LCA TERREBONNE BASIN BARRIER SHORELINE RESTORATION STUDY

APPENDIX K
COST-EFFECTIVENESS/ INCREMENTAL COST ANALYSIS

ANNEX K-1
RESPONSES TO WVA COMMENTS

LCA Terrebonne Basin Barrier Shoreline Restoration Study
Responses to Wetland Value Assessment (WVA) Model Certification Comments.

1. *Comment #1:   Starting the SI curves for all variables at 0.1 is problematic because even habitat with no ecological value appears to have some ecological value.*
Response: The use of the 0.0 intercept would not affect the relative rankings of the alternatives for the LCA Terrebonne Basin Barrier Shoreline Restoration Study (LCA TBBSR). The use of an SI value starting at 0.1 is consistent with assumptions of similar habitat assessment methods presently in use by the Natural Resources Conservation Service (NRCS). Reference NRCS Biology Technical Note No. 51 and No 52 dated May 2005 and assumptions regarding wildlife habitat appraisal guides:

"*There is no minimum size for land to be appraised as wildlife habitat. However, tracts of 1 to 20 acres may be limited as habitat by their size alone. 1. All land and waters provide habitat for wildlife. 2. The quality of habitat is variable depending on the quality, quantity, and interspersion of food, cover, water, and space.*"

This response is consistent with responses previously provided to the ECO-PCX regarding certification of the WVA Models by the US Fish and Wildlife Service (USFWS), other model users, and the ERDC reviewers (McKay and Fischenich manuscript dated September 21, 2009); see comments furnished in a document entitled "Draft Model Certification Review Report for the Wetland Value Assessment Models," dated July 8, 2009.

2. *Comment #2. Justification for assigning variable weights needs to be provided.*
Response: Justification for SI curves and aggregation equations is not included in the model documentation. Aggregation formulas were originally developed based on existing literature and professional judgment of model developers. Assumptions related to these aggregation formulas, although originally developed based on existing literature and professional judgment of the model developers, were not documented. In addition, aggregation formulas have been modified based on lessons learned in model application.   Assumptions of the WVA Model formulas pertaining to the LCA TBBSR Study have been documented in the WVA Project Information Sheet. A separate effort responding to the comments on the WVA Models is presently planned by the New Orleans District to conduct a literature review by an interagency group and contractor that would then utilize these references for adding supporting justification to the model documentation.   Revisions to the WVA Models would be considered if published literature conflicts with the existing Suitability Indices. In addition, sensitivity analysis on the weightings would also be considered. This response is consistent with responses previously provided to the ECO-PCX regarding certification of the WVA Models by the US Fish and Wildlife Service (USFWS), other model users, and the ERDC reviewers (McKay and Fischenich manuscript dated September 21, 2009); see comments furnished in a document entitled "Draft Model Certification Review Report for the Wetland Value Assessment Models," dated July 8, 2009.

3. *Comment #3: The number of Target Years should be increased to improve the predictive ability of the models given that changes are often non-linear.*

Response: For the LCA TBBSR Study, different alternatives were analyzed using different Target Years depending upon various assumptions such as vegetation planting and establishment, renourishment, and others. This and other assumptions are described in the Project Information Sheet prepared for this Study. Target Years represent points within the Study period of analysis when habitat conditions in the Study area are expected to change (e.g., storms, increasing salinity, restoration implementation, maintenance, increase in vegetative cover, etc). Changes between Target Years are assumed to be linear; which is consistent with assumptions of HEP models.

4. *Comment #4: In the spreadsheet for the marsh models, open water and emergent marsh AAHUs are incorrectly combined and should be added rather than taking the weighted arithmetic mean (model issue).*

Response: The higher weighting of the marsh benefits was incorporated to ensure that benefits to wetlands, not open water, clearly provide the driving force behind benefits. It seems more obvious and transparent to the user to apply an adjustment to the benefits (AAHUs) than to artificially lower the HSI. It would seem more appropriate to provide a more accurate measure of the habitat quality (HSI) for the open water component and then adjust the benefits resulting from the Study to that component than to do the opposite. This response is consistent with responses previously provided to the ECO-PCX regarding certification of the WVA Models by the US Fish and Wildlife Service (USFWS), other model users, and the ERDC reviewers (McKay and Fischenich manuscript dated September 21, 2009); see comments furnished in a document entitled "Draft Model Certification Review Report for the Wetland Value Assessment Models," dated July 8, 2009.

5. *Comment #5: Off-site or surrounding human impacts and disturbances should be addressed by the models.*

Response: The LCA TBBSR Study Area is located in remote areas and human activities related to land use are not key drivers for these natural communities. While human activities and land use disturbances are not key factors in the remote Study Areas, land use activities that create open water are often significant factors. Human factors that create open water are accounted for in the model input for variables such as percent open water, percent open water at a given depth, edge and interspersion, etc. In assessing Future With Project and Future Without Project conditions for a given project, assumptions are made regarding human activities that create open water and increase marsh loss. These assumptions are documented in the Study reports and/or appendices. The primary purpose of the WVA model is to evaluate habitat suitability. Human impacts are only accounted for if they potentially affect the habitat. The potential impacts of human disturbances in the LCA TBBSR Study, construction of the cement-filled geotextile bag revetments and the construction of the sunken-barge rip-rap filled breakwaters on the Caminada Headland; as well as potential natural disturbances, such as tropical storms and subsidence were considered in the development of the land loss rates and other assumptions utilized in preparing the WVA models.

6. *Comment #6: Sea level is an important phenomenon and relative sea level rise and climate change should be included in the models.*

Response: Sea level change and climate change are important factors. The LCA TBBSR Study was evaluated with the WVA models before more recent guidance regarding consideration of sea level change. The impacts of sea level change and climate change were taken into consideration when the Study team is forecasting the input variables (e.g. percent open water, percent open water at a given depth, edge and interspersion). These forecasts are made using the best available engineering models and expert judgment. In addition, local subsidence rates, relative sea level rise and shoreline erosion are considered when determining land loss rates used in the models.

7. *Comment #7: Validation of the models based on performance measures needs to be described and documented.*
Response: Two of the three levels of validation and testing outlined in the comments have been conducted on the WVA models. Expert review was conducted by the model development team. This model review effort was intended to meet the Expert Review validation level. Testing with hypothetical (and real) data has been conducted since the models were developed and in use beginning in early 1990s. Users have assessed the model structure, output and sensitivity of the models and the models have been modified based on this information. These validation and testing steps that have been conducted will be described in the model documentation.

8. *Comment #8: The model documentation should clearly state the basis for the model assumptions, the theoretical basis of the models and how the science is applied for these ecosystems, and how the models were developed to eliminate the appearance of subjectivity.*
Response: See response to Comment 2.

9. *Comment #9: The methods for data collection are unclear and not well-documented, therefore data quality is uncertain.*
Response: We concur that additional documentation in the WVA Model guidance related to variable measurement would be helpful. However, the LCA TBBSR team has considerable experience in utilizing the WVA models. The specific items identified in this comment will be evaluated and considered by an interagency team. The model documentation will be revised accordingly. Revisions will recommend use of available tools and methods, but will not be prescriptive, such that as better tools are developed they can be used. The quality of the input data should also be evaluated as part of the Agency Technical Review process.

10. *Comment #10: For some model variables, policy decisions appear to supersede what is known about the ecology and hydrology of the relationships.*
Response: We acknowledge the potential problems associated with Variables 1, 2, and 3 of the WVA Marsh Models, especially when using a short period of analysis such as with the 20-year period of analysis utilized in typical CWPPRA (Coastal Wetlands Planning, Protection and Preservation Act) projects. Application of the WVA Models to compare stable marsh with deteriorating marsh is likely problematic when using a short period of analysis as the short term benefits of the deteriorating marsh are typically higher than solid marsh. However, for the LCA TBBSR Study it is anticipated that these problems are not as significant when the period of analysis is longer (50 years). Another important point is that the solid marsh provides some storm attenuation functions not currently measured by the models. These are real benefits and

not solely policy. These benefits are typically appropriate to add discussion on the flood risk benefits of marsh.

11. *Comment #11: The spreadsheets for the models as created are likely to lead to errors in maintenance and use.*
Response: We concur that the WVA spreadsheets are potentially susceptible to these problems especially for novice model users. Spreadsheet/model documentation and revision of spreadsheets to allow the majority of calculations to be completed within the spreadsheet would potentially reduce susceptibility of errors, especially for novice model users. However, the LCA TBBSR habitat analysis was conducted by an interagency team each with over a decade or more of experience in using and conducting the WVA analysis and this issue is not considered significant for the LCA TBBSR Study.

12. *Comment #12: Several inaccuracies were identified in the model spreadsheets that should be corrected (spreadsheet issue).*
Response: We concur with the reviewers that calculations should be modified to allow the spreadsheet to make calculations. This would be especially useful for novice model users. However, the LCA TBBSR habitat analysis was conducted by an interagency team each with over a decade or more of experience in using and conducting the WVA analysis and this issue is not considered significant for the LCA TBBSR Study.

13. *Comment #13: The usability of the spreadsheets is limited because of the spreadsheets' user interface and user and maintainer documentation.*
Response: We concur that improvements to the interface would improve model utility especially for novice model users. However, the LCA TBBSR habitat analysis was conducted by an interagency team each with over a decade or more of experience in using and conducting the WVA analysis and this issue is not considered significant for the LCA TBBSR Study.

14. *Comment #14: Data validation needs to be built into the spreadsheets.*
Response: Concur that a spreadsheet specialist should build data validation into the spreadsheet. However, the LCA TBBSR habitat analysis was conducted by an interagency team each with over a decade or more of experience in using and conducting the WVA analysis and this issue is not considered significant for the LCA TBBSR Study.

15. *Comment #15: The WVA method should be expanded to handle risk and uncertainty in areas exposed to episodic events.*
Response: Risk and uncertainty are already incorporated into the WVA model inputs for the LCA TBBSR Study. Currently risk and uncertainty are considered in the engineering model, such as SBEACH, used to develop WVA model input for the LCA TBBSR Study. Other sources of risk and uncertainty also considered in the WVA model include sea level change, subsidence, and frequency of tropical storms. In addition, the Study reports will address how risk and uncertainty were addressed.

16. *Comment #16: The WVA method should be updated, taking into account new sources of GIS data, LIDAR, and other new data sources, as well computer simulation and visualization tools.*

Response: The WVA Procedural Manual references geospatial and other data sources as a guide, but is not intended to be prescriptive or exhaustive. The WVA model used for the LCA TBBSR Study included use of the most recent available imagery and land loss data available from the US Geological Service as well as the most appropriate historic imagery that was used in determining land loss and habitat conversion.

17. *Comment #17: Development and documentation of a more precise approach to measurement of some variables could be improved.*
Response: see response to comment #9.

18. *Comment #18: The use of the geometric mean may be more appropriate than the arithmetic mean to derive some HSIs. Provide scientific basis for the decision to use one over the other.*
Response: With regard to the LCA TBBSR Study, while applying geometric weighting as well as other weighting schemes that accomplish the same aim may change the overall magnitude of the output, it does not affect the relative ranking of alternatives. This response is consistent with responses previously provided to the ECO-PCX regarding certification of the WVA Models by ERDC reviewers (McKay and Fischenich manuscript dated September 21, 2009).

19. *Comment #19: A performance measure should be stipulated to identify the measurable community characteristics to which the HSIs are related.*
Response: We concur that performance measures (such as species diversity) could be developed for each WVA community model and that such information on the performance measures could be added to the model documentation. With regard to the LCA TBBSR Study, because of long standing standardizations of CWPPRA we feel this approach is appropriate and consistent until further refined.

20. *Comment #20: The geographic boundaries/domain of the models is unclear.*
Response: The geographic boundary for the WVA model used in the LCA TBBSR Study is clearly delineated in the WVA Project Information Sheet prepared for this particular Study as well as the Study impact area described in the EIS. This issue is not considered significant for the LCA TBBSR Study.

21. *Comment #21: An explicit statement should be provided regarding the minimum area to which the models can be applied.*
Response: The geographic boundary for the WVA model used in the LCA TBBSR Study is clearly delineated in the WVA Project Information Sheet prepared for this particular Study as well as the Study impact area described in the EIS. This issue is not considered significant for the LCA TBBSR Study.

22. *Comment #22. Additional error checks should be incorporated into the model spreadsheets.*
Response: We concur that more specific error messages/information be incorporated into model error messages. However, the LCA TBBSR habitat analysis was conducted by an interagency team each with over a decade or more of experience in using and conducting the WVA analysis and this issue is not considered significant for the LCA TBBSR Study.