Addendum to Final Independent External Peer Review Report Port Everglades Harbor Feasibility Study, Broward County, Florida

Prepared by
Battelle Memorial Institute

Prepared for
Department of the Army
U.S. Army Corps of Engineers
Deep Draft Navigation Planning Center of Expertise
Mobile District

Contract No. W912HQ-10-D-0002
Task Order: 0040

October 20, 2014

Battelle
The Business of Innovation

This page is intentionally left blank.

CONTRACT NO. W912HQ-10-D-0002
Task Order: 0040

Addendum to Final Independent External Peer Review Report
Port Everglades Harbor Feasibility Study, Broward County, Florida

Prepared by

Battelle
505 King Avenue
Columbus, Ohio 43201

for

Department of the Army
U.S. Army Corps of Engineers
Deep Draft Navigation Planning Center of Expertise
Mobile District

October 20, 2014

This page is intentionally left blank.

Table of Contents

List of Tables

1. INTRODUCTION

This addendum is a supplement to the Final Independent External Peer Review Report for the Port Everglades Harbor Feasibility Study, Broward County, Florida (hereinafter Port Everglades Feasibility Study Final IEPR Report) submitted on August 15, 2013, by Battelle. This addendum was prepared to document activities associated with the IEPR Panel's (the Panel's) review of revisions to the Environmental Impact Statement (EIS), revisions to the Economics Appendix to the Feasibility Report, and the public and agency comments. Battelle was directed to conduct these additional review activities per a contract modification. Hereinafter, the documents that were reviewed for this addendum will be referred to as the "revised documents and public comments".

Prior to the review of the revised documents and public comments by the Panel, all work items listed in Task 7 (Response to the Independent External Peer Review Report) had been completed. U.S. Army Corps of Engineers (USACE) Evaluator Responses and Panel BackCheck Responses had been entered into USACE's Design Review and Checking System (DrChecks) for the original 22 Final Panel Comments (Appendix A of Port Everglades Feasibility Study Final IEPR Report) developed by the Panel. Battelle also had provided USACE and the Panel a pdf printout of all DrChecks entries, through comment closeout, as a deliverable and record of the IEPR results.

Battelle received the revised documents and public comments from USACE on September 25, 2014 and September 8, 2014, respectively. Battelle provided the revised documents and public comments to the IEPR panel members. The Panel was asked to determine if additional discipline-specific technical concerns existed in the revised documents and to determine if any information or concerns presented in the public comments raised any additional discipline-specific technical concerns with regard to the overall Port Everglades Feasibility Study review documents. The Panel identified fifteen new issues and subsequently generated fifteen Final Panel Comments summarizing the concerns.

This addendum contains the additional Final Panel Comments (presented in Section 4) and briefly details the IEPR process that determined the need for, and led to the generation of, the comments.

2. METHODS

The section summarizes the activities associated with the public and agency comment review (Task 8 Review of Revised Documents and Public Comments) conducted for this project. The schedule associated with these activities is shown in Table 1. Due dates for milestones and deliverables are based on the task order award modification date of September 24, 2014.

It is anticipated that Battelle will enter the additional Final Panel Comments developed by the Panel into 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 additional 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 (for Task 8), through comment closeout, as a final deliverable and record of the revised documents and public comment review results.

Table 1. Port Everglades IEPR Schedule

Task	Action	Due Date
8	Award of Contract Modification[1]	9/24/2014
	USACE sends public comments to Battelle	9/8/2014
	USACE sends revised EIS and Economics Appendix to Battelle	9/25/2014
	Battelle modifies Panel's subcontracts	9/26/2014
	Battelle sends revised EIS, revised Economics Appendix, and public and agency comments to Panel members	9/26/2014
	Panel members complete review of the revised EIS, revised Economics Appendix, and public and agency comments	10/6/2014
	Battelle convenes Panel Review Teleconference with Panel	10/7/2014
	Panel members provide draft Final Panel Comments to Battelle	10/14/2014
	Panel finalizes Final Panel Comments	10/17/2014
	Battelle submits Final IEPR Report addendum to USACE[a]	**10/20/2014**
	Battelle inputs Final Panel Comments to the Design Review and Checking System (DrChecks) and provides Final Panel Comment response template to USACE	10/20/2014
	USACE provides draft Project Delivery Team (PDT) Evaluator Responses to Battelle	10/22/2014
	Panel members provide Battelle with draft BackCheck Responses	10/24/2014
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	10/27/2014
	Battelle convenes Comment-Response Teleconference with panel members and USACE	10/28/2014
	USACE inputs final PDT Evaluator Responses to DrChecks	10/29/2014
	Battelle inputs the panel members' final BackCheck Responses to DrChecks	10/30/2014
	Battelle submits pdf printout of DrChecks project file[a]	10/30/2014
	Civil Works Review Board[b]	2/15/2015
	Contract End/Delivery Date	1/8/2015

[a] *Deliverable.*
[b] *A time extension contract modification will be required to allow Battelle and the Panel to participate in the CWRB.*

[1] The contract modification was for additional activities in Tasks 5, 6, and 7, but for presentation and reporting purposes, Battelle is reporting all activities included in the contract modification as Task 8.

Revised Documents and Public Comments

The IEPR panel members received the revised EIS, revised Economic Appendix, and the public and agency comments from Battelle on September 26, 2014. Battelle also provided the panel members with an electronic version of the charge questions. The documents and files in bold font were provided for review.

- **Final Environmental Impact Statement: Navigation Improvements Port Everglades Harbor, Broward County, Florida (337 pages)**
    - The Panel was asked to only review **Sections 2.3, 4.0, and 5.0** of this Final EIS
- **Port Everglades Harbor Feasibility Study, Draft Socio-Economic Appendix (September 2014) (104 pages)**
- **Public Comment Matrix (Excel file with 582 rows of comments extracted from comment letters)**
    - The Panel was also provided with the full text (in PDF format) of every public comment letter, email, and comment card for their reference.

Review of Revised Documents and Public Comments

The IEPR panel members reviewed the revised sections of the EIS and the revised Economics Appendix to assess the "adequacy and acceptability of the economic and environmental methods, models, and analyses used" (EC 1165-2-214; p. D-4).The panel members were "charged" with responding to three specific technical questions identified by USACE:

1. **For your particular area of expertise, provide an in-depth review of whether the analyses of the economic, navigation, and natural environments within the project area are sufficient to support the estimate of impacts for the alternatives.**
2. **Comment on the adequacy and accuracy of the assumptions and scenarios used to calculate benefits.**
3. **Comment on the ability of the proposed mitigation plan to address adverse impacts from the project.**

The IEPR panel members also reviewed the public comments to determine if any information or concerns presented in the public and agency comments raised any additional discipline-specific technical concerns with regard to the overall Port Everglades review documents. Battelle provided two charge questions to the panel members to focus their review of the public comments:

4. **Does information or concerns raised in the public and agency comments raise any additional discipline-specific technical concerns with regard to the overall report?**
5. **Has adequate stakeholder and agency involvement occurred to identify issues of interest and to solicit feedback from interested parties?**

The Panel was instructed to address the charge questions/discussion points within a charge question response table 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 in a preliminary list of 16 overall comments and discussion points. Each panel member's individual comments were shared with the full Panel in a merged individual comments table.

Battelle facilitated a four-hour 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 Addendum to the Final IEPR Report and decide which panel member would serve as the lead author for the development of each Final Panel Comment. This information exchange ensured that the Addendum to the Final IEPR Report would accurately represent the Panel's assessment of the project. The Panel engaged in a thorough discussion of the overall findings, 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. At the end of these discussions, the Panel identified fifteen comments and discussion points that should be brought forward as Final Panel Comments.

Following the teleconference, Battelle prepared 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 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. The Final Panel Comments were developed as part of a four-part structure following guidance previously described in the Final IEPR Report.

Battelle reviewed and edited the Final Panel Comments for clarity, consistency, and adherence to guidance on the Panel's overall charge, which included ensuring that the comment did not make any observations regarding either the appropriateness of the selected alternative or USACE policy. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comment. The additional Final Panel Comments are presented in Section 4 of this Addendum.

3. FINAL PANEL COMMENTS

This section presents the full text of the Final Panel Comments prepared by the IEPR panel members. Some of the Final Panel Comments in this section refer back to Final Panel Comments from the original IEPR because, in some cases, the Panel did not think that revisions that had been previously agreed to during the Comment/Response process appeared in the revised documents.

Final Panel Comment 1

Commodity forecasts are not sufficiently documented, and the approach appears to overstate the forecast for key benefitting commodities.

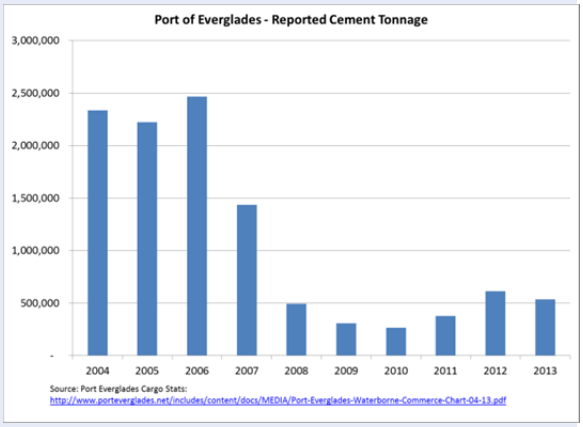
Basis for Comment

The Economic Appendix (Section 5.1) gives an overview of the commodity forecasts (which cover the period 2015-2060) and the forecasting steps but lacks sufficient detail to assess the reliability or reasonableness of the forecast results. Changes anticipated in response to the Panel's original Final Panel Comment 9 were either not made or are insufficient to support the forecast. While most of the growth rates used in the forecast appear intuitively reasonable, they are not substantiated beyond general references to outside sources. Moreover, the forecast is the product of both the growth rates and the estimated 2015 starting point, and the methodology employed appears to have overstated the base year tonnage for major commodities of interest. Since discounting places the highest value on the near-term benefits, using a higher starting point can have a significant effect on the benefits estimate.

The near-term (2015-2029) commodity forecast was based on an IHS South Atlantic forecast; however, that forecast has not been provided to the Panel or explained in sufficient detail for the Panel to determine its applicability to the Port Everglades project. Table 24 (page 47 of the Economic Appendix) shows growth rates "based" on IHS projections but does not provide the IHS projections themselves for comparison. The Economic Appendix does not state when the IHS forecast was completed, which is critical because a pre-recession forecast would no longer be reliable today. USACE's derivation of medium- and long-term forecasts from other sources is likewise not covered in sufficient detail.

Bulk and Non-Container Forecasts. The Waterborne Commerce Statistics Center data used to calculate Port Everglades shares for bulk and non-containerized cargo only extended through 2010, although 2012 data are now available. Using an average of the 2003-2010 shares, as shown in Tables 21 and 22 of the Economic Appendix, may not be a reliable forecasting method because it does not consider significant trends in those shares, such as the declining share of import manufactured goods or the rising share of coal, lignite, and coke exports.

As noted below, Appendix B states that cement and related imports are the major benefitting bulk commodity. In the Waterborne Commerce Statistics Center data used for Tables 21 and 22, cement is classified as "Primary Manufactured Goods". As Table 21 shows, Port Everglades' share of that group has fallen from 22.92% in 2003 to 10.01% in 2010, yet the forecast uses an average of 17.45%. The forecast starting point is thus 74% above the 2010 actual, significantly inflating the forecast. Port Everglades data indicate that post-



recession cement imports started to increase in 2011, peaked in 2012, but declined in 2013, as shown in the above chart developed by the Panel using Port Everglades data (Waterborne Commerce Statistics Center, 2013).

The Port's share in Total Crude Materials, which would include aggregates, limestone, etc., has also declined since 2003, although not as markedly. The Port appears to have two cement importers: Lehigh Hudson and CEMEX. The future volume of cement and related materials depends on the plans and strategies of these two companies more than on IHS projections or past market shares. The brief discussion of vessel operations on page 46 does not address future cargo volumes. The possibility of long-term market share shifts for these commodities away from Port Everglades does not seem to have been considered.

Container Forecast. Container trade is apparently the other major benefitting commodity (Economic Appendix, page 42). The near-term container cargo forecast is likewise linked to and dependent on the IHS forecast (Economic Appendix, page 45). Solid information on that forecast and its development and assumptions is not available in Appendix B. In addition, the forecast combines imports and exports, which fails to consider the possibility of substantial differences in their growth rates. The analysis used Port Import/Export Reporting Service (PIERS) data for 2008-2011, but (like the bulk and non-container forecasts) used the average by trade (Table 23) to forecast the Port Everglades containerized cargo. The risk in using this approach is illustrated by the market shares for East Coast South America, where the mean is 22.15% but stood at 14.8% in 2010 and 13.27% in 2011. The use of the mean thus raises the forecast starting point for that trade by 67% above the most recent actual total. The Port's overall share fell slightly between 2008 and 2011. Using shares in this way implicitly assumes that Port Everglades will regain the cargo lost when the Mediterranean Shipping Company (MSC) reduced its service (Economic Appendix, pages 31-32), which is a highly uncertain assumption.

The 2015-2020 containerized cargo growth rate of 4.27% in Appendix B, Table 24, appears relatively high for the post-recession period. The Panel was unable to substantiate the validity of that rate.

The medium-term container cargo growth was estimated at 2.5% annually, claimed to be in line with IHS and U.S. Department of Energy Annual Energy Outlook forecasts for economic growth. The two forecasts themselves are not quoted or referenced and, without further information on those forecasts, it is not clear to the Panel that those rates are appropriate for 2029-2040. The Annual Energy Outlook 2012 Early Release Overview projects a real gross domestic product (GDP) growth rate of 2.6% for 2010 to 2035 (EIA, 2012), versus the Economic Appendix's rate of 2.5% for 2020-2040.

Benefitting Commodities. The discussion of benefitting commodities (Appendix B, page 42) is too general, and benefits are not quantified. At a minimum, more detail on which commodities benefit and by how much is needed to identify the sensitivity of the benefit-cost ratio to the commodity forecasts.

It is not possible to compare forecasted amounts with actual amounts to date for the benefitting commodities because there is no table showing the actual and forecast amounts and growth

rates for the various forecast periods. Table 24 only goes as far as 2029. The growth rates can be calculated from Table 25, but they should be listed clearly in the table. Moreover, Table 25 presents the results at too high a level of aggregation and does not single out the benefitting commodities (e.g., cement).

Significance – High

Project benefits depend critically on commodity and major benefitting commodity forecasts, which may be overstated.

Recommendations for Resolution

1. Contact Lehigh Hudson and CEMEX to determine their plans for Port Everglades facilities and imports (or provide notes if contacts have been made).
2. Revise the cement forecast to reflect more accurately post-recession cargo shares and trends.
3. Provide copies of notes from the MSC contact cited in the footnotes in the Economic Appendix on pages 31-32, and from other container shipping line contacts.
4. Provide the IHS forecast as an appendix or provide a detailed summary as part of the Economic Appendix.
5. Provide details on all forecast adjustments, with precise citations to sources used.
6. Provide data (actual and forecast tonnages and growth rates) for each benefitting commodity for 2010-2060.
7. Perform sensitivity analyses on the impact of reduced 2015 cement and container market shares on benefits estimates.

Literature Cited:

EIA. 2012. Annual Energy Outlook 2012 (AEO2012) Early Release Overview. U.S. Energy Information Administration. Available at http://www.eia.gov/forecasts/aeo/er/pdf/0383er(2012).pdf.

Waterborne Commerce Statistics Center. 2013. Port Everglades Waterborne Commerce Chart for the Ten Fiscal Years 2013 through 2004 (Unaudited). Available at http://www.porteverglades.net/includes/content/docs/MEDIA/Port-Everglades-Waterborne-Commerce-Chart-04-13.pdf

Final Panel Comment 2

The analyses presented in revised Section 4.0 of the Final Environmental Impact Statement (FEIS) do not support the conclusion that "there would be no cumulative adverse effect on the geology or coastal sediment budget/transfer for the area".

Basis for Comment

This comment addresses a new issue derived from the Panel's public comment review. Several public comments (including Public Comments 50 [from J. Carlson], 123, [from D. Barbour], and 211 [from the City of Hollywood, Florida]) disagree with the statement made in Section 4.28.5 of the FEIS that there will be no cumulative adverse effect on coastal sediment budget for the area. This statement is based on the assertion that the with and without project impacts will be "similar" (FEIS, page 266). The Panel believes that this assertion is incorrect.

The Port Everglades Feasibility Study Dredged Material Management Plan (DMMP) (June 2011) (page 14) states that maintenance dredging volumes will increase by 5,740 cubic yards (cu yd) per year under the "with project" condition. This amounts to an additional 287,000 cu yd removed over the 50-year DMMP lifespan. The DMMP estimate of an additional 5,740 cu yd per year to be removed from the littoral system would result in an equal amount of additional annual erosion, or a 14% increase in the average erosion rate south of the inlet shoreline of 41,000 cu yd per year, as reported by Olsen (2004) for 1991 to 2001.

The above volumes used in the Feasibility Study estimates of maintenance dredging material to be removed and placed in the Offshore Dredged Material Disposal Site (ODMDS) represent an increase in loss of sediment from the littoral system. This system is already suffering erosion south of the inlet, as reported by Olsen (2004, 2007). It is not a "similar" impact, as stated in the FEIS. The cumulative impacts to south beach shoreline erosion will range from a 14% increase (according to the FEIS estimated maintenance volumes) to a doubling of erosion (according to the Panel's more conservative estimate).

Shoreline erosion is a serious issue, affecting public and private properties and infrastructure. In addition, the City of Hollywood, Florida, states in its public comments (Comment #13) that the "with project" plan violates "Florida Statute 161, the adopted Inlet Management Plan, and the Strategic Beach Management Plan (SBMP)." All Federal projects are required by the Coastal Zone Management Act "Consistency" rule to comply with state coastal management plans and laws; it does not appear that the Port Everglades project is in compliance.

Significance – Medium/High

Inaccurate cumulative geological impacts of the Port Everglades project will have a negative effect on an already eroding shoreline, which may affect the recommendation or justification of the project.

Recommendations for Resolution

1. Revise the Cumulative Impacts (Section 4.28) of the FEIS to state that the recommended plan will increase coastal erosion south of the inlet.
2. Provide a sound quantitative estimate of the potential erosion rate.

Literature Cited:

Olsen Associates Inc. 2004. Port Everglades Inlet Sand Management Phase I: Sand Bypassing Feasibility Study. Prepared for Broward County Board of County Commissioners. June 2004.

Olsen Associates Inc. 2007. Port Everglades Inlet Sand Management Phase II: Sand Bypassing Feasibility –Addendum. Prepared for Broward County Board of County Commissioners. November 2007.

Final Panel Comment 3

The assumptions supporting the impact analyses could not be verified because information on the revised analyses and mitigation and monitoring plans is not provided in the FEIS.

Basis for Comment

The amount of compensatory mitigation needed to replace natural resources impacted and ecosystem services lost depends, in part, on the ability of the affected resources to return to their baseline conditions and on the ability of the selected compensatory mitigation measures to replace lost services. To determine this, the functional assessment methodologies used for this project included the Florida Uniform Mitigation Assessment Methodology (UMAM) for seagrasses and mangroves and the Habitat Equivalency Analysis (HEA) for hardbottoms/reefs (FEIS, page 273). Since the Panel reviewed the Draft Environmental Impact Statement (DEIS), the primary environmental components of this project, including the Mitigation Plan, Monitoring Plan, and HEA (upon which the mitigation requirements are based), were extensively revised. However, neither the Mitigation Plan, the Monitoring Plan, nor the results of the HEA or UMAM (upon which the two plans were based) were provided to the Panel for review. Therefore, assumptions made in these analyses could not be verified. The FEIS does not provide any substantial detail regarding the assumptions made and specific details involved in these analyses and plans.

The U.S. Army Corps of Engineers (USACE) stated, in its response to Broward County Public Comment #7, that

> "HEA assumptions and parameters have been re-evaluated in conjunction with NMFS [National Marine Fisheries Service], and new calculations have been completed."

The FEIS does not summarize these re-evaluated assumptions or parameters. Because the mitigation portion of the Port Everglades project is ambitious and multifaceted, details on the HEA are necessary to understand how the appropriate mitigation for lost ecosystem services was determined. Without reviewing the re-evaluated HEA, and in the absence of any discussion of the analyses and assumptions in the FEIS, the Panel cannot be certain if these calculations and assumptions are justified.

Similarly, the FEIS does not contain the UMAM score sheets for the impacts or the mitigation, and there is no discussion to assess the analysis results. USACE stated, in its response to Broward County Public Comment #5, that

> "…the UMAM numbers for the mangrove and seagrass impact scores were developed at a joint agency meeting in June 2005. The agencies did not prepare UMAM sheets during this meeting, but the scores that were agreed to were documented. Final UMAM sheets will be prepared as part of the FLDEP [Florida Department of Environmental Protection] permit application, as required by Florida regulations. The wetland delineation (specifically mangroves) has been re-verified annually through aerial photography and discussions with FLDEP

John U Lloyd park staff."

Table 1 (FEIS, page 12) shows that several meetings occurred in 2005, 2006, and 2008, during which UMAM analyses were discussed. Because the UMAM numbers were not determined based on worksheets, it is not clear how the final mitigation numbers presented in the FEIS were calculated, whether the data used in the assessment are limited to pre-2005, whether the mitigation acreage will change based on the actual analysis that will be completed for the FLDEP, and whether that analysis will use data collected preconstruction. These issues should be clarified in the FEIS.

Another source of information that would have helped the Panel evaluate the likely success of the mitigation plan is the monitoring plan. There was no discussion or summary of the monitoring plan in the FEIS. The timeframe for assessing success was not defined in the FEIS, and several public comment letters had conflicting assumptions of recovery timeframes. As the mitigation plan and HEA were revised, the monitoring plan must have also been revised to address changes in the mitigation plan, but it was not provided to the Panel for review.

Significance – Medium/High

Without reviewing the analyses and assumptions that form the basis of the revised mitigation plan, or reviewing the plan itself (as well as the monitoring plan), the Panel cannot determine whether the mitigation plan is likely to succeed.

Recommendations for Resolution

1. Include in the FEIS:
    a. a summary of the HEA and UMAM assumptions,
    b. clarifications on the sources of data,
    c. information on whether preconstruction surveys will be conducted to finalize numbers, and
    d. a description of resulting conclusions as to mitigation requirements.
2. Include in the FEIS a summary of the key aspects of the monitoring plan, including:
    a. likely recovery times,
    b. monitoring requirements,
    c. success criteria,
    d. contingency plans, and
    e. state thresholds that will trigger adaptive management.

Final Panel Comment 4

The planned mitigation planting of seagrass at West Lake Park may not provide equivalent ecosystem services in comparison to the seagrass impacted by the expansion.

Basis for Comment

This is a new issue derived from the Panel's public comment review. Deepening shallow-water habitats beyond 10 to 13 feet (3 to 4 meters) is likely to impede post-dredging seagrass recolonization. Seagrass habitat loss results in loss of refugia and foraging habitat for many marine invertebrates and vertebrates, including both protected and managed species. Removal of seagrasses also affects the ecosystem by impeding important processes and functions such as sediment stabilization, nutrient cycling, and oxygen production. Although seagrass mitigation is already permitted to occur at a selected location (West Lake Park [WLP]), this site may not provide ecosystem services equivalent to those lost to dredging activities. Because the UMAM analysis was not provided, the Panel is unable to assess the adequacy and acceptability of the mitigation plan.

USACE concludes that the loss of seagrass habitats is relatively small with respect to overall seagrass abundance throughout the area. USACE further states that impacts will be compensated through mitigation associated with other restoration efforts that has already begun to show increases in seagrass coverage in WLP. However, the U.S. Environmental Protection Agency (EPA) states (Public Comment #60) that NMFS is concerned that seagrass habitats at WLP would not provide the same ecosystem services as the seagrass affected through the expansion because WLP is located farther away from the inlet and coral reefs. Several managed species are dependent on the resources in the seagrass habitat, currently in the ocean inlet, and WLP is located substantially farther from the ocean habitat of these species.

Specifically, EPA's Public Comment #60 expresses concern about the WLP equivalency "regarding Port Everglades seagrasses habitat value to two federally managed species: the gray snapper and blustriped grunt, which is a function of distance from the ocean and inlet which West Lake Park cannot adequately compensate." This issue suggests that important ecosystem services that seagrass provides may not be met.

The FEIS notes (page 276) that

> "In the event that the number of mitigation credits available at the West Lake Park property/project is lower than the required number of credits necessary to offset impacts to seagrasses, three alternative options are available. One off-site location is available for mitigation in Palm Beach County, another is available in Miami-Dade County, and another may be available on-site within Port Everglades Harbor."

Consideration should be given to the resource needs of the above species of concern to determine if one of these other potential sites may provide services not captured by the WLP

site.

Significance – Medium/High

Seagrass mitigation planned at WLP may not replace ecosystem services lost to the project; therefore, the mitigation may be inadequate.

Recommendations for Resolution

1. Assess all other potential locations for seagrass mitigation that may be closer to the inlet and provide ecosystem services needed by managed species.
2. Document how seagrass restoration in WLP will replace ecosystem services lost from areas close to the Port Everglades inlet.

Final Panel Comment 5

The sensitivity analysis does not provide sufficient detail and does not consider the uncertainties involved in commodity forecasts prior to the 2023 base year, in the vessel fleet forecasts, or in the realization of projected transportation cost savings.

Basis for Comment

The sensitivity analysis (Appendix B, Section 14) is exceptionally brief, providing only a high-level description of the analysis and a summary of results. Based on the information provided in that section, USACE examined the benefit-cost ratio (BCR) sensitivity under three scenarios: a 7% discount rate; flat commodity growth and flat vessel fleet change after 20 years; and flat vessel fleet change and flat commodity growth after the base year.

However, USACE did not examine the sensitivity of the benefits estimate to the base year commodity tonnage forecasts (i.e., the values projected for 2023). The cement forecast in particular assumes a substantial recovery in Port Everglades market share that cannot be taken for granted. The container cargo forecast likewise appears to assume resumption of an MSC service that has shifted to other ports, which is inherently uncertain. Because the base year forecast determines the value of project benefits in the lightly discounted early years, it could significantly affect the benefits estimate and thus the BCR. This sensitivity should be acknowledged and analyzed.

The sensitivity analysis also does not address the numerous assumptions made regarding base vessel fleet changes and realization of cost savings (e.g., heavier loading, the use of larger vessels). These assumptions rely on the actions of outside parties, which may be anticipated but cannot be controlled, and are therefore a source of risk.

Significance – Medium/High

The sensitivity analysis does not address significant sources of uncertainty and risk.

Recommendations for Resolution

1. Analyze the sensitivity of transportation cost savings estimates and the BCR to commodity forecasts for the base year, applying assumptions regarding the base year fleet, port market share, and actions taken by fleet operations.
2. Provide sufficient detail for the reader to follow and understand the structure and findings of the sensitivity analyses.

Final Panel Comment 6

Details about coral nursery development, operation, and evaluation are not provided in the revised FEIS; therefore, the competency of this form of mitigation cannot be verified.

Basis for Comment

The propagation of coral progeny for mitigation purposes is relatively new and experimental. Success of the coral reef mitigation plan is critical to the Port Everglades project. However, the Panel could not find details on a variety of important coral mitigation-related issues in the revised sections of the FEIS. The only description found by the Panel states the following:

> "The proposed reef mitigation project would enhance degraded reefs by outplanting regionally-appropriate coral colonies and sponges at a density commensurate with those impacted. The organisms for outplanting would be sourced from corals and sponges of opportunity (damaged or rescued colonies from events potentially unrelated to the federal project) or **propagated in ocean- or land-based coral nurseries during an 11-year period**. In addition to the five acres of reef creation described above, approximately 18 acres of reef will be enhanced via installation of approximately 103,000 coral colonies (calculated via HEA) outplanted from coral nurseries." (FEIS, page 274)

The reef mitigation plan lacks the following details:

- Documentation of other projects in the region (Miami-Dade to Martin County) that have used coral nursery propagation (at near-equivalent spatial scales) successfully.
- Description of what entity is responsible for managing the mitigation activities.
- Information on whether the production is from donor colony fragments and/or from spawning and rearing larvae.
- Standards against which the health and genetic affinities of the outplants will be evaluated.
- Metrics that will be employed to judge the success or failure of the nursery mitigation project.
- Discussion on what the contingencies will be if the project is unsuccessful. For example, what the available viable options are if open-water nurseries are found to be ineffective.
- Information on how this approach was evaluated from a cost-benefit standpoint. Many of the corals in this project grow at rates that will require five years or more to produce reasonably sized (≥ 10-centimeter) outplants.

Edwards and Gomez (2007) report that culturing larvae is very challenging (e.g., coral spawning for the most part is an annual event and is not always predictable; survival success of nursery-reared coral outplants onto degraded reefs is very much unknown), and for some nursery outplanting projects, predation and disease resulted in large losses of outplants.

Significance – Medium

Due to the lack of detail provided in the FEIS, which is necessary to understand the coral nursery

mitigation approach, it is not clear whether the mitigation will have a reasonable chance for success.

Recommendations for Resolution

1. Provide more details on the coral nursery mitigation project, including the information provided in the bullets above.
2. Provide evidence that success is possible for coral nursery mitigation, given the many marginal environmental variables (water quality, spatial competition from other organisms, predation, disease, nutrient enrichment) that exist in the Broward County reef system.
3. Explain how the monitoring plan integrates with coral nursery mitigation. For example, if, after six months of monitoring, more than 60% of the outplanted nursery corals are deceased, perhaps a meeting would be convened by the regulatory agencies to consider the problems, find solutions, or alternatives.

Literature Cited:

Edwards, A.J., and E.D. Gomez. 2007. Reef Restoration Concepts and Guidelines: making sensible management choices in the face of uncertainty. Coral Reef Targeted Research & Capacity Building for Management Programme: St Lucia, Australia. iv + 38 pp.

Final Panel Comment 7

The estimates of transportation cost benefits do not provide a breakdown by benefitting vessel type or by commodity, nor do they distinguish between benefits due to larger vessel size, heavier vessel loading, and reduced delays.

Basis for Comment

Project benefits in the form of transportation cost savings are expected to be of three types: use of larger, more efficient vessels; heavier loading and greater utilization of existing vessels; and reduced vessel delays. However, the Economic Appendix provides no breakdown of benefit types. Table 56 of the Economic Appendix (page 92) presents only lump sum total transportation costs.

Anticipated changes in response to the Panel's original Final Panel Comment 10 either have not been made or are insufficient to resolve the issue.

In addition, it is expected that some vessels will benefit from the project and others will not, but the Economic Appendix does not clearly explain which vessels are in each group. While some assumptions might be made from Tables 39, 40, and 41, the distinction should be made clear to the reader.

Likewise, some commodities are expected to benefit from the project in varying degree, but no breakdown of benefits by commodity is given.

Significance – Medium

The reasonableness of project benefit estimates and the benefit-cost ratio cannot be determined without more detailed information on the types and sources of transportation cost savings.

Recommendations for Resolution

1. Provide a breakdown of estimated transportation savings by benefitting vessel type and commodity, distinguishing between benefits of larger vessels, heavier loading, and reduced delays.

Final Panel Comment 8

The impact of a potential severe storm event and associated sediment mobilization on newly restored resources or new channel depths has not been adequately addressed.

Basis for Comment

The FEIS notes (page 191) that coral cover adjacent to the Port Everglades area was naturally low due to stochastic events such as hurricanes and tropical storms. The FEIS does not discuss contingencies around the issue of storm events, including climate change-driven storms potentially resulting in increased storm frequency and severity. Data provided in the FEIS on sedimentation rates (FEIS, pages 228-231) demonstrate that significantly increased sedimentation is likely to occur during a high-intensity storm event. If a hurricane were to hit this area in the future, impacts to newly created reefs may be significant. In addition, new authorized depths resulting from this project may be at risk in the event of a severe storm because sediment mobilization will likely result in deposition in the lowest elevation locations, such as the new channel. Some contingency plan for a severe storm event during the project duration should be defined and accounted for in this final plan.

Storm surge is the greatest risk to port infrastructure and natural systems. A major storm, such as a class 4 hurricane, could generate a storm surge of 25 to 38 feet based on Hurricane Katrina statistics (National Hurricane Center, 2014). This would devastate port facilities and coastal biological resources (mangroves, seagrasses, and coral reefs). Many elements of the Port Everglades Port expansion are at risk from storm surge. This warrants consideration of the risk and discussion of contingency plan. The monitoring plan should provide a contingency in the event that newly restored resources or the new channel depth are adversely affected by a storm event.

Significance – Medium

Many elements of the Port Everglades Port expansion are at risk from severe storm events, and the lack of a clear contingency plan for these occurrences is a risk to the future success of the project.

Recommendations for Resolution

1. Assign a probability to a large storm event occurring one time during the project lifetime (50 years).
2. Summarize potential impacts to the Port Everglades project resulting from a severe storm event in the FEIS.
3. Define actions that would be taken in the event that newly restored resources or the new channel depth are adversely affected by a storm event.
4. Discuss funding sources for repair and maintenance in the FEIS if a large storm event hits the project area.

Literature Cited:

National Hurricane Center. 2014. Hurricanes in History: Hurricane Katrina 2005. National Weather Service, National Hurricane Center. Available at http://www.nhc.noaa.gov/outreach/history/#katrina

Final Panel Comment 9

A comparative port analysis has not been conducted to provide justification for Port Everglades' projected traffic volume.

Basis for Comment

The traffic levels and forecasts for Port activity are critical for estimating benefits and the BCR. The FEIS contains a marketing analysis, but it is qualitative only, with no findings identified. An explanation of the alternative ports, the competitive factors affecting key commodities, and the resultant flows in the future is necessary to give credence to the commodity projections.

The commodity projections by industry estimate the overall growth in the traffic. The central role played by market share assumptions in the traffic forecasts highlights the need to address explicitly port competition. A comparative port analysis would strengthen the credibility of projected market shares in the future port movements.

Significance – Medium

Without a more complete, quantitative comparative port analysis for each of the major benefitting commodities, confidence in the accuracy of the market share, traffic projections, and the BCR is reduced.

Recommendations for Resolution

1. For each major benefitting commodity, analyze the relative landed cost, the capacity (differing modes, terminals, steamship lines, etc.), and other competitive factors affecting the choice between Port Everglades and competing ports.
2. Determine the sensitivity of commodity growth projections to changes in port competition, by benefitting commodity.

Final Panel Comment 10

The USACE determination that the project's cumulative impacts are negligible may not be accurate because the project components that have been removed from the Federal project are still being pursued by the Port.

Basis for Comment

National Marine Fisheries Service (NMFS) (Public Comment #38) and EPA (Public Comments #34, 53, 55, 63, and 64) believe that the impacts of the proposed project, along with project components that have been removed from the Federal project but are still being pursued by the Port, result in more adverse impacts than the impacts described in Section 4.28.6 of the FEIS. Therefore, USACE's conclusion that the project's cumulative impacts are negligible (FEIS, page 273) is debatable. Specifically, when the project alternatives were revised, the Dania Cutoff component was eliminated for economic reasons. However, it was approved for the non-Federal sponsor (Port Everglades) to implement and the Port is currently dredging this area. Mitigation requirements associated with impacts to seagrass and mangrove areas resulting from sponsor activities in Dania Cutoff and Turning Notch is not discussed in the FEIS. The Panel did not review the revised mitigation plan, but because sponsor activities occurring in the Port are not discussed in the FEIS, the Panel does not believe that cumulative impacts to seagrass from Dania Cutoff are included. EPA (Public Comment #63) requested that USACE clarify the claim made in the DEIS that damage to 0.66 acre of seagrasses would be avoided because, although the Dania Canal Cutoff component was dropped from the Federal project, the non-Federal sponsor is currently dredging this canal.

Similarly, the Turning Notch component of the project did not have a positive BCR of greater than 1.0 and, as a result, did not qualify to be included in the Federal project. Therefore, mangrove impacts associated with this component were eliminated. However, the Port will be conducting this work unilaterally, dredging 8.4 acres of mangrove to expand the Turning Notch. These impacts are not presented in the FEIS to evaluate for cumulative impacts to mangroves and seagrass.

Significance – Medium

Cumulative impacts resulting from sponsor activities are not discussed in the FEIS; therefore, cumulative impacts may not have been adequately assessed and the proposed mitigation may not address all impacts.

Recommendations for Resolution

1. In the FEIS cumulative impact analysis, discuss what potential impacts may result from:
    a. the Port's implementation of the Dania Cutoff component, specifically in terms of seagrass impacts; and,
    b. the Port's implementation of the Turning Notch component, specifically in terms of mangrove impacts.
2. Reassess the cumulative impacts discussed above to determine whether they are significant and would require additional mitigation.

Final Panel Comment 11

The discussion of the HarborSym analysis provides no information on the cost parameters assigned to vessel operations, which are critical to the validity and reasonableness of transportation cost savings.

Basis for Comment

The description of the HarborSym analysis in Appendix B, Section 11, has no information on the unit operating costs of the benefitting vessels. The HarborSym outputs are presented only as transportation cost totals. The reasonableness of the HarborSym transportation cost estimates depends on both the modeled changes to vessel loading and operations and on the costs per hour, per nautical mile, or per ton assigned to those vessels.

Significance – Medium/Low

Without supporting information for vessel costs in HarborSym analysis, it is not possible to determine whether the benefits estimates are reasonable.

Recommendations for Resolution

1. Provide information on the vessel operating costs, the impacts of light-loading and delay on those costs, the method for estimating the costs, and the sources used.

Final Panel Comment 12

USACE's response to a public comment indicates there is an upland dredged material disposal area on Port property for dredged material that exceeds toxicity standards; however, the FEIS states that there are no suitable upland disposal sites in the project vicinity.

Basis for Comment

This comment addresses a new issue derived from the Panel's public comment review. Several EPA comments (including #78-81, #86, and #87) raise concerns that it is not certain that all of the dredged material will be suitable for ocean disposal. In addition, the Tropical Audubon Society et al. (Public Comment #228) ask what will be done if any dredged materials are found to be unsuitable for ocean disposal.

In response to Public Comment 228, USACE states that any dredged materials found to be unsuitable for ocean disposal will be sent to "a confined upland Dredged Material Disposal Area on Port property." This response is inconsistent with Section 2.5.6 of the FEIS:

> "There are currently no other known upland sites suitable for the placement of dredged materials in the project vicinity. As a result, upland disposal is not a viable option for the placement of dredged materials."

Significance – Medium/Low

If upland disposal is being considered, then the FEIS is not complete and the environmental impacts from upland disposal need to be addressed.

Recommendations for Resolution

1. Clarify whether upland disposal of any dredged materials is being considered.
2. If upland disposal is being considered for any dredged materials, describe and address this alternative in the FEIS.
3. If upland disposal is not being considered, explain what will be done if any dredged materials are found to be unsuitable for ocean disposal.

Final Panel Comment 13

The assumption that round-the-clock dredging in Port Everglades would not have significant population impacts on larval fish densities is not supported by the data provided in the revised FEIS.

Basis for Comment

USACE assessed potential impacts on larval fish densities and concluded (FEIS, Section 4.28.6) that there would be no substantial impacts from dredging requiring mitigation. The basis for this conclusion is USACE's assumption (Section 4.4.4.2.1) that if an inlet such as Beaufort, North Carolina, with high densities of larval fishes, can be dredged for 24 hours a day without significant population level impacts to larval fish densities, the same would hold true at Port Everglades, where a significant portion of the larval development habitat is in the nearshore and offshore areas north and south of the Port (FEIS, page 200). The specific species of larval fish found in the study area at Beaufort were not presented or compared to the species found in Port Everglades, nor were the impacts on seagrass colonies or other natural resources upon which these larval fish communities depend discussed for Beaufort. Therefore, the Beaufort information does not necessarily support the assumptions on dredging impacts to larval fish densities in the Port Everglades project because impacts are site-specific based on species and resource needs.

Significance – Medium/Low

The determination of the impact analysis for larval fish populations may not be justified because inadequate data have been presented to support the comparison of the Port Everglades site to the referenced Beaufort site.

Recommendations for Resolution

1. Provide additional information in the FEIS to support the determination that dredging in Port Everglades would not have significant population impacts on larval fish densities.

Final Panel Comment 14

Public comments and interview notes from private-sector entities that would benefit from the project (e.g., cruise lines, shipping companies, or customers) would be evidence for the reasonableness of the with-project scenarios, but the comments and notes have not been presented.

Basis for Comment

Benefits of the Port Everglades project include greater utilization of existing vessels; use of larger, more efficient vessels; and reduced vessel delays. Realization of these benefits depends on the actions of cruise lines and of cargo shipping companies, shippers, and receivers. Obtaining the views of these private parties should have been a major focus of outreach efforts. A review of comments received from public outreach efforts, however, found no comments from cargo shipping lines, few from benefitting customers, and only general comments from cruise line operators. For example, the public comment record includes emails from Holland America and Princess Cruises, both citing delay reductions as a benefit but giving no data or specifics. USACE apparently contacted Royal Caribbean International in February 2013 (Appendix B, footnote 9 on pg 30), but no notes are provided. Appendix B also contains footnote references to contacts with CEMEX, Lehigh-Hudson, MSC, Hamburg Sud, and TransMontaigne, but no notes are provided.

Significance – Medium/Low

Project benefits depend on realization of transportation cost savings by private entities whose views are not well documented, creating uncertainty regarding the validity of with-project scenarios.

Recommendations for Resolution

1. Describe efforts made to obtain the views of affected cruise lines, shipping lines, shippers, and receivers.
2. Provide copies of notes from interviews with Royal Caribbean International CEMEX, Lehigh-Hudson, TransMontaigne, MSC, Hamburg Sud, and other vessel operators or shipper/receivers.
3. Explain how the information developed in the interviews and documented in the notes supports the project benefits, and discuss what assumptions the interviewees held when asserting benefits accruing to them.

Final Panel Comment 15

The assumption that reef mitigation projects will restore all ecosystem services and structure to 100% equivalency is unsupported in the FEIS.

Basis for Comment

This is a new issue derived from the Panel's public comment review. EPA's Public Comment #49 asks, "how it will be determined that 100% equivalency of natural reef habitat has been achieved when it is expected to take decades after boulder reef construction to achieve 100%?"

First, it is uncertain whether a restored reef will ever replace all lost ecosystem services and provide niches for a multitude of species dependent upon them (Wells, 1957; Edwards and Gomez, 2007). Furthermore, ecologists are challenged to quantify all the ecosystem services provided by a coral reef, whether it is pristine or marginally degraded (Jaap et al., 2006; Edwards and Gomez, 2007). Currently, ecologists have metrics (such as species richness or diversity, resemblance measurements based on relative species abundance/cover [Clarke, 1993; Clarke et al., 2006], taxonomic distinctness measurement [Warwick and Clarke, 1998], and contrasting functional physiological variables) to make a judgment on what percent equivalent an impacted reef exhibits compared to the reference reef. While 100% ecosystem service equivalency is a highly desirable mitigation/restoration achievement, it is uncertain if such equivalency can be achieved within a few decades. Most reefs in this Florida area evolved over several thousand years (Banks et al., 2007).

Mitigation and monitoring plans need to be realistic about what is achievable, especially given the chronic disturbances and the generally degraded status of reef resources offshore of Broward County (Moyer et al., 2003). Quantitative success criteria should be defined at a variety of intervals to assess the reef restoration, and thresholds should be defined to trigger adaptive management if mitigation is not meeting the targeted goals of the project.

Significance – Low

Without quantitative measures of success and realistic equivalency goals, the status and trends of the coral reef mitigation project cannot be reliably measured and project mitigation goals may not be met.

Recommendations for resolution

1. Develop quantitative success criteria with defined parameters at specific milestones during the project.
2. Define specific success criteria to trigger adaptive management for remedial action if reef mitigation is not meeting the targeted goals of the project

Literature Cited:

Banks, K.W., B.M. Riegl, E.A. Shinn, W.E. Piller, and R.E. Dodge. 2007. Geomorphology of the southeast Florida continental reef tract (Miami-Dade, Broward, and Palm Beach Counties, USA). *Coral Reefs* 26: 617-633.

Clarke, K.R. 1993. Non-parametric multivariate analyses of change in community structure. *Aust J Ecol* 18:117-143.

Clarke, K.R., P.J. Somerfield, and M.G. Chapman. 2006. On resemblance measures for ecological studies, including taxonomic dissimilarities and a zero-adjusted Bray-Curtis coefficient for denuded assemblages. *J Exp Mar Biol Ecol* 330:55-80.

Edwards, A.J., and E.D. Gomez. 2007. Reef restoration concepts and guidelines: making sensible management choices in the face of uncertainty. St. Lucia, Australia: Coral Reef Targeted Research & Capacity Building for Management Programme.

Jaap, W.C., J.H. Hudson, R.E. Dodge, D. Gilliam, and R. Shaul. 2006. Coral reef restoration with case studies from Florida. In *Coral Reef Conservation,* pp. 478-514. M. Cote and D. Reynolds (eds). Cambridge, England: Univ. Cambridge Press.

Moyer, R.P., B. Riegl, and K. Banks. 2003. Spatial patterns and ecology of benthic communities on a high-latitude south Florida (Broward County, USA) reef system. *Coral Reefs* 22:447-464.
Warwick, R.M., and K.R. Clarke. 1998. Taxonomic distinctness and environmental assessment. *J Appl Ecol* 35:532-543.

National Hurricane Center. 2014. Hurricanes in History: Hurricane Katrina 2005. National Weather Service, National Hurricane Center. Available at http://www.nhc.noaa.gov/outreach/history/#katrina

Wells, J.W. 1957. Coral reefs. In *Treatise on marine ecology and paleoecology*. Vol. 1: Ecology, pp. 609-631. J. Hedgpeth (ed). Geol Soc Amer Mem 67. New York Lithographic Corp.

4. REFERENCES

Banks, K.W., B.M. Riegl, E.A. Shinn, W.E. Piller, and R.E. Dodge. 2007. Geomorphology of the southeast Florida continental reef tract (Miami-Dade, Broward, and Palm Beach Counties, USA). *Coral Reefs* 26: 617-633.

Clarke, K.R. 1993. Non-parametric multivariate analyses of change in community structure. *Aust J Ecol* 18:117-143.

Clarke, K.R., P.J. Somerfield, and M.G. Chapman. 2006. On resemblance measures for ecological studies, including taxonomic dissimilarities and a zero-adjusted Bray-Curtis coefficient for denuded assemblages. *J Exp Mar Biol Ecol* 330:55-80.

Edwards, A.J., and E.D. Gomez. 2007. Reef restoration concepts and guidelines: making sensible management choices in the face of uncertainty. St. Lucia, Australia: Coral Reef Targeted Research & Capacity Building for Management Programme.

EIA. 2012. Annual Energy Outlook 2012 (AEO2012) Early Release Overview. U.S. Energy Information Administration. Available at http://www.eia.gov/forecasts/aeo/er/pdf/0383er(2012).pdf.

Jaap, W.C., J.H. Hudson, R.E. Dodge, D. Gilliam, and R. Shaul. 2006. Coral reef restoration with case studies from Florida. In *Coral Reef Conservation,* pp. 478-514. M. Cote and D. Reynolds (eds). Cambridge, England: Univ. Cambridge Press.

Moyer, R.P., B. Riegl, and K. Banks. 2003. Spatial patterns and ecology of benthic communities on a high-latitude south Florida (Broward County, USA) reef system. *Coral Reefs* 22:447-464.
Warwick, R.M., and K.R. Clarke. 1998. Taxonomic distinctness and environmental assessment. *J Appl Ecol* 35:532-543.

Olsen Associates Inc. 2004. Port Everglades Inlet Sand Management Phase I: Sand Bypassing Feasibility Study. Prepared for Broward County Board of County Commissioners. June 2004.

Olsen Associates Inc. 2007. Port Everglades Inlet Sand Management Phase II: Sand Bypassing Feasibility –Addendum. Prepared for Broward County Board of County Commissioners. November 2007.

Waterborne Commerce Statistics Center. 2013. Port Everglades Waterborne Commerce Chart for the Ten Fiscal Years 2013 through 2004 (Unaudited). Available at http://www.porteverglades.net/includes/content/docs/MEDIA/Port-Everglades-Waterborne-Commerce-Chart-04-13.pdf

Wells, J.W. 1957. Coral reefs. In *Treatise on marine ecology and paleoecology*. Vol. 1: Ecology, pp. 609-631. J. Hedgpeth (ed). Geol Soc Amer Mem 67. New York Lithographic Corp.

Battelle
The Business *of* Innovation