating relevant constraints?

c. Please evaluate the screening of the proposed alternatives. Are the screening criteria appropriate? In your opinion, are the results of the screening acceptable?

5. Evaluation and Comparison of Alternatives

a. Were the assumptions made for use in developing the future conditions for each alternative reasonable? Were assumptions consistent across the range of alternatives?

b. Did the technologies and techniques used in this study yield complete and acceptable analyses?

c. Are the changes between the no-action and proposed action conditions adequately described?

d. Based on your experience, is there any additional significant engineering, economic, social or environmental information that should be considered when evaluating the alternatives?

e. Were the planning models used sufficiently discriminatory to identify meaningful differences between alternatives and support the conclusions drawn from them?"

6. Implementation of Recommended Plan

a. Have the cumulative impacts of the tentatively selected alternative been comprehensively and accurately described?

b. Are implementation responsibilities and requirements, to include environmental commitments, of the USACE sufficiently described?

7. Public Involvement and Coordination.

a. Based on your experience with similar projects, has adequate public, stakeholder, and agency involvement occurred to determine all issues of interest and to ensure that they are adequately addressed?

Appendix D – USACE Conflicts of Interest Questionnaire

Conflicts of Interest Questionnaire

[Independent External Peer Review]

[ACT WCM]

The purpose of this document is to help the U.S. Army Corps of Engineers identify potential organizational conflicts of interest on a task order basis as early in the acquisition process as possible. Complete the questionnaire with background information and fully disclose relevant potential conflicts of interest. Substantial details are not necessary; USACE will examine additional information if appropriate. Affirmative answers will not disqualify your firm from this or future procurements.

NAME OF FIRM: Noblis
REPRESENTATIVE'S NAME: Ahmad Faramarzi
TELEPHONE: 703-610-2137
ADDRESS: 3150 Fairview Park Drive South Falls Church, VA 22042
EMAIL ADDRESS: ahmad.faramarzi@noblis.org

I. INDEPENDENCE FROM WORK PRODUCT. Has your firm been involved in any aspect of the preparation of the subject study report and associated analyses (field studies, report writing, supporting research etc.) (No) Yes (if yes, briefly describe):

II. INTEREST IN STUDY AREA OR OUTCOME. Does your firm have any interests or holdings in the study area, or any stake in the outcome or recommendations of the study, or any affiliation with the local sponsor? (No) Yes (if yes, briefly describe):

III. REVIEWERS. Do you anticipate that all expert reviewers on this task order will be selected from outside your firm? No (Yes) (if no, briefly describe the difficulty in identifying outside reviewers):

IV. AFFILIATION WITH PARTIES THAT MAY BE INVOLVED WITH PROJECT IMPLEMENTATION. Do you anticipate that your firm will have any association with parties that may be involved with or benefit from future activities associated with this study, such as project construction? (No) Yes (if yes, briefly describe):

V. ADDITIONAL INFORMATION. Report relevant aspects of your firm's background or present circumstances not addressed above that might reasonably be construed by others as affecting your firm's judgment. Please include any information that may reasonably: impair your firm's objectivity; skew the competition in favor of your firm; or allow your firm unequal access to nonpublic information.

YOUR SIGNATURE

2/20/13
DATE