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Date: 28 January 2004

Feasibility Study
Monitoring of Alternative Construction Template
For Beach Nourishment Projects
Kick-Off Meeting

Date of Meeting: 13 January 2004
Location: PBS&J, Orlando Office

Attendees:

Florida Department of Environmental Protection (FDEP)
Phil Flood

FWCC
Robbin Trindell (via phone)

USFWS
Trish Adams
Sandy MacPherson

USACE
Ken Dugger
Bill Fonferek

EAI
Bob Ernest
Erik Martin

UCF
Lew Ehrhart

PBS&J, Inc.
Jeff Tabar
David Thompson

This memo summarizes the activities during a meeting held on January 13, 2004 between the above attendees. The meeting was used to present information to the Technical Advisory Group (TAG) members and present the strategy for the work. The scope of work for this task assignment is included at the end of this document. In addition, the meeting was used to present a timeline, initiate discussion within the group, and start to review the work assignment.

The meeting started with brief introductions by all attendees and Phil Flood thanking everyone for attending. Mr. Flood reiterating the Department's enthusiasm regarding the proposed work and presented a brief overview. Mr. Flood then turned the meeting over to Jeffrey Tabar. Mr. Tabar reviewed the meeting agenda (attached) and began a formal

presentation. The presentation was given by Mr. Tabar and Mr. Ernest and reviewed the project scope, traditionally built beaches, the observed impacts to marine turtles, and reviewed the goals and objectives. Mr. Tabar explained that the work assignment would be broken into two phases:

Phase I (expected to take 1 year to complete)
Project Performance Evaluation.
Recommended Design & Construction Criteria
Monitoring Program Development.
Project Site Selection.

Phase II
Coordination w/ Local Sponsor.
Design & Permitting.
Construction.
Monitoring & Evaluation.

A lengthy discuss followed the presentation with the USACE indicating that they had looked into this idea of building "turtle friendly beaches" a few years ago. Mr. Fonferek presented the group with a figure that illustrated a conceptual design for a beach design (attached). Mr. Fonferek stressed that this was a preliminary evaluation and the Corps had not taken any official position, however they were encouraged by this project and look forward to participation.

Prior to lunch a brief discuss took place of the possible project locations around Florida where a project could be implemented. Mr. Tabar displayed an image that showed all the beach nourishment projects throughout Florida. Much of the group agreed that the proposed work assignment will have to focus on areas were projects have been constructed and there is adequate monitoring data (physical and biological). Largely, projects in the southeast and southwest coastlines will be utilized.

Following lunch the group reconvened, Mr. Tabar reviewed the anticipated responsibility of the TAG members and the number of workshop/meeting they would be required to attend. Mr. Tabar explained that four workshops are expected and include:

1) Project Performance Evaluation & Design Recommendations:
   0-3 Months
2) Constructability, Dredge Industry Represented:
   3-6 Months
3) Development of Monitoring Program
   6-9 Months
4) Development of Monitoring Program:
   9-12 Months

Next a brief review of the objectives of the first work assignment under Phase I was presented:

Project Performance Evaluation
Evaluate Past Projects throughout Florida
QA/QC Project Data
Document Physical Performance
Document Biological Response
Link Physical and Biological
Comprehensive Assessment of Marine Turtle Impacts
Develop Alternative Design/Construction Considerations

Finally, Mr. Ernest passed out a document that outlined some of the items to be recovered from the physical and biological monitoring data (attached). A discussion continued regarding the availability, quantity, and quality of the data. The physical data would be recovered from the FDEP and USACE. Most of the biological data will be recovered from the FWCC's office and Dr. Trindell indicated she would assist in this process. Dr. Trindell cautioned the group that some of the monitoring data might be unsuitable for this work. She indicated that contacting the local sponsors that performed the monitoring would help to recover the best data sets. Mr. Ernest indicated that the next step would be to contact Dr. Trindell and set up a time to meet and review the FWCC data.

The meeting adjourned at 2:15PM as Mr. Tabar and group thanked the attendees for their time.

Jeffery R. Tabar, P.E.
Senior Coastal Engineer

SCOPE OF WORK

Introduction

Florida's beaches support the highest density of loggerhead nests in the western hemisphere, regionally significant numbers of green turtle nests, and regular nesting by leatherbacks. Consequently, maintaining the quality of Florida's beaches as nesting habitat is critical to the national recovery plans for all three species (NMFS and USFWS, 1991a, 1991b, 1992).

Beach nourishment has been used increasingly in Florida as a method for restoring and maintaining the social and economic values of sandy beaches. This approach has also been touted as a means of increasing the quantity of sea turtle nesting habitat. Although national recovery plans for sea turtles acknowledge that "beach nourishment can improve nesting habitat in areas of severe erosion and is a preferred alternative to beach armoring," the simple creation of potential nesting habitat through the mechanical placement of sand on the beach does not necessarily confer an increase in nesting. In fact, nest densities have often exhibited an inverse relationship with beach width on both natural (Provancha and Ehrhart, 1987) and nourished beaches (Ernest and Martin, 1999).

Beach nourishment can affect the sea turtle reproductive process in a variety of ways, as summarized by Crain et al. (1995). In general, the principal documented impacts of beach nourishment projects in Florida can be summarized as follows:

1. The extent and persistence of scarping typically increases on nourished beaches.
2. Sediments of nourished beaches are typically more compact than those of natural beaches.
3. Often, sediment characteristics of nourished beaches differ from the native sands they replace.
4. Traditionally built nourished beaches tend to be wide and flat, whereas heavily nested natural beaches are often relatively narrow and steeply sloped.
5. Changes in beach elevation and slope following nourishment.
6. Patterns of nest placement are altered on nourished beaches relative to natural beaches.
7. The increased width of nourished beaches may increase energy expenditures of nesting females utilizing upper areas of the beach (greater crawl distances) thereby reducing annual reproductive output.

The Florida Department of Environmental Protection (FDEP) has had a long-term interest in identifying those aspects of beach nourishment projects that may impact sea turtles and acknowledges that altering future design and construction criteria may prove to minimize those impacts.

It is also recognized that the primary purpose of beach nourishment is shoreline protection. If a new construction template cannot be designed to conform to requisite cost-benefit ratios or does not result in the desired biological response, this study will provide the data needed to assess the efficacy (cost/benefit) of relocating nests deposited along the seaward portion of the berm. In the absence of relocation, many of these nests will be lost to erosion during profile equilibration.

Scope of Services

The Effect of Beach Profile on Sea Turtle Nesting

Of those aspects of the physical environment that have been studied, the alteration of beach profile appears to offer the most promise for improving the biological performance of beach nourishment projects. Although changes in sediment characteristics, compaction, and scarping can certainly affect nest densities, the most conspicuous feature of a nourished beach is its wide, flat profile. In perhaps the best assessment, to date, of the physical variables influencing loggerhead nest site selection on a natural beach, Wood and Bjorndal (2000) concluded, "Of the four environmental factors evaluated, slope appears to have the greatest influence on nest site selection, perhaps because it is associated with nest elevation." Higher elevations reduce the potential for nest loss to tidal inundation, and thus increase the probability of survival.

Conceptual Experimental Design

The goal of this project is to determine if statistically valid improvements in nest densities and hatchling production can be achieved through modifications to the traditional construction template for beach nourishment projects. One of the criteria for selecting a test project will be the availability of reliable monitoring data for a previous nourishment event at that location. The beaches comprising the new and old template test parcels will have been previously built in the traditional manner with documented reductions in nest densities, nesting success, and/or skewed nest placement toward the seaward edge of the berm. This will allow inferences regarding the relative importance of the new construction template in reducing these negative effects. Statistically significant differences in measured biological variables between the new and old templates and/or between the new template and the previously nourished site will suggest that the new template has been effective in eliminating past negative effects.

A Technical Advisory Group (TAG), acceptable to FDEP, will be initiated and organized to review the work products of the design team. In addition, the TAG will be tasked to contribute to the final plan provided to FDEP. Based on input from this group, appropriate parametric and/or non-parametric statistical tests will be applied to data collected during the study. Prior to implementation of the monitoring program, the TAG will prepare a written acknowledgement that the experimental approach to be taken in this project is scientifically defensible and is designed to yield statistically valid results. These results will permit inferences regarding the extent to which the new construction template improved the biological performance of the nourished beach.

Selection of a Project Site

In developing a suite of monitored variables, it must be recognized that the availability of both baseline and control data improve the interpretive capability for segregating natural patterns and trends from those related solely to the beach nourishment project. Background data for this project will come in two forms: contemporary baseline data (collected immediately prior to the new test project using the monitoring program set forth below) and historical baseline data (collected during the previous nourishment project), both types collected at the site of the proposed test. It is unlikely that all of the proposed monitored variables listed below will have been acquired during a previous beach nourishment project. Additional monitoring may be required prior to initiating a nourishment project. The Control should likewise consist of both historical and contemporary baseline data sets, if possible. This will improve the capacity to draw inferences regarding the effectiveness of the new construction template.

The following criteria, (as well as others proposed by TAG), will be discussed to select an appropriate test site in consultation with the FDEP:

1. A high-density loggerhead nesting area;
2. An area with reliable, long-term, sea turtle monitoring data available;
3. An area with long-term engineering data on beach profiles;

4. A site previously nourished using the traditional construction template with documented reductions in relative nest densities and/or nesting success and skewed placement of nests toward the seaward portion of the berm;
5. A project whose timing would allow collection of adequate (minimally one year) baseline data using the new monitoring protocols included in this proposal;
6. A project in which the environmental setting would allow the construction of the alternative design template without undue permitting constraints;
7. A project of sufficient total length to allow separation of new and old template test parcels by at least 0.5 miles (to prevent cross "contamination" as sediments are redistributed). Additionally, test parcels, each at least 1.0 mile in length, must be located sufficiently distant from the ends of the project area to avoid the tapering effects that occur there (i.e., the average beach width of both parcels should be equal and widths uniform throughout each parcel); and
8. A project area that would permit the establishment of at least one control site (preferably two, one north and one south of the test parcels), of comparable length to the test sites. Ideally, the control would exhibit similar beach characteristics and nesting patterns documented for the test parcels prior to nourishment and would be separated from the test parcels by at least 0.5 miles.

Variables to be discussed for the monitoring plan:

The following variables (as well as others defined as part of the TAG) will be discussed for the purposes of developing a contemporary baseline and post-construction monitoring program and control sites.

1. Enumeration of crawls by species and survey zone (0.5 DEP Monuments).
2. Photo documentation of dune horizon for each survey zone.
3. Documentation of nighttime lighting conditions for each survey zone.
4. Determination of beach slope along randomly selected crawls using an inclinometer.
5. Inclination to highest upland feature and feature type.
6. Elevation of landward most extent of crawl.
7. Documentation of the spatial distribution of nests.
8. Compaction adjacent to each randomly selected nest and apex of the false crawl.
9. Scarp encounters.
10. Grain-size analysis of representative samples across selected beach profiles at the beginning (April) and end of each nesting season (September).
11. Abandoned digging attempts.
12. Nest fate of randomly selected nests.
13. Reproductive success.
14. Engineering profiles of the beach and nearshore bottom at each FDEP monument within control and test parcels during April (early nesting season) and September (late nesting season).

Schedule and process:

The following is a generalized schedule of activities to be conducted for this study. The study team will coordinate the development of the data collection program, analysis of data and organization of team meetings with the TAG. The design team will provide the TAG with available documents and summary documents prepared for this study as well as provide an overview of work to date as well as goals of the individual workshops. The study is anticipated to take approximately nine (9) months to complete.

- Organizational Meeting (Orlando)
- Finalize TAG
- Develop screening criteria for acquisition of historical physical and biological data
- Review and tabulate historical biological data
- Integrate historical physical and biological data
- Prepare assessment of adequacy of existing biological data in characterizing past project performance
- Provide recommendations for modifying existing monitoring requirements
- Characterize differences in biological responses between nourishment and renourishment projects
- Provide recommendations for input into design features of alternative template
- Organize and hold 2 workshops related to alternative template design (1 in Tallahassee, 1 in Orlando)
- Develop screening criteria for potential test sites
- Develop monitoring program for study of alternative template
- Organize and hold 2 workshops related to monitoring program design (1 in Tallahassee, 1 in Orlando)
- Provide estimate of cost of implementing biological monitoring program to assess performance of alternative template
- Prepare a Final Report to sum up the entire work-effort

Deliverables:

1. Selection and organization of a Technical Advisory Group.
2. A project report to include the following:
    a. An outline of the process used to develop the program.
    b. Assessment of biological and physical data.
    c. A preliminary design for an alternate beach design.
    d. Cost/Benefit analysis of the alternative beach design.
    e. Program monitoring plan designed to document the effect of the alternate beach design on nesting success and total reproductive success.
3. Selection of a location(s) to implement the program defined in (2).
4. Provide recommendations for standardizing turtle monitoring that can be implemented as a permit condition until new conditions can be developed based on results from the monitoring program defined in (d).