

Appendix A. Task Force Findings and CCCL Challenges to Dune Erosion Modeling

I. Charlotte County (1984) Challenge to CCCL

In accord with State of Florida – Division of Administrative Hearings
Case Numbers 84-3571R and 84-3572R
and personal conversations with Dr. T.Y. Chiu and Dr. R.G. Dean based on recollections,
the following items were established:

Historical facts are not entirely clear as to which erosion model was utilized for this county as hearing documents refer to the Kriebel Model and modified Kriebel Model, yet make reference to the 2.5 factor (which is used in the DNR/CCCL Dune Erosion Model but may also have been used in the Kriebel [EBEACH] dune erosion modeling work for CCCL line reestablishment). Personal conversation with Dr. Chiu and Dr. Dean who were both active in CCCL studies at the time has not provided any added information to clarify this subject. Additionally, the report entitled "Coastal Construction Control Line Review and Reestablishment Study for Charlotte County, Florida", Beaches and Shores Resource Center, Florida State University, April 1984, does not specifically state which model was utilized for dune erosion work but notes it was a "newly developed numerical model" based on the work of Kriebel.

One of two models appear to have been used in the dune erosion work, either
(a) EBEACH, a product of D. Kriebel's thesis work at University of Delaware which was later documented by D. Kriebel for the Florida DNR to utilize in erosion work; or
(b) DNR dune erosion model developed by Dr. Dean and based upon previous work of D. Kriebel (a student of Dr. Dean's) and Dr. R.G. Dean.

One (and possibly both) of these models appear to have been investigated and possibly utilized for dune erosion model work on the CCCL study for Charlotte County. The "DNR" model is the predecessor to the existing CCCL Dune Erosion Model utilized in most CCCL studies and discussed in Appendix C in the "Methodology on Coastal Construction Control Line Study", Beaches and Shores Technical and Design Memorandum No. 84-6, Florida Department of Natural Resources, July 1984 (also a report by Beaches and Shores Resource Center, Florida State University). This report lists the source code for the dune erosion modeling believed to be utilized in most CCCL studies.

As the dune erosion model was a controlling factor for only a small limited number of profiles (primarily State park land) on the northernmost portion of Manasota Key that lies within Charlotte County, challenges to the CCCL study did not address shortcomings of the dune erosion modeling other than note that the 2.5 multiplying factor appeared to be an over-conservative approach compared to recent Kriebel model calculations (made by consultant) based on a multiplying factor of 1.0 (with no supporting documentation in evidence). No significant challenges were made to the dune erosion model (to the best knowledge of BSRC) other than criticisms regarding the fact that the model "assumes

high dunes, high enough to reflect storm waves" and the inclusion of the 2.5 [safety] factor in estimating recession. Major criticisms of the CCCL reset work in the challenge addressed storm surge work (i.e. three foot wave criteria as utilized in flooding) rather than the dune modeling work. As EBEACH is no longer utilized and the present version of the CCCL model has evolved, any criticism of that particular model would not pertain to recent CCCL methodology.

Findings of the Charlotte County hearings were that there ".....was no proof of any significant defect in the theory or use of the storm surge model", and that ".....use of the erosion model as calibrated was appropriate to that end."

II. Palm Beach County Peer Review of CCCL, SBeach, and Kriebel Erosion Models (1992-1995).

Palm Beach County public hearings occurred at three locations in the county at the end of May 1992. After the presentation of the proposed CCCL location, a number of questions were raised from local interests concerning the erosion model which was used in the CCCL study and the effect of the seawall on the location of the CCCL. The state decided to conduct a study to address the questions in a scientific way and entered a contract with Dr. Robert G. Dean, Graduate Research Professor at the Department of Coastal and Oceanographic Engineering, University of Florida to carry out the study. The FDEP who sponsored the CCCL program required that the study should address questions concerning the erosion model along with additional considerations of seawall effects on beach profiles and whether credit should be given for a seawall in reducing erosion for CCCL studies. This report primarily addresses the comments made regarding dune erosion modeling and the CCCL dune erosion model along with responses made to peer review comments. As no requirements or further formal studies were made regarding the peer review panel comments, no official changes to the CCCL dune erosion model were made as a result of this process although the CCCL model usage was modified slightly after this review process to apply a 2.5 multiplication factor over the entire profile such that continuity would be preserved. This model usage change was made in response to Peer Review Group comments that the model did not preserve continuity since previous usage of the model only applied the 2.5 factor to contours above water.

The peer review group which reviewed the dune erosion models along with other topics consisted of the following members:

1. Professor Robert L. Wiegel, Department of Civil Engineering, University of California, Berkeley, California
2. Professor David L. Kriebel, Ocean Engineering Program, U. S. Naval Academy, Annapolis, Maryland
3. Mr. Tom Jarrett, Chief, Coastal Engineering Branch, Wilmington District, U. S. Army Corps of Engineers, Wilmington, North Carolina

4. Professor Billy Edge, Ocean Engineering Program, Department of Civil Engineering
Wiesenbaker Engineering Research Center, Texas A and M University, College Station,
Texas
5. Mr. Erik Olsen, President, Olsen Associates, Inc., Jacksonville, Florida

The first three members were invited by Dr. Robert G. Dean and the other two members were selected by local interests and the state's Department of Environmental Protection. The Peer Review Group (PRG) held three meetings with dates and places listed below:

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| First Meeting: | February 7 and 8, 1994 in Gainesville, Florida. |
| Second Meeting: | July 10 and 11, 1994 in Riviera Beach, Florida. |
| Third Meeting: | January 3, 4 and 5, 1995 at Cypress Room at Wakulla Springs
near Tallahassee, Florida. |

There were comments by the PRG after the first and second meetings and a final report after the third meeting. Due to the time span, the responses to each comment by Dr. Robert G. Dean were missing from the file and can not be shown.

All the comments and final report which deals with major issues of the PRG meetings are depicted herein along with Dr. Robert G. Dean's assessment of the PRG report to the project sponsor. A more detailed discussion of the peer review group meeting agendas, etc. is found in the "Methodology on Coastal Construction Control Line Establishment" by Dr. T.Y. Chiu and Dr. R.G. Dean, Beaches and Shores Resource Center, Florida State University, June 2002.

The dune erosion model review task undertaken by the peer review group was to be an inter-comparison of the various dune erosion models for common input conditions. The models reviewed included:

- (a) Kriebel Model (EBEACH);
- (b) DNR (Now called the CCCL Dune Erosion Model. Various versions of the DNR model were in existence, i.e. DNR1; DNR2; DNR3; and DNR4. These versions of the model differed only by the method by which the "A" factor in the Equilibrium Beach Profile was calculated);
- (c) SBEACH (believed to be version 1 developed by the Coastal Engineering Research Center, U.S. Army Corps of Engineers.

The intent of the study was to:

- (1a) Gather the detailed characteristics of the various models;
- (1b) Exercise the models for common input and initial profile characteristics and compare and document the results.
- (1c) Study the limits of erosion for the 100 year storm surge in Palm Beach County using the Kriebel model and the most advanced of the other available models (DNR2). The

results were to be compared with the recommended position of the Coastal Construction Control Line.

(1d) Compare the models against available data including, but not limited to those from Hurricane Eloise and other data (primarily profile data from Palm Beach County).

The peer review group was then to review the results of the numerical model study and comparisons to determine consistency of results and/or identify problems associated with the numerical models. A list of reports developed in the study is provided below. The first two reports are of most interest to the present discussion as they detail a comparison of the three models for dune erosion purposes using both field and laboratory data along with hypothesized storm surges on a limited number of East Coast of Florida profiles. The remaining reports are primarily concerned with physical modeling of seawall failure along with a limited look at numerical modeling. As the CCCL model does not attempt to address seawalls, further discussion of these reports is not considered within the framework of a model comparison. Findings of the first two reports are as noted previously, i.e. the CCCL model and the Kriebel model were found to represent the erosion best for the field data while SBEACH showed consistently less recession than either the CCCL model or the Kriebel model. A listing of the study reports is as follows:

1. Srinivas, R. and Dean, R. G., 1994. Evaluation Study and Comparison of Erosion Models and Effects of Seawalls for Coastal Construction Control Line, Intercomparison of Existing Dune Erosion Models. COEL-94/001, University of Florida, Gainesville, Florida.
2. Srinivas, R. and Dean, R. G., 1994. Evaluation Study and Comparison of Erosion Models and Effects of Seawalls for Coastal Construction Control Line, Intercomparison of Three Models for: (1) 100 Year Storm and Palm Beach County, and (2) Large Scale Wave Tank Tests. COEL-94/004, University of Florida, Gainesville, Florida.
3. Thompson, Lynda, Lin, Lihwa and Dean, R. G., 1994. Evaluation Study and Comparison of Erosion Models and Effects of Seawalls for Coastal Construction Control Line, Generic Modeling of Seawall Overtopping and Associated Scour: Interim Reports 1 and 2. COEL-94/003, University of Florida, Gainesville, Florida.
4. Charles, Lynda L., Lin, Lihwa and Dean, R. G., 1994. Evaluation Study and Comparison of Erosion Models and Effects of Seawalls for Coastal Construction Control Line, Interim Report #3. COEL-94/005, University of Florida, Gainesville, Florida.
5. Lin, Lihwa, Zheng, Jie and Dean, R. G., 1994. Evaluation Study and Comparison of Erosion Models and Effects of Seawalls for Coastal Construction Control Line, Interim Report #4. COEL-94/020, University of Florida, Gainesville, Florida.
6. Demas, Carol, Lin, Lihwa and Dean, R. G., 1994. Evaluation Study and Comparison of Erosion Models and Effects of Seawalls for Coastal Construction Control Line, Interim Report #5 and Summary of Previous Results. COEL-94/021, University of Florida, Gainesville, Florida.
7. Dean, R. G., Lin, Lihwa, Charles, Lynda, Zheng, Jie and Demas, Carol, 1994. Evaluation

Study and Comparison of Erosion Models and Effects of Seawalls for Coastal Construction Control Line, Generic Modeling of Seawall Overtopping and Associated Scour: Summary Report. COEL-95/001, University of Florida, Gainesville, Florida.

Overall, the Peer Review Group (PRG) found that the use of a closed loop model such as the CCCL model (existing versions at time of study referred to as DNR1, DNR2, DNR3, DNR4) was scientifically sound and appropriate for the CCCL program. They also noted that the use of the SBEACH model should not be considered for State use in the CCCL program as it consistently underestimated erosion compared to other models tested.

With regard to the CCCL dune erosion model, the PRG noted the following major points:

1. The CCCL model did not explicitly include run-up in it although they note that the lack of the explicit use of run-up in the model does not make it invalid.
2. Calibration of the CCCL model should be summarized.
3. Model use of a 2.5 recession multiplication factor for contours above water caused the model not to preserve continuity and that such a factor should not be used in model comparisons although it could be utilized in final use for CCCL establishment purposes (As noted previously the usage of the model was subsequently changed to use a 2.5 factor over all contours thereby preserving continuity).

The PRG also noted that considerable more research was needed on models with regard to ability to address the following issues: seawall erosion; erosion where rock or reef outcroppings exist in the profiles; sensitivity of "A" value to erosion estimates; and use of 100 year storm tide to obtain 100 year erosion event as opposed to directly determining a 100 year erosion event.

The FDEP's consultant (Dr. Robert Dean) in response to comments made by the PRG defended the use of the 2.5 factor as a viable safety factor consistent with the needs of the State in establishment of the CCCL line with the caveat that the final use of the model to establish a prudent erosion distance estimate was most important to the state and not the fact that the 2.5 factor was used in model comparisons.

Additional comparison of the CCCL Dune Erosion Model and the EDUNE Model were made and documented in a report entitled:

Application of the EDUNE Model in the CCCL Establishment, by S.Y.Wang and T.Y.Chui, Beaches and Shores Resource Center, Institute of Science and Public Affairs, Florida State University, Tallahassee, FL., 1993.

Findings from the study suggested that a larger K transport coefficient value was needed in the EDUNE Model to make model predictions in better agreement with measured after storm profile lines in Palm Beach County. No conclusion was made that suggested the EDUNE Model to be a better model to utilize in the CCCL studies than the existing CCCL Dune Erosion Model.

After the PRG studies and response by Professor Dean, no additional formal response was made to address any of the above issues although the CCCL model was further modified to preserve continuity in the profile under a multiplying factor.

No additional files have been found within BSRC to address any of the PRG detailed

questions and/or state answers to these questions. Discussions with Dr. T.Y. Chiu and Dr. Robert G. Dean also have not provided information beyond what is noted herein.

PRG Comments along with Response Comments by Dr. R. G. Dean are provided as follows:

Kean

**David L. Kriebel, Ph.D., P.E.
Coastal and Ocean Engineering
745 Buckeye Court
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March 2, 1994

Dr. Robert G. Dean, Chairman
Dept. of Coastal and Oceanographic Engineering
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University of Florida
Gainesville, FL 32611-2083

Dear Bob:

On behalf of the Peer Review Group (PRG), I am enclosing the report that we prepared following our meetings with you in Gainesville on February 7 and 8.

These comments originated in our closed-door meeting on February 8 and have been revised and edited by each member of the PRG. I believe that I am correct in stating that the PRG is in unanimous agreement on these comments and recommendations. We recognize that many of our suggestions are far-reaching and may require significant additional effort that was not planned as part of your current study. We have therefore made an attempt to prioritize our suggestions to assist you in modifying your present research plan.

To facilitate communication between you and the PRG, we have elected Professor Wiegel to serve as chairman of the PRG. Specific comments and questions can be directed to him, although I am sure that each member of the PRG would be glad to provide additional input on any of our recommendations.

You and your students have obviously put forth a significant effort to compare, calibrate, and verify the various erosion models, and to carry-out fundamental research on the effects of seawalls. We hope that these comments will assist you in your efforts. I would also like to express the appreciation of all members of the PRG for being part of this study, which we believe will have broad impact both within the State of Florida and nationally.

Sincerely,

David L. Kriebel
David L. Kriebel, Ph.D., P.E.

cc: R. Wiegel
B. Edge
T. Jarrett
E. Olsen

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MAR 10 1994

**BUREAU OF
COASTAL DATA ACQUISITION**

**COMMENTS
OF
PEER REVIEW GROUP
FOR**

**"EVALUATION STUDY AND COMPARISON OF EROSION MODELS
AND EFFECT OF SEAWALLS FOR COASTAL CONSTRUCTION
CONTROL LINE"**

February 8, 1994

INTRODUCTION

The Peer Review Group (PRG) met on February 7 and 8 to discuss the objectives of the study, to review project results to date, and to formulate comments and suggestions to guide future research. Members of the PRG included: Prof. Billy Edge, Mr. Tom Jarrett, Prof. David Kriebel, Mr. Erik Olsen, and Prof. Robert Wiegel. Robert Wiegel was unanimously elected to be chairman of the PRG.

The meetings consisted of briefings by Professor Robert Dean regarding project activities undertaken by the University of Florida, a briefing by Mr. Robert Wang regarding the activities of the Beaches and Shores Resource Center, and general discussions concerning the project with representatives from the Florida Department of Environmental Protection.

At the conclusion of the meeting, the PRG met for approximately one and one-half hours to formulate preliminary comments. Discussion focussed on two major aspects of the project: (1) the comparison of three candidate beach and dune erosion models for use in establishing the Coastal Construction Control Line (CCCL) and (2) the extent to which, and how, seawalls should be included in the establishment of the CCCL.

It is the consensus opinion of the PRG that this study has the potential to resolve many of the issues pertaining to the dune erosion modeling in the State of Florida. The second issue, regarding the effect of seawalls on the CCCL, will be more difficult to resolve and may require significant additional effort in this study. Specific comments on each phase of the study are itemized below.

SPECIFIC COMMENTS: DUNE EROSION MODELS

- I. Inter-comparisons between the three "closed-loop" dune erosion models have been very useful and should be continued, subject to the following recommendations (listed in order of priority):
 - a. All numerical models should be evaluated to determine their sensitivity to the shape of the initial offshore profile. The influence of the assumed "A" parameter should be investigated further. Uniform guidelines for defining the "A" parameter from measured beach profiles, and from one survey monument to another, should be established. It is suggested that cases be investigated in which the initial profile is not in equilibrium to determine the extent to which initial profile shape influences numerical model results. If the initial profile does not match the assumed equilibrium form, procedures should be developed to "initialize" the initial profile, perhaps by running the models to simulate normal water levels and wave conditions prior to a storm event.
 - b. Wave runup is a major source of discrepancy between the various models, as the EDUNE and SBEACH models include runup while the CCCL model does not. It is the belief of the PRG that wave runup should be included in any model used to establish the CCCL. As a sensitivity study, the EDUNE model should be evaluated without wave runup to allow more direct comparison to the CCCL model. Of more importance, however, the CCCL model should be modified to include wave runup effects and the revised CCCL model should be compared to the EDUNE and SBEACH models.
 - c. The models should be inter-compared, after necessary modification based on current state-of-the-art, to include the effect of seawalls (vertical and sloping), rock outcroppings, and offshore reefs. Two of the erosion models (EDUNE and SBEACH) now include provisions for simulating seawalls but these have not been widely evaluated. The CCCL model should be modified to include provisions for seawalls similar to those contained in the other models. None of the models now include the effects of rock outcrops or offshore reefs, and some basic research should be conducted to investigate whether these effects can be included in the numerical erosion models. The revised models should then be compared relative to each other and relative to any available data.
- II. Additional calibration and verification of each model is suggested, based on the following recommendations (listed in order of priority):
 - a. All erosion models should be evaluated by comparison with available high quality field data from severe storms. Data from Ocean City, Maryland is believed to be particularly relevant, owing to the amount and quality of the data, and to the severity of the storms. Data from Hurricane Hugo in South Carolina may also be readily available and relevant for verification of the calibrated models. Additional data from within the State of Florida should also be located, perhaps following

the Thanksgiving Storm of 1984. Tests should be carried out in a "blindfolded" manner to simulate, as closely as possible, the procedures used in establishing the CCCL.

- b. It is the consensus of the PRG that the Beaches and Shores Resource Center report and its conclusions are inconclusive and premature. Results of this report should not be adopted at this time, however, the report is useful in highlighting the effect of the offshore profile shape on erosion predictions. Further study on the effect of the offshore profile on model calibration is required. One additional phase of this study should include: (1) fitting an equilibrium profile through the nearshore portions of the surveyed profiles to determine appropriate values of the "A" parameter and (2) repeating the model calibration exercise using this revised input parameter. It would appear that a smaller value of the "A" parameter will result that may yield greater erosion estimates in closer agreement with measurements without the need for a large revision in the calibration parameters.
- c. The calibration procedures of all models should be more thoroughly summarized. Specific questions to be addressed might include: What is the effect of the initial profile on model calibration? How was the CCCL calibrated and what is the origin of the value $k = 0.075 \text{ hr}^{-1}$? What is the basis for calibration of the EDUNE model and how is the calibration of the CCCL model related to the calibration of the EDUNE model? Is the SBEACH model re-calibrated or "tuned" for each application? Should the various calibration parameters be adjusted to reflect the "scale" of the 100-year storm?
- d. It is recommended that model comparisons be made without the use of *ad hoc* multipliers. Use of multipliers for establishing the CCCL should be an administrative or regulatory decision, but should not be used when scientifically comparing various models against each other or against data. In this regard, the "2.5 factor" employed in the CCCL model should be documented and explained in more detail. It is not clear how this factor is actually applied in practice since, if applied directly to computed contour recession, the final profile will often end up with a physically unrealistic shape. It is also not clear whether the factor was used as part of the original model calibration or whether it has been applied subsequently as a factor of safety to account for longshore variability in the observed erosion when compared to predictions obtained from the calibrated model.
- e. All erosion models should be evaluated by comparison with available large scale wave tank tests conducted with irregular waves rather than with regular waves. The data published by the Delft Hydraulics Laboratory and by the University of Hannover in Germany are particularly relevant. Data from the Corps of Engineers SUPERTANK project may also be useful. Laboratory tests conducted with regular waves are not viewed as particularly relevant to erosion models that will be applied to a 100-year storm for the establishment of the CCCL.

III. Additional research should be conducted regarding the relationship between the storm surge and erosion estimates, as follows:

- a. The Beaches and Shores Resource Center should conduct a study to determine whether the existing approach provides a rational basis for determining the 100-year erosion event. In particular, a Monte Carlo simulation should be conducted in which erosion is estimated for many statistically-representative hypothetical hurricanes. The frequency distribution of erosion events should then be determined to define the 100-year erosion event. This value should then be compared to the erosion calculated from the 100-year storm tide following the current procedures.
- b. The PRG was not directed to review the procedure for determining the 100 year storm tide. However, the PRG recognizes that the 100-year storm surge and duration (hydrograph) are perhaps the most important input parameters for erosion models. The validity of the CCCL depends to a great extent on the validity of the storm tide estimates. Questions remain regarding how the size of the study area is determined for each county, how the 100-year storm duration is determined, and whether dynamic wave setup should be included in the predicted storm tide for subsequent use in erosion models.

SPECIFIC COMMENTS: SEAWALL EFFECTS

- I. The PRG believes that substantial background research is required, on the part of the study participants and on the part of the PRG itself, before significant progress can be made in addressing the role of seawalls in the establishment of the CCCL.
 - a. A synopsis of the literature concerning the effects of seawalls on the beach should be prepared. This synopsis should consolidate references regarding issues such as seawall-induced scour, end-effects, and overtopping.
 - b. Field data from the State of Florida concerning seawall effects and failures should be assembled. Data from other areas, such as areas affected by Hurricane Hugo in South Carolina, may also be useful if data from Florida are not located.
 - c. A review of typical seawall types in the State of Florida should be conducted. Location and features of well-engineered "major" seawalls, such as those in Palm Beach and Duval Counties, should be distinguished from "minor" seawalls, which may include structures built without thorough engineering design. Such a review is required to develop a listing of parameters to be used in evaluating the influence/impact of seawalls, since some parameters may be unique to each wall type, e.g. sloping rubble-mound construction versus vertical concrete sheet-pile construction.

- d. The PRG suggests that the University of Florida develop a preliminary list of parameters or criteria to be used in evaluating seawall performance. The PRG would then serve as an independent body to review these performance criteria for applicability to the CCCL program.
- II. The PRG suggests some modification to the laboratory study of seawalls in order to enhance its relevance to the CCCL program.
- a. The laboratory test program should be conducted with irregular waves as opposed to regular waves in order to produce profile response more representative of nature. In all tests, measurements should be made of wave reflection and wave overtopping rates. A test series should be conducted to evaluate the effect of wall removal (failure) during a storm and to simulate the effect of remnant walls. Similar tests should be conducted to compare walls with and without toe protection. Baseline tests without walls should also be conducted to document the "natural" beach response for comparison to the response with seawalls. One concern regarding model tests is that test results will not be compared directly to field data on scour so that verification of model test results is not possible. Therefore, an effort should be made to collect, for comparison purposes, any available field data on scour at seawalls.
 - b. While laboratory tests are being conducted, selected tests should be considered to simulate the effect of natural rock either underlying the beach profile, exposed at some location along the profile, or underlying the seawall toe. There is some debate as to whether exposed/underlying rock will have a beneficial or detrimental effect on profile evolution. Selected tests, on profiles with and without seawalls, may illustrate the effect and help resolve the issue of whether such natural rock formations should be included in the establishment of the CCCL.

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DATE: 26 Sept 1994

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SUBJ: Final Comments of Peer Review Group

I am enclosing the consolidated comments of the Peer Review Group Members. I will follow with a mail copy to Bob Dean. Please don't hesitate to call me with any questions.

Dave

COMMENTS
OF
PEER REVIEW GROUP

"EVALUATION STUDY AND COMPARISON OF EROSION MODELS
AND EFFECT OF SEAWALLS FOR COASTAL CONSTRUCTION CONTROL LINE"

July 10-11, 1994
Second Meeting

INTRODUCTION

The Peer Review Group (PRG) held its second meeting on 10-11 July in Riviera Beach, Florida, to discuss project results since the first meeting on 7-8 February and to formulate comments and suggestions to guide future research.

The meetings consisted of opening comments by Mr. Kirby Green of the Florida Department of Environmental Protection, briefings by Professor Robert Dean regarding project activities undertaken by the University of Florida, a briefing by Mr. Robert Wang regarding the activities of the Beaches and Shores Resource Center, and open discussion among the PRG members.

This meeting was held in Palm Beach County in order to allow PRG members to become more familiar with the issue of how seawalls are treated in the establishment of the Control Line (CL) in the Palm Beach area. Following the meetings, the members toured seawalls located at Highland Beach, Manalapan, and Palm Beach.

Due to the length of the site visits, the PRG did not have time to conduct formal deliberations at the conclusion of the open meeting. The PRG met informally over lunch and finalized comments by mail after the meeting.

SUMMARY COMMENTS

The study has involved extensive inter-comparisons of the three dune erosion models. From these comparisons, the CCCL and EDUNE models seem to produce estimates of post-storm profiles that, under most conditions, seem realistic and generally similar to one another. Specific differences between the two models seem to be the result of their different calibration procedures and, more significantly, the result of the 2.5 multiplier used in the CCCL model. The SBEACH model, in contrast, does not seem to provide realistic estimates of post-storm beach profiles and seems to underestimate the extent of erosion expected for severe hurricanes. Based on these findings, the remaining study effort should be focussed on the CCCL and EDUNE models with less effort devoted to the SBEACH model.

Future study efforts on dune erosion modelling should: (1) provide a more detailed explanation and documentation of the calibration methods, including the development of the 2.5 multiplier, for the CCCL model, (2) compare the models to field data of measured storm surge and associated dune erosion, and (3) describe other factors considered in establishing the CL location, especially the degree of engineering judgement made by Dr. T. Y. Chiu in drawing the final CL. It would also be appropriate for Professor Dean to summarize results of the model inter-comparisons and to prepare preliminary recommendations on dune erosion modelling.

The issue of whether and/or how seawalls should be considered in the establishment of the CL is more difficult to resolve. PRG meetings thus far have focussed mostly on the dune erosion models and have not considered seawalls in great detail. As a result, resolution of issues regarding seawalls may require significant additional effort in this or subsequent studies.

It is the consensus of the PRG members that some seawalls, if properly designed and maintained, can withstand the 100-year storm event and provide substantial protection to upland property. Many of the sea walls visited in the Palm Beach area are in this category (although only 3 or 4 sites were visited) and, in these locations, the position of the proposed CL seemed too far landward. In such cases, it seems appropriate to consider some beneficial protection offered by the walls in establishing the CL location. On the other hand, many walls in the State of Florida are clearly not adequately designed to withstand the 100-year storm and, as demonstrated by Professor Dean's laboratory study, such walls offer little protection to the upland if they fail during the 100-year storm.

It is recommended that at the next PRG meeting, significantly more time be devoted to a discussion of the seawall issue. Discussion should include detailed technical evaluation of seawall types and characteristics, seawall failure mechanisms, and procedures by which the adequacy of seawalls can be assessed in establishing the CL.

In his opening comments, Kirby Green asked the PRG to make recommendations regarding whether the existing CCCL methodology should be applied to the remaining counties (Bay, Palm Beach, and Pinellas Counties) or whether an interim line should be established in these counties until a new methodology is developed. It is the consensus of the PRG members that it would be premature to make any conclusive recommendation on how the CL should be drawn in the remaining three counties until the final results of Professor Dean's study are available for review and until questions raised by the PRG have been discussed.

The PRG members also believe that it would be premature to hold an open Workshop in the near future to present project results to engineers and policy makers in the State of Florida. A workshop should be held only after project conclusions and recommendations are summarized in a single document that addresses the questions raised by the PRG and that has been discussed and reviewed by the PRG.

SPECIFIC COMMENTS: DUNE EROSION MODELS

Inter-comparisons between the three dune erosion models have been thorough and very useful. Based on these intercomparisons, the following recommendations are made in approximate order of importance:

- a. The critical task in the remainder of the study is an evaluation of the erosion models relative to high quality field data from severe storms.

The study has concentrated on comparing the three erosion models relative to each other. A definitive comparison relative to field measurements is needed before any final conclusion may be made with regard to which model is most appropriate or before any model is re-calibrated.

One problem with the existing erosion models is that calibration and verification have relied too heavily and for too long on one storm event - Hurricane Eloise. Verification or re-calibration using other storms of different intensities is necessary. Several sources of additional data have been discussed in the PRG meetings.

- b. The procedures and assumptions used to calibrate the CCCL model must be more thoroughly summarized.

The origin of the erosion rate constant, $k = 0.075 \text{ hr}^{-1}$, remains unclear to PRG members and should be documented. Results of other analytical and numerical models indicate that this rate parameter may vary with beach geometry and sediment size.

The origin of the 2.5 factor in the CCCL model has not been explained in sufficient detail and should also be documented. Much of the discrepancy between the CCCL and EDUNE models seems to be the result of the 2.5 multiplier.

- c. The PRG would like to meet with Dr. T. Y. Chiu and review the technical factors and engineering judgement that form the basis of the CL mapping program.

It is apparent that dune erosion is only one factor that is used to establish the CL location. It is not clear what other factors are considered. It would be useful for the PRG to see Dr. Chiu's computation summaries, his working notes, and his "mark-up" maps for Palm Beach County in order review the other factors that may contribute to the CL being placed farther landward than the calculated limit of storm erosion.

- d. Continued research is needed on how the initial profile is defined and on the sensitivity of model results to the "A" parameter used to represent the beach profile.

A sensitivity analysis should be carried out to determine the extent to which initial offshore profile shape influences model results. If the profile does not match the assumed equilibrium form, standard procedures should be developed to "initialize" the models.

Numerical results suggest that erosion predictions are very sensitive to the A parameter. Two methods of selecting the A parameter should be investigated: (1) the present CL method whereby three representative A values are used for each county and (2) an alternate method of determining A by best-fit for each profile (each R monument), with possibly some smoothing to avoid unrealistic changes in A from profile-to-profile.

- e. In comparisons of the erosion models, the volumetric erosion should be used as a basis of comparison in addition to the retreat of (arbitrary) elevation contours.

In many cases, the offshore profiles predicted by the CCCL and EDUNE models seem to agree quite well, suggesting both give approximately the same eroded volume. At the same time, the contour retreat in the dune may differ significantly due to the 2.5 factor in the CCCL model, and sand is not conserved in the CCCL model as eroded volume exceeds the deposited volume. Comparison on the basis of eroded volume, without use of the 2.5 multiplier, would seem more appropriate for comparing the two model results.

- f. Evaluation of the SBEACH model for the CL program may be discontinued.

While the SBEACH model seems to provide good results for large-scale laboratory data with regular waves, results from application to field profiles do not appear to be consistent with observed post-storm beach profiles and model predictions appear to underestimate the extent of erosion experienced in major hurricanes.

- g. The PRG members agree with Professor Dean that the issue of whether wave runup is or is not contained in the existing erosion models is not of major concern since all models were calibrated to replicate dune retreat and scarp location.

It is recommended that in any future models, however, wave runup be incorporated to more realistically simulate the formation of the erosion scarp at an elevation above the storm surge elevation and to more realistically estimate the vertical depth of erosion on the beach face (since erosion models are used in the permit process to evaluate required depth of pile penetration).

- h. The nonlinear (cubic) sediment transport relationship proposed by Professor Dean may be relevant to a "next generation" erosion model but is not viewed as having major importance for the existing CL program.

In this case, existing numerical models have been calibrated to predict erosion associated with hurricane Eloise. Storm hydrographs used in other counties are specifically selected to be similar to the Eloise hydrograph. As a result, any effect of the nonlinear transport equation is probably not significant for CL applications.

- i. The Beaches and Shores Resource Center study comparing the 100-year erosion with the erosion associated with the 100-year storm surge was enlightening.

Additional written description of the methods used in this study, along with additional interpretation of results, would be useful.

SPECIFIC COMMENTS: SEAWALL EFFECTS

The PRG still believes that substantial background research is required before significant progress can be made in addressing the role of seawalls in the establishment of the CL. Recommendations are as follows:

- a. A brief synopsis of the literature concerning the effects of seawalls on the beach should be prepared.

A synopsis of the state-of-the-art in prediction of seawall-induced beach changes would form a useful focus for subsequent discussion of whether and/or how the presence of seawalls might influence the location of the CL.

- b. Field data from the State of Florida concerning seawall effects and seawall failures should be assembled.

Since the Florida DEP conducts extensive surveys to assess storm damage along the coast, photographic and beach survey data from both surviving and failed seawalls would be of use in distinguishing seawall types and in identifying the effects of walls on the beach. Any policy adopted in the CL program that either includes or neglects the effects of seawalls should be based on documented evidence of wall performance in storms.

- c. Discussion at the next PRG meeting should focus on methods of assessing seawall construction and maintenance that could be used to predict the performance of a wall in the 100-year hurricane.

As noted previously, well-engineered "major" seawalls, such as some of those observed on the site visit in Palm Beach Counties, should be distinguished from "minor" seawalls or bulkheads that are present over much of the Florida coast. The PRG suggests that the University of Florida develop a preliminary list of parameters or criteria to be used in evaluating seawall performance.

- d. The laboratory study of the effect of seawalls has been informative, especially those tests which have compared beach profile with seawalls to those without seawalls.

It would be useful for Professor Dean to develop a summary of the laboratory results. Thus far, test results have been presented in several reports and it is not entirely clear what implications those results might have on the CL program, especially given potential scale effects in the small scale laboratory study.

One conclusion that is evident from these tests is that if a wall fails completely at any time near the peak of the storm event, the resulting erosion behind the wall is similar to that which would have been experienced if the wall had not been present. In such cases, the wall offers little or no benefit to the upland property and should not be considered in the location of the CL. The studies do not address the effect of partial wall failure.

A limited number of additional wave tank tests may be useful to illustrate the effect of natural rock either underlying the profile or exposed at some location along the profile.

- e. The proposed method of simulating erosion on seawalled profiles by running erosion models on a vertical sand face should be evaluated.

A procedure should be developed to initially smooth a seawalled profile to redistribute sand both landward and seaward of the wall location on a stable slope before application of an erosion model.

- f. The rationale for applying the 2.5 erosion factor to profiles behind large well-constructed seawalls should be discussed.

The general reaction of the PRG members was that the newly proposed CL in Palm Beach County was too far landward behind major seawalls. It would appear that the location was often farther landward on seawalled profiles than on natural profiles. This may be due to the fact that the horizontal erosion calculated for these profiles is accentuated by the vertical sand face assumed in the pre-storm profile and is then further magnified by the 2.5 factor used in the CCCL calculations.

- g. The PRG cautions that specific results of the wave tank tests should not be extrapolated to prototype scale since the water level in the wave tank probably far exceeds the comparable 100-year storm surge level.

The still water level used in the wave tank tests was scaled to reflect the 100-year storm surge from Palm Beach County, which included the effects of static and dynamic wave setup included. In the tank, however, wave setup would have been generated by the breaking waves so that, in effect, wave setup would have been "double counted" in the laboratory tests. As a result, water levels tested in the physical model tests may correspond to a storm far exceeding the 100-year return period and test results should not be used to infer the behavior of the profile under the 100-year storm in Palm Beach County.

David L. Kriebel, Ph.D., P.E.
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To: Hal Bean -
Total of 6 page report
From: Bob Dean

January 25, 1995

Dr. Robert Dean
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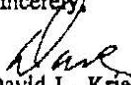
Dear Bob:

As secretary of the Peer Review Group, I have been directed to transmit our final report to you. Under normal circumstances, Professor Wiegel would have sent the report to you. Professor Wiegel did review the report, however, and his comments have been fully incorporated.

The PRG members have reached unanimous agreement on the major issues discussed in the three PRG meetings. We agreed that a short report that deals directly with two major issues is preferable to a lengthy report that attempts to discuss all aspects of your study in great detail. As a result, this final report covers what we believe are the two critical issues: (1) the suitability of the existing CCCL model and (2) the extent to which seawalls should be included in the control line program.

On behalf of the PRG members, I would like to thank you for the opportunity to serve on this review group. Please call any PRG member if you have questions regarding our final report. We sincerely hope that our comments will help to strengthen the control line program.

Sincerely,


David L. Kriebel, Ph.D., P.E.

cc: H. Bean
R. Wiegel
B. Edge
T. Jarrett
E. Olsen

**COMMENTS
OF
PEER REVIEW GROUP**

**"EVALUATION STUDY AND COMPARISON OF EROSION MODELS
AND EFFECT OF SEAWALLS FOR COASTAL CONSTRUCTION CONTROL LINE"**

**January 3-5, 1995
Third Meeting**

INTRODUCTION

The Peer Review Group (PRG) held its third and final meeting on 3-5 January 1995 in Tallahassee and Wakulla Springs, Florida. The meetings consisted of opening comments by officials from the Florida Department of Environmental Protection (DEP), briefings by Professor Robert Dean regarding project activities undertaken by the University of Florida (UF), and a briefing by Dr. T.Y. Chiu of the Beaches and Shores Resource Center regarding methods used to map the Control line (CL) position. These briefings were accompanied by open discussion among participants and were then followed by closed discussion by the PRG members. Members of the PRG present at the meeting included Dr. Billy Edge, Mr. Tom Jarrett, Dr. David Kriebel, and Mr. Erik Olsen. Dr Robert Wiegel was unable to attend for medical reasons.

TASKING OF PRG

As stated in Task 6 of the UF project proposal, the PRG was established in order to provide an independent and impartial peer review, and to provide recommendations, regarding:

- (1) the consistency of, and scientific basis for, numerical models used to predict erosion associated with the 100-year hurricane for use in establishing the CL, and
- (2) the extent to which seawalls and other similar armoring structures should be accounted for in the establishment of the CL.

A further function of the PRG, as presented by the DEP, was to provide guidance to the DEP on how to proceed with re-establishing the CL in the remaining three counties for which the CL has not yet been re-set.

PREVIOUS FINDINGS OF THE PRG

In previous reports, the PRG developed detailed comments and recommendations related to specific technical issues. Many of the comments and observations contained in these reports remain valid and should be addressed by the DEP in future development and application of numerical models for use in the CL program. The Appendix contains a revised list of detailed technical concerns that remain at the conclusion of the study.

FINAL RECOMMENDATIONS OF PRG

Findings on Numerical Erosion Models

Based on extensive comparisons of the CCCL model to both the EDUNE and SBEACH models, the PRG believes that basing the CL position on the results of closed-loop numerical models utilizing equilibrium beach profile concepts is scientifically sound and technically appropriate for the purposes of the CL program.

Furthermore, the assumption of a simple exponential time response as used in the CCCL model, as opposed to the solution of more detailed governing equations for sediment transport rates as used in the EDUNE and SBEACH models, also appears to be reasonable. In comparisons of numerical results for which the 2.5 multiplier was not used in the CCCL model, the CCCL model seems to produce eroded profiles that are similar to those produced by other numerical models and to measured post-storm beach profiles.

Despite these attributes, however, the PRG finds serious shortcomings in the calibration and application of the CCCL model, arising principally from the use of the 2.5 multiplier.

The calibration of the CCCL model, and the methods used to determine both the erosion rate parameter (k) and the 2.5 multiplier, are neither adequately nor consistently described. No quantitative (graphical or tabular) data was presented to support the selection of these parameters based on comparisons between measured and predicted erosion. As a result, the brief explanations offered for these factors do not instill either scientific or public confidence in the accuracy of model predictions.

More importantly, application of the 2.5 factor produces severe inconsistencies between eroded profiles predicted by the model and those observed in nature. In particular, eroded profiles following application of the 2.5 multiplier violate the most basic requirement for any two-dimensional erosion model, namely that sand volume must be conserved so that eroded and deposited sand volumes balance.

Prior to application of the 2.5 factor, the CCCL model satisfies this requirement for sand conservation and produces eroded profiles whose shape is in general agreement with those observed after severe storms. After application of the 2.5 multiplier, however, the shape of the eroded profile above mean sea level is altered in a seemingly arbitrary way. As a result, (1) the eroded sand volume is increased significantly, usually more than 2.5 times that originally predicted, (2) the profile often exhibits "kinks" or discontinuities that are not physically realistic, and (3) the toe of the dune erosion scarp is often modified so that it no longer coincides with the peak storm surge level but is at some arbitrary elevation either above or below this elevation. In many cases, the CCCL model produces unrealistically large predicted erosion, with contour recession hundreds of feet landward of what might be reasonably expected and with eroded volumes far in excess of the 540 ft³/ft suggested by FEMA as typical of 100-year storms.

In the opinion of the PRG members, the CCCL model, with the 2.5 multiplier, is fundamentally flawed and use of the CCCL model with this or any other multiplier should be discontinued. Any numerical model adopted for the CL program should avoid use of ad hoc or blanket multipliers, applied to any specific elevation contour, to achieve model calibration. As an interim solution, the DEP should consider two options:

- (1) using other existing numerical models that are calibrated to the same erosion event (hurricane Eloise) and which conserve sand volume without use of multipliers, or
- (2) undertaking a well-documented re-calibration of the CCCL model with use of multipliers for beach recession discontinued.

Once any calibrated erosion model is used to compute the erosion limit of a 100-year storm, DEP may, as an administrative decision, consider application of an additional factor of safety based on demonstrated longshore variability in erosion. Variations in wave parameters and beach profile characteristics can cause substantial variability in erosion from monument to monument, producing a zone in which erosion predictions are uncertain. DEP should therefore determine a more appropriate method of accounting for this uncertainty that can be well justified and easily interpreted for application to any existing or future erosion model.

Findings on Seawall Issue

The PRG unanimously believes that certain seawalls, if properly designed and maintained, can provide substantial protection to upland property during the 100-year storm as defined for the purpose of setting the CL.

A seawall with sufficient crest elevation, adequate return walls, and structural integrity to withstand the loadings associated with a 100-year storm, will reduce if not prevent erosion and wave impact damage landward of the wall in a 100-year storm. In those cases where such a seawall is reasonably expected to protect upland property, the DEP should take one or more of the following actions:

- (1) assess the beneficial effect of the seawall and account for the reduced limit of erosion/wave impact in setting the CL,
- (2) modify existing mapping procedures to identify a zone of reduced impact between the CL and the seawall with relaxed or more flexible permitting standards, or
- (3) achieve a legislative modification to applicable statutes to administratively differentiate the nature of regulation in areas of reduced erosion vulnerability behind major seawalls.

It is expected that relatively few seawalls in the State of Florida will qualify for such "credit" in reducing the impact of the 100-year storm. Once the DEP develops specific criteria regarding seawall overtopping and flanking, it is expected that most walls in the state will have

insufficient crest elevation or return wall length to meet these standards. Of the remaining walls that meet these geometrical standards, the requirement for structural integrity and adequate maintenance will further reduce the number of walls qualifying.

It is the opinion of the PRG, however, that those walls that do meet these stringent requirements should be considered positively in resetting the CL. The DEP should therefore commence a study to define specific criteria related to seawall survivability and seawall effectiveness in reducing erosion/wave impact of upland property during the 100-year storm.

In those cases where seawalls are not of sufficient height, do not have adequate return walls, and are not deemed structurally sound to withstand the 100-year storm, no "credit" should be given for reducing the landward extent of erosion/wave impact. For these walls, laboratory tests conducted in this study have demonstrated that beach response will be essentially the same as that which would occur if no seawall were present. For such cases, the PRG believes that the present method of applying numerical erosion models under the assumption that the sand behind the seawall is free to erode is reasonable. This approach should be utilized only after revisions to the erosion model have been completed, such that any *ad hoc* multiplier is removed and the model is re-calibrated so that sand conservation is ensured.

Publication and Dissemination of Study Results

Because some of the conclusions of the PRG may conflict with some conclusions drawn in the various draft reports produced in the study, it is strongly recommended that all previous reports be considered as "interim" or "draft" reports. These reports should be compiled into one or two summary documents with text appropriately edited so that comments and alternative conclusions of the PRG are included. This is considered important because project reports are to be made available to other researchers, consulting engineers, state and local government officials, and members of the public.

Summary Comments

This study has provided a useful forum to evaluate the CCCL model against additional data and against alternative numerical models. While the PRG believes that the basic mechanics of the CCCL model are scientifically sound, the use of the 2.5 multiplier to adjust computed beach recession should be discontinued. Likewise, although the procedures used to establish the CL location on most armored profiles is generally appropriate, some beneficial effects of large and well-maintained seawalls should be recognized. These changes will require some modification of the CL mapping program. In the opinion of the PRG, it is not appropriate to continue the current procedures in the remaining three counties, unless other criteria (such as the 3-foot wave impact zone) are the dominant factors used to establish the revised CL location.

All comments and conclusions in this report are the unanimous findings of the five PRG members. We believe it significant that these are consensus opinions and that no minority or dissenting reports are necessary.

APPENDIX

Recommendations on Detailed Technical Issues

- a. As noted in the main report, model calibrations and comparisons should be made without the use of *ad hoc* multipliers. Any erosion model should conserve sand volume as a general principle.
- b. All numerical models should be evaluated to determine their sensitivity to the shape of the initial offshore profile. Likewise, the influence of the assumed "A" parameter on the computed erosion limit should be investigated further. Uniform guidelines for defining the "A" parameter from measured beach profiles should be established.
- c. Wave runup is a major source of discrepancy between the various models, as the EDUNE and SBEACH models include runup while the CCCL model does not. It is the belief of the PRG that wave runup should be included in any model used to establish the CCCL.
- d. Future erosion models should be capable of simulating the effect of seawalls (vertical and sloping), rock outcroppings, and offshore reefs. Additional laboratory tests should be conducted to simulate the effect of natural rock either underlying the beach profile, exposed at some location along the profile, or underlying a seawall toe.
- e. Additional calibration and verification of erosion models is needed. It is surprising, and somewhat distressing, that model calibrations continue to rely on one primary data set (hurricane Eloise). The DEP should continue efforts to verify numerical erosion models using available field data.
- f. The Beaches and Shores Resource Center report concerning recalibration of erosion models should be reconsidered in light of the influence that initial profile form has on numerical simulation. Further analysis of the effect of the offshore profile on model calibration is required.
- g. The PRG was not directed to review the procedure for determining the 100-year storm tide or wave height. Questions remain regarding how the incident wave height (10-feet) is selected, how the 100-year storm duration (similar to hurricane Eloise) is determined, and whether dynamic wave setup should be included in the predicted storm tide.
- h. A synopsis of the literature concerning the effects of seawalls on the beach, and storm-induced seawall failure, should be prepared. This should consolidate references on seawall-induced scour, end-effects, and overtopping. Field data from the State of Florida concerning seawall effects and failures should be assembled.

- i. The PRG cautions that specific results of the wave tank tests should not be extrapolated to prototype scale since the water level in the wave tank probably far exceeds the comparable 100-year storm surge level. The still water level used in the wave tank tests was scaled to reflect the 100-year storm surge from Palm Beach County, which included the effects of static and dynamic wave setup. In the tank, however, wave setup would have been generated by the breaking waves so that, in effect, wave setup would have been "double counted" in the laboratory tests. As a result, water levels tested in the physical model tests may correspond to a storm far exceeding the 100-year return period and test results should not be used to infer the behavior of the profile under the 100-year storm in Palm Beach County.



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February 12, 1995

3 page second

Memorandum

To: Hal Bean and Al Devereaux

By FAX : 8-278-5257

From: Bob Dean

Bob Dean

Subject: Assessment of the Peer Review Group Final Report "Evaluation Study and Comparison of Erosion Models and Effects of Seawalls for Coastal Construction Control Line."

Attached is my assessment of the Final Report of the Peer Review Group for the subject Project.

Please advise me if you have any questions concerning this assessment.

"Evaluation Study and Comparison of Erosion Models and Effects of Seawalls for Coastal Construction Control Line."

General Comments

I believe that the following general comments are relevant to the determinations and recommendations of the Peer Review Group (PRG).

(1) It seems to me that for some reason, the PRG was unable to or chose to not consider the matter from the point of a view of an agency that is responsible for the stewardship of the beaches and dunes of the State of Florida.

(2) It was probably a mistake to include, in the composition of the PRG, two Members who had consulted with communities in the Palm Beach area and taken previous positions contrary to the Coastal Construction Control Line. In retrospect, it would have been appropriate for these individuals to have presented material and perhaps testified to Members of the PRG, but not to be active Members where they could be advocates of their previously established positions. This was, of course, a political expedient.

(3) There appears to be a lack of balance in the points made by the PRG in their assessment. Clearly there are areas in the models and their application where conservatism is present and areas where the process tends to under represent the storm impact. It appears that there has been a selective emphasis in the Final PRG Report of those points that reinforce the conservative elements in the process.

(4) The task assigned to the PRG was difficult in terms of the amount of material to digest and the potential significance of their assessment.

Specific Comments

Findings on Numerical Erosion Models

(1) The PRG criticizes the use of a 2.5 multiplier for purposes of setting the CCCL (Page 2). Yet they say (Page 3) that "Once any calibrated erosion model is used to compute the erosion limit of a 100 year storm, DEP may, as an administrative decision, consider application of an additional factor of safety based on demonstrated longshore variability in erosion." This seems to be what was done, although perhaps not broken down in the steps that the PRG would have preferred. For example, in a report provided to the PRG during the

last meeting, it is stated that "... it was found appropriate to increase the calculated erosion due to four causes: (1) The calculated erosion was considerably less than the measured, (2) There was substantial variability around the average measured erosion, (3) It was felt appropriate that there be some safety factor due to the fact that considerable portions of the Florida shoreline are experiencing long term erosion (witness Amelia Island, Jupiter Island, Casey Key, etc.), and (4) The inherent flexibility in the permitting process to address those areas where focused studies have demonstrated that it is justified to relax permitting requirements." In my view, the application of the 2.5 factor is consistent with the general thrust of the PRG comments.

In an independent study by the U. S. Army Corps of Engineers (Birkemeier, et. al. 1987), it is stated in discussing the erosion variability that "Use of the 75 percent factor of 2.1 is recommended." (Page 23). Later (Page 66), it is stated in the recommendations section "Once the model has been used to compute an estimate of the volume above the surge level, this estimate is multiplied by the variability factor (e.g., 2.0 from Part I, or another representative value)."

The PRG believes it important to separate the calibration from the decision to apply a "safety factor." However, this is more a matter of how the process was carried out and doesn't affect the ultimate result of the calculations. At the time that this decision was made, there did not seem to be a compelling need to separate the two.

The final PRG Report states (Page 2): "In many cases, the CCCL model produces unrealistically large predicted erosion, with contour recession hundreds of feet landward of what might be reasonably expected and with eroded volumes far in excess of the 540 ft³/ft suggested by FEMA as typical of 100-year storms." First, it is not clear that the FEMA recommended erosion volume has a strong basis; however, I have attempted unsuccessfully to determine the basis for this PRG statement. The 540 ft³/ft is the recommended erosion above the peak storm surge. A cursory review of the calculated profiles in the report "Task 1B: Intercomparison of Three Models for: (1) 100 Year Storm and Palm Beach County, and (2) Large Scale Wave Tank Tests" distributed for the second PRG Meeting in Palm Beach County does not appear to support this statement especially in the unseawalled areas. In fact in some areas, the eroded volume as calculated by the CCCL model, including the effect of the 2.5 factor is less than the 540 ft³/ft.

Findings on Seawall Issues

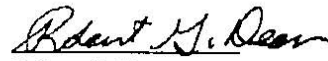
The central issue here appears to be that properly designed, constructed and maintained seawalls can be designed to withstand the effects of a 100 year storm. I am in agreement with

that position. It is another matter to determine which of those seawalls have been designed, constructed and maintained so that today and throughout the life of the activity to be permitted, the seawall will continue to be capable of withstanding the effects of a 100 year storm. We know that seawalls deteriorate and that in the past, some substantial seawalls in Palm Beach County have been judged to be vulnerable and have required repairs. Surely, this determination cannot be made on a broad brush basis during the time that the CCCL location is being determined. Should the State, in conjunction with setting the CCCL: (1) Obtain all of the seawall design drawings to evaluate the designs, (2) Determine through field inspection whether the seawall was constructed as designed, (3) Evaluate the remaining effective thickness for steel seawalls thereby establishing how much corrosion has occurred, (4) Evaluate the loss of strength in concrete seawalls due to saltwater corrosion degrading the reinforcing rods, and (5) Excavate and determine whether the tie backs for a seawall are still functional? It has been the State's position and it still seems reasonable that the determination of the integrity of a seawall should be established at the time of permitting activity during which resources can be directed to evaluating the seawall and any necessary agreements can be developed to ensure its maintenance throughout an appropriate time period.

If the State decides to recognize seawalls as a basis for locating the CCCL farther landward, this will encourage seawall construction and, because of the associated investment, discourage beach nourishment and will contribute to the further deterioration of Florida's beaches.

Comments on Appendix

The comments in the Appendix are in the form of a recommendations. It is surprising that in Comment e., no mention was made of the calculations for the Ocean City storms as described in the Report "Comparison of Erosion Models for January 4, 1992 Storm at Ocean City, Maryland" which was distributed at the last PRG meeting.


Robert G. Dean

III. Pinellas County CCCL Reestablishment Challenges by Pinellas County Gulf Beaches Technical Advisory Committee (2000-2001).

Numerous questions were asked and criticisms made regarding the CCCL reestablishment in Pinellas County by the Pinellas County Gulf Beach Technical Advisory Committee. These questions primarily addressed the storm surge studies with no (known) criticism of the utilized beach/dune erosion model (developed by Dr. Dean and listed in Appendix C of "Methodology on Coastal Construction Control Line Establishment", by T.Y.Chiu and R.G. Dean, Beaches and Shores Resource Center, Florida State University). Some of the major items of concern as provided by the Pinellas County Gulf Beach Technical Advisory Committee were as follows: the storm history and methodology utilized was not the only storm surge modeling in Pinellas County; dynamic wave setup utilized in the model was not explained fully; and wave height analysis used in the study was not sufficiently explained. Additionally, survey information was called into question by the Pinellas County Gulf Beach Technical Advisory Committee although FDEP after providing corrected survey information ruled out LIDAR survey information collected by Pinellas County. It is noted that Pinellas County is primarily low dunes and CCCL line was often established by the storm surge methodology and three foot wave limit, although the erosion criteria applied to 101 FDEP range locations (14 on Clearwater Beach Island, 62 on Sand Key, 9 on Treasure Island, and 16 on Long Key). The dune erosion model utilized in the restudy was previously noted to be that documented in the report entitled "Methodology on Coastal Construction Control Line Establishment", by T.Y.Chiu and R.G. Dean, Beaches and Shores Resource Center, Florida State University. As best can be determined by the existing knowledge, the dune erosion methodology and the dune erosion model did not play any significant role in CCCL challenges in this county although some minor modifications were made of the storm tide frequency curves for Pinellas County based on a restudy of the historical storms.