Final Independent External Peer Review Report Modified Water Deliveries to Everglades National Park and Canal 111 South Dade Projects Combined Operational Plan

Prepared by
Battelle Memorial Institute

Prepared for
Department of the Army
U.S. Army Corps of Engineers
Baltimore District

Contract No. W912HQ-15-D-0001
Task Order: W912HQ20F0037

May 22, 2020

Photo by Mrk Bias, USACE

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Executive Summary

Project Background and Purpose

During the development of the original U.S. Army Corps of Engineers (USACE) Master Water Control Manuals (WCM) for the Central and Southern Florida Project for Flood Control and Other Purposes (C&SF Project), the south Florida hydrologic system was divided into five interconnected geographical regions. Volume 4 of the Master WCM, which was last updated in 1996, addresses operations for the region encompassing the Water Conservation Areas (WCAs), Everglades National Park (ENP), and ENP–South Dade Conveyance System (SDCS).

The Water Control Plan (WCP) combines the 2012 WCP water management operations for WCA 1 and WCA 2 with the new water management operations developed for WCA 3, ENP, and the SDCS in the Combined Operational Plan (COP). The COP is part of the WCP update. The COP is an integrated operational plan for two modifications of the C&SF Project known as Modified Water Deliveries (MWD) to ENP and the Canal 111 South Dade (C-111SD) projects. The purpose of the COP is to define the water management operations for the WCA 3A and WCA 3B outlets, structures in the L-31N and the C-111 basins constructed as part of the C&SF Project, and the recently constructed components of the MWD and C-111SD projects. Comprehensive modifications to the WCP are necessary in order to fully realize the natural system benefits associated with the MWD and C-111SD projects in accordance with the National Environmental Policy Act (NEPA) consultation, and a Draft Environmental Impact Statement (DEIS) has been prepared in support of the WCP update for the COP.

The update to the WCP is being prepared with consideration of information and water management operating criteria previously incorporated through changes made to (1) the 2006 Interim Operational Plan; (2) the Everglades Restoration Transition Plan 2010, implemented in a 2012 WCP update; (3) the C-111SD and MWD to ENP Incremental Field Test, Increment 1.0 (2015), Increment 1.1/1.2 (2017), and Increment 2 (2018); and (4) pertinent content in the 1996 Master WCM Volume 4–WCAs, ENP, and ENP-SDCS.

The WCP is one chapter within an existing WCM for a specific region within the C&SF Project. The WCP is a technical document, and the WCP content specifically relates to its reference and use by water managers/operators in performing their day-to-day water management activities. USACE WCPs include coordinated operating schedules for project/system regulation and such additional provisions as may be required to collect, analyze, and disseminate basic data; prepare detailed operating instructions; assure project safety; and carry out regulation of projects in an appropriate manner. Regulation schedule refers to a compilation of operating criteria, guidelines, rule curves, and specifications that govern basically the storage and release functions of a reservoir. In general, schedules indicate limiting rates of reservoir

releases required during various seasons of the year to meet all functional objectives of the particular project, acting separately or in combination with other projects in a system. Schedules are usually expressed in the form of graphs and tabulations, supplemented by concise specifications.

WCPs are developed for reservoirs, locks and dams, deregulation, and major control structures and interrelated systems to conform to objectives and specific provisions of authorizing legislation and applicable USACE reports. In addition, there may be references within the WCP to specific areas of the WCM, standing operating procedures, references to other USACE documents, and standard USACE procedures.

The WCM contains additional information pertinent to the WCP such as basin description and characteristics, general history of the basin, description of project features, and data collection and communication networks. In accordance with the 2003 Congressionally-authorized Programmatic Regulations for the Comprehensive Everglades Restoration Plan (CERP), which became effective on December 12, 2003, as Title 33, Part 385 of the Code of Federal Regulations, the WCM for the WCAs, ENP, and ENP-SDCS is being converted to a System Operating Manual (SOM). Section 601 of the Water Resources Development Act of 2000, which authorized the CERP, required the Secretary of the Army, with the concurrence of the Secretary of the Interior and the Governor of Florida, and after notice and opportunity for public comment, to promulgate Programmatic Regulations to ensure that the goals and purposes of the CERP are achieved and to establish the processes necessary for its implementation.

The complete SOM provides explicit guidance and operating criteria for the operational interactions between the system's geographically related regions. The COP WCP (Chapter 7 of the SOM; Appendix A of the MWD/C-111SD COP DEIS, hereinafter COP DEIS) has been developed to match the format of a CERP Project Operating Manual (POM), in order to facilitate implementation of future, near-term CERP projects into the WCP and the SOM. Initial construction of some CERP project features by the Non-Federal Sponsor for the C&SF Project and CERP, such as S-333N, a CERP Central Everglades Planning Project (CEPP) feature, and the S-199 and S-200 (components of the CERP C-111 Spreader Canal project), has allowed these operations to be included as state-operated features within the COP WCP, and construction of additional CEPP/CERP features are expected to begin within the first year following COP implementation.

The SOM replaces the existing set of Master WCMs. The SOM consists of seven volumes, six of which (Volumes 2 through 7) deal with the geographically related regions within the original C&SF Project. The overall system framework of the SOM is contained in Volume 1, which provides a system-wide operating plan for the implemented projects and the C&SF Project features. Generally, Volumes 2 through 7 retain the original format of the Master WCMs for the existing C&SF Project, with a few modifications to accommodate the CERP POMs. The information from the existing C&SF Project Master WCMs will be utilized and modified as necessary for the appropriate volumes of the SOM. The C&SF Project *WCAs, ENP, ENP-SDCS Manual* (the original Volume 5 of the Master WCM, now SOM-Volume 4) has been updated to include information located in the WCP developed from the COP, and is the first available volume for the SOM. The COP DEIS describes anticipated changes to the existing environment, including direct, indirect, and cumulative effects as they relate to (1) implementation of the COP and the new WCP and (2) applicable alternatives developed during plan formulation efforts in support of the COP (reference Section 2 [Alternatives] and Section 4 [Environmental Effects] of the COP DEIS). The SOM-Volume 4 (Chapters 1-6 and 8-9) is an administrative update required by the 2007 Draft CERP Programmatic Guidance Memoranda and does not require additional NEPA documentation.

Independent External Peer Review Process

Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. USACE is conducting an Independent External Peer Review (IEPR) of the Modified Water Deliveries to Everglades National Park and Canal 111 South Dade Projects Combined Operational Plan (hereinafter: MWD/C-111SD COP IEPR). As a 501(c)(3) non-profit science and technology organization, Battelle is independent, is free from conflicts of interest (COIs), and meets the requirements for an Outside Eligible Organization (OEO) per guidance described in USACE (2018). Battelle has experience in establishing and administering peer review panels for USACE and was engaged to coordinate this IEPR. The IEPR was external to the agency and conducted following USACE and Office of Management and Budget (OMB) guidance described in USACE (2018) and OMB (2004). This final report presents the Final Panel Comments of the IEPR Panel (the Panel). Details regarding the IEPR (including the process for selecting panel members, the panel members' biographical information and expertise, and the charge submitted to the Panel to guide its review) are presented in appendices.

Based on the technical content of the decision documents and the overall scope of the project, Battelle identified potential candidates for the Panel in the following key technical areas: economics, water management, environmental and NEPA, and hydrology and hydraulics (H&H) / climate preparedness and resilience (dual role). Battelle screened the candidates to identify those most closely meeting the selection criteria and evaluated them for COIs and availability. USACE was given the list of all the final candidates to independently confirm that they had no COIs, and Battelle made the final selection of the four-person Panel from this list.

The Panel received electronic versions of the decision documents (1,351 pages in total), along with a charge that solicited comments on specific sections of the documents to be reviewed. Following guidance provided in USACE (2018) and OMB (2004), USACE prepared the charge questions, which were included in the revised final Work Plan.

The USACE Project Delivery Team (PDT) briefed the Panel and Battelle during a kick-off meeting held via teleconference at the start of the review to provide the Panel an opportunity to ask questions of USACE and clarify uncertainties. Other than Battelle-facilitated teleconferences, there was no direct communication between the Panel and USACE during the peer review process.

IEPR panel members reviewed the decision documents individually and produced individual comments in response to the charge questions. The panel members then met via teleconference with Battelle to review key technical comments and reach agreement on the Final Panel Comments to be provided to USACE. Each Final Panel Comment was documented using a four-part format consisting of (1) a comment statement; (2) the basis for the comment; (3) the significance of the comment (high, medium/high, medium, medium/low, or low); and (4) recommendations on how to resolve the comment. Overall, 12 Final Panel Comments were identified and documented. Of these, one has been identified as high significance, two have medium/high significance, three have medium significance, four have medium/low significance, and two have low significance.

Battelle received an Excel file containing 95 public comment and verbal transcript entries on the COP DEIS and SOM from USACE. The panel members were charged with determining if any information or concerns presented in the public comments raised any additional discipline-specific technical concerns with regard to the MWD/C-111SD COP review documents. After completing its review, the Panel

confirmed that no new issues or concerns were identified other than those already covered in the Final Panel Comments.

Results of the Independent External Peer Review

The panel members agreed on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2018) in the COP DEIS and SOM. Table ES-1 lists the Final Panel Comment statements by level of significance. The full text of the Final Panel Comments is presented in Section 4.2 of this report. The following summarizes the Panel's findings.

Based on the Panel's review, the MWD/C-111SD COP IEPR review documents were found to be comprehensive, providing a detailed evaluation of the project. However, the Panel identified several elements of the project where additional analysis is warranted or where project findings and objectives need to be documented, clarified, or revised.

Engineering: The Panel found that substantial analyses and modeling were performed to evaluate the system-wide hydrological response under each alternative. However, panel members noted two issues with the life safety hazard model, Miami-Dade Regional Simulation Model (MDRSM). First, the information provided on MDRSM does not document whether the model calibration and verification provide sufficient accuracy to quantify differences of 0.5 foot or less under the various alternatives. Second, the COP DEIS does not provide information supporting the assumption that a single wet year, May 2005 to April 2006, adequately represents flood events necessary to assess how the COP changes extreme flood risk in the study area.

Economics: The systematic and logical integration of the H&H modeling output with the Hydrologic Engineering Center Flood Impact Analysis (HEC-FIA) flood risk economics model identified a preferred alternative that did not violate the COP flood risk constraint. However, the Panel could not determine whether the H&H modeling incorporated impacts to the project from El Niño/La Niña. The COP DEIS recognized El Niño/La Niña as a significant influence on the region's precipitation patterns, but it was unclear whether these impacts were taken into account as part of the socioeconomic flood risk analysis conducted. It was also unclear if the socioeconomic analysis fully evaluated impacts to residential and agricultural assets from flooding influenced by groundwater and surface water antecedent conditions that the COP system could experience. The Organization for Economic Cooperation and Development (OECD) notes that understanding the antecedent conditions is an important element in estimating flood risk (OECD, 2016).

Environmental: The Panel noted that the COP DEIS contains a plethora of detailed data and analysis, graphs, and maps leveraged from related projects and NEPA actions, including compliance with issued/ongoing biological opinions under the Endangered Species Act (ESA) and incorporation of "lessons learned." USACE has provided transparency in areas of controversy, risk, and uncertainty and a willingness, through stakeholder input, to consider and incorporate suggestions into the development and analysis of alternatives, including adding additional sensitivity runs or COP Adaptive Management and Monitoring Plan (AMMP) provisions. However, the Panel is concerned that effective use of adaptive management to make future timely operational decisions and address uncertainties under COP may be limited. The Panel noted that the documents are not always clear regarding the mechanism, processes, timing, and limitations in place regarding implementation of adaptive management options, including identification of the primary implementing authority. The Panel is also concerned that the COP DEIS does

not fully describe potential impacts associated with nutrient loading that accompanies pulse discharges from S-197 that could result in water quality impacts, including harmful algae blooms (HABs) in Barnes Sound and Manatee Bay.

Table ES-1. Overview of 12 Final Panel Comments Identified by the MWD/C-111SD COP IEPR Panel

No.	Final Panel Comment
Significance – High	
1	Differences of 0.5 foot or less identified in the assessment of alternatives using the life safety model may not be accurate due to biases present in the model calibration and validation.
Significance – Medium/High	
2	The COP DEIS does not support the assumption that the single selected wet year used in the life safety model (MDRSM) adequately represents the flood events necessary to assess how the COP changes extreme flood risk in the study area.
3	It is unclear if the El Niño/La Niña process, which is recognized as a significant influence on the region's precipitation patterns, was considered in the models.
Significance – Medium	
4	It is unclear if the socioeconomic analysis fully evaluated impacts to residential and agricultural assets from flooding influenced by groundwater and surface water antecedent conditions that the COP system could experience.
5	The effective use of adaptive management to make future timely operational decisions and to address identified uncertainties under COP may be limited.
6	No analyses were performed to evaluate how the COP will be applied in cases of increases in precipitation, evaporation, temperature, and salinity related to climate change.
Significance – Medium/Low	
7	It is unclear if a plan to minimize high-volume discharges at S-197 has been fully considered, given the potential for ecological and economic impacts.
8	The COP DEIS does not fully describe the impacts of increased nutrient loading on water quality associated with pulse discharges from S-197, which could stimulate HABs in Barnes Sound and Manatee Bay.

Table ES-1. Overview of 12 Final Panel Comments Identified by the MWD/C-111SD COP IEPR Panel (continued)

No.	Final Panel Comment
9	Risk and uncertainty associated with the operational malfunction of primary system components, and the degree to which other system components could compensate, have not been evaluated.
10	Use of multiple linear regression statistics to relate processes that increase water depths in SRS Taylor Slough with the conditions and processes that change salinity in Florida Bay may not be sufficient to quantify salinity decrease in Florida Bay.
Significance – Low	
11	The property and agricultural areas impacted and the level of flood risk that would remain after implementation of AtlQ+ are unclear.
12	The tabulated percentage change for locations that result in a reduction in flood damage during the wet year have been listed as though they had an increase in flood damages.

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LIST OF ACRONYMS

AM	Adaptive Management
AMMP	Adaptive Management and Monitoring Plan
AMO	Atlantic Multidecadal Oscillation
BDR	Baltimore District Representative
C-111SD	Canal 111 South Dade
C&SF	Central and Southern Florida
CEPP	Central Everglades Planning Project
CERP	Comprehensive Everglades Restoration Plan
cfs	Cubic Foot per Second
COI	Conflict of Interest
COP	Combined Operational Plan
DEIS	Draft Environmental Impact Statement
DrChecks	Design Review and Checking System
EC	Engineer Circular
EFDC	Environmental Fluid Dynamics Code
EHWL	Extreme High Water Level
ENP	Everglades National Park
ER	Engineer Regulation
ESA	Endangered Species Act
ERDC	Engineer Research and Development Center
FDOT	Florida Department of Transportation
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
H&H	Hydrology and Hydraulics
HAB	Harmful Algae Bloom
HEC-FDA	Hydrologic Engineering Center-Flood Damage Reduction Analysis
HEC-FIA	Hydrologic Engineering Center-Flood Impact Analysis
HEC-HMS	Hydrologic Engineering Center-Hydrologic Modeling System
HEC-RAS	Hydrologic Engineering Center-River Analysis System
HEC-ResSim	Hydrologic Engineering Center-Reservoir System Simulation

HHD	Herbert Hoover Dike
HQ-USACE	USACE-Headquarters
IEPR	Independent External Peer Review
IWR	Institute for Water Resources
MDRSM	Miami-Dade Regional Simulation Model
MWD	Modified Water Delivery
NAS	National Academy of Sciences
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Agency's Administration
O&M	Operation and Maintenance
OECD	Organization for Economic Cooperation and Development
OEO	Outside Eligible Organization
OMB	Office of Management and Budget
OMRR&R	Operations, Maintenance, Repair, Rehabilitation or Replacement
RECOVER	REstoration COordination and VERification
PDT	Project Delivery Team
POM	Project Operating Manual
psu	Practical Salinity Unit
RSM	Regional Simulation Model
RSM-GL	Regional Simulation Model - Glades Lower East Coast Service Area Application
SAD	South Atlantic Division
SDCS	South Dade Conveyance System
SFWMD	South Florida Water Management District
SHPO	State Historic Preservation Office
SMA	Square Mile Area
SOM	System Operating Manual
SRS	Shark River Slough
STOF	Seminole Tribe of Florida
SWIM	Surface Water Improvement and Management
TTFF	Tamiami Trail Flow Formula
USACE	United States Army Corps of Engineers

USFWS	United States Fish and Wildlife Service
WCA	Water Conservation Area
WCM	Water Control Manual
WCP	Water Control Plan

1. INTRODUCTION

During the development of the original U.S. Army Corps of Engineers (USACE) Master Water Control Manuals (WCM) for the Central and Southern Florida Project for Flood Control and Other Purposes (C&SF Project), the south Florida hydrologic system was divided into five interconnected geographical regions. Volume 4 of the Master WCM, which was last updated in 1996, addresses operations for the region encompassing the Water Conservation Areas (WCAs), Everglades National Park (ENP), and ENP–South Dade Conveyance System (SDCS).

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The update to the WCP is being prepared with consideration of information and water management operating criteria previously incorporated through changes made to (1) the 2006 Interim Operational Plan; (2) the Everglades Restoration Transition Plan 2010, implemented in a 2012 WCP update; (3) the C-111SD and MWD to ENP Incremental Field Test, Increment 1.0 (2015), Increment 1.1/1.2 (2017), and Increment 2 (2018); and (4) pertinent content in the 1996 Master WCM Volume 4–WCAs, ENP, and ENP-SDCS.

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The complete SOM provides explicit guidance and operating criteria for the operational interactions between the system's geographically related regions. The COP WCP (Chapter 7 of the SOM; Appendix A of the MWD/C-111SD COP DEIS, hereinafter COP DEIS) has been developed to match the format of a CERP Project Operating Manual (POM), in order to facilitate implementation of future, near-term CERP projects into the WCP and the SOM. Initial construction of some CERP project features by the Non-Federal Sponsor for the C&SF Project and CERP, such as S-333N, a CERP Central Everglades Planning Project (CEPP) feature, and the S-199 and S-200 (components of the CERP C-111 Spreader Canal project), has allowed these operations to be included as state-operated features within the COP WCP, and construction of additional CEPP/CERP features are expected to begin within the first year following COP implementation.

The SOM replaces the existing set of Master WCMs. The SOM consists of seven volumes, six of which (Volumes 2 through 7) deal with the geographically related regions within the original C&SF Project. The overall system framework of the SOM is contained in Volume 1, which provides a system-wide operating plan for the implemented projects and the C&SF Project features. Generally, Volumes 2 through 7 retain the original format of the Master WCMs for the existing C&SF Project, with a few modifications to accommodate the CERP POMs. The information from the existing C&SF Project Master WCMs will be utilized and modified as necessary for the appropriate volumes of the SOM. The C&SF Project *WCAs, ENP, ENP-SDCS Manual* (the original Volume 5 of the Master WCM, now SOM-Volume 4) has been updated to include information located in the WCP developed from the COP, and is the first available volume for the SOM. The COP DEIS describes anticipated changes to the existing environment, including direct, indirect, and cumulative effects as they relate to (1) implementation of the COP and the new WCP and (2) applicable alternatives developed during plan formulation efforts in support of the COP (reference Section 2 [Alternatives] and Section 4 [Environmental Effects] of the COP DEIS). The SOM-Volume 4 (Chapters 1-6 and 8-9) is an administrative update required by the 2007 Draft CERP Programmatic Guidance Memoranda and does not require additional NEPA documentation.

Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. The objective of the work described here was to conduct an Independent External Peer Review (IEPR) of the Modified Water Deliveries to Everglades National Park and Canal 111 South Dade Projects Combined Operational Plan (hereinafter: MWD/C-111SD COP IEPR) in accordance with procedures described in the Department of the Army, U.S. Army Corps of Engineers (USACE), Engineer Circular (EC) *Review Policy for Civil Works* (EC 1165-2-217) (USACE, 2018) and the Office of Management and Budget (OMB), *Final Information Quality Bulletin for Peer Review* (OMB, 2004). Supplemental guidance on evaluation for conflicts of interest (COIs) was obtained from the *Policy on Committee Composition and*

Balance and Conflicts of Interest for Committees Used in the Development of Reports (The National Academies, 2003).

This final report presents the Final Panel Comments of the IEPR Panel (the Panel) on the existing engineering, economic, and environmental analyses contained in the MWD/C-111SD COP IEPR documents (Section 4). Appendix A describes in detail how the IEPR was planned and conducted, including the schedule followed in executing the IEPR. Appendix B provides biographical information on the IEPR panel members and describes the method Battelle followed to select them. Appendix C presents the final charge to the IEPR panel members for their use during the review; the final charge was submitted to USACE in the revised final Work Plan according to the schedule listed in Table A-1. Appendix D presents the organizational COI form that Battelle completed and submitted to the Institute for Water Resources (IWR) prior to the award of the MWD/C-111SD COP IEPR.

2. PURPOSE OF THE IEPR

To ensure that USACE documents are supported by the best scientific and technical information, USACE has implemented a peer review process that uses IEPR to complement the Agency Technical Review, as described in USACE (2018).

In general, the purpose of peer review is to strengthen the quality and credibility of the USACE decision documents in support of its Civil Works program. IEPR provides an independent assessment of the engineering, economic, and environmental analyses of the project study. In particular, the IEPR addresses the technical soundness of the project study's assumptions, methods, analyses, and calculations and identifies the need for additional data or analyses to make a good decision regarding implementation of alternatives and recommendations.

In this case, the IEPR of the MWD/C-111SD COP was conducted and managed using contract support from Battelle, which is an Outside Eligible Organization (OEO) (as defined by EC 1165-2-217). Battelle, a 501(c)(3) organization under the U.S. Internal Revenue Code, has experience conducting IEPRs for USACE.

3. METHODS FOR CONDUCTING THE IEPR

The methods used to conduct the IEPR are briefly described in this section; a detailed description can be found in Appendix A. The IEPR was completed in accordance with established due dates for milestones and deliverables as part of the final Work Plan; the due dates are based on the award/effective date and the receipt of review documents.

Battelle identified, screened, and selected four panel members to participate in the IEPR based on their expertise in the following disciplines: economics, water management, environmental / NEPA, and hydrology and hydraulics (H&H) / climate preparedness and resilience (dual role). The Panel reviewed the MWD/C-111SD COP documents and produced 12 Final Panel Comments in response to 19 charge questions provided by USACE for the review. This charge also included two overview questions added by Battelle, for a total of 21 questions. Battelle instructed the Panel to develop the Final Panel Comments using a standardized four-part structure:

1. Comment Statement (succinct summary statement of concern)
2. Basis for Comment (details regarding the concern)

3. Significance (high, medium/high, medium, medium/low, or low; in accordance with specific criteria for determining level of significance)
4. Recommendation(s) for Resolution (at least one implementable action that could be taken to address the Final Panel Comment).

Battelle reviewed all Final Panel Comments for accuracy, adherence to USACE guidance (EC 1165-2-217), and completeness prior to determining that they were final and suitable for inclusion in the Final IEPR Report. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The Panel's findings are summarized in Section 4.1; the Final Panel Comments are presented in full in Section 4.2.

4. RESULTS OF THE IEPR

This section presents the results of the IEPR. A summary of the Panel's findings and the full text of the Final Panel Comments are provided.

4.1 Summary of Final Panel Comments

The panel members agreed on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2018) in the COP DEIS and SOM. The following summarizes the Panel's findings.

Based on the Panel's review, the MWD/C-111SD COP IEPR review documents were found to be comprehensive, providing a detailed evaluation of the project. However, the Panel identified several elements of the project where additional analysis is warranted or where project findings and objectives need to be documented, clarified, or revised.

Engineering: The Panel found that substantial analyses and modeling were performed to evaluate the system-wide hydrological response under each alternative. However, panel members noted two issues with the life safety hazard model, Miami-Dade Regional Simulation Model (MDRSM). First, the information provided on MDRSM does not document whether the model calibration and verification provide sufficient accuracy to quantify differences of 0.5 foot or less under the various alternatives. Second, the COP DEIS does not provide information supporting the assumption that a single wet year, May 2005 to April 2006, adequately represents flood events necessary to assess how the COP changes extreme flood risk in the study area.

Economics: The systematic and logical integration of the H&H modeling output with the Hydrologic Engineering Center Flood Impact Analysis (HEC-FIA) flood risk economics model identified a preferred alternative that did not violate the COP flood risk constraint. However, the Panel could not determine whether the H&H modeling incorporated impacts to the project from El Niño/La Niña. The COP DEIS recognized El Niño/La Niña as a significant influence on the region's precipitation patterns, but it was unclear whether these impacts were taken into account as part of the socioeconomic flood risk analysis conducted. It was also unclear if the socioeconomic analysis fully evaluated impacts to residential and agricultural assets from flooding influenced by groundwater and surface water antecedent conditions that the COP system could experience. The Organization for Economic Cooperation and Development (OECD) notes that understanding the antecedent conditions is an important element in estimating flood risk (OECD, 2016).

Environmental: The Panel noted that the COP DEIS contains a plethora of detailed data and analysis, graphs, and maps leveraged from related projects and NEPA actions, including compliance with issued/ongoing biological opinions under the Endangered Species Act (ESA) and incorporation of "lessons learned." USACE has provided transparency in areas of controversy, risk, and uncertainty and a willingness, through stakeholder input, to consider and incorporate suggestions into the development and analysis of alternatives, including adding additional sensitivity runs or COP Adaptive Management and Monitoring Plan (AMMP) provisions. However, the Panel is concerned that effective use of adaptive management to make future timely operational decisions and address uncertainties under COP may be limited. The Panel noted that the documents are not always clear regarding the mechanism, processes, timing, and limitations in place regarding implementation of adaptive management options, including identification of the primary implementing authority. The Panel is also concerned that the COP DEIS does not fully describe potential impacts associated with nutrient loading that accompanies pulse discharges from S-197 that could result in water quality impacts, including harmful algae blooms (HABs) in Barnes Sound and Manatee Bay.

4.2 Final Panel Comments

This section presents the full text of the Final Panel Comments prepared by the IEPR panel members.

Final Panel Comment 1

Differences of 0.5 foot or less identified in the assessment of alternatives using the life safety model may not be accurate due to biases present in the model calibration and validation.

Basis for Comment

Based on statements within the COP DEIS Appendix H, Annex 6, the life safety hazard model (MDRSM) appears to have been calibrated and validated to within ±0.5 foot. COP DEIS Appendix H, Annex 6 further states:

> "Based on recommendations from the [Interagency Modeling Center] technical review and since the calibration and validation periods applied during MDRSM development were prior to full functionality of the MWD 8.5 Square Mile Area (SMA) Project following completion of the C-111 NDA, additional robustness and validation checks of the MDRSM capability to simulate the 8.5 SMA were conducted prior to application of the MDRSM with the COP Round 2 alternative evaluations. These additional checks are fully documented in Annex 2 of the COP DEIS Hydraulics and Hydrology Appendix (Appendix H). In summary, however, the results demonstrated that the MDRSM model can reproduce the water levels in the 8.5 SMA for the period of May 2017 to February 2018 **with a bias consistent with the results of the calibrated model**. The biases remain consistent with the scale of bias observed in model calibration and support our conclusion that the MDRSM provides effective representation of the 8.5 SMA for planning purposes." (emphasis added, page 6)

Based on the above statements, the reliability of this model to differentiate results that are within ±0.5 foot from ground elevation and/or from other alternatives' results appears to be unproven.

COP DEIS Appendix H, Annex 6, Figures H-6.5 to H-6.7 (and other similar duration curves in Annex 6) show MDRSM calculated stage duration curves for COP Base Conditions and Round 2 alternatives for the wet year. These examples estimate ponding depth from the simulated ground elevation. Portions of the duration curves indicate a ponding depth of less than ±0.5 foot from the simulated ground elevation. These duration curves rely on the model's ability to accurately provide stage differences that are less than ±0.5 foot.

In another example, COP DEIS Figures 4-142 to 4-147 show flood risks when Alternatives Q, Qm, and Qm1 were compared with the 1994Base and ECB19 conditions for the wet, average, and dry years. These comparisons rely on the model's ability to accurately distinguish flood stage differences of less than 0.5 foot from first-floor elevations. Given that the model appears to have been calibrated within an accuracy of ±0.5 foot, the Panel is unclear on how reliable the model is when model results show differences (from ground level or from other alternative results) within ±0.5 foot.

Significance – High

The ±0.5-foot differences in the model results can change flood risks, ponding depths, flood durations, inundated areas, and water flow volumes calculated for the different alternatives considered in the COP DEIS. Economic and environmental restoration benefits that would ensue due to changes within ±0.5-foot differences in the model results could be affected.

Final Panel Comment 1

Recommendations for Resolution

1. Explain how the MDRSM calibration to within ±0.5-foot accuracy affects:

    a. The selection of the Preliminary Preferred Alternative over the other alternatives considered in the COP DEIS.

    b. The modeled flood risk and flood duration under the Preliminary Preferred Alternative in areas including the 8.5 SMA.

    c. The modeled COP Round 3 alternatives having secondary events later in the wet season, where water levels temporarily rise above ground in response to moderate rainfall events due to the persistently higher groundwater stages.

    d. The modeled net additional flow volumes to the ENP, Florida Bay, and other areas that the COP DEIS states are likely to gain environmental restoration and/or flood risk mitigation benefits under the Preliminary Preferred Alternative.

Final Panel Comment 2

The COP DEIS does not support the assumption that the single selected wet year used in the life safety model (MDRSM) adequately represents the flood events necessary to assess how the COP changes extreme flood risk in the study area.

Basis for Comment

The COP DEIS (page 4-14) states that the "RSM-GL software was used to simulate the hydrologic responses under a wide range of meteorological conditions encompassing a 41-year period from 1965 to 2005". For the Regional Simulation Model Glades Lower East Coast Service Area Application (RSM-GL) modeling, the COP DEIS lists the selected dry year (1989), average year (1978), and wet year (1995). The RSM-GL modeling also simulated the water levels and flows in the system for the period 1965 to 2005. In contrast, the COP DEIS Appendix H, Annex 6, states that the MDRSM modeling and evaluation of various alternatives (including the Preliminary Preferred Alternative) relied on analyses of model results for the selected dry year (2011), average year (2005), and wet year (2006). Thus, it appears that the 8.5 SMA flood risk evaluation was limited to flood events in the single wet year period from May 2005 to April 2006, which is different from the RSM-GL modeling wet year (1995). The Panel did not find information to support the assumption that the single wet year (2006) for the MDRSM modeling provides the flood events necessary to properly assess how the COP would change extreme flood risk in the study area. It is possible that other periods in the RSM-GL 41-year record could contain more extreme flood events than those in the MDRSM single wet year (2006).

Significance – Medium/High

The application of a single selected wet year (i.e., May 2005 to April 2006) in MDRSM for analysis of flood risk under the Preliminary Preferred Alternative limits investigation and engineering analyses to hydrological events in this period. It is possible that more extreme events that were not included in the selected wet year period (and therefore were not analyzed) would pose higher risk to life safety.

Recommendations for Resolution

1. Provide information in the COP DEIS on how the period from May 2005 to April 2006 was selected as the wet year period for MDRSM.

2. Provide documentation or data in the COP DEIS that supports the assumption that the May 2005 to April 2006 timeframe contains appropriate flood events to adequately investigate COP impacts to extreme flood risk in the study area.

Final Panel Comment 3

It is unclear if the El Niño/La Niña process, which is recognized as a significant influence on the region's precipitation patterns, was considered in the models.

Basis for Comment

Though the COP DEIS and supporting documents describe and review future climate change in the study area, climate change was not the only climatic process identified as influencing the development of the COP. In the COP DEIS (Section 4.1, Climate), the El Niño/La Niña sea surface temperature/atmospheric process, also known as El Niño/La Niña teleconnections, were identified as an influence on Florida's seasonal precipitation conditions:

> "However, **due to the variability of climate patterns (La Niña and El Niño),** dry periods may occur during the wet season and wet periods may occur during the dry season" (emphasis added, page 4-14).

In COP DEIS Section 4.20 (Climate Change), El Niño/La Niña seasonal climatic processes were also referred to:

> "Note that, for **COP's limited operational timeframe, it is assumed that climate-related projections are likely more influenced by natural variability in global climate systems (El Niño/La Niña-Southern Oscillation and the Atlantic Multidecadal Oscillation (AMO)) and uncertainty in global climate model projections**." (emphasis added, page 4-258)

The scientific literature supports the statements made in Sections 4.1 and 4.20 of the COP DEIS (Abiy, Melesse, and Abtew 2019; Beckage et al. 2003; Clark, Nnaji, and Huang 2014; Kwon et al. 2006; Kwon, Lall, and Khalil 2007; Kwon, Lall, and Obeysekera 2009; Malone 2014; Moses et al. 2013). Specific examples include:

> "Climate teleconnections with a region's rainfall, with drought and flooding implications, should be part of short- and long-term water management planning and operations" (Abiy et al. 2019, Abstract).

> "The degree of influence El Niño Southern Oscillation has on each hydrologic series can be predicted for different watersheds in the area. This can be of immense help for water management strategy and planning in the region (Clark, Nnaji, and Huang 2014, Abstract).

Given the scientific evidence of the importance of El Niño/La Niña processes for water management in Florida, the Panel believes those processes should be taken into account. However, it is not clear from the COP DEIS how these processes were integrated into the H&H modeling used to produce the scenarios for the socioeconomic analysis. It is also not clear if El Niño/La Niña processes will be integrated into the COP AMMP (COP DEIS, Appendix C).

In Appendix C, Table C.2-22 (Uncertainties screened out of the COP AMMP), Row 5a, the Adaptive Management Workshop Attendees ranked El Niño/La Niña processes associated with the Florida Department of Transportation (FDOT) constraint on the Tamiami Trail 8.5-foot maximum constraint on canal stage L-29 as a Tier 3 problem that was "not pursued further" (page C-111). This is in contrast to

Final Panel Comment 3

the importance placed on El Niño processes in the USACE co-authored document, *Central and Southern Florida Project Comprehensive Everglades Restoration Plan Central Everglades Planning Project Final Integrated Project Implementation Report and Environmental Impact Statement, Addendum, December 2014*, which states:

> "The flow rate of the water should reach at least 2.5 centimeters per second (cm/s) during high volume precipitation events to drive restoration of the historical ridge and slough landscape patterns and tree islands (RECOVER 2011, Section 1.4), and water levels must have natural variation and cycling during events such as El Nino and La Nina (USACE 2014, page 3-3).

Assuming the scientific literature is correct, and based on USACE's notations that El Niño/La Niña processes are a critical part of the Everglades restoration, then inevitably such processes will influence flood risk and ENP restoration. Based on the science and the technical information available, greater clarity in understanding how these processes are accounted for in the flood risk and restoration analyses is warranted.

Significance – Medium/High

Impacts due to El Niño/La Niña processes could influence the effectiveness of future COP operations if those processes are not taken into account.

Recommendations for Resolution

1. Describe how El Niño/La Niña forecasts are integrated into the H&H modeling.
2. Describe how El Niño/La Niña forecasts were integrated into the scenarios used to conduct the socioeconomic flood risk analysis.
3. Describe how El Niño/La Niña forecasts are integrated into the COP AMMP.

Literature Cited:

Abiy, A. Z., A.M. Melesse, and W. Abtew (2019). Teleconnection of Regional Drought to ENSO, PDO, and AMO: Southern Florida and the Everglades. Atmosphere, 10(6): 295.

Beckage, B., W.J. Platt, M.G. Slocum, and B. Panko (2003). Influence of the El Nino Southern Oscillation on fire regimes in the Florida Everglades. Ecology, 84(12): 3124-3130.

Clark II, C., G.A. Nnaji, and W. Huang (2014). Effects of El-Nino and La-Nina sea surface temperature anomalies on annual precipitations and streamflow discharges in southeastern United States.

Kwon, H. H., U. Lall, and J. Obeysekera (2009). Simulation of daily rainfall scenarios with interannual and multidecadal climate cycles for South Florida. Stochastic Environmental Research and Risk Assessment, 23(7): 879-896.

Kwon, H. H., U. Lall, and A.F. Khalil (2007). Stochastic simulation model for nonstationary time series using an autoregressive wavelet decomposition: Applications to rainfall and temperature. Water Resources Research, 43(5).

Kwon, H. H., U. Lall, Y.I. Moon, A.F. Khalil, and H. Ahn (2006). Episodic interannual climate oscillations and their influence on seasonal rainfall in the Everglades National Park. Water resources research, 42(11).

Malone, S. L. (2014). Hydrology drives Everglades ecosystem function: implications for ecosystem vulnerability to drought, energy balance, climate teleconnections and climate change (Doctoral dissertation, University of Alabama Libraries).

Moses, C. S., W. T. Anderson, C. Saunders, and F. Sklar (2013). Regional climate gradients in precipitation and temperature in response to climate teleconnections in the Greater Everglades ecosystem of South Florida. Journal of Paleolimnology, 49(1): 5-14.

USACE (2014). Central Everglades Planning Project: Final Integrated Project Implementation Report and Environmental Impact Statement. US Army Corps of Engineers, Jacksonville District and South Florida Water Management District, Jacksonville, FL.

Final Panel Comment 4

It is unclear if the socioeconomic analysis fully evaluated impacts to residential and agricultural assets from flooding influenced by groundwater and surface water antecedent conditions that the COP system could experience.

Basis for Comment

The COP is a complex project with multiple objectives and constraints. In the socioeconomic analysis, the Preliminary Preferred Alternative performed well within the H&H scenarios modeled, both in terms of individual representative years (wet, average, and dry) and also when combined with a representative 1-10, 1-25, or 1-100 year storm event for the region.

Given the amount of time required to model the flood risk with the MDRSM set at 15-minute increments, it is understood that tradeoffs were made between the number of scenarios modeled and the acceptable residual risk that was not quantified. What is unclear is how robust the Preliminary Preferred Alternative is in terms of flood risk beyond the scenarios modeled due to antecedent conditions. This concern is from a technical and scientific perspective as it relates to flood risk management.

In Appendix I, Socioeconomics, USACE noted that:

> "…there is a limit in the extent to which operational changes, such as those proposed under the COP process, can systematically enhance flood risk reduction" (page I-75).

Research described in the scientific literature and information from the technical literature describe why antecedent conditions, in terms of both surface and sub-surface moisture conditions, are important to consider to effectively assess flood risk and flood risk impacts in general and southern Florida specifically (Behera et al. 2010; Chen and McGlynn 2015; De Bruijn et al. 2019; Hettiarachchi, Wasko, & Sharma 2019; Loucks 2015; Organization for Economic Cooperation and Development (OECD) 2016; Spellman et al. 2019; USACE 2014; Watt and Marsalek 2013).

The OECD's publication, Financial Management of Flood Risk, notes that understanding the antecedent conditions is an important element in estimating flood risk:

> "The impact of floods on assets-at-risk depends on the level of water that actually reaches (and then penetrates) a given structure from a given precipitation or storm event. For example, a given area may be protected by a structural barrier which requires assessing the level of effective protection provided by that barrier and the potential for failure (which involves significant uncertainty). How much water reaches a given asset also depends on the amount of water that is captured by drainage systems or absorbed in the ground, which depends on land-use, type of vegetation as well as the level of ***antecedent*** wetness in the ground" (OECD, 2016; page 55).

In USACE (2014), Table 2-1 (Existing Conditions and Future Without Project Conditions) states (page 2-8):

> "Areas may become flooded during heavy rainfall events due to antecedent conditions that cause saturation and high runoff from developed areas." (Existing Conditions)

Final Panel Comment 4

Flood damage reduction needs have increased since the original C&SF Project was constructed and will likely continue to increase in the future." (Future Without Project Conditions)

It is unclear from the information in Appendix I, Socioeconomics, what antecedent conditions were considered in the scenarios used to conduct the socioeconomic analysis and how the scenarios tested would impact flood risk under different antecedent conditions.

Significance – Medium

Flood risk and damage reduction estimates could change with different antecedent conditions. Understanding what antecedent conditions were modeled is important to understand how sensitive the alternatives are in terms of not exceeding the flood risk management constraint.

Recommendations for Resolution

1. Describe what antecedent conditions were considered in the development of the scenarios used in the socioeconomic analysis.
2. Describe what antecedent conditions, if any, may limit the ability of the COP operational changes to manage flood risk under the Preliminary Preferred Alternative.

Literature Cited:

Behera, P. K., Y. Guo, R. S. Teegavarapu, and T. Branham (2010). Evaluation of Antecedent Storm Event Characteristics for Different Climatic Regions based on Interevent Time Definition (IETD). In World Environmental and Water Resources Congress 2010: Challenges of Change, 2441-2450.

Chen, X., M. Kumar, and B. L. McGlynn (2015). Variations in streamflow response to large hurricane-season storms in a southeastern US watershed. Journal of Hydrometeorology, 16(1): 55-69.

De Bruijn, K. M., C. Maran, M. Zygnerski, J. Jurado, A. Burzel, C. Jeuken, and J. Obeysekera (2019). Flood resilience of critical infrastructure: Approach and method applied to Fort Lauderdale, Florida. Water, 11(3): 517.

Hettiarachchi, S., C. Wasko, and A. Sharma (2019). Can antecedent moisture conditions modulate the increase in flood risk due to climate change in urban catchments? Journal of hydrology, 571: 11-20.

Loucks, J. (2015). Impact of Antecedent Groundwater Heads and Transient Aquifer Storage on Flood Peak Attenuation in an Unconfined Karst Aquifer: Study of the Upper Suwannee River, Florida, Dissertation, Michigan Technological University, Houghton, MI, USA.

OECD (2016), Financial Management of Flood Risk, OECD Publishing, Paris, https://doi.org/10.1787/9789264257689-en.

Spellman, P., J. Gulley, J. B. Martin, and J. Loucks (2019). The role of antecedent groundwater heads in controlling transient aquifer storage and flood peak attenuation in karst watersheds. Earth Surface Processes and Landforms, 44(1): 77-87.

USACE (2014). Central Everglades Planning Project: Final Integrated Project Implementation Report and Environmental Impact Statement. U.S. Army Corps of Engineers, Jacksonville District and South Florida Water Management District, Jacksonville, FL.

Watt, E., and J. Marsalek (2013). Critical review of the evolution of the design storm event concept. Canadian Journal of Civil Engineering, 40(2): 105-113.

Final Panel Comment 5

The effective use of adaptive management to make future timely operational decisions and to address identified uncertainties under COP may be limited.

Basis for Comment

Implementation of an AMMP is a requirement under CERP; however, COP is the first non-CERP project to integrate AMMP. As stated in the COP DEIS, the objective of the COP AMMP is to "…[identify] the monitoring information needed to inform implementation and to document progress toward meeting the project's goals and objectives, as well as address uncertainties related to project performance" (page 4-272). The COP AMMP (Appendix C) further states that "…results may inform CEPP or other agencies regarding the next phase of CEPP project sequencing or other advisable actions that are beyond the scope of COP…" (page C-6). Nonetheless, optimization of COP as indicated in the DEIS relies, in part, on effective implementation of the COP AMMP. The following are examples from the COP DEIS in this regard:

- "Unavoidable potentially adverse impacts on water quality over the next several years could occur with implementation of ALTQ+. However, the adaptive management options evaluated by the PDT have determined it is possible to reduce those potential impacts." (page ES-viii)

- "Additional operational flexibility within the COP Water Control Plan (WCP) to address uncertainties identified in the COP AMMP regarding: (a) water quality inflows to Shark River Slough (SRS) (included in RSM-GL Round 3 sensitivity simulations SRQ2 and SRQ3); and (b) Tamiami Trail Flow Formula (TTFF) dry season operations for SRS (dry season Field Test criteria developed based on technical evaluation of RSM-GL ALT O versus ALTQ hydrologic responses within WCA 3A and ENP)." (page 2-34).

The COP AMMP (Appendix C) further describes adaptive management (AM) options associated with each uncertainty by classifying them into one or more of the following categories depending on whether additional NEPA permitting/review would be required: (1) AM options defined in the WCP and supported by the DEIS; (2) AM options not defined in the WCP and not supported by the DEIS, and (3) AM options not in COP authority. Other key items in the COP AMMP include hypotheses tested to address assigned uncertainty and attributes, methodology and time frames for assessment, identification of triggers/thresholds, and proposed management options when a trigger is crossed.

In this regard, review of the COP AMMP identified several potential concerns:

- Reliance on AM Option Category 2 & 3 Actions – Many of the identified AM strategies rely on actions outside of COP and may require additional NEPA review as summarized in Table C.2-23 (i.e., AM Uncertainties # 1, 8, 20, 2, 11, 23, 18, 24, etc.). Therefore, the mechanisms and timetable to effectively implement these AM strategies under COP appear uncertain.

- Timeframes/Frequency – Many of the measured attributes identified in the AM strategy require 3 to 10 years to determine statistically valid trends, which equals the expected duration of COP (i.e., AM Uncertainties # 1, 21,8, 23, 16a/b, 24, etc.). Pertaining to triggers, the COP AMMP states that under AM Uncertainties #1 and #21: "If a trigger is detected…a scientific peer-review of the data to determine the relationship between the trigger metric, COP implementation, and the environmental

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drivers…" would need to be implemented (page C-18). It is not clear in what timeframe the peer review process can be effectively accomplished to inform operations in real-time and in guiding which corrective action(s) should be taken (if any) under AM actions.

- AM Triggers/Thresholds – Identified metrics may not provide clarity as to when a trigger or threshold is exceeded. As an example, in the COP AMMP, under AM Uncertainty 16a, it is stated that "Discrete total phosphorus changes can be nearly immediately detected, but determination of any statistically significant change from historic levels could take 3 to 10 years, depending on the change magnitude" (page C-103). It is unclear how these data will be applied to assess identified triggers to inform COP operations in real time given these stated timeframes. Similar inferences are contained in the cited literature such as "...the C-111 Spreader Canal Project, which began operations in 2011, has collected years of monitoring data. However, to date, monitoring and assessment are insufficient to understand the project's performance" (NAS 2018).

- Cultural Resource Monitoring Plan (C.7) – In monitoring known archeological sites through Everglades Depth Estimation Network, the COP AMMP states that .."where water levels may approach overtopping these sites, an assessment will be conducted by the USACE to determine the cause of the highwater levels. The purpose of the analysis will be to examine the root cause or complexity of the issue and help understand the cause…" (page C-258). The corrective action that would be taken and the timeframe within which it would occur are not defined.

  Moreover, some underlying concerns regarding the COP AMMP were expressed by the Seminole Tribe of Florida (STOF) pertaining to how the 394 tree islands were selected in stating "We are also concerned that the current sample size is not statistically significant given the total number of tree islands that exist within the APE [Area of Potential Effects]. Additionally, it is our position that the significance of all tree islands are not equal and thus cannot be treated as one resource. At this time, we do not believe there is sufficient information available for the STOF to concur with the USACE's National Historic Preservation Act of 1966…" (COP DEIS Excel Spreadsheet Public Comment #69 dated March 23, 2020, from the Seminole Tribe of Florida Heritage and Environmental Resources Office).

- Redundancy/Conflict with REstoration COordination & VERification (RECOVER) – The COP WCP and AMMP do not clearly specify roles/responsibilities regarding operational protocols, may include unnecessary review team processes and contain some inconsistencies with RECOVER objectives. As referenced in the COP DEIS Excel Spreadsheet, Public Comment #48 dated March 23, 2020, provided by the SFWMD, "The COP WCP differs from the RECOVER team's approach of clearly identifying options and criteria to implement them", identifies "multiple groups or teams tasked with recommending operational options. This is unnecessary and should be removed…." and "should clarify that operational decisions rest with the District and USACE water managers."

Significance – Medium

The COP AMMP (including its integration within the COP DEIS and COP WCP) requires technical consistency, effective coordination, and clear mechanisms for implementation in real-time operations. Failure to address these concerns could compromise successful implementation/optimization of COP.

Final Panel Comment 5

Recommendations for Resolution

1. Update the COP DEIS, WCP, and AMMP to better summarize the intent of the COP AMMP, primary authority/parties responsible for operational decisions, processes in place to achieve the intended objective, the effective use of key trigger points in informing management actions, and the limitations of the COP AMMP in addressing uncertainties within the expected 10-year duration of the COP.

2. Provide additional clarity regarding the mechanism, processes, timing, and limitations to implement AM options under Categories 2 (Not in the WCP or supported by COP DEIS) and 3 (Not under authority of COP) in the COP AMMP.

Literature Cited:

National Academies of Sciences (NAS), Engineering, and Medicine (2018). Progress Toward Restoring the Everglades: The Seventh Biennial Review—2018. Washington, DC: The National Academies Press.

Final Panel Comment 6

No analyses were performed to evaluate how the COP will be applied in cases of increases in precipitation, evaporation, temperature, and salinity related to climate change.

Basis for Comment

The COP DEIS does not analyze for climate change-related future changes in precipitation, evaporation, temperature, and salinity intrusion that may affect the COP structures and/or future COP operation. The COP DEIS recommends consideration of future resiliency and adaptive management measures as part of the COP AMMP, or through future CERP studies and operational considerations. However, the COP DEIS lacks information on how the COP application would be affected by climate change related to future changes in precipitation, evaporation, temperature, and salinity intrusion. The COP DEIS Appendix C, AM Uncertainty ID #7 (Saltwater Intrusion), appears to evaluate future sea level rise effects on COP operation. However, the Panel did not see a COP AM measure to address uncertainty related to climate change-related increases of precipitation.

Significance – Medium

By not evaluating all climate change impacts, COP development and refinement could inflate the benefits and deflate the risks associated with the Preliminarily Preferred Alternative.

Recommendations for Resolution

1. Describe how climate change can affect the COP operation, benefits, and risks.
2. Consider concurrent climate change-induced increased precipitation and sea level rise in the application or refinement of the COP AMMP.

Final Panel Comment 7

It is unclear if a plan to minimize high-volume discharges at S-197 has been fully considered, given the potential for ecological and economic impacts.

Basis for Comment

High volume S-197 discharges (a) abruptly decrease Florida Bay salinity and (b) result in high total phosphorus and subsequent Chlorophyll-*a* levels which can contribute to HABs. Given the potential for significant ecological impacts associated with high-volume discharges and the commensurate "opportunity cost" of sending freshwater flows needed to facilitate restoration of Taylor Slough, the Everglades Panhandle, and Florida Bay, reliance on the continued use of the S-197 structure to discharge large volumes of water should be clearly documented.

While the Panel noted that there are decreases to the total number of days of discharges between 0 and 400 cubic feet per second (cfs), the difference in number and percentage of days with large event discharges between 400 and 800 cfs and flows greater than 800 cfs are not so pronounced when compared against the baseline condition. Another metric that appears to be missing is the total number of continuous flow days potentially associated with larger discharge (i.e., flows greater than 800 cfs) events. In this regard, reference is made to COP DEIS Appendix G, which states: "Based on nearly three years of data, prudent guidance would indicate that two discharge events within six months of magnitude 800 cfs or more for a week would negatively impact the system and suggests that the optimal way to operate the S-197 structure would be to favor several smaller releases (e.g., < 500 cfs) over large, pulsed releases." (see *A White Paper by the South Florida Natural Resources Center of the National Park Service and the Everglades Section of the South Florida Water Management District for the Combined Operational Plan, dated April 19, 2019,* page 2, contained in COP DEIS Appendix G).

The Panel did not find in the COP DEIS explicit constraints to stop or minimize extreme high water level (EHWL) condition and/or S-197 high volume flows as such constraints pertain to minimizing damaging freshwater flows to Manatee Bay/Barnes Sound and increasing flows through Taylor Slough and coastal creeks.

Moreover, review of the public comments on the COP DEIS shows a common concern on the frequency of S-197 high volume discharges with the implementation of the COP. For example, one public comment reads:

> "Another major concern is the complication of the normalization of the S-197 structure…We think that that structure should only be used in emergencies like Hurricane Irma. Anything less than Hurricane Irma, it doesn't need to be used. The thing that worries me the most is that after Hurricane Irma, that structure stayed opened until March. That was long after we had the emergency problems that are in the system anymore…Once the emergency is passed, that structure needs to just simply be nailed shut…We believe that a better operational plan can be developed that maximizes the environmental benefits without undue risk of flooding to neighboring areas while being more in line with the $1 billion cost of these projects towards restoration." (COP DEIS Excel Spreadsheet, Transcript_Islamorada, Comment #2, Dr. Jerry Lorenz of Audubon, Florida).

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Significance – Medium/Low

Documentation of whether high-volume releases are expected to increase, remain the same, or decrease will help clarify the overall expected future operations of the COP and the potential for meeting operational objectives, including minimizing damaging freshwater flows to Manatee Bay/Barnes Sound and increased flows through Taylor Slough and coastal creeks.

Recommendations for Resolution

1. Document the importance of keeping the EHWL criterion and infrequent S-197 high-volume flows in the COP, if applicable.
2. Describe the features of the COP that explicitly stop or minimize S-197 high-volume discharges, if any.
3. Document whether a plan to avoid EHWL and/or high-volume discharges at S-197 was developed. If there is a plan, describe the plan and the system capacity (if any) to store water during high-runoff periods for later release during the dry season.

Final Panel Comment 8

The COP DEIS does not fully describe the impacts of increased nutrient loading on water quality associated with pulse discharges from S-197, which could stimulate HABs in Barnes Sound and Manatee Bay.

Basis for Comment

Episodic discharges from S-197, as experienced in 2005 during a series of hurricanes, have been widely implicated in contributing to significant ecological impacts to Barnes Sound and Manatee Bay. These events resulted in major inputs of total phosphorus well above background concentrations (±84 parts per billion) in Manatee Bay (Boyer and Briceño 2008), which in turn facilitated locally elevated Chlorophyll-*a* concentrations leading to a *Synechococcus* bloom (Gilbert et al. 2009, Rudnick et al. 2007) followed by *Thalassia testudinum* and sponge mortality events (Rudnick et al. 2008) that in some cases extended into the upper Florida Keys. The COP does not fully address the potential for contributing to increased occurrences of HABs and related impacts to sensitive marine resources associated with increased nutrient loading resulting from pulse discharges from the S-197 into Manatee Bay and Barnes Sound.

While the relationship of nutrient inflows and the potential for increased HABs relative to the S-197 structure are briefly mentioned in one paragraph in the COP DEIS (page 4-104) with additional reference to COP DEIS Appendix G, the potential consequences of continued large-volume discharges from the S-197 are not fully described. Such consequences include the long-term implications of accumulated (both existing and future) nutrient inputs associated with the C-111/S-197 discharges. This condition was referenced in *A White Paper by the South Florida Natural Resources Center of the National Park Service and the Everglades Section of the SFWMD for the Combined Operational Plan* contained in COP DEIS Appendix G, which states “Ecological impacts of nutrient enrichment can accumulate over time, and that biological responses may be muted until a threshold is reached, eventually triggering widespread blooms of algae and/or reduced dissolved oxygen (DO) levels. These impacts may be more severe during storm events” (page 6). Similar assertions, including how this condition may be exacerbated by increasing ambient water temperatures related to climate variability, are supported elsewhere in both the cited and published literature accounts.

Significance – Medium/Low

The COP DEIS would benefit from a more thorough, integrated review of potential direct, indirect long-term, and cumulative impacts to the ecology and affected marine resources associated with increased nutrient loading to better relate the environmental consequences of continuing pulse discharges from the S-197.

Recommendations for Resolution

1. Expand the discussion of past HAB events and related marine resource impacts, including references to applicable literature, in the COP DEIS.

Final Panel Comment 8

2. Provide a more detailed assessment of the positive and negative direct and indirect impacts of S-197 discharges with specific focus on the frequency and duration of larger events (>500 cfs) between the baseline and ALT Q+.

3. Provide a statement regarding the anticipated long-term and cumulative impacts associated with operation of the S-197 under COP.

Literature Cited:

Boyer, J. and H. O. Briceño (2008). FY2007 Annual Report of the South Florida Coastal Water Quality Monitoring Network. SFWMD/SERC Cooperative Agreement #4600000352. SERC Tech. Rep. T-351.

Gilbert, P. M., J. Boyer, C. Heil, S. Kelly, C. Madden, and D. Rudnick (2009). Florida Bay: Water Quality Status and Trends, Historic and Emerging Algal Problems. Contributions in Marine Science December 2009 Vol 38: 5-17.

Rudnick, D., J. Boyer, S. Blair, P. Gilbert, C. Heil, R. Jaffe, R. Price, M. Koch and C. J. Madden (2008). Florida Bay Biogeochemistry and Phytoplankton Dynamics: Synthesis for Ecosystem Management and Restoration. 2008 Florida Bay and adjacent marine systems science conference, Naples, FL, 29-33. (abstract only).

Rudnick, D., C. Madden, S. Kelly, R. Bennett and K. Cunniff (2007). Report on algal blooms in eastern Florida Bay and southern Biscayne Bay. 2007 South Florida Environmental Report, Appendix 12-3. SFWMD. 28 pp.

Final Panel Comment 9

Risk and uncertainty associated with operational malfunction of primary system components, and the degree to which other system components could compensate, have not been evaluated.

Basis for Comment

There is no information presented in the COP DEIS or in Appendix J, System Operating Manual, addressing operations, maintenance, repair, rehabilitation or replacement (OMRR&R). While these issues are usually addressed in the economic analysis with regard to project feasibility, the documents do not cover project requirements for OMRR&R and its role and potential impact upon operations of the MWD and C-111SD infrastructure. In addition, details of the uniqueness of components in terms of reparability or replacement are not provided. Without operational disruption probabilities, the overall impact to the project cannot be determined. However, due to the large number of infrastructure components, the Panel assumes that disruption of the system would be minimal.

The issue with exclusion of OMRR&R, in the context of project operation, relates to the system having all components available at all times. There is no mention of the risk and uncertainty of components being nonfunctional, the degree to which other components of the system could compensate, and the impact of any delays associated with repair or replacement upon environmental goals and flood risk. In addition, there is no mention of a Monte Carlo analysis that would give the probabilities that would allow for an evaluation of consequences.

Significance – Medium/Low

OMRR&R of the project infrastructure is the same under each operational alternative; however, inoperability of a critical component or significant outage could carry environmental and life safety consequences.

Recommendations for Resolution

1. Provide a qualitative description of OMRR&R as it relates to operability of the COP, particularly with respect to repair and or replacement of operable flow control structures.
2. Describe emergency power generation needed for the system central control as well as individual electrically driven infrastructure.
3. Document whether a public warning system exists if project failure were to jeopardize public safety.

Final Panel Comment 10

Use of multiple linear regression statistics to relate processes that increase water depths in SRS Taylor Slough with the conditions and processes that change salinity in Florida Bay may not be sufficient to quantify salinity decrease in Florida Bay.

Basis for Comment

The COP DEIS describes post-processing of simulated hydrology results from RSM-GL modeling of each COP alternative and ECB19RR by using multiple linear regression statistical models to estimate salinity conditions at 17 marine monitoring network stations in Florida Bay. The statistical models correlate increased water depths in SRS Taylor Slough with changes in salinity in Florida Bay. However, multiple linear regression statistics that relate processes that increase water depths in SRS Taylor Slough with the conditions and processes that change salinity in Florida Bay may not be sufficient to quantify salinity decreases in Florida Bay because other factors (for example, winds and bay currents) also affect Florida Bay salinity. Decreases in Florida Bay salinity are not related solely to freshwater flows from upland. Thus, statistical analysis is not adequate to estimate COP effects on Florida Bay salinity. Currently, there are many numerical models that can evaluate salinity changes given a time series of inflows in a water body.

Significance – Medium/Low

Given that the computed salinity decreases were small (e.g., 1.29 practical salinity unit [psu]), the COP DEIS statement relating these small changes to have ecologically significant impacts on Florida Bay water because they reflect long-term seasonal means or they decrease annual extremes is inconclusive and may be misleading without additional supporting information.

Recommendations for Resolution

1. Provide information to support the assertion that changes in Florida Bay salinity are predominantly caused by changes in freshwater flows from upland, and explain that other factors like winds and bay currents play a minor role in Florida Bay salinity changes.

2. Provide additional information to support the assertion that long-term, small salinity decreases or small decreases in annual salinity extremes cause ecologically significant impacts on Florida Bay water.

Final Panel Comment 11

The property and agricultural areas impacted and the level of flood risk that would remain after implementation of AtlQ+ are unclear.

Basis for Comment

Flood risk maps (Figures 4-148 through 4-150) and tables are provided in the COP DEIS for the various rounds of screening including AltQ, but not for the Preliminary Preferred Alternative, AltQ+. The area of what the COP DEIS refers to as "nuisance flooding" appears to be confined to the 8.5 SMA. The COP DEIS states, "This analysis [of alternatives exclusive of AltQ+] shows that there is some increase in risk of nuisance flooding in select cells…" (page 4-230). There is no discussion of the impact, if any, of AltQ+, and there is no mention of mitigation for those cells that experience a risk increase and how that relates to the constraint conditions.

Significance – Low

Flooding is part of the constraint conditions. All indications are that the alternatives meet that condition in the aggregate but not on an individual cell basis. Probability maps would provide clarity that is presently missing.

Recommendations for Resolution

1. Provide a map comparing the base and preferred plans showing the probabilities of flooding in 8.5 SMA by depth contour.
2. Describe the impact of AltQ+ compared to the alternatives discussed.

Final Panel Comment 12

The tabulated percentage change for locations that result in a reduction in flood damage during the wet year have been listed as though they had an increase in flood damages.

Basis for Comment

In Appendix I, Table 4-49, a reduction in flood risk damage in the Damage Difference columns for the Average and Dry years are represented in the Percent Change columns for the Average and Dry years, respectively, with a negative sign for the percentage changes representing reductions in damages. However, only positive percentages have been listed in the column for the wet year Alt Q Percentage Change. The Panel believes that at least some of these numbers should be negative percentages.

Significance – Low

This issue is assumed to be a clerical error that has no impact on the alternatives assessment. If, however, it did influence which alternative was selected, the impact on the project could be greater.

Recommendation for Resolution

1. Correct the table entries as appropriate and consider any potential impacts that may have resulted from the use of the data in the table.

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APPENDIX A

IEPR Process for the MWD/C-111SD COP Project

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A.1 Planning and Conduct of the Independent External Peer Review (IEPR)

Table A-1 presents the major milestones and deliverables of the Independent External Peer Review (IEPR) of the Modified Water Deliveries to Everglades National Park and Canal 111 South Dade Projects Combined Operational Plan (hereinafter: MWD/C-111SD COP IEPR). Due dates for milestones and deliverables are based on the award/effective date listed in Table A-1. The review documents were provided by U.S. Army Corps of Engineers (USACE) on March 2, 2020. Note that the actions listed under Task 6 occur after the submission of this report. Battelle anticipates submitting the pdf printout of the USACE's Design Review and Checking System (DrChecks) project file (the final deliverable) on July 28, 2020. The actual date for contract end will depend on the date that all activities for this IEPR are conducted and subsequently completed.

Table A-1. Major Milestones and Deliverables of the MWD/C-111SD COP IEPR

Task	Action	Due Date
1	Award/Effective Date	3/2/2020
	Review documents available	3/2/2020
	Public comments available	3/23/2020
	Battelle submits draft Work Plan[a]	3/11/2020
	USACE provides comments on draft Work Plan	3/17/2020
	Battelle submits final Work Plan[a]	3/19/2020
	Battelle submits revised final Work Plan[a]	4/22/2020
2	Battelle submits list of selected panel members[a]	3/16/2020
	USACE confirms the panel members have no COI	3/16/2020
3	Battelle convenes kick-off meeting with USACE	3/9/2020
	Battelle convenes kick-off meeting with panel members	3/27/2020
	Battelle convenes kick-off meeting with USACE and panel members	3/31/2020
4	Panel members complete their individual reviews	4/23/2020
	Panel members provide draft Final Panel Comments to Battelle	4/27/2020
	Battelle sends public comments to panel members for review	4/24/2020
	Panel confirms no additional Final Panel Comment is necessary with regard to the public comments	4/28/2020
	Panel finalizes Final Panel Comments	5/14/2020
5	Battelle submits Final IEPR Report to USACE[a]	5/22/2020
6[b]	Battelle convenes Comment Response Teleconference with panel members and USACE	7/13/2020
	Battelle submits pdf printout of DrChecks project file[a]	7/28/2020
SAD	USACE South Atlantic Division (SAD) Coordination Meeting	TBD
	Contract End/Delivery Date	3/30/2021

[a] *Deliverable.*
[b] *Task 6 occurs after the submission of this report.*

At the beginning of the Period of Performance for the MWD/C-111SD COP IEPR, Battelle held a kick-off meeting with USACE to review the preliminary/suggested schedule, discuss the IEPR process, and address any questions regarding the scope (e.g., terminology to use, access to DrChecks, etc.). Any revisions to the schedule were submitted as part of the final Work Plan. The final charge consisted of 19 charge questions provided by USACE, two overview questions added by Battelle (all questions were included in the revised final Work Plan), and general guidance for the Panel on the conduct of the peer review (provided in Appendix C of this final report).

Prior to beginning their review and after their subcontracts were finalized, all the members of the Panel attended a kick-off meeting via teleconference planned and facilitated by Battelle in order to review the IEPR process, the schedule, communication procedures, and other pertinent information for the Panel. Battelle planned and facilitated a second kick-off meeting via teleconference during which USACE presented project details to the Panel. Before the meetings, the IEPR Panel received an electronic version of the final charge, as well as the review documents and reference/supplemental materials listed in Table A-2.

Table A-2. Documents to Be Reviewed and Provided as Reference/Supplemental Information

Review Documents	No. of Review Pages
Environmental Impact Statement	
Section Abstract	2
Executive Summary	11
Section 1 – Purpose and Need	26
Section 2 - Alternatives	40
Section 3 – Affected Environment	42
Section 4 – Effects of the Alternatives	285
Section 6 – Public Involvement Summary	14
Appendix A Water Control Plan	81
Appendix C Adaptive Management and Monitoring Plan	272
Appendix E.1 Ecological Evaluation of Alternatives	112
Appendix H. Annex 3 Modeling Assumptions	102
Appendix H Annex 6 8.5 Square Mile Area (SMA) Evaluation	50
Appendix H Annex 8 TTFF	34
Appendix I Socioeconomics	120

Table A-2. Documents to Be Reviewed and Provided as Reference/Supplemental Information (continued)

Review Documents	No. of Review Pages
System Operating Manual	
Chapters 1-6, 8, 9	160
Total Number of Review Pages	**1,351**
Public Comments	**200**
Supplemental Documents	
Environmental Impact Statement	
Master Table of Contents	7
Section 5 – List of Preparers	6
Section 7 – References	9
Master Table of Contents	7
Section 5 – List of Preparers	6
Section 7 – References	9
Section 8 – Index	4
Appendix B Coastal Zone Consistency Determination	16
Appendix D.1 NEPA Correspondence	357
Appendix D.2 ESA Compliance	568
Appendix D.3 NHPA Compliance	101
Appendix E.2 Supporting Information	22
Appendix F Memorandum for Record S-331, S-334 and S-356	26
Appendix G S-197 Releases	11
Appendix H Hydraulics and Hydrology Cover	4
Appendix H Annex 1 Modeling Strategy	46
Appendix H Annex 2 8.5 SMA Validation	14
Appendix H Annex 4 Sensitivity Runs	81
Appendix H Annex 5 Modeling Results_Round 3	141

Table A-2. Documents to Be Reviewed and Provided as Reference/Supplemental Information (continued)

Supplemental Documents	No. of Pages
Appendix H Annex 7 Design Storms	8
System Operating Manual	
Appendix A: Structural Descriptions	296
Appendix B: Drought Contingency Plan	9
Appendix C: Agreements with Non-Federal Sponsors	68
Appendix D: Code of Federal Regulations	29
Appendix E: Standing Instructions to Structure Operator	6
Appendix G: Water Control Plans and Project Operating Manuals	37
Total Number of Reference Pages	**1,942**

In addition to the materials provided in Table A-2, the panel members were provided the following USACE guidance documents.

- Review Policy for Civil Works, (EC 1165-2-217, February 20, 2018)
- Office of Management and Budget's Final Information Quality Bulletin for Peer Review (December 16, 2004)
- USACE Climate Change Adaptation Plan (2015)
- ETL 1100-2-1 – Procedures to Evaluate SLR Change Impacts Responses Adaptation
- ER 1100-2-8162 – Incorporating SLR Change in CW Programs.

About halfway through the review, a teleconference was held with USACE, Battelle, and the Panel so that USACE could answer any questions the Panel had concerning either the review documents or the project. Prior to this teleconference, Battelle submitted 19 panel member questions to USACE. USACE was able to provide responses to all the questions during the teleconference and also provided written responses to all the questions prior to the end of the review.

A.2 Review of Individual Comments

The Panel was instructed to address the charge questions/discussion points within a charge question response form provided by Battelle. At the end of the review period, the Panel produced individual comments in response to the charge questions/discussion points. Battelle reviewed the comments to identify overall recurring themes, areas of potential conflict, and other overall impressions. At the end of the review, Battelle summarized the individual comments into a preliminary list of overall comments and discussion points. Each panel member's individual comments were shared with the full Panel.

A.3 IEPR Panel Teleconference

Battelle facilitated a teleconference with the Panel so that the panel members could exchange technical information. The main goal of the teleconference was to identify which issues should be carried forward as Final Panel Comments in the Final IEPR Report and decide which panel member should serve as the lead author for the development of each Final Panel Comment. This information exchange ensured that the Final IEPR Report would accurately represent the Panel's assessment of the project, including any conflicting opinions. The Panel engaged in a thorough discussion of the overall positive and negative comments, added any missing issues of significant importance to the findings, and merged any related individual comments. At the conclusion of the teleconference, Battelle reviewed each Final Panel Comment with the Panel, including the associated level of significance, and confirmed the lead author for each comment.

A.4 Preparation of Final Panel Comments

Following the teleconference, Battelle distributed a summary memorandum for the Panel documenting each Final Panel Comment (organized by level of significance). The memorandum provided the following detailed guidance on the approach and format to be used to develop the Final Panel Comments for the MWD/C-111SD COP IEPR:

- Lead Responsibility: For each Final Panel Comment, one panel member was identified as the lead author responsible for coordinating the development of the Final Panel Comment and submitting it to Battelle. Battelle modified lead assignments at the direction of the Panel. To assist each lead in the development of the Final Panel Comments, Battelle distributed a summary email detailing each draft final comment statement, an example Final Panel Comment following the four-part structure described below, and templates for the preparation of each Final Panel Comment.

- Directive to the Lead: Each lead was encouraged to communicate directly with the other panel members as needed and to contribute to a particular Final Panel Comment. If a significant comment was identified that was not covered by one of the original Final Panel Comments, the appropriate lead was instructed to draft a new Final Panel Comment.

- Format for Final Panel Comments: Each Final Panel Comment was presented as part of a four-part structure:
    1. Comment Statement (succinct summary statement of concern)
    2. Basis for Comment (details regarding the concern)
    3. Significance (high, medium/high, medium, medium/low, and low; see description below)
    4. Recommendation(s) for Resolution (see description below).

- Criteria for Significance: The following were used as criteria for assigning a significance level to each Final Panel Comment:
    1. **High:** There is a fundamental issue within study documents or data that will influence the technical or scientific basis for selection of, justification of, or ability to implement the recommended plan.

2. **Medium/High:** There is a fundamental issue within study documents or data that has a strong probability of influencing the technical or scientific basis for selection of, justification of, or ability to implement the recommended plan.

3. **Medium:** There is a fundamental issue within study documents or data that has a low probability of influencing the technical or scientific basis for selection of, justification of, or ability to implement the recommended plan.

4. **Medium/Low:** There is missing, incomplete, or inconsistent technical or scientific information that affects the clarity, understanding, or completeness of the study documents, and there is uncertainty whether the missing information will affect the selection of, justification of, or ability to implement the recommended plan.

5. **Low:** There is a minor technical or scientific discrepancy or inconsistency that affects the clarity, understanding, or completeness of the study documents but does not influence the selection of, justification of, or ability to implement the recommended plan.

- Guidelines for Developing Recommendations: The recommendation section was to include specific actions that USACE should consider to resolve the Final Panel Comment (e.g., suggestions on how and where to incorporate data into the analysis, how and where to address insufficiencies, areas where additional documentation is needed).

Battelle reviewed and edited the Final Panel Comments for clarity, consistency with the comment statement, and adherence to guidance on the Panel's overall charge, which included ensuring that there were no comments regarding either the appropriateness of the selected alternative or USACE policy. At the end of this process, 12 Final Panel Comments were prepared and assembled. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The full text of the Final Panel Comments is presented in Section 4.2 of the main report.

A.5 Conduct of the Public Comment Review

Following the schedule in Table A-1, Battelle received an Excel file containing 95 public comment and verbal transcript entries on the COP Draft Environmental Impact Statement and System Operating Manual from USACE. Battelle then sent the public comments to the panel members and requested that they respond to Charge Question 13:

> Does information or do concerns provided in the public comments raise any additional discipline-specific technical concerns with regard to the overall report?

The Panel produced individual comments in response to the charge question. Each panel member's individual comments for the public comment review were shared with the full Panel. Battelle reviewed the comments to identify any new technical concerns that had not been previously identified during the initial IEPR. Upon review, Battelle determined and the Panel confirmed that no new issues or concerns were identified other than those already covered in the Final Panel Comments.

A.6 Final IEPR Report

After concluding the review and preparation of the Final Panel Comments, Battelle prepared a final IEPR report (this document) on the overall IEPR process and the IEPR panel members' findings. Each panel

member and Battelle technical and editorial reviewers reviewed the IEPR report prior to submission to USACE for acceptance.

A.7 Comment Response Process

As part of Task 6, Battelle will enter the 12 Final Panel Comments developed by the Panel into USACE's DrChecks, a Web-based software system for documenting and sharing comments on reports and design documents, so that USACE can review and respond to them. USACE will provide responses (Evaluator Responses) to the Final Panel Comments, and the Panel will respond (BackCheck Responses) to the Evaluator Responses. All USACE and Panel responses will be documented by Battelle. Battelle will provide USACE and the Panel a pdf printout of all DrChecks entries, through comment closeout, as a final deliverable and record of the IEPR results.

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APPENDIX B

Identification and Selection of IEPR Panel Members for the MWD/C-111SD COP Project

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B.1 Panel Identification

The candidates for the Independent External Peer Review (IEPR) of the Modified Water Deliveries to Everglades National Park and Canal 111 South Dade Projects Combined Operational Plan (hereinafter: MWD/C-111SD COP IEPR) Panel were evaluated based on their technical expertise in the following key areas: economics, water management, environmental and National Environmental Policy Act (NEPA), hydrology and hydraulics (H&H) / climate preparedness and resilience (dual role). These areas correspond to the technical content of the review documents and overall scope of the MWD/C-111SD COP project.

To identify candidate panel members, Battelle reviewed the credentials of the experts in Battelle's Peer Reviewer Database, sought recommendations from colleagues, contacted former panel members, and conducted targeted Internet searches. Battelle evaluated these candidate panel members in terms of their technical expertise and potential conflicts of interest (COIs). Of these candidates, Battelle chose the most qualified individuals, confirmed their interest and availability, and ultimately selected four experts for the final Panel. The remaining candidates were not proposed for a variety of reasons, including lack of availability, disclosed COIs, or lack of the precise technical expertise required.

Candidates were screened for the following potential exclusion criteria or COIs. These COI questions were intended to serve as a means of disclosure in order to better characterize a candidate's employment history and background. Battelle evaluated whether scientists in universities and consulting firms that are receiving USACE-funding have sufficient independence from USACE to be appropriate peer reviewers. Guidance in OMB (2004, p. 18) states,

> "…when a scientist is awarded a government research grant through an investigator-initiated, peer-reviewed competition, there generally should be no question as to that scientist's ability to offer independent scientific advice to the agency on other projects. This contrasts, for example, to a situation in which a scientist has a consulting or contractual arrangement with the agency or office sponsoring a peer review. Likewise, when the agency and a researcher work together (e.g., through a cooperative agreement) to design or implement a study, there is less independence from the agency. Furthermore, if a scientist has repeatedly served as a reviewer for the same agency, some may question whether that scientist is sufficiently independent from the agency to be employed as a peer reviewer on agency-sponsored projects."

The term "firm" in a screening question referred to any joint venture in which a firm was involved. It applied to any firm that serves in a joint venture, either as a prime or as a subcontractor to a prime. Candidates were asked to clarify the relationship in the screening questions.

Panel Conflict of Interest (COI) Screening Statements for the IEPR of the Modified Water Deliveries to Everglades National Park and Canal 111 South Dade Projects Combined Operational Plan
1. Previous and/or current involvement by you or your firm in the Modified Water Deliveries to Everglades National Park (MWD) and Canal 111 South Dade (C-111 South Dade) Projects Combined Operational Plan (hereinafter: South Dade COP) and related projects, specifically including but not limited to the authorized MWD Project components (Tamiami Trail Roadway Modifications, 8.5 Square Mile Area, etc.), and the authorized C-111 South Dade Project components (North Detention Area, South Detention Area, etc.).

Panel Conflict of Interest (COI) Screening Statements for the IEPR of the Modified Water Deliveries to Everglades National Park and Canal 111 South Dade Projects Combined Operational Plan
2. Previous and/or current involvement by you or your firm in flood risk management (including Climate Change Resiliency) or similar studies in Miami-Dade County, Florida.
3. Previous and/or current involvement by you or your firm in the conceptual or actual design, construction, or operation and maintenance (O&M) of any related projects in Miami-Dade County, Florida.
4. Current employment by the U.S. Army Corps of Engineers (USACE).
5. Previous and/or current involvement with paid or unpaid expert testimony related to the South Dade COP project and related projects, specifically including but not limited to the authorized MWD Project components (Tamiami Trail Roadway Modifications, 8.5 Square Mile Area, etc.) and the authorized C-111 South Dade Project components (North Detention Area, South Detention Area, etc.).
6. Previous and/or current employment or affiliation with the non-Federal sponsors or any of the following collaborating or cooperating Federal, State, County, local and regional agencies, environmental organizations, and interested groups *(for pay or pro bono):* • South Florida Water Management District • Everglades National Park • U.S. Fish and Wildlife Service • Center for Biological Diversity
7. Past, current, or future interests or involvements (financial or otherwise) by you, your spouse, or your children related to flood risk management in Miami-Dade County, Florida.
8. Current personal involvement with other USACE projects, including whether involvement was to author any manuals or guidance documents for USACE. If yes, provide titles of documents or description of project, dates, and location (USACE District, Division, Headquarters, Engineer Research and Development Center [ERDC], etc.), and position/role. Please highlight and discuss in greater detail any projects that are specifically with the Jacksonville District.
9. Previous or current involvement with the development or testing of models that were used for, or in support of, the South Dade COP project. If yes, provide title/description, dates employed, and place of employment. Note: The following model was used to prepare the South Dade COP: South Florida Water Management District's Regional Simulation Model (RSM) specifically the RSM application for the Everglades and Lower East Coast Service Areas (RSM-GL) and the RSM application for Miami-Dade (MDRSM).
10. Current firm involvement with other USACE projects, specifically those projects/contracts that are with the Jacksonville District. If yes, provide title/description, dates, and location (USACE District, Division, Headquarters, ERDC, etc.), and position/role. Please also clearly delineate the percentage of work you personally are currently conducting for the Jacksonville District. Please explain.
11. Any previous employment by USACE as a direct employee, notably if employment was with the Jacksonville District. If yes, provide title/description, dates employed, and place of employment (District, Division, Headquarters, ERDC, etc.), and position/role.

Panel Conflict of Interest (COI) Screening Statements for the IEPR of the Modified Water Deliveries to Everglades National Park and Canal 111 South Dade Projects Combined Operational Plan
12. Any previous employment by USACE as a contractor (either as an individual or through your firm) within the last 10 years, notably if those projects/contracts are with the Jacksonville District. If yes, provide title/description, dates employed, and place of employment (District, Division, Headquarters, ERDC, etc.), and position/role.
13. Previous experience conducting technical peer reviews. If yes, please highlight and discuss any technical reviews concerning relevant studies (i.e., aquatic ecosystem restoration and/or flood risk management) and include the client/agency and duration of review (approximate dates).
14. Pending, current, or future financial interests in contracts/awards from USACE related to the South Dade COP project.
15. Significant portion of your personal or office's revenues within the last three years came from USACE contracts.
16. Significant portion of your personal or office's revenues within the last three years came from South Florida Water Management District contracts.
17. Any publicly documented statement (including, for example, advocating for or discouraging against) related to the South Dade COP project.
18. Participation in relevant prior and/or current Federal studies related to the South Dade COP project.
19. Previous and/or current participation in prior non-Federal studies related to the South Dade COP project.
20. Has your research or analysis been evaluated as part of the South Dade COP project?
21. Is there any past, present, or future activity, relationship, or interest (financial or otherwise) that could make it appear that you would be unable to provide unbiased services on this project? If so, please describe.

Providing a positive response to a COI screening question did not automatically preclude a candidate from serving on the Panel. For example, participation in previous USACE technical peer review committees and other technical review panel experience was included as a COI screening question. A positive response to this question could be considered a benefit.

B.2 Panel Selection

In selecting the final members of the Panel, Battelle chose experts who best fit the expertise areas and had no COIs. Table B-1 provides information on each panel member's affiliation, location, education, and overall years of experience. Battelle established subcontracts with the panel members when they indicated their willingness to participate and confirmed the absence of COIs through a signed COI form. USACE was given the list of candidate panel members, but Battelle selected the final Panel.

Table B-1. MWD/C-111SD COP IEPR Panel: Summary of Panel Members

Name	Affiliation	Location	Education	P.E.	Exp (yrs)
Economics					
Harvey Hill	Independent Consultant	Saskatoon, Saskatchewan, Canada	Ph.D., Trade Development & Marketing; M.S. and B.S., Agricultural Economics	No	20+
Water Management					
David Bastian	Independent Consultant	Annapolis, MD	M.S., River Engineering	Yes	37+
Environmental and NEPA					
Peter Bottone	Ardurra Group, Inc.	Tampa, FL	B.A., Biology	No	35+
Hydrology and Hydraulics (H&H) / Climate Preparedness and Resilience (Dual Role)					
Michael Kabiling	Taylor Engineering, Inc.	Jacksonville, FL	Ph.D., Hydraulics and Coastal Engineering	Yes	28+

Table B-2 presents an overview of the credentials of the final four members of the Panel and their qualifications in relation to the technical evaluation criteria. More detailed biographical information on the panel members and their areas of technical expertise is given in Section B.3.

Table B-2. MWD/C-111SD COP IEPR Panel: Technical Criteria and Areas of Expertise

Technical Criterion	Hill	Bastian	Bottone	Kabiling
Economist				
At least 15 years of demonstrated experience in economics	X			
Minimum M.S. degree or higher in economics	X			
Experience working on water management operations studies and evaluating USACE ecosystem restoration project benefits and costs	X			
Experience in identifying incidental benefits, preferably flood risk management and water supply	X			
Familiarity with the Hydrologic Engineering Center's Flood Impact Analysis (HEC-FIA)	X			
Water Management Specialist				
At least 15 years of experience directly related to operations of multipurpose, regional-scale water resource systems		X		
Knowledge of southwestern Florida hydrology and water management		X		
Environmental and NEPA				
At least 15 years of experience directly related to water resources environmental evaluation or review and the NEPA process			X	
Experience in water management operations			X	
Familiarity with large, complex Civil Works projects with high public and interagency interest			X	
Familiarity with the ecology of shallow freshwater, coastal and estuarine systems in south Florida			X	
Familiarity with methods for evaluating ecological benefits in those environments including the ecological modeling tools utilized for benefit calculation			X	
Expert in compliance with additional environmental laws, policies, and regulations, including compliance in Fish and Wildlife Coordination Act, Endangered Species Act (ESA), Section 106 of the National Historic Preservation Act (NHPA), and state and Federal laws/executive orders pertaining to American Indian Tribes			X	
H&H / Climate Preparedness and Resilience (Dual Role)				
Registered professional engineer (PE)				X
Minimum B.S. degree in engineering				X
At least 15 years of experience in H&H engineering and H&H modeling				X
General knowledge of south Florida hydrology and water management				X

Table B-2. MWD/C-111SD COP IEPR Panel: Technical Criteria and Areas of Expertise (continued)

Technical Criterion	Hill	Bastian	Bottone	Kabiling
A thorough understanding of water storage and conveyance in south Florida and knowledge of associated H&H model applications, with the ability to understand the application of these models to south Florida conditions				X
Experience with evaluating H&H modeling completed under SMART Planning				X
Experience with the South Florida Water Management District's Regional Simulation Model (RSM) specifically the RSM application for the Everglades and Lower East Coast Service Areas (RSM-GL)				X
At least 15 years of experiences in civil engineering and design				X
Working knowledge of the USACE policy guidelines on Sea Level Rise and Climate Change assessments for project life-cycle planning				X

B.3 Panel Member Qualifications

Detailed biographical information on each panel members' credentials, qualifications and areas of technical expertise is provided in the following paragraphs.

Name	Harvey S.J. Hill, Ph.D.
Role	Economist
Affiliation	Independent Consultant

Harvey Hill holds a Ph.D. in Agricultural Economics and a certificate of International Agricultural and Resource Management from Texas A &M University. He also earned a M.Sc. in Agricultural Economics from Texas A&M University and B.Sc. in Agricultural Economics from the University of Saskatchewan.

Dr. Hill is currently an independent consultant and an adjunct professor at the Johnson-Shoyama Graduate School of Public Policy at the University of Saskatchewan and has more than 20 years of experience in natural resource economics.

From 2016 to 2018, Dr. Hill worked at the U.S. Army Corps of Engineers (USACE) Institute for Water Resources (IWR) as a Federal term employee. In 2014-2016, he was an American Association for the Advancement of Sciences policy fellow at IWR. At IWR, Dr. Hill initiated and co-led a collaboration with other USACE employees that developed multi-hazard game-based flood risk reduction decision support applications. This effort also was enhanced by significant collaboration with several Federal, state, and local government partners, academic institutions, and applied stakeholders. The work was recognized for its innovation and relevance, with Dr. Hill and his colleagues being awarded IWR's 2016 Best Product of the Year Award. In addition, he explored a form of public private partnerships, long-term concessions, for their potential to support the refurbishment of aging U.S. Federal dams in a cost-effective manner. The

results of that work were presented at the 11th North American Infrastructure Leadership Forum in Washington, D.C., October 2019.

Prior to IWR, Dr. Hill worked at Agriculture and Agri-Food Canada for 10 years as the creator and leader of its Climate Decision Support and Adaptation unit. This unit developed climate variability and climate change risk management applied adaptation practices, tools, and strategies. The unit initiated and contributed to the development of a remote-sensing crop forecasting product that received a Canadian public service innovation award. It also developed a drought mitigation game methodology that has been applied to a range of drought risk management issues around the world.

From September 2001 to August 2004, as a University Corporation of Atmospheric Research employee, Dr. Hill coordinated the National Oceanic and Atmospheric Administration's (NOAA) Regional Integrated Sciences and Assessments Program. In that role, he led a research funding program that focused on supporting integrated applied research linking seasonal climate information to decision-making in the areas of water, agriculture, forest fire management, and communications. His position at NOAA and his subsequent positions have required or made it possible for him to participate in several reviews of research and applied natural resource projects, papers, and programs.

Throughout his career, Dr. Hill's professional research and work has focused on linking climate information to agricultural- and water-decision support, proactive infrastructure disaster risk management, cost/benefit analysis related to public/private partnership/long-term concessions, and flood and drought risk management. He has familiarity with interpreting the Hydrologic Engineering Center Flood Impact Analysis (HEC-FIA) model output. Dr. Hill has created and taught a number of university classes, including a graduate-level cost-benefit analysis and disaster risk reduction class for Florida International University. He has authored or co-authored publications on topics related to the value of climate information in agriculture, drought preparedness, and natural disaster adaptation and mitigation.

Name	David Bastian, P.E.
Role	Water Management Specialist
Affiliation	Independent Consultant

Mr. Bastian is an independent consultant from Annapolis, Maryland. He specializes in USACE feasibility studies and their technical and policy compliance, adherence to plan formulation, and review of feasibility studies incorporating incremental cost analysis, ecosystem restoration, flood risk reduction, deep-draft navigation, dredged material disposal, and hydraulic and river engineering. He earned his B.S. in civil engineering from the Georgia Institute of Technology and an M.S. in river engineering from Delft University in the Netherlands. Mr. Bastian is a registered professional engineer (PE) in Mississippi and Maryland.

Mr. Bastian has more than 37 years of experience with USACE and as a contractor/consultant on USACE projects involving feasibility studies and public works planning, all based on the USACE six-step planning process. As a reviewer at USACE-Headquarters (HQ-USACE), he was a practitioner and continues to have direct experience with Engineer Regulation (ER) 1105-2-100 as well as other USACE engineering regulations, manuals, and pamphlets, and continues to use and remain familiar with the "planning community toolbox." He co-authored the USACE Planner's Workshop Manual. His project history has resulted in his review of and collaboration on more than 100 USACE reports evaluating and comparing

alternative plans. He understands the appropriate use of risk and uncertainty language in decision documents needed to effectively convey overall risks to the public and decision makers.

Mr. Bastian has reviewed dozens of regional economic impact analyses associated with environmental impact statements for Federal water resource projects as a reviewer for the USACE and, within the last 10 years, as an IEPR panel member for the following ecosystem restoration projects:

- Picayune Strand Restoration Project (Jacksonville District): Involved restoring freshwater wetlands as a component of the Comprehensive Everglades Restoration Plan (CERP). The specific restoration included building pump stations, spreader canal, and tie-back levee; plugging miles of canals to block flow; and removing and degrading 95 miles of roads and tram roads.
- Malibu Creek Ecosystem Restoration Feasibility Study (Los Angeles District): Involved the removal of a dam to re-establish migratory opportunities of aquatic habitat.
- Hudson-Raritan Estuary Ecosystem Restoration Feasibility Study (New York District): Involved a wide range (in scope and scale) of estuarine and riverine restoration components. One of its primary purposes was to reconnect and restore freshwater streams to the estuary to provide a range of quality habitats for aquatic organisms, including the modification of rock weir for fish passage.
- Puget Sound Nearshore Study (Seattle District): Evaluated a suite of ecosystem restoration sites around the Puget Sound nearshore zone that included freshwater and tidal wetlands, coastal embayments, intertidal mudflats, reconnection of estuarine tidal channels, and sediment delivery from bluff-backed beaches. Included was the removal of fish passage barriers, and reduction of habitat fragmentation to restore a highly degraded tributary to the Duwamish River as well as a new 1,000-foot channel with soil amendments and plantings.

Mr. Bastian has more than 22 years of experience in flood risk evaluation and has worked directly to identify and evaluate flood risk. For nine years, he was involved in the coastal economic evaluation for coastal Louisiana restoration, the greater New Orleans hurricane and storm damage risk reduction system, and four other study areas along the Louisiana and Texas coasts. His extensive review experience includes the Delaware River Basin Comprehensive Flood Risk Management Interim Feasibility Study and Integrated Environmental Assessment for New Jersey (2016); the Souris River Basin Integrated Feasibility Report/Environmental Assessment (2017); the Upper Turkey Creek, Johnson & Wyandotte Counties, Kansas, Flood Risk Management Project; and the Kansas City Local Flood Protection Project (2005-2006). He helped author the report, provided technical and policy guidance, and supervised District staff in revising a feasibility report concerning a major metropolitan levee system upgrade for Kansas City, Kansas, and Kansas City, Missouri. On the Topeka Local Flood Damage Reduction Project (2006-2007), he provided technical, policy, and writing guidance to the District for design deficiency, levee system upgrade, and flood risk reduction. For the Mississippi River Levee System (Units L-455 & R471-460), St. Joseph, Missouri/Elwood, Kansas (2006-2007), he provided technical and policy compliance for a flood risk reduction study involving a portion of the levee system.

Mr. Bastian is familiar with large, complex Civil Works projects with high public and interagency interests through his extensive involvement with the Louisiana Coastal Study area pre- and post-Hurricane Katrina. He is familiar with USACE flood risk and hurricane/coastal damage risk reduction analysis and economic benefit calculations, including the use of standard USACE computer programs such as the HEC-FIA

modeling program. He has reviewed HEC-FIA and other model applications and their outputs for several flood risk reduction projects for technical and economic justification.

During his career, Mr. Bastian has developed economic input databases for deep-draft navigation studies at the IWR (1980-1987); evaluated deep-draft economic feasibility for enlarging the Panama Canal (1987-1993); reviewed feasibility studies for economic justification (1993-1998) at HQ-USACE; and reviewed and/or authored planning and economic analyses for various USACE projects (2001-present), including hurricane and storm damage risk reduction analyses for the New Orleans District, its architectural/engineering firms, and non-Federal sponsors (2006-2011).

Since 1993, Mr. Bastian has reviewed USACE studies with a focus on evaluating and comparing alternative plans for compliance with plan formulation processes, procedures, and standards. Since 2001, he has participated in the preparation of the Kansas City, Turkey Creek, Texas City, and Boardman flood risk management and post-Hurricane Katrina and Texas City hurricane and storm damage risk reduction studies. He also has reviewed the Blanchard environmental restoration study and various dam safety studies regarding plan formulation compliance and economic justification.

While at HQ-USACE and as a contractor/consultant on USACE projects, Mr. Bastian applied ER 1105-2-100 (Principles and Guidelines) to projects subject to Civil Works project evaluations, all of which involved the six-step planning process. During his career, he has reviewed and collaborated on more than 100 USACE reports evaluating and comparing alternative plans. He also has had direct experience with other USACE engineer regulations, manuals, and pamphlets and was the co-author of the USACE Planner's Workshop Manual.

Mr. Bastian has evaluated and conducted National Economic Development analysis procedures for all USACE business lines, including ecosystem restoration, navigation, dam safety, flood risk management, and hurricane and coastal storm damage risk reduction. Some of these studies involved review of output from the HEC suite of models, such as HEC-Flood Damage Reduction Analysis (HEC-FDA) software.

Mr. Bastian's previous employment at USACE included positions as Deputy Chief of Staff for Support, Office Chief of Engineers; Assistant Director of Civil Works, Office Chief of Engineers; technical and policy compliance review expert, Washington Level Review Center; and navigation research, USACE IWR. He has served as a USACE Washington-level technical and policy compliance review expert and managed interdisciplinary reviews of more than 70 feasibility reports.

Mr. Bastian is a member of the American Society of Civil Engineers, the American Association of Port Authorities, the Permanent International Association of Navigation Congresses, and the Western Dredging Association.

Name	Peter Bottone, PWS, Certified Ecological Restoration Practitioner
Role	Environmental and NEPA
Affiliation	Ardurra Group, Inc.

Mr. Bottone is the ecological services manager for Ardurra Group, Inc. in Tampa, Florida. He earned his B.A. in biology from the University of South Florida in 1982 and has more than 35 years of professional consulting experience conducting ecological evaluations for large-scale, complex, multi-objective public works projects with competing trade-offs in Florida, primarily under CERP; the Southwest Florida Water

Management District's (SWFWMD) Surface Water Improvement and Management (SWIM); the Florida Fish and Wildlife Conservation Commission restoration programs, and the Florida Department of Transportation (FDOT). Mr. Bottone's areas of specialization are NEPA environmental assessment/environmental impact studies and documentation; habitat and hydrological restoration and mitigation design; environmental resource permitting / Section 10/404 regulatory permitting; submerged aquatic vegetation mapping, research, and analysis; watershed and land management planning; stormwater retrofit design; wetland delineation, impact assessment; and mitigation; and wildlife and listed species studies, including coordination of project National Historic Preservation Act/State Historic Preservation Office (NHPA/SHPO) requirements.

Mr. Bottone has served as an environmental consultant responsible for preparation of NEPA documentation for large FDOT and Federal Highway Administration (FHWA) highway/bridge projects. He also has participated in previous IEPR Panel reviews of Federally sponsored projects involving NEPA compliance. For example, the I-75 Mobility 2000 Expansion Projects in Collier and Lee Counties for FDOT/FHWA-SR 951 to Bonita Beach; Golden Gate to Bonita Beach; and Alico, Corkscrew Roads to Daniels Parkway all included wetland assessments, pond siting, Endangered Species Act (ESA) consultations for the Florida panther and other endangered species, development of an environmental impact statement, and evaluation of effects on multi-agency flow-way restoration projects during the project development and environment / environmental assessment process. These projects required evaluation of tradeoffs among private, public, and conservation landowners with various interests relative to the expansion of the Interstate highway system, while providing mitigation and maintaining water resource and habitat restoration objectives. Of the numerous large-scale public works projects that Mr. Bottone has worked on, many have involved proximity to sensitive lands and required detailed assessment of all potential project impacts associated with the proposed action and coordination with various agencies. Examples include FDOT District 1s original feasibility assessment of the westernmost segment of the Tamiami Trail Widening Project in Collier County; the Everglades Agricultural Area Project Implementation Report; and prior participation as an IEPR panelist for SFWMD's Picayune Strand Restoration Project, Draft Limited Reevaluation and Environmental Assessment Post Authorization Change Report under the CERP.

Mr. Bottone has also evaluated impacts involving tradeoffs among private and public stakeholders with varying interests. He routinely addresses compliance with the ESA and Essential Fish Habitat, prepares biological assessments, and coordinates with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service in the evaluation of project impacts using USACE dichotomous keys for the determination of effect and obtaining Federal permits for numerous public sector roadway, port, and water resource projects. Representative projects include the SWIM Coral Creek and Alligator Creek Ecosystem Restoration Projects; the Kissimmee River Pool E Restoration Feasibility Study for SWFWMD/CERP; and the 10,000-acre Myakka River Deer Prairie Creek Hydrological Restoration Plan, Myakka State Forest and Edward W. Chance Reserve Hydrologic Restoration Projects for SWFWMD. He is a Professional Wetland Scientist (PWS# 2919) member of the Society of Wetland Scientists, a Certified Ecological Restoration Practitioner (#0199) and a member of the Society for Ecological Restoration.

Name	Michael Kabiling, Ph.D., P.E., CFM
Role	H&H / Climate Preparedness and Resilience (Dual Role)
Affiliation	Taylor Engineering, Inc.

Dr. Kabiling is a senior water resource and coastal engineer with Taylor Engineering, Inc. in Jacksonville, Florida, an engineering consulting firm that specializes in hydrology, hydraulic, and coastal engineering. He has more than 28 years of experience in water resources; hydrologic, hydraulic, and coastal engineering; and numerical modeling. He earned his Ph.D. in hydraulic and coastal engineering from Yokohama National University, Japan, in 1994 and is a registered PE licensed in Florida, Georgia, South Carolina, and Washington. In his early career, he served as a hydraulic engineer and numerical modeler in hydrodynamics, water quality, and pollution transport for river rehabilitation projects. He also completed flood studies and sediment engineering works.

Among the numerous projects that demonstrate Dr. Kabiling's H&H engineering experience are the Herbert Hoover Dam Breach Dam-Break Analysis, Illustrative Flood Inundation Maps and Associated Sensitivity and Uncertainty Analyses (2011); G-160 Hydraulic Modeling, Palm Beach County, Florida (2004); Taylor Creek Reservoir Water Supply Permitting Project, Osceola County, Florida (2011); Wolf-Pennywash Creek Reservoir Water Supply Permitting Project, Osceola County, Florida (2011); Coastal Storm Surge Study, Federal Emergency Management Agency (FEMA) Region IV, Northeast Florida and Georgia (2014), East-Central Florida (2015), and South Florida (2018); Jacksonville Harbor Deepening Project Impact Assessment (2009-2014); Pasig River Rehabilitation, Manila, Philippines (1995-2001); and Diagnostic Modeling System, Phase II, Duval County, Florida (2001).

During his career, Dr. Kabiling has gained a general knowledge of south Florida hydrology and water management and a thorough understanding of the water storage and conveyance in South Florida, including knowledge of associated H&H models and their application to south Florida conditions through completion of various water supply, conveyance, and flood risk studies in south Florida. The following project experience demonstrates Dr. Kabiling's familiarity with the water storage, conveyance, and flood risks in south Florida.

In 2004, as a H&H expert for the G-160 Hydraulic Modeling, Palm Beach County, Dr. Kabiling evaluated various H&H modeling systems for application to flood and hydroperiod modeling. He developed a hydrologic model to generate basin hydrographs and supervised the application of an unsteady HEC-River Analysis System (HEC-RAS) hydraulic model to assess the impacts for the G-160 water control structure, an essential component of the CERP. The structure is intended to enhance the hydroperiod for the Loxahatchee Slough located in North Palm Beach County, Florida.

Dr. Kabiling's familiarity with the water storage, conveyance, and flood risks in South Florida is demonstrated by his work on the Herbert Hoover Dike (HHD) associated with Lake Okeechobee. The HHD system consists of approximately 143 miles of levee surrounding Lake Okeechobee. The project analyzed, documented, and illustrated the expected impact to the public from flood inundation resulting from an uncontrolled breach of any of the reaches of the HHD. In addition to project management responsibilities, as flood engineer, Dr. Kabiling led review, analysis, and selection of suitable dam breach and flood routing models for levee or dam breach analysis. As lead modeler, he set up and applied 1-D HEC-RAS and MIKE11, 2-D MIKE21, and combined 1-D and 2-D MIKE-FLOOD hydrodynamic and dam break models to simulate several HHD dam failure inundation scenarios. The results of the flood model

provided the input data to map the flood inundation for the various breach scenarios evaluated in the study and to life loss evaluations.

In 2011, Dr. Kabiling, as water resources engineer, reviewed previous water supply studies and data, conducted field reconnaissance to inspect existing reservoir levees and dam structures, and evaluated different reservoir development schemes for the Wolf-Pennywash Creek Reservoir Water Supply Permitting Project, Osceola County, Florida. He used available flow data over a 60-year period to set up and apply the HEC-Reservoir System Simulation (HEC-ResSim) model to estimate the water supply yields from different water sources, reservoir impoundment schemes, and reservoir operations. The HEC-ResSim model provided the design parameters for reservoir sizing, spillway location and geometry, and emergency overflow structures. The model also provided an operational protocol consistent with water supply yield needs and environmental requirements, including wetland development and minimum flow requirements.

Dr. Kabiling used available flow data and the HEC-ResSim reservoir operation simulation model to estimate the water supply yields from different water supply demands and reservoir operations for the Taylor Creek Reservoir Water Supply Permitting Project, Osceola County, Florida. The HEC-ResSim model provided the water supply yield for a proposed demand diversion and its impact on the quantity and duration of existing water supply diversions.

As a steering committee member since 2014, Dr. Kabiling reviewed task procedures, results, and reports necessary to complete FEMA storm surge studies along coastal Georgia and northeast Florida, east central Florida, and south Florida. He provided technical guidance to task leaders in developing and implementing modeling systems to evaluate storm surge, including the influence of wave-induced water and current effects.

Dr. Kabiling gained experience in evaluating H&H modeling completed under SMART Planning when he completed some of the following IEPR studies: Jordan Creek Feasibility Study Report and Environmental Assessment, Springfield Greene County, Missouri (2013); IEPR of the Dallas Floodway Feasibility Report and Environmental Impact Statement, Dallas, Texas (2013-2014); IEPR of the Princeville, North Carolina, Flood Risk Management Feasibility Study, Integrated Feasibility Report and Environmental Assessment (2014-2015); IEPR Charleston Harbor Post 45 Phase II, Charleston, South Carolina, Feasibility Report and Environmental Impact Statement (2014-2015); and Peer Review of Coastal Modeling Report, Port Fourchon, Louisiana (2018).

Dr. Kabiling completed comprehensive training and workshops for applications of various 1-D, 2-D, and 3-D integrated groundwater-surface water modeling systems like the MIKE-SHE and FEFLOW modeling systems. He is familiar with the development and application of these models and similar models like the South Florida Water Management District (SFWMD) Regional Simulation Model (RSM). His project experience also includes the application of 1-D, 2-D, and 3-D hydrodynamic, advection-dispersion, sediment transport, morphology models such as the MIKE11/MIKE21/MIKE3 model suites, Delft3D model suites, ADCIRC, EFDC, CMS-Flow, HEC-RAS, HEC-Hydrologic Modeling System (HEC-HMS), RMA2, RMA4, and the MIKE21 Spectral Wave, Boussinesq Wave, and Nearshore Wave models, Delft3D-Wave / SWAN, ACES, STWAVE, REFDIF1, CGWAVE, and CMS-Wave wave models. He has applied these models on more than 30 hydraulics and scour studies in Florida, South Carolina, and Louisiana and more than 70 numerical modeling projects in hydrology, hydrodynamics, waves, riverine and coastal flood, dam break, water quality, contaminant transport, sediment transport, morphology, and sea level rise.

Dr. Kabiling's H&H engineering works on the three projects—Jacksonville Harbor Deepening Project, IEPR Charleston Harbor Post 45 Phase II, and Broward County ADCIRC Flood Study—demonstrate his familiarity with USACE H&H engineering requirements for Civil Works projects and feasibility studies and his good working knowledge of the USACE policy guidelines on sea level rise and climate change assessments for project life-cycle planning.

The Jacksonville Harbor Project demonstrates Dr. Kabiling's H&H experience in deep-draft navigation and channel modification as well as his familiarity with USACE policy guidelines on sea level rise and climate change assessments. For that project, he provided project management, supervised EFDC model validation and application for various harbor dredging scenarios, and performed quality assurance/quality control model reviews. The EFDC modeling of the St. Johns River provided the means to evaluate the effect on river hydraulics, salinity, ecology, and water quality of the channel deepening, channel widening at select locations, and construction of new turning basins, as well as the cumulative impacts of other projects. In addition, Dr. Kabiling performed evaluations for the project life cycle of the effects of sea level rise on the St. Johns River salinity vis-à-vis channel dredging.

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APPENDIX C

Final Charge for the MWD/C-111SD COP IEPR

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Charge Questions and Guidance to the Panel Members for the Independent External Peer Review (IEPR) of the Modified Water Deliveries to Everglades National Park and Canal 111 South Dade Projects Combined Operational Plan

This is the final Charge to the Panel for the MWD/C-111SD COP IEPR. This final Charge was submitted to USACE as part of the revised final Work Plan, originally submitted on April 22, 2020. The dates and page counts in this document have not been updated to match actual changes made throughout the project.

BACKGROUND

During the development of the original United States Army Corps of Engineers (USACE) Master Water Control Manuals (WCM) for the Central and Southern Florida (C&SF) Project for Flood Control and Other Purposes (C&SF Project), the south Florida hydrologic system was divided into five interconnected geographical regions. Volume 4 of the Master WCM, which was last updated in 1996, addresses operations for the region encompassing the Water Conservation Areas (WCA), Everglades National Park (ENP), and ENP–South Dade Conveyance System (SDCS).

The Water Control Plan (WCP) combines the 2012 WCP water management operations for WCA 1 and WCA 2 with the new water management operations developed for WCA 3, ENP, and the SDCS in the Combined Operational Plan (COP). The COP is part of the WCP update. The COP is an integrated operational plan for two modifications of the C&SF Project – known as Modified Water Deliveries (MWD) to ENP and the Canal 111 South Dade (C-111SD) projects. The purpose of the COP is to define the water management operations for the WCA 3A and WCA 3B outlets, structures in the L-31N and the C-111 basins constructed as part of the C&SF Project and the recently constructed components of the MWD and C-111SD projects. Comprehensive modifications to the WCP are necessary in order to fully realize the natural system benefits associated with the MWD and C-111SD projects in accordance with the National Environmental Policy Act (NEPA) consultation, and a Draft Environmental Impact Statement (DEIS) has been prepared in support of the WCP update for the COP.

The update to the WCP is being prepared with consideration of information and water management operating criteria previously incorporated through changes made in the 2006 Interim Operational Plan; made in the Everglades Restoration Transition Plan 2010, implemented in a 2012 WCP update; made in the C-111SD and MWD to ENP Incremental Field Test, Increment 1.0 (2015), Increment 1.1/1.2 (2017) and Increment 2 (2018); and pertinent content in the 1996 Master WCM Volume 4 - WCAs, ENP, and ENP - SDCS.

The WCP is one chapter within an existing WCM for a specific region within the C&SF Project. The WCP is a technical document, and the WCP content specifically relates to its reference and use by water managers/operators in performing their day-to-day water management activities. USACE WCPs include coordinated operating schedules for project/system regulation and such additional provisions as may be required to collect, analyze and disseminate basic data, prepare detailed operating instructions, assure project safety and carry out regulation of projects in an appropriate manner. Regulation schedule refers to a compilation of operating criteria, guidelines, rule curves and specifications that govern basically the storage and release functions of a reservoir. In general, schedules indicate limiting rates of reservoir

releases required during various seasons of the year to meet all functional objectives of the particular project, acting separately or in combination with other projects in a system. Schedules are usually expressed in the form of graphs and tabulations, supplemented by concise specifications.

WCPs are developed for reservoirs, locks and dams, deregulation and major control structures and interrelated systems to conform to objectives and specific provisions of authorizing legislation and applicable USACE reports. In addition, there may be references within the WCP to specific areas of the WCM, standing operating procedures, references to other USACE documents, and standard USACE procedures.

The WCM contains additional information pertinent to the WCP such as basin description and characteristics, general history of the basin, description of project features as well as data collection and communication networks. In accordance with the 2003 Congressionally-authorized Programmatic Regulations for the Comprehensive Everglades Restoration Plan (CERP), which became effective on December 12, 2003 as Title 33, Part 385 of the Code of Federal Regulations, the WCM for the WCAs, ENP, and ENP-SDCS System is being converted to a System Operating Manual (SOM). Section 601 of the Water Resources Development Act of 2000, which authorized the CERP, required the Secretary of the Army, with the concurrence of the Secretary of the Interior and the Governor of Florida, and after notice and opportunity for public comment, to promulgate Programmatic Regulations to ensure that the goals and purposes of the CERP Plan are achieved and to establish the processes necessary for implementing the Plan.

The complete SOM provides explicit guidance and operating criteria for the operational interactions between the system's geographically related regions. The COP WCP (Chapter 7 of the SOM; Appendix A of the MWD/C-111SD COP DEIS; hereinafter: COP DEIS) has been developed to match the format of a CERP Project Operating Manual (POM), in order to facilitate implementation of future, near-term CERP projects into the WCP and the SOM. Initial construction of some CERP project features by the Non-Federal Sponsor for the C&SF Project and CERP, such as S-333N, a CERP Central Everglades Planning Project (CEPP) feature and the S-199 and S-200 (components of the CERP C-111 Spreader Canal project), has allowed for inclusion of these operations as State-operated features within the COP WCP, and construction of additional CEPP/CERP features are expected to begin within the first year following COP implementation.

The SOM replaces this existing set of Master WCMs. The SOM consists of seven volumes, six of which (Volumes 2 through 7) are comprised of the geographically related regions within the original C&SF project. The overall system framework of the SOM is contained in Volume 1, which provides a system-wide operating plan for the implemented projects of the Plan and the C&SF project features. Generally, Volumes 2 through 7 retain the original format of the Master WCMs for the existing C&SF project, with a few modifications to accommodate the CERP POMs. The information from the existing C&SF project Master WCMs will be utilized and modified as necessary for the appropriate volumes of the SOM. The C&SF project "WCAs, ENP, ENP- SDCS Manual" (the original Volume 5, now SOM-Volume 4) has been updated to include information located in the WCP developed from the COP, and is the first available volume for the SOM. The COP DEIS describes anticipated changes to the existing environment including direct, indirect, and cumulative effects as they relate to implementation of the COP and the new WCP and applicable alternatives developed during plan formulation efforts in support of the COP; reference Section 2 (Alternatives) and Section 4 (Environmental Effects) of the COP DEIS. The SOM-Volume 4 (Chapters 1-6 and 8-9) is an administrative update required by the 2007 Draft CERP Programmatic Guidance Memoranda and does not require additional NEPA documentation.

OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the Modified Water Deliveries to Everglades National Park and Canal 111 South Dade Projects Combined Operational Plan (hereinafter: MWD/C-111SD COP IEPR) in accordance with the Department of the Army, U.S. Army Corps of Engineers (USACE), Water Resources Policies and Authorities' *Review Policy for Civil Works* (Engineer Circular [EC] 1165-2-217, dated February 20, 2018), and the Office of Management and Budget's (OMB's) *Final Information Quality Bulletin for Peer Review* (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, validity of the research design, quality of data collection procedures, robustness of the methods employed, appropriateness of the methods for the hypotheses being tested, extent to which the conclusions follow from the analysis, and strengths and limitations of the overall product.

The purpose of the IEPR is to "assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, economic analyses, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, models used in evaluation of economic or environmental impacts, and any biological opinions" (EC 1165-2-217; p. 39) for the decision documents. The IEPR will be limited to technical review and will not involve policy review. The IEPR will be conducted by subject matter experts (i.e., IEPR panel members) who meet the technical criteria and areas of expertise required for and relevant to the project.

The Panel will be "charged" with responding to specific technical questions as well as providing a broad technical evaluation of the overall project. Per EC 1165-2-217 (p.41), review panels should identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods. Review panels should be able to evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable. Reviews should focus on assumptions, data, methods, and models. The panel members may offer their opinions as to whether there are sufficient analyses upon which to base a recommendation.

DOCUMENTS PROVIDED

The following is a list of documents, supporting information, and reference materials that will be provided for the review. The review assignments for the panel members may vary slightly according to discipline.

Review Documents	No. of Review Pages	Subject Matter Experts			
		Economics	Water Management Specialist	Environmental and NEPA	Hydrology and Hydraulics / Climate Preparedness and Resilience (Dual Role)
Environmental Impact Statement					
Section Abstract	2	2	2	2	2
Executive Summary	11	11	11	11	11
Section 1 – Purpose and Need	26	26	26	26	26

Review Documents	No. of Review Pages	Subject Matter Experts			
		Economics	Water Management Specialist	Environmental and NEPA	Hydrology and Hydraulics / Climate Preparedness and Resilience (Dual Role)
Section 2 - Alternatives	40	40	40	40	40
Section 3 – Affected Environment	42	42	42	42	42
Section 4 – Effects of the Alternatives	285	285	285	285	285
Section 6 – Public Involvement Summary	14			14	
Appendix A Water Control Plan	81	81	81	81	81
Appendix C Adaptive Management and Monitoring Plan	272			272	
Appendix E.1 Ecological Evaluation of Alternatives	112			112	
Appendix H. Annex 3 Modeling Assumptions	102	102	102	102	102
Appendix H Annex 6 8.5 Square Mile Area (SMA) Evaluation	50	50	50	50	50
Appendix H Annex 8 TTFF	34	34	34	34	34
Appendix I Socioeconomics	120	120		120	
System Operating Manual					
Chapters 1-6, 8, 9	160	160	160	160	160
Total Number of Review Pages	**1,351**	**953**	**833**	**1,351**	**833**
Public Comments[a]	**200**	**200**	**200**	**200**	**200**
Supplemental Information					
Environmental Impact Statement					
Master Table of Contents	7	7	7	7	7
Section 5 – List of Preparers	6			6	
Section 7 – References	9	9	9	9	9
Master Table of Contents	7	7	7	7	7
Section 5 – List of Preparers	6	6	6	6	6
Section 7 – References	9	9	9	9	9
Section 8 – Index	4	4	4	4	4

Review Documents	No. of Review Pages	Subject Matter Experts			
		Economics	Water Management Specialist	Environmental and NEPA	Hydrology and Hydraulics / Climate Preparedness and Resilience (Dual Role)
Appendix B Coastal Zone Consistency Determination	16			16	
Appendix D.1 NEPA Correspondence	357			357	
Appendix D.2 ESA Compliance	568			568	
Appendix D.3 NHPA Compliance	101			101	
Appendix E.2 Supporting Information	22	22	22	22	22
Appendix F Memorandum for Record S-331, S-334 and S-356	26	26	26	26	26
Appendix G S-197 Releases	11	11	11	11	11
Appendix H Hydraulics and Hydrology Cover	4				4
Appendix H Annex 1 Modeling Strategy	46	46			46
Appendix H Annex 2 8.5 SMA Validation	14				14
Appendix H Annex 4 Sensitivity Runs	81				81
Appendix H Annex 5 Modeling Results_Round 3	141				141
Appendix H Annex 7 Design Storms	8	8			8
System Operating Manual					
Appendix A: Structural Descriptions	296	296	296	296	296
Appendix B: Drought Contingency Plan	9	9	9	9	9
Appendix C: Agreements with Non-Federal Sponsors	68	68	68	68	68
Appendix D: Code of Federal Regulations	29	29	29	29	29
Appendix E: Standing Instructions to Structure Operator	6	6	6	6	6
Appendix G: Water Control Plans and Project Operating Manuals	37	37	37	37	37
Appendix F: USFWS Biological Opinion for Everglades Restoration Transition Plan Pertinent Information [b]	54			54	
Total Number of Reference Pages	**1942**	**600**	**546**	**1648**	**840**

[a] The public comment page count was not included in the overall review pages or supplemental pages due to the hours being considered separately and Option 1 being implemented if they increase.
[b] Appendix F was not received.

SCHEDULE

This schedule is based on the receipt date of the final review documents. This schedule may also change due to circumstances out of Battelle's control such as changes to USACE's project schedule and unforeseen changes to panel member and USACE availability. As part of each task, the panel member will prepare deliverables by the dates indicated in the table (or as directed by Battelle). All deliverables will be submitted in an electronic format compatible with Microsoft® Word (Office 2003).

Task	Action	Due Date
Meetings	Subcontractors complete mandatory Operations Security training	4/24/2020
	Battelle sends review documents to panel members	3/26/2020
	Battelle convenes kick-off meeting with panel members	3/27/2020
	Battelle convenes kick-off meeting with USACE and panel members	3/30/2020
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	4/8/2020
Review	Panel members complete their individual reviews	4/23/2020
	Battelle provides talking points for Panel Review Teleconference to panel members	4/27/2020
	Battelle convenes Panel Review Teleconference	4/28/2020
	Battelle provides Final Panel Comment templates and instructions to panel members	4/29/2020
	Panel members provide draft Final Panel Comments to Battelle	5/6/2020
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	5/7/2020 - 5/13/2020
	Panel finalizes Final Panel Comments	5/14/2020
Public Comment Review	Battelle receives public comments from USACE	3/23/2020
	Battelle sends public comments to Panel	4/27/2020
	Panel completes its review of public comments	4/30/2020
	Battelle and Panel review the Panel's responses to the charge question regarding the public comments	5/1/2020
	Panel drafts Final Panel Comment for public comments, if necessary	5/11/2020
	Panel finalizes Final Panel Comment regarding public comments, if necessary	5/13/2020
Final Report	Battelle provides Final IEPR Report to panel members for review	5/18/2020
	Panel members provide comments on Final IEPR Report	5/20/2020
	*Battelle submits Final IEPR Report to USACE	5/22/2020

Task	Action	Due Date
	USACE Baltimore District Representative (BDR) provides decision on Final IEPR Report acceptance	6/1/2020
Comment Response Process	Battelle inputs Final Panel Comments to Design Review and Checking System (DrChecks) and provides Final Panel Comment response template to USACE	6/3/2020
	Battelle convenes teleconference with Panel to review the Comment Response process	6/3/2020
	USACE Project Delivery Team (PDT) provides draft Evaluator Responses to USACE BDR for review	6/24/2020
	USACE BDR reviews draft Evaluator Responses and works with USACE PDT regarding clarifications to responses, if needed	6/30/2020
	USACE BDR provides draft PDT Evaluator Responses to Battelle	7/1/2020
	Battelle provides draft PDT Evaluator Responses to panel members	7/6/2020
	Panel members provide draft BackCheck Responses to Battelle	7/9/2020
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	7/10/2020
	Battelle convenes Comment Response Teleconference with panel members and USACE	7/13/2020
	USACE inputs final PDT Evaluator Responses to DrChecks	7/20/2020
	Battelle provides final PDT Evaluator Responses to panel members	7/21/2020
	Panel members provide final BackCheck Responses to Battelle	7/24/2020
	Battelle inputs panel members' final BackCheck Responses to DrChecks	7/27/2020
	*Battelle submits pdf printout of DrChecks project file	7/28/20
SAD	USACE South Atlantic Division (SAD) Coordination Meeting	TBD
	Contract End/Delivery Date	3/30/2021

CHARGE FOR PEER REVIEW

Members of this IEPR Panel are asked to determine whether the technical approach and scientific rationale presented in the decision documents are credible and whether the conclusions are valid. The Panel is asked to determine whether the technical work is adequate, competently performed, and properly documented; satisfies established quality requirements; and yields scientifically credible conclusions. The Panel is being asked to provide feedback on the economic, engineering, environmental resources. The panel members are not being asked whether they would have conducted the work in a similar manner.

Specific questions for the Panel (by report section or appendix) are included in the general charge guidance, which is provided below.

General Charge Guidance

Please answer the scientific and technical questions listed below and conduct a broad overview of the decision documents. Please focus your review on the review materials assigned to your discipline/area of expertise and technical knowledge. Some sections have no questions associated with them; however, you may still 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 that the Panel will be asked to provide an overall statement related to 2 and 3 below per USACE guidance (EC 1165-2-217).

1. Your response to the charge questions should not be limited to a “yes” or “no.” Please provide complete answers to fully explain your response.

2. Assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, and any biological opinions of the project study.

3. Assess the adequacy and acceptability of the economic analyses, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, and models used in evaluating economic or environmental impacts of the proposed project.

4. If appropriate, offer opinions as to whether there are sufficient analyses upon which to base a recommendation.

5. Identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods.

6. Evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable.

7. Please focus the review on assumptions, data, methods, and models.

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. Comments should be provided based on your professional judgment, **not** the legality of the document.

1. If desired, panel members can contact one another. 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 (ATR).

2. Please contact the Battelle Project Manager (Project Manager; Patti Connaughton-Burns; burnsp@battelle.org or Program Manager Lynn McLeod; mcleod@battelle.org for requests or additional information.

3. In case of media contact, notify the Battelle Program Manager, Lynn McLeod (mcleod@battelle.org) immediately.

4. 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.

Please submit your comments in electronic form to the Project Manager, no later than 10 pm ET by the date listed in the schedule above.

Independent External Peer Review of the Modified Water Deliveries to Everglades National Park and Canal 111 South Dade Projects Combined Operational Plan

Charge Questions and Relevant Sections as Supplied by USACE

The following Review Charge to Reviewers outlines the objectives of the Independent External Peer Review (IEPR) for the subject study and identifies specific items for consideration for the IEPR Review Panel.

The objective of the IEPR is to obtain an independent evaluation of whether the interpretations of analysis and conclusions based on analysis are reasonable for the subject study. The IEPR Review Panel is requested to offer a broad evaluation of the overall study decision document in addition to addressing the specific technical and scientific questions included in the Review Charge. The Review Panel has the flexibility to bring important issues to the attention of decision makers, including positive feedback or issues outside those specific areas outlined in the Review Charge. The Review Panel can use all available information to determine what scientific and technical issues related to the decision document may be important to raise to decision makers. This includes comments received from agencies and the public as part of the public review process.

The Panel review is to focus on scientific and technical matters, leaving policy determinations for USACE and the Army. The Panel should not make recommendations on whether a particular alternative should be implemented or present findings that become “directives” in that they call for modifications or additional studies or suggest new conclusions and recommendations. In such circumstances the Review Panel would have assumed the role of advisors as well as reviewers, thus introducing bias and potential conflict in their ability to provide objective review.

Panel review comments are to be structured to fully communicate the Panel’s intent by including the comment, why it is important, any potential consequences of failure to address, and suggestions on how to address the comment.

The Review Panel is asked to consider the following items as part of its review of the decision document and supporting materials.

Broad Evaluation Review Charge Questions

1. Is the need for and intent of the decision documents clear?
2. Do the decision documents adequately address the stated need and intent relative to scientific and technical issues?
3. Does the South Dade System Operating Manual (SOM) provide guidance on operational concerns related to projects in the aggregate, including existing Central and Southern Florida Project for Flood Control and Other Purposes (C&SF Project) features and CERP features, to ensure that projects function in a coordinated, systematic way?
4. Given the need for and intent of the decision documents, assess the adequacy and acceptability of the project evaluation data used in the alternatives analyses.

5. Given the need for and intent of the decision documents, assess the adequacy and acceptability of the economic, environmental, and engineering assumptions that underlie the alternatives analyses.

6. Given the need for and intent of the decision documents, assess the adequacy and acceptability of the economic, environmental, and engineering methodologies, analyses, and projections.

7. Given the need for and intent of the decision documents, assess the adequacy and acceptability of the models used in the evaluation of existing and future without-project conditions and of economic or environmental impacts of alternatives.

8. Given the need for and intent of the decision documents, assess the adequacy and acceptability of the methods for integrating risk and uncertainty.

9. Given the need for and intent of the decision documents, assess the adequacy and acceptability of the formulation of alternative plans and the range of alternative plans considered.

10. Given the need for and intent of the decision documents, assess the adequacy and acceptability of the overall assessment of significant environmental impacts and any biological analyses.

11. Evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable.

12. Assess the considered and preliminary preferred alternatives from the perspective of systems, including systemic aspects being considered from a temporal perspective, including the potential effects of climate change.

13. Does information or do concerns provided in the public comments raise any additional discipline-specific technical concerns with regard to the overall report?

14. For the Preliminary Preferred Alternative, assess whether the models used to assess life safety hazards are appropriate.

15. For the Preliminary Preferred Alternative, assess whether the assumptions made for the life safety hazards are appropriate.

16. For the Preliminary Preferred Alternative, assess whether the quality and quantity of the formulation and engineering are sufficient for development of operations considering anticipated controversial nature of the operational changes.

17. For the Preliminary Preferred Alternative, assess whether the analysis, recommended operations, and recommended adaptive management plan adequately addresses the uncertainty and residual risk given the potential human and environmental effects associated with the Water Control Plan implementation.

18. For the Preliminary Preferred Alternative, assess whether from a public safety perspective, the proposed alternative is reasonably appropriate or are there other alternatives that should be considered.

Specific Technical and Scientific Review Charge Questions

19. Is the assessment of residual flood risk and potential for induced flooding appropriate?

Battelle Summary Charge Questions to the Panel Members[1]

The following questions will be included in the list of questions sent to the Panel for completion during their review. These questions are provided for Battelle's use in identifying the Panel's key technical issues.

Summary Questions

20. Please identify the most critical concerns (up to five) you have with the project and/or review documents. These concerns can be (but do not need to be) new ideas or issues that have not been raised previously.

21. Please provide positive feedback on the project and/or review documents.

[1] Questions 20 through 21 are Battelle-supplied questions and should not be construed or considered part of the list of USACE-supplied questions. These questions were delineated in a separate appendix in the final Work Plan submitted to USACE.

APPENDIX D

Conflict of Interest Form

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David Kaplan
USACE, Institute for Water Resources
February 26, 2020
C-2

Conflicts of Interest Questionnaire

Independent External Peer Review

Canal 111 South Dade and Modified Water Deliveries to Everglades National Park Projects, Combined Operational Plan (COP)

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: **Battelle Memorial Institute Corporate Operations**
REPRESENTATIVE'S NAME: **Courtney Brooks**
TELEPHONE: **614-424-5623**
ADDRESS: **505 King Avenue, Columbus, Ohio 43201**
EMAIL ADDRESS: **brooksc1@battelle.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.

No additional information to report.

Courtney M. Brooks
Courtney Brooks

February 26, 2020
Date

Use or disclosure of data contained on this sheet is subject to the restriction on the title page of this proposal

BATTELLE

It can be done