SBEACH-32 INTERFACE
USER'S MANUAL

Final Report

by

Barry G. Sommerfeld, Nicholas C. Kraus, Magnus Larson

Prepared for: **U.S. Army Corps of Engineers**
Jacksonville District
400 West Bay Street
Jacksonville, Florida 32232

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Preface

The work described in this report was commissioned by the U.S. Army Corps of Engineers, Jacksonville District, in support of its shore-protection mission and beach-fill design activities. The objective of the Jacksonville District was to develop predictive technology to assess the impacts of beach-fill activities on hard-bottom (non-erodible) areas of the nearshore zone as exist along the coasts of Florida, Puerto Rico, and the Virgin Islands. To accomplish this task, the authors enhanced the Storm-induced BEAch CHange (SBEACH) numerical model (Larson and Kraus 1989) to represent hard bottoms. This report serves as a user's manual for the new interface developed in this project. A companion report (Larson and Kraus 1995) documents the theoretical work, numerical implementation, and tests of the enhanced model. This work was authorized by the Jacksonville District on June 5, 1995. A draft of this report and the companion report were distributed at a workshop held at the Jacksonville District on November 28-29, 1995.

Jacksonville District Technical Monitors for this project were Mr. Peter Grace, Hydrology and Hydraulics Branch, Coastal Design Section (CESAJ-EN-HC), and Mr. Thomas Smith, Plan Formulation Branch, Coastal Section (CESAJ-PD-PC). Programming of the interface was accomplished by Mr. Barry G. Sommerfeld, with technical assistance on the SBEACH model and conceptual guidance given by Dr. Nicholas C. Kraus, Director, Conrad Blucher Institute of Surveying and Science, Texas A&M University-Corpus Christi, and Dr. Magnus Larson, Department of Water Resources Engineering, University of Lund, Sweden. The authors would like to acknowledge Mr. Eric Livesay and Mr. Ronald Livesay, both of Hecate Software, Fort Worth, Texas, for technical advice on linking the model and the interface through Dynamic Data Exchange (DDE). They also appreciate the assistance provided by numerous members of the Jacksonville District, in particular, Mr. David Schmidt (Chief of CESAJ-PD-PC), who clearly saw the problem, and Ms. Cynthia Perez (CESAJ-EN-HC), who gave freely of her experience in dune erosion modeling. Comments received by Jacksonville District staff at the November workshop were incorporated in this manual. SBEACH team member Mr. Randall A. Wise, CERC, provided information and advice over the course of this project.

The new interface for the enhanced model, called SBEACH-32, represents a commitment by the authors to provide a powerful numerical simulation model that both correctly represents the phenomena of significance and organizes data associated with a dune-erosion study in a format that is convenient to use. Success of the SBEACH-32 interface will be judged by the time made available for calculations that might otherwise be spent in routine tasks of entering data, waiting for results, and in obtaining, checking, and manipulating output.

1 *Introduction*

The SBEACH (Storm-induced BEAch CHange) numerical simulation model was developed at the US Army Engineer Waterways Experiment Station, Coastal Engineering Research Center (CERC), to calculate beach and dune erosion under storm wave action (Larson and Kraus 1989, Larson, Kraus and Byrnes 1990). The original model has been modified and improved over the years, and the present version supported by CERC is Version 3.0 operated in the MS-DOS environment (Rosati et al. 1993).

Numerous applied and more fundamental studies have been conducted with SBEACH and published in the engineering and scientific literature. Examples are Larson and Kraus (1991), who discuss beach-fill design and predicted beach and dune response to hurricanes and extra-tropical storms; Kraus and Wise (1993) and Wise and Kraus (1993) who describe model predictions for Ocean City, Maryland, for which an overwash algorithm was incorporated in SBEACH (Version 3.0); and Wise, Smith, and Larson (1995) who examine SBEACH predictions for the SUPERTANK physical model data (Kraus and Smith 1994; Kraus, Smith, and Sollitt 1992) and for all available good-quality field data sets on dune erosion.

The present work is an outcome of an SBEACH enhancement requested by the US Army Engineer District, Jacksonville, to represent hard bottoms in the model. A hard bottom is a non-erodible bottom feature that may be located anywhere on the beach profile calculation grid. Documentation of the hard-bottom algorithm and tests is given in a companion report (Larson and Kraus 1995).

As part of the research and development project performed by the authors to represent the action of a hard bottom in SBEACH, limitations in the MS-DOS interface became apparent in the time taken to run the model and in manipulation of both input and output data. The hard-bottom capability introduced the need for an additional input file, and visualization of the hard bottom on the profile in the course of operating the model was found to be desirable if not essential for achieving quality results in the shortest possible time. For these and other reasons, it was decided to move to the 32-bit, multi-tasking Windows NT platform to allow development of a modern interface. This manual describes Version 1 of the interface to SBEACH-32.

The current MS-DOS SBEACH, presently supported by CERC (Rosati et al. 1990), utilizes as many as five *free-format* input files and one large formatted input configuration file. Manual input of the data proves to be tedious and provides no mechanism for real-time error checking. Additionally, the MS-DOS SBEACH generates as many as four output files, making visual inspection of the output difficult. The MS-DOS SBEACH includes a graphical interface that allows the user to enter or import data desired for a given project or data set. The interface, however, does not provide for easy

implementation of multiple runs with different data for a given project. The SBEACH-32 model allows for the inclusion of hard bottoms in calculations; the MS-DOS interface does not yet allow for this capability. Herein lies the need for a new interface that is more robust and user-friendly.

This report was prepared to serve as a user's guide to the SBEACH-32 interface. This user's guide is written assuming a basic familiarity of the Microsoft Windows NT operating system. For information regarding starting programs, using a mouse, cutting and pasting, and similar basic operations, the reader should consult a Windows NT user's guide.

Within this report, there may be some mention of model execution; however, no attention is given to the technical aspects of the model. Technical information concerning the model may be found in Larson and Kraus (1995).

Though the interface has undergone a major update, the engine of the model has remained basically the same. With the exception of the inclusion of hard-bottom calculations, an option to allow sand to move off the seaward end of the grid, and some minor adjustments to account for the change in operating systems, the source code for the model engine continues to be the same as that compiled for the MS-DOS Version 3.0 presently supported by CERC.

Data Storage and Manipulation

SBEACH-32 implements a user interface that allows multiple data sets to be loaded within a project while providing a greater level of error checking during data entry. All data associated with a project are stored in one project file. The model is designed and developed for the Microsoft Windows NT operating system. As a 32-bit application, the model may make use of "unlimited" memory (limited only by the total amount of RAM and fixed disk space available to the operating system). The model also makes use of 32-bit disk access, reducing the time for disk transactions.

Interface and Model Interaction

The interface and the model communicate through a *Dynamic Data Exchange* (DDE) link. Introduced in Microsoft Windows 3.0, DDE is a method of allowing independent programs to communicate with one another during run time. In the present situation, the data sent back and forth may include such items as profile data, calculation results, and error messages. Presently, the DDE is responsible for sending error messages from the model to the interface and for allowing a way for the model to notify the interface when it has completed a run so that the interface may launch a new run. No input or output data are communicated through DDE at this time. Instead, input and output data are written to and read from temporary files. The next version will incorporate DDE for all

data shared by the interface and the model. Because of this DDE link, the model should not be executed outside of the interface. Doing so may cause unpredictable results.

System Requirements

The following are required to install and run SBEACH-32:

- Any of the processors supported by Windows NT 3.5, i.e., Intel 386 (486 or better recommended), DEC Alpha, MIPS, or PowerPC (requires Windows NT 3.51).

- Microsoft Windows NT 3.5 or greater

- 12 MB RAM (required by Windows NT)

- 5 MB disk space

- Mouse

Organization of Report

Chapter 1 describes the purpose of this manual and background information regarding the SBEACH-32 interface. Chapter 2 gives instructions on the installation of the program and sample files included with this version of SBEACH-32. Chapter 3 provides an overview of the layout of the program window and a short description of each menu option. It also addresses the mouse and how it is used in the interface. Chapter 4 discusses entering data into the project and running the model. This chapter also discusses the output data generated by the model. The final chapter presents an overview of importing data into the interface including MS-DOS SBEACH Version 2.0 and Version 3.0 projects. Appendix A discusses file formats for the import routines. Appendix B lists the model run-time errors.

2 *Installation*

This chapters discusses the steps for installing and uninstalling SBEACH-32.

Installing SBEACH-32

Run SETUP.EXE located on disk one of the two Installation diskettes:

- Run File Manager

- Select the floppy drive that contains the installation diskette 1

- Double-click on SETUP.EXE

The installation program will start and will check the system requirements. Figure 1 shows the opening dialog screen. On each dialog screen in the installation program are a Back button, a Next button, and a Cancel button. The Back button goes back to the previous dialog screen, the Next button goes to the next dialog screen, and the Cancel button aborts the installation process.
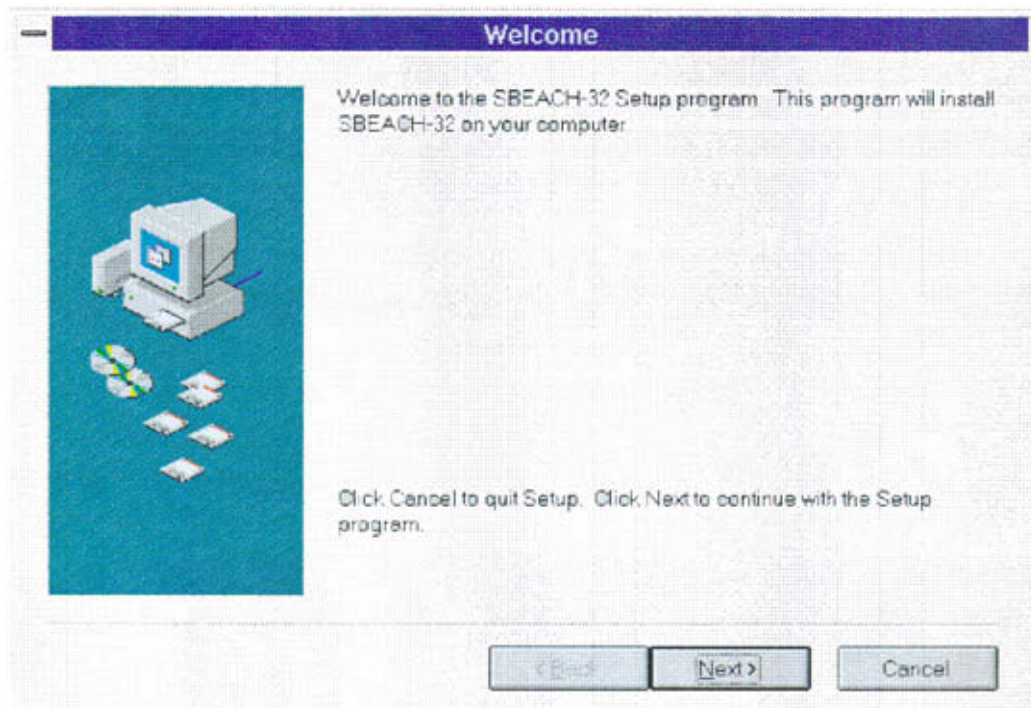

Figure 1. Opening Dialog Screen

After the Next button is pressed on the opening dialog screen, the installation program prompts the user for the destination directory of SBEACH-32 (Figure 2). The default directory is c:\sbeach32. If this directory is desired, press next; otherwise, press Browse. Pressing Browse causes a directory tree to be displayed where you may find the destination directory or type the directory. After the desired directory has been recorded, press Next. If the directory does not exist, the installation program prompts for confirmation before creating the directory.
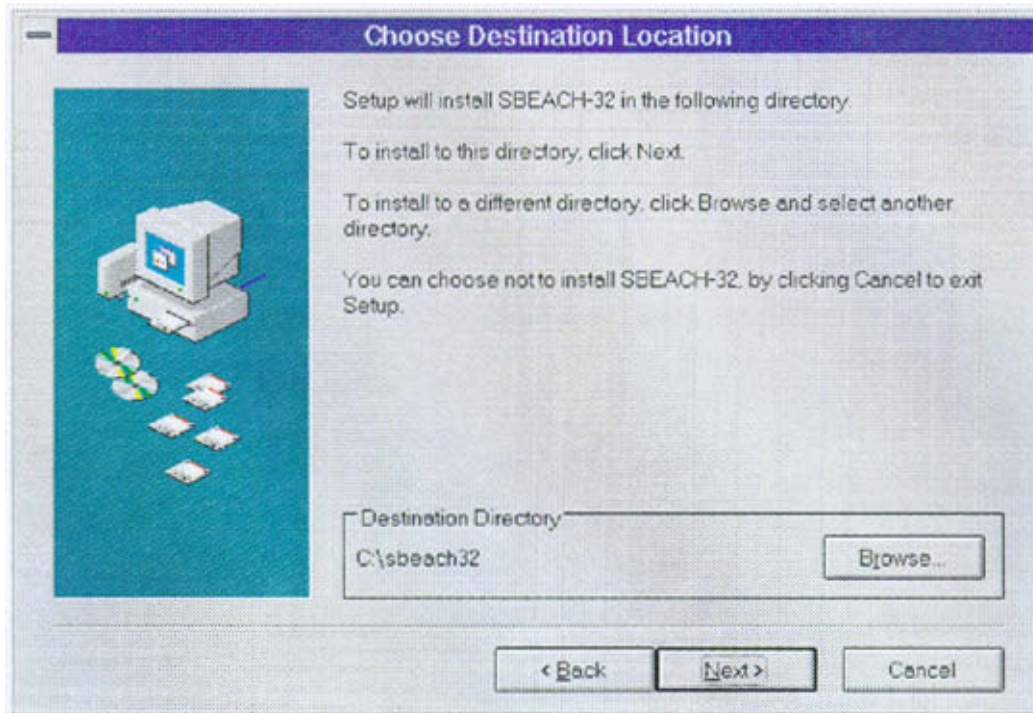
Figure 2. Destination directory dialog screen

The next dialog screen requests entry of the Program Folder for SBEACH-32 (Figure 3). This folder is where the installation program will store the icons for the SBEACH-32 program, README.TXT, and the sample project. The default folder is SBEACH-32 Group. You may select an existing folder by clicking on the name in the list box, or you may type a new folder name. If the folder does not exist, the installation program will create it during the installation process.

Figure 3. Folder selection dialog screen

After the Next button has been pressed, the program installs SBEACH-32 to the desired location and creates or updates the SBEACH-32 folder (Figure 4).

Figure 4. SBEACH-32 program group

Program Icons

The following icons are installed in the SBEACH-32 Group:

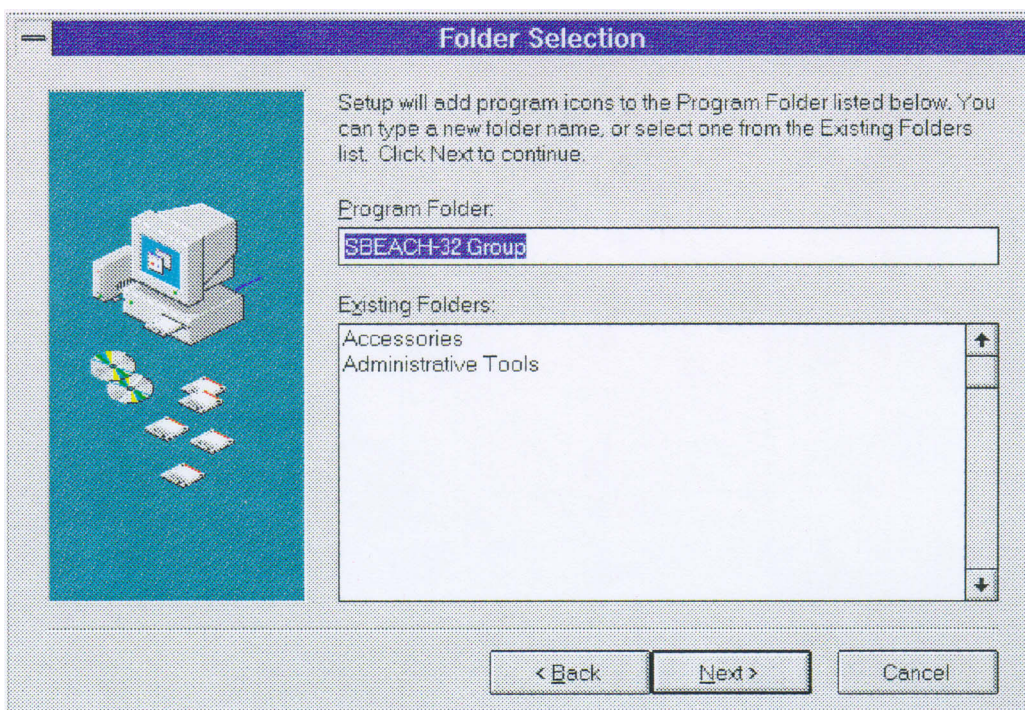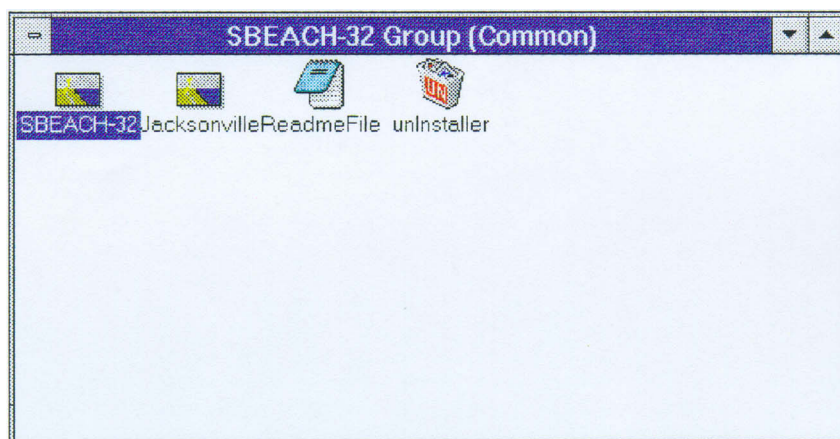- SBEACH-32 - This is the SBEACH-32 interface program.

- Jacksonville - Run this icon to start the SBEACH-32 program with the sample data loaded.

- ReadmeFile - This file contains last-minute information concerning the SBEACH-32 program.

- unInstaller - Running this program removes from the hard drive SBEACH-32 and any associated installation and setup files. See *Uninstalling SBEACH-32* below for more information.

Uninstalling SBEACH-32

Because a Windows NT application contains more than one executable file, it may be difficult to remove all components of an application in the future without a knowledge of what files were installed and where they were installed. In addition, some items installed may be "shared" resources, i.e., resources that are shared among many applications. Deleting such files would hinder other applications from executing. For this reason SBEACH-32 is packaged with an uninstaller program. This program allows you to delete the SBEACH-32 package from your hard drive. Basically, it removes all the files and registry information that were copied during installation, checking that the shared files are not in use by other applications. The uninstaller program will not affect new files created in the SBEACH-32 directories. Therefore, if you run uninstaller and have added projects, the uninstaller will not delete the SBEACH-32 directory; it will only delete the program-associated files in that directory. If no files have been added, the uninstaller will remove the directory as well.

To run unInstaller, double-click on the unInstaller icon in the SBEACH-32 program group. Upon execution, the uninstaller will prompt you to confirm the uninstallation process. After you choose "yes" the uninstaller program will delete the associated program files and registry entries.

3 *The Window*

The main window of the SBEACH-32 interface is divided into four sections. The window also includes a menu bar, a tool bar, and a status bar. Most of the data entry takes place in this window. Each of the four sections are proportionally fit to the entire main window. Therefore, resizing the entire window automatically resizes the four sections.

The SBEACH-32 interface has the appearance and functionality of a commercial Windows software application. Therefore, many of the functions will be intuitive, and the new user can expect to become productive in the first session.

The Mouse

Before moving on to a discussion of the window and data entry in detail, it is important to mention the mouse, or other pointing device, and its role in the SBEACH-32 interface. In SBEACH-32, the mouse may be used for specific purposes in addition to being a pointing device for standard Windows mouse operations. Each section of the main window has a set of floating pop-up menus assigned to it. To activate these menus, press the right mouse key in one of the main window sections. For example, to edit a reach's configuration, press the right mouse key on "Config" under the corresponding reach in the "Reaches" list box. A pop-up menu appears to the right of the mouse pointer with options available for the selected object. In this case, the options are Edit, Copy, and Paste. This pop-up menu depends upon the type of data of the selected object. If no data are present in a given section, the pop-up window is deactivated. The right mouse button is a powerful feature for convenient and fast operation of SBEACH-32.

Running SBEACH-32

When the SBEACH-32 interface is first run, the main window appears with no data loaded (Figure 5). The window contains a menu bar, a tool bar, and a status bar, located on the bottom of the window. Directly below the tool bar are two of the four interface sections. The left section below the tool bar is the data entry section. This is where most of the data entry takes place. This section of the window also contains the graph legend when a plot is displayed on the screen. The right section below the tool bar is the graph section. Here is where the user-specified plots are displayed. The left section on the bottom of the screen is a list box reserved for reach-specific data and, the right section is a list box reserved for storm-specific information.

Menu Options

Though much of the data is entered by choosing options from the pop-up menus, some information may only be entered through the use of the menus located on the menu bar.
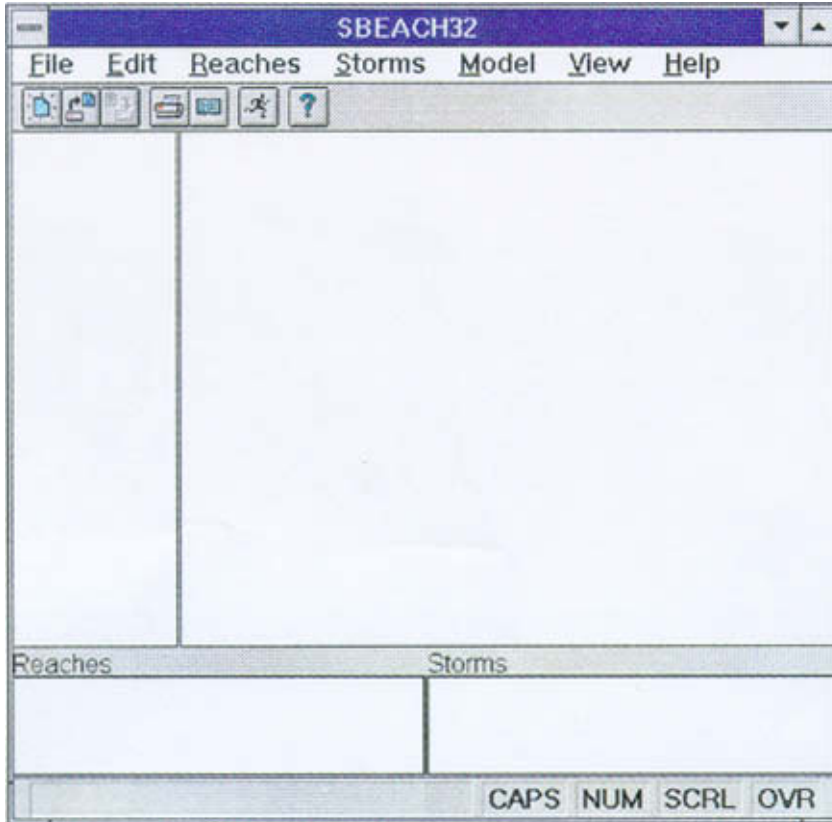
Figure 5. SBEACH-32 opening window

File Menu

The File menu contains operations for project file manipulation, including defining a new project, opening an existing project, saving the current project to disk, printing a plot, setting up the printer, and exiting the program.

The File|New option creates a new project. After you choose the option, the interface prompts for the project name, units of measurement, number of reaches, and number of storms. Following this entry, the interface loads default data into the project and the "Reaches" and "Storms" list boxes are updated. Figure 6 shows a newly created project with four reaches and two storms. Notice that the title bar on the top of the window now says "SBEACH-32: Test Project [Untitled]." This means that the project name, entered in the project setup dialog box, is "Test Project" and that the project has not been saved, i.e., "[Untitled]." After the project is saved using the File Save or File Save As option, the phrase "[Untitled]" changes to the name of the file that is saved.

Figure 6. New Project

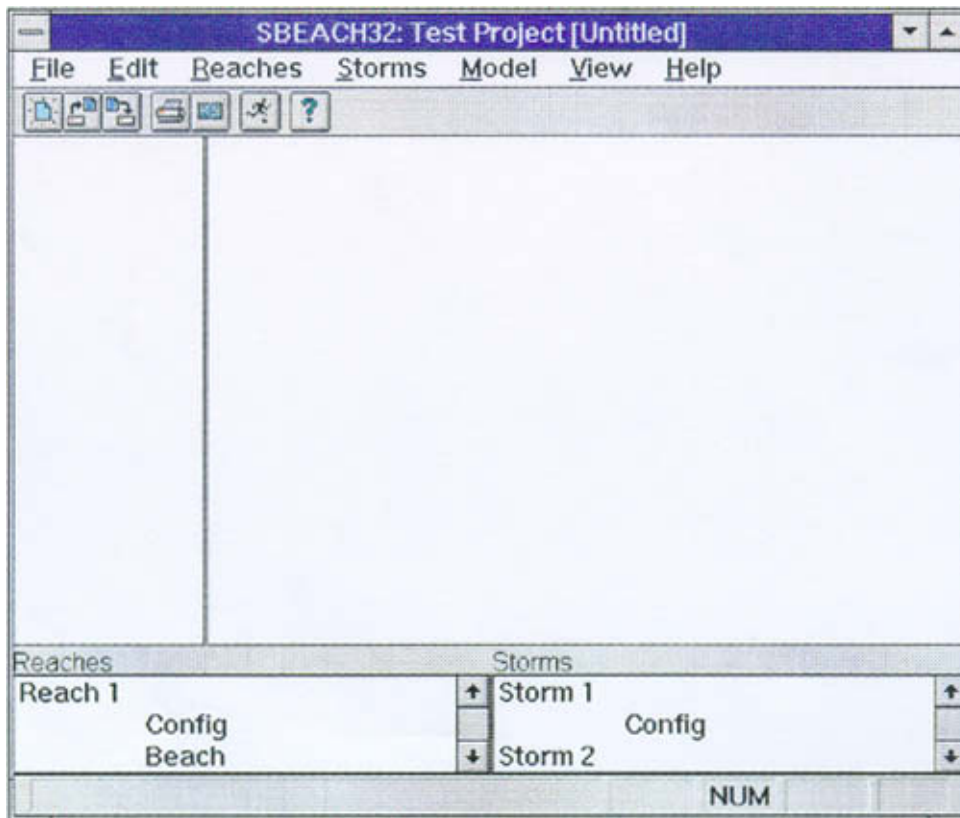The File|Save option saves the current project to disk. If the project has been previously saved, the program will save the project to that file name without confirmation. If the project has not been previously saved, the program will prompt for the file name. This option is disabled if there have been no changes to the project since the last save. Use File Save As... to save the project to a new name.

The Import option imports an MS-DOS SBEACH 2.0 or 3.0 project. After this option is chosen, the interface prompts you for the CFG file of the MS-DOS SBEACH 2.0/3.0 project. The interface will then load all the data from the corresponding SBEACH 2.0/3.0 files and append the data to the current project. Note that all the files in the selected SBEACH 2.0/3.0 project must be located in the same directory and that the files must contain the default SBEACH 3.0 file extensions. If a file is not found, it is omitted from the project. Also note that the import routine only imports input files, not output files.

The Export option allows for export of all the data associated with this project, including any output, to an ASCII text file. After you choose this option, you are asked to enter the name of the export file.

The Project Setup option allows for modifying the project name and the units of measurement. The Print option allows for printing the currently displayed graph. The Printer Setup option allows you to change the printing options, and File Exit exits the

program. If a project has been changed since the last save, the program asks if you wish to save the current project before exiting.

Reaches

The Reaches menu contains options for manipulating the reaches. All of these options are available after the right mouse key is pressed while the mouse cursor is in the "Reaches" list box. Use of the right mouse button is recommended. The Reaches menu is provided for menu completeness, i.e., all actions that are performed by pressing the right mouse button may also be performed by accessing the menus located in the menu bar.

The Insert option adds a new reach to the current project. The Rename option prompts for the new name of the currently selected reach. The Edit option allows for editing of the currently selected item in the reach list box. Because there are no model data associated with the reach name, this option is disabled if a reach name is selected in the reach list box. The Copy option allows you to copy reach data. If the currently selected item is a Reach name, the interface prompts for the name of the new reach and then appends that reach to the project. Otherwise, a list of reaches is presented. You should select the reach or reaches of the desired destination. Multiple reaches may be selected by pressing the left mouse button while dragging the mouse cursor over all the desired reaches or by clicking with the left mouse button on each reach while holding down the CTRL key. After you press the **OK** button, the interface copies the data to the desired destination reaches. All the existing data in the currently selected item of the destination reaches are overwritten. The Delete option deletes the currently selected reach from the project.

Storms

The Storms menu contains options for manipulating the storms. All of these options are available after you press the right mouse key in the "Storms" list box. Use of the right mouse button is recommended. The Storms menu is provided for menu completeness. All actions that are performed by pressing the right mouse button may also be performed by accessing the menus located in the menu bar.

the existing data in the currently selected item of the destination storms are overwritten. The Delete option deletes the currently selected storm from the project.

Model

The Model menu currently has only the Run Model option. This option initiates SBEACH-32 execution with one simulation run for each reach for each storm.

View

The View menu allows you to swap from viewing input to viewing output. A check mark appears next to the currently selected view. If no output is available in this project, the Output option is disabled.

Help

The SBEACH-32 interface is packaged with a complete online reference manual to the interface. Choosing Help|Contents brings up the contents page of the help manual. The Help menu also includes a link to Windows NT's help document "Using Help," which provides a basic guide to using the help system. The About.. option displays an About dialog box containing information concerning the SBEACH-32 application. This box also contains current version information.

The Tool Bar

The tool bar offers short cuts to selective menu options. The first icon is associated with the File|New option. The second icon is associated with the File|Open option. The third icon saves the project. The fourth icon prints the current plot. The fifth icon is associated with the Print Preview command. The sixth icon runs the SBEACH-32 model. The last icon brings up the help contents page. You may notice that as the mouse cursor moves over the Tool Bar icons, explanatory text appears in the status bar at the bottom of the window. The status bar text gives hints about what each icon does.

4 *Data Entry*

This chapter discusses in detail entering input data into a project, executing (running) SBEACH-32, and inspecting the model calculation results.

Defining a New Project

Before data may be entered, a new project must be defined. After the File|New option is chosen or the "New" icon on the tool bar is pressed, the Project Setup dialog box is presented. Enter the name of the project, the units of measurement, the number of reaches, and the number of storms. The project name can be up to 255 characters in length. Once a new project has been defined, the descriptive project information may be edited by choosing File|Project Setup. However, the File|Project Setup option does not allow for editing of the Number of Reaches and Number of Storms. You may add or delete storms by choosing Reaches (or Storms)|Delete or Insert. Once a new project is defined, the title bar is updated with the name of the project and the "Reaches" and "Storms" list boxes are loaded with default data for each reach and storm (Figure 6).

Reach Data

This section discusses entering reach-specific input data.

Reach Name

When a project is created, the SBEACH-32 interface automatically names the reaches in consecutive order as Reach 1, Reach 2, etc. You may change these names by double-clicking with the left mouse button on the particular reach name. A dialog box appears prompting for the new reach name. This new name replaces the old name for input as well as for output.

Reach Configuration

The **Reach Configuration** dialog box contains basic setup data defining this reach. To edit these data, select the "Config" item in the list box with the right mouse key. A pop-up menu appears. Choose "Edit." After **Edit** is chosen, the **Reach Configuration** dialog box (Figure 7) is displayed.
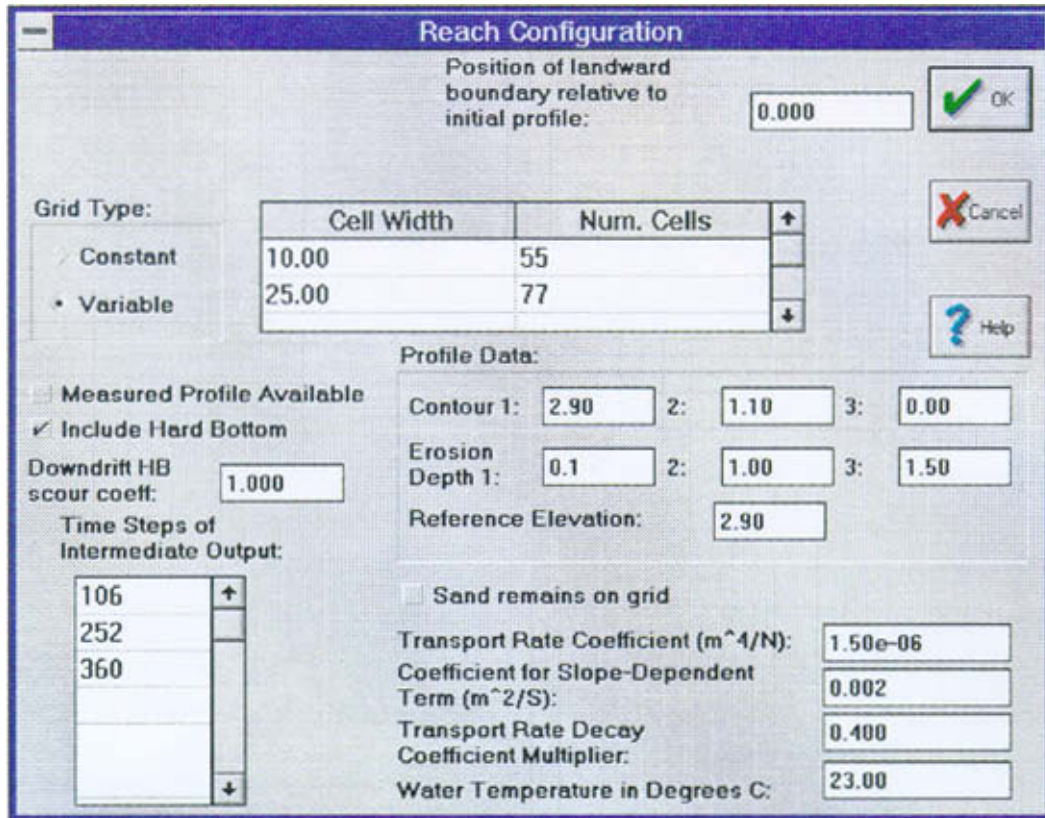
Figure 7. Reach Configuration

The "Number of calculation Cells" is the number of cells along the profile and position of the landward boundary relative to the established profile coordinate system. The number of calculation cells must be less than or equal to 1,000. The number of grid cells and cell length determine the cross-shore range of the simulation. The landward boundary is the landward-most point at which calculations are performed. This boundary should be moved further landward if a discontinuity (e.g., sand piling up, scour) is observed at that location. Moving the landward boundary seaward reduces simulation time. The SBEACH-32 model warning "Boundary Limited Runup" occurs if the landward boundary is limiting model simulations.[*] The "Number of calculation Cells" edit box is unavailable if the Grid Type is variable.

Choosing a constant grid type causes the Grid table to disappear and a Grid Cell Width edit box to appear. Likewise, choosing a variable grid type causes the Grid Cell Width edit box to disappear and a Grid table to appear. Grid cell width must be greater than zero.

If a variable grid is desired, enter the cell width and number of cells having that width for each different grid cell region. For studies in which the regions of interest are the subaerial

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[*] Much of the data description found in this chapter is taken from Rosati et al (1993).

beach and dunes, a fine spacing is usually chosen for the subaerial beach (typically 1 to 5 ft), an intermediate spacing for the surf zone (typically 5 to 10 ft), and a coarser spacing for regions offshore of the breaker line (typically 15 to 50 ft). In Figure 7, there are two different cell regions: 55 cells with a width of 10.0 ft and 77 cells with a width of 25.0 ft. As many as ten grid regions may be entered for the variable grid. Numeric stability of the simulation is dependent upon the relationship between cell length and the time step. If a variable grid is used, the time step should correspond to the smallest grid cell size. Typical values for cell length range from 10- to 20-ft and a typical time step ranges from 5- to 10-min. For information regarding time steps, see *Storm Data* discussed later in this chapter.

Check the **Measured Profile Available** check box if a measured profile is available for this reach. Checking this option causes the SBEACH-32 interface to include a measured profile in the list box for this reach.

Check the **Include Hard Bottom** item if hard bottom data are available for this reach. After this option is checked, the dialog box includes another edit box, i.e., **Downdrift HB scour coeff.** This contains the downdrift hard-bottom scour coefficient (Larson and Kraus 1995).

Contours 1, 2, and 3 record the three elevation contours for which an output of maximum horizontal recession is desired. The datum of these elevations corresponds to the datum of the entire data set. Erosion depths 1, 2, and 3 are used to output distances to the landward-most occurrence of these erosional elevation changes along the profile. The recorded values should be the absolute value of the desired elevation changes. These distances are measured relative to the pre-storm profile at the entered **Reference Elevation**.

The **Time Steps of Intermediate Output** list contains the time steps that intermediate output is desired. The output consists of beach profiles and cross-shore distributions of wave height and water elevation. Up to ten values may be entered. This list may be left blank if no intermediate output is desired.

The **Sand remains on grid** option is new for SBEACH-32. Choosing this option keeps sand from moving off the grid and corresponds to the MS-DOS version default. If the grid is too small for a given storm, sand forced to remain on the grid may cause pile up avalanching at the end of the grid which produces a run-time error. If this option is not checked, the model allows sand to move off or on to the grid at the seaward end.

The transport parameters **Transport Rate Coefficient,** K and **Coefficient for Slope-Dependent Term,** *Eps* are calibration parameters for the sediment transport calculations. Detailed technical information relating to these variables is given in Report 1, Part VI (Larson and Kraus 1989), and Report 2, Part II (Larson, Kraus, and Byrnes 1990). Larger K values produce greater sand transport and more prominent bar features, and larger values of *Eps* produce a more subdued bar. The **Transport Rate Coefficient** units must be m^4/N and the **Coefficient for Slope-Dependent Term** units must be in m^2/sec, even if American customary units are chosen.

The transport rate seaward of the breaker line and from the wave reformation point to the next break point (if wave reformation occurs) decays according to the **Transport Rate**

Decay Coefficient Multiplier, which may vary from 0.1 to 0.5. Larger values of the parameter result in more rapid transport rate decay.

The fall speed of sediment depends on the **Water Temperature** which should range between 0 and 40 deg C.

The **OK** button saves the data entered in this dialog box; the **Cancel** button exits the dialog box without saving the changes to the data, and the **Help** button brings up context-sensitive help for this dialog box. If you choose **OK**, the interface asks whether to copy this configuration to all reaches. Answering **Yes** to this question copies all the Configuration data to all the reaches, overwriting any configuration data present in those reaches.

Initial Profile

This list box item is a link to the initial profile data of the current reach. After you select this item, a data entry table automatically appears in the data entry section of the window. If no profile data have been previously entered, the table is blank. If profile data have been entered, the data are displayed in the table, a plot of the profile is shown in the graph section, and the title of the profile and line color appears in the Legend list box on the top of the data entry section. Importing a profile is accomplished by pressing the right mouse button on the data table and choosing **Import**. For more information concerning importing profile data, see Chapter 5, *Importing Data*. Line colors may be changed and lines may be deleted via the Legend list box. For more information concerning the line manipulation, see *Legend List Box* later in this chapter. Once data have been entered for the profile, the profile item in the Reaches list box should be selected in order to update the graph. Choosing the profile item ensures that the data are stored in memory. However, the data are not saved to disk unless **File|Save** or **File|Save As...** is chosen.

Beach

This item is a link to the data defining the beach. Press the right mouse key on this item and choose **Edit** to bring up a dialog box of the beach data (Figure 8). The **Type of Input Profile** check boxes determine what data are included in this dialog box. If **Arbitrary** is selected, no profile data are displayed. If **Schematized** is selected, as in the case of Figure 8, the profile edit boxes are displayed on the bottom of the dialog box. An arbitrary profile is one for which an initial profile is available. A schematized profile allows the initial profile to be described with seven distance-elevation pairs, defining the landward boundary, dune, berm and foreshore region, and an equilibrium beach profile for the subaqueous portion. This type of profile may be used if actual profile data are not available or if sensitivity tests are to be made.

The **Depth Corresponding to Landward End of Surf Zone** is the depth (in user-specified units of measurement) where the swash zone begins. This value may range from 0.15 to 0.5 m or 0.5 to 1.6 ft.

Figure 8. Beach Data dialog box.

The **Effective Grain Size** is the effective median grain size (mm) that, along with water temperature, determines sediment particle fall speed. This value may range from 0.13 to 1.0 mm. Quartz sand particles are assumed.

The **Maximum Profile Slope Prior to Avalanching** is the maximum slope angle, ranging from 15 to 30 deg, that the profile is allowed to achieve. If the profile reaches an angle greater than this value at the end of any time step, avalanching occurs and the slope is reduced to 10 deg less than this value.

Pressing **OK** on this dialog box stores the data in memory; pressing **Cancel** aborts any changes made to the data, and pressing **Help** brings up context-sensitive help on this dialog box.

Beach Fill Data

The Beach Fill dialog box records the data associated with the beach fill of this reach, if applicable (Figure 9). If beach fill data are not included for this reach, you should choose **No** for **Beach Fill Present**. If **No** is chosen, no other data are available for editing in this dialog box. If **Yes** is chosen, as in the case of Figure 9, the starting and ending positions and the location and elevation values must be entered for the beach fill.

The **Start** and **End** edit boxes record the starting and ending points of the beach fill in the cross-shore direction. The values of these points should correspond to the horizontal axis established for the profile data.
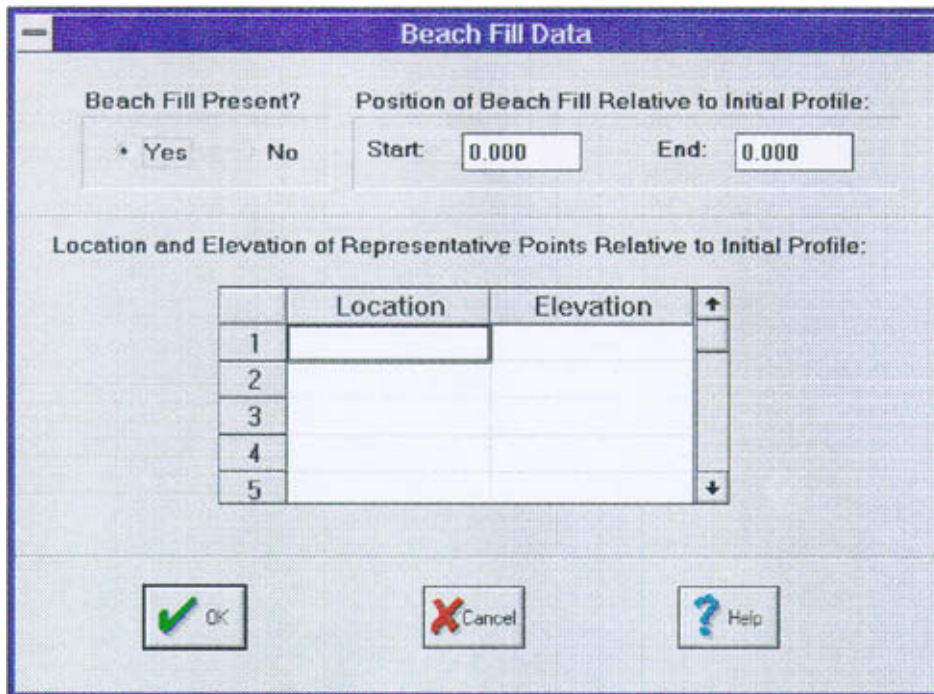
Figure 9. Beach Fill Data dialog box.

The table in the Beach Fill Data dialog box contains the data defining the beach fill. Enter the location (corresponding to the horizontal axis already established) and elevation of representative points to describe the beach fill. As many as ten distance-elevation pairs may be entered in this table. Choosing **OK** stores the data, choosing **Cancel** aborts any changes made to the data, and choosing **Help** brings up context-sensitive help concerning the data in this dialog box.

Seawall Data

The Seawall Data list item is a link to the seawall data for this reach. Press the right mouse button on the item in the list box and choose **Edit** to edit the data. A dialog box appears (Figure 10).
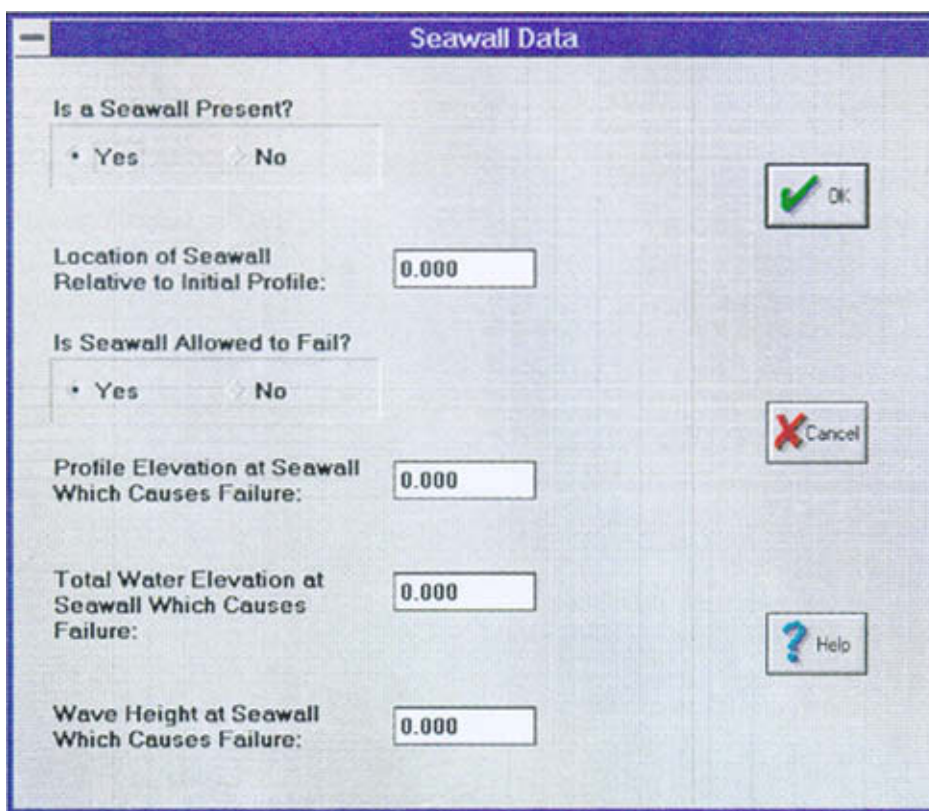
Figure 10. Seawall Data dialog box.

Measured Profile

This list box item is a link to the measured profile data of the current reach. This item is displayed only if you selected **Measured Profile Available** in the **Reach Configuration** dialog box. After you select this item, a data entry table appears in the data entry section of the window. If no profile data have been previously entered, the table is blank. If profile data have been entered, the data are displayed in the table, a plot of the profile appears in the graph section, and the title of the profile and line color appears in the Legend list box on the top of the data entry section. Importing a profile is accomplished by pressing the right mouse button on the data table and choosing **Import**. For more information concerning importing profile data, see Chapter 5, *Importing Data*. Line colors may be changed and lines may be deleted via the Legend list box. For more information concerning the line manipulation, see *Legend List Box* later in this chapter. Once data have been entered for the profile, select the profile item in the Reaches list box to update the plot. This procedure automatically stores the data in memory.

Hard Bottom

This list box item is a link to the hard-bottom data associated with the current reach. This item is displayed only if you selected **Include Hard Bottom** in the **Reach Configuration** dialog box. After this item is selected, a data entry table appears in the data entry section of the window. If no hard-bottom data have been previously entered, the table is blank. If hard-bottom data have been entered, the distance and elevation values are displayed in the

data table, a plot of the hard bottom is shown in the graph section, and the title of the hard bottom and line color appears in the Legend list box on the top of the data entry section. Distance-Elevation pair data should be entered to describe hard-bottom areas. If there is no hard bottom along a given section of the profile, a value of -9999 must be entered for elevation. Importing hard-bottom data is accomplished by pressing the right mouse button on the data table and choosing **Import**. For more information concerning importing data, see Chapter 5, *Importing Data*. Line colors may be changed and lines may be deleted via the Legend list box. For more information concerning the line manipulation, see *Legend List Box* later in this chapter. Once data have been entered, the hard bottom item in the Reaches list box should be selected to update the plot. This procedure stores the data in memory.

Duplicating Reach Data

SBEACH-32 has the capability of duplicating both an entire reach and individual reach items. If you wish to create a new reach using data from an existing reach, press the right mouse button on the reach name in the list box, then choose **Copy** from the pop-up menu. A prompt for the name of the new reach appears. This reach is appended to the end of the reach list. If you want to copy an individual reach item, e.g., **Reach Configuration** data, press the right mouse button on that item and choose **Copy** from the pop-up menu. A list of reaches is presented. You should select the reach or reaches of the desired destination. Multiple reaches may be selected by pressing the left mouse button while dragging the mouse over all the desired reaches or by clicking with the left mouse button on each reach while holding down the CTRL key. After you press the **OK** button, the interface copies the data to the desired destination reaches. All the existing data in the currently selected item of the destination reaches are overwritten.

This concludes the section on input reach data. We now move on to discussing the other input list box on the bottom right side of the window, the storms list box.

Storm Data

This section discusses the entry of storm-specific input data.

Storm Name

When a project is created, the SBEACH-32 interface automatically names the storms in consecutive order as Storm 1, Storm 2, etc. These names may be changed by double-clicking with the left mouse button on the storm name. A dialog box appears prompting for the new storm name. This new name replaces the old name for input as well as output.

Storm Configuration

Storm configuration contains basic setup data defining the particular storm. To edit these data, select the "Config" item in the list box with the right mouse button. A pop-up menu appears. Choose **Edit**. After **Edit** is chosen, a Storm Configuration dialog box is presented (Figure 11).

The two options for **Wave Type** are monochromatic (laboratory data) and irregular (using significant wave height). The Number of Time Steps records the number of time steps for the simulation. The value of each time step, in minutes, is recorded in Time Step Value. The duration of the simulation is equal to the product of the number of time steps and the time step value. Numeric stability of the simulation is dependent upon the relationship between cell length and the time step. If using a variable grid, the time step should correspond to the smallest grid cell size. For information concerning cell length, see the *Reach Data* section above.

The two options for **Wave Height and Period Input** are constant or variable. If **Constant** is selected, the constant wave height and period are required entries. These options are not displayed if **Variable** is selected for **Wave Height and Period Input**. If **Variable** is selected, as in the case of Figure 11, the time step of variable wave height and period in minutes, e.g., 5, 10, or 15 must be entered. This value should correspond to the time between wave data to be entered in the **Wave Height** and **Wave Period** sections described below. This option is not displayed if **Constant** is selected.

The **Input Wave Water Depth** field records the absolute value of water depth at the location of the input wave data. For deep water conditions, select the **Deep Water** check box. If this box is checked, the **Input Wave Water Depth** field is unavailable.

Wave Angle Input may be constant or variable. If **Constant** is selected, the constant wave angle is a required entry. A wave angle of 0 deg indicates shore-normal approach; positive angles are from the right-hand quadrant if looking from the sea, and negative angles are from the left-hand quadrant from the same orientation. This option is not displayed if **Variable** is selected for **Wave Angle Input**. If **Variable** is selected, as in the case of Figure 11, the **Time Step of Variable Wave Angle** in minutes must be entered. This value should correspond to the time between wave angle data to be entered in the **Wave Angle** section described below. This field is not displayed if **Constant** is selected for **Wave Angle Input**.

If random wave height is desired, choose **Yes** in the **Random Wave Height?** selection box. This requires that you enter the **Seed Value** and the **Percent Variability**. The **Seed Value** must be between 1000 and 9999 inclusive and the **Percent Variability** must be between 0 and 100 inclusive.

Total Water Elevation data may be **Constant** or **Variable**. If **Constant** is chosen, the constant water elevation must be entered. This elevation must be referenced to the same datum as the beach profile data. This field is not displayed if **Variable** is chosen for **Total Water Elevation Input**. If **Variable** is desired, the **Time Step of Variable Water Elevation** in minutes must be entered. This value should correspond to the time between water elevation data to be entered in the **Water Elevation** section described below. This field is not displayed if **Constant** is selected for **Total Water Elevation Input**.

Figure 11. Storm configuration dialog box.

Wind Speed and Angle data may be **Constant** or **Variable**. If **Constant** is chosen, the constant wind speed and angle must be entered. The wind speed is measured in meters (or feet) per second. This field is not displayed if **Variable** is chosen for **Wind Speed and Angle Input**. If **Variable** is desired, the **Time Step of Variable Wind Speed and Angle** in minutes must be entered. This value should correspond to the time between wind speed and angle data to be entered in the **Wind Speed** and **Angle** sections described below. This field is not displayed if **Constant** is selected for **Wind Speed and Angle Input**.

Wave Height

This list box item is a link to the wave height data of the current storm. This item is displayed only if **Variable** for **Wave Height and Period Input** in the **Storm Configuration** dialog box was selected. After you select this item, a data entry table appears in the data entry section of the window. If no wave height data have been previously entered, the table is blank. If wave height data have been entered, the data are displayed in the table, a plot of the wave height is shown in the graph section, and the title of the wave height and line color appears in the Legend list box on the top of the data entry section. Importing wave height data is accomplished by pressing the right mouse button on the data table and choosing **Import**. For more information concerning importing data, see Chapter 5, *Importing Data*. Line colors may be changed and lines may be deleted via the Legend list box. For more information concerning the line manipulation, see *Legend List Box* later in this chapter. Once data have been entered for the wave height, the wave

height item in the Storms list box should be selected to update the plot. This procedure stores the data in memory.

Wave Period

This list box item is a link to the wave period data of the current storm. This item is displayed only if **Variable** for **Wave Height and Period Input** in the **Storm Configuration** dialog box was selected. After you select this item, a data entry table appears in the data entry section of the window. If no wave period data have been previously entered, the table is blank. If wave period data have been entered, the data are displayed in the table, a plot of the wave period is shown in the graph section, and the title of the wave period and line color appears in the Legend list box on the top of the data entry section. Importing wave period data is accomplished by pressing the right mouse button on the data table and choosing **Import**. For more information concerning importing data, see Chapter 5, *Importing Data.* Line colors may be changed and lines may be deleted via the Legend list box. For more information concerning the line manipulation, see *Legend List Box* later in this chapter. Once data have been entered for the wave period, the wave period item in the Storms list box should be selected to update the plot. This procedure stores the data in memory.

Wave Angle

This list box item is a link to the wave angle data of the current storm. This item is displayed only if **Variable** was selected for **Wave Angle Input** in the **Storm Configuration** dialog box. After you select this item, a data entry table appears in the data entry section of the window. If no wave angle data have been previously entered, the table is blank. If wave angle data have been entered, the data are displayed in the table, a plot of the wave angle is shown in the graph section, and the title of the wave angle and line color appears in the Legend list box on the top of the data entry section. Importing wave angle data is accomplished by pressing the right mouse button on the data table and choosing **Import**. For more information concerning importing data, see Chapter 5, *Importing Data.* Line colors may be changed and lines may be deleted via the Legend list box. For more information concerning the line manipulation, see *Legend List Box* later in this chapter. Once data have been entered for the wave angle, the wave angle item in the Storms list box should be selected to update the plot. This procedure stores the data in memory.

Wind Speed

This list box item is a link to the wind speed data of the current storm. This item is displayed only if **Variable** was selected for **Wind Speed and Angle Input** in the **Storm Configuration** dialog box. After you select this item, a data entry table appears in the data entry section of the window. If no wind speed data have been previously entered, the table is blank. If wind speed data have been entered, the data are displayed in the table, a plot of the wind speed is shown in the graph section, and the title of the wind speed and line color appears in the Legend list box on the top of the data entry section. Importing wind speed data is accomplished by pressing the right mouse button on the data table and choosing **Import**. For more information concerning importing data, see Chapter 5,

Importing Data. Line colors may be changed and lines may be deleted via the Legend list box. For more information concerning the line manipulation, see *Legend List Box* later in this chapter. Once data have been entered for the wind speed, the wind speed item in the Storms list box should be selected to update the plot. This procedure stores the data in memory.

Wind Direction

This list box item is a link to the wind direction data of the current storm. This item is displayed only if **Variable** was selected for **Wind Speed and Angle Input** in the **Storm Configuration** dialog box. After you select this item, a data entry table appears in the data entry section of the window. If no wind direction data have been previously entered, the table is blank. If wind direction data have been entered, the data are displayed in the table, a plot of the wind direction is shown in the graph section, and the title of the wind direction and line color appears in the Legend list box on the top of the data entry section. Importing wind direction data is accomplished by pressing the right mouse button on the data table and choosing **Import**. For more information concerning importing data, see Chapter 5, *Importing Data.* Line colors may be changed and lines may be deleted via the Legend list box. For more information concerning the line manipulation, see *Legend List Box* later in this chapter. Once data have been entered for the wind direction, the wind direction item in the Storms list box should be selected to update the plot. This procedure stores the data in memory.

Duplicating Storm Data

SBEACH-32 has the capability of duplicating an entire storm or individual storm items. If you wish to create a new storm using data from an existing storm, press the right mouse button on the storm name in the list box, then choose **Copy** from the pop-up menu. You are prompted for the name of the new storm. This storm is appended to the end of the storm list. If you want to copy an individual storm item, e.g., **Storm Configuration** data, you should press the right mouse button on that item and choose **Copy** from the pop-up menu. A list of storms is presented. You should select the storm or storms of the desired destination. Multiple storms may be selected pressing the left mouse button while by dragging the mouse over all the desired storms or by clicking with the left mouse button on each storm while holding down the CTRL key. After you press the **OK** button, the interface copies the data to the desired destination storms. All the existing data in the currently selected item of the destination storms are overwritten.

Data Entry Table

The data entry table is a spreadsheet-like table that is displayed in the lower half of the data entry window whenever tabular data items are selected in the reach or storm list boxes. Selecting a tabular data item in these list boxes causes the interface to transfer the stored data, if any, to this table. If data have not been stored, the table is blank. Data may be entered manually by typing directly into the table or may be imported from a free-format file or ISRP (Interactive Survey Reduction Program) data file. To import data, you

must press the right mouse button while your mouse cursor is in the table. A pop-up menu appears. You should choose import. For more information concerning importing data, see Chapter 5, *Importing Data*. Another option is to copy data from another data item. There are two ways to do this. First, if you wish to copy all the data from the same type of item in another reach or storm, press the right mouse button on the data item to be copied and choose copy from the pop-up menu. If you only wish to copy sections of data from one item to another, you can select the desired data in the table by dragging the mouse over the data while holding down the left mouse button. Then press the right mouse button on the table and choose copy from the pop-up menu. Choose the desired destination data item in the reach or storm list box and position the table cursor on the beginning column or row where you wish to paste the data. Press the right mouse key while the cursor is in this position and choose paste.

Graph Window

The graph window is located in the upper-right two-thirds of the screen. This window is blank initially. However, whenever you choose a graphable item in the storm or reach list boxes, the graph window is displayed with a plot of the selected data. If data are already displayed in the graph window, the new data are overlaid in the window. You may change line colors and delete plots from the graph window in the **Legend List Box** described below. You may also print this plot by choosing **File|Print**.

Legend List Box

The legend list box is located in the upper-half of the data entry window. This list contains a legend of the graphs displayed in the graph window. If a graph is not currently displayed, this list box is hidden. You may change line colors by double-clicking with the left mouse button on the data item. A color selection box is displayed. Choose the desired color and press **OK**. This updates the color of the selected data item. The color is saved together with the graph data. As a default, the hard bottom is plotted in light green and all other data are plotted in black.

You may delete items from the graph by selecting the item in the **Legend List Box** and pressing delete. This operation does not delete the data; it merely removes the corresponding plot from the graph window.

Running the SBEACH-32 Model

Once all data have been entered, you may run the SBEACH-32 model by choosing **Model|Run Model** on the main menu bar. A dialog box of all the reaches and storms included in this project is displayed. Select each reach and each storm for which you wish to execute an SBEACH run. Initially, all reaches and storms are selected. Clicking on an

item with the left mouse button toggles the selection state of the corresponding item. The SBEACH-32 interface runs the model once for each reach selected for each storm selected and stores the output data after each run, overwriting any output data existing for that reach and storm. If a fatal run-time error occurs in a particular run, the interface will display a message of the associated error. However, the interface continues running the model with the next run. This capability is helpful for unattended execution of the model in that an error in one run does not stop execution of subsequent runs. Although data may be viewed in the interface during execution of the model, it is not recommended that data be changed during the model runs.

After the a run is launched, you may wish to continue in another application in the Windows NT environment. When you switch windows to another application, SBEACH-32 will continue calculating as a true multitasking process.

Viewing Model Results

After the interface has executed all the model runs, you may view the results by choosing **View|Output** on the main menu bar. You will see in the reach list box a list of all the reaches for which output data are available. The storm list box contains all the output data for the currently selected reach. The data are arranged according to each storm that was run with the selected reach. Data items include:

- Profile data after each time step specified in **Time Steps of Intermediate Output** in the **Reach Configuration** dialog box.

- Final profile data.

- Maximum water elevation across the profile.

- Minimum water elevation across the profile.

- Wave height data across the profile after each time step specified in **Time Steps of Intermediate Output** in the **Reach Configuration** dialog box.

- Water elevation data across the profile after each time step specified in **Time Steps of Intermediate Output** in the **Reach Configuration** dialog box.

- Maximum wave height across the profile.

- Maximum water depth across the profile.

- A report containing volume information and other calculations for this run

With the exception of the report, the data may be viewed by selecting an item in the list box with the left mouse button. To view the report, select the item with the right mouse button and choose **View** from the pop-up menu.

Consistent with most Windows applications, the SBEACH-32 interface does not save data to the hard drive unless specifically instructed to do so. It is strongly recommended to save periodically after entering data and after model execution to ensure that data are not lost. To save the data to the hard drive, choose **File|Save** or **File|Save As...**.

5

Importing Data

Data may be imported into the SBEACH-32 project from ASCII text files. The SBEACH-32 interface allows for importing of an entire data set from an MS-DOS SBEACH 2.0/3.0 project, as well as individual data items, such as profile data. The methods for both of these cases are discussed below. This chapter introduces several formats available for importing. Consult *Appendix A File Formats* for information describing these formats.

Importing MS-DOS SBEACH Projects

Because many projects built with the MS-DOS SBEACH exist, the SBEACH-32 interface provides for importing of these projects. To import an MS-DOS SBEACH project, choose **File|Import** from the menu bar at the top of the window. After the **Import** option is chosen, an Import dialog box is displayed (Figure 12). Pressing **Add** causes a file dialog box to be displayed. In this dialog box, you should locate the model configuration file (.CFG) of the MS-DOS SBEACH project and choose **OK**. This procedure adds the
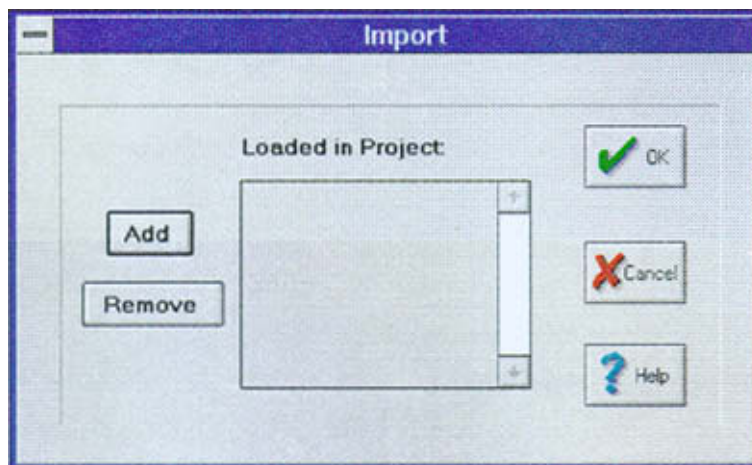

Figure 12. Import dialog box.

project file name to the **Loaded in Project** list box. Pressing **Remove** removes the currently selected project file name from the list box. Once you have chosen all the desired MS-DOS SBEACH projects to import, choose **OK**. The SBEACH-32 interface displays a dialog box asking whether the reaches or the storms from that project should be

imported. This option has been included because, in many cases, multiple storms are used for a single reach. In the MS-DOS SBEACH, one would have to define a model configuration file for each storm for each reach. Allowing the user to specify whether the storms or reaches should be imported means that only one project file needs to be imported for the reach. Once you have chosen the desired data to import, choose **OK**. The SBEACH-32 interface imports the desired model configuration file, as well as the corresponding data. For example, if **Import Reaches** is chosen, the SBEACH-32 interface imports the reach-specific data in the model configuration file, the initial profile (found in the PRI file), and the measured profile (found in the PRM file), if applicable. If the SBEACH-32 interface is unable to locate one or more data files, it leaves those data items blank in the SBEACH-32 project. However, the interface continues to import all the other data items.

For an example, suppose there is an existing project for Beauty Beach containing five reaches and five storms, and the base name of each MS-DOS SBEACH 3.0 project are as follows:

BB_R1S1   Reach 1, Storm 1

BB_R1S2   Reach 1, Storm 2

BB_R1S3   Reach 1, Storm 3

BB_R1S4   Reach 1, Storm 4

BB_R1S5   Reach 1, Storm 5

BB_R2S1   Reach 2, Storm 1

...

BB_R5S5   Reach 5, Storm 5

To import all the data for this project, choose **File|Import**. From the Import dialog box, choose **Add**, and then select BB_R1S1, BB_R2S1, BB_R3S1, BB_R4S1, and BB_R5S1. Choose **OK** from the Import dialog box. When prompted, choose **Import Reaches** and press **OK**. This imports the reaches for this project. To import the storm data, choose **File|Import**. From the Import dialog box, choose **Add**, and then select BB_R1S1, BB_R1S2, BB_R1S3, BB_R1S4, and BB_R1S5. Choose **OK** from the Import dialog box. When prompted, choose **Import Storms** and press **OK**. This imports the storms for this project.

Importing Individual Data Items

The SBEACH-32 interface is capable of importing data for each tabular data item, e.g., profile data, hard-bottom data, wave heights, wave periods, etc. To import a data item, choose the item in the **Reaches** or **Storms** list box on the bottom of the window. The SBEACH-32 interface displays the data entry table. Press the right mouse button on the data entry table and choose **Import** from the pop-up menu. The SBEACH-32 interface asks whether the data file is an ISRP (Birkemeier 1984) data file or a Free-Format data file. Both of these formats are described in *Appendix A - File Formats*. After the desired file format is chosen, a file dialog box is displayed. Choose the file that contains the desired data and press **OK**. If **ISRP File** was chosen as the file format, the SBEACH-32 interface displays a list of the id, date, and time of each profile stored in that file. Choose the desired profile and press **OK**. The SBEACH-32 interface loads the data into the table, replacing any data that exist in that table.

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Appendix A - File Formats

The SBEACH-32 interface allows for importing of two types of data, ISRP and Free Format. These two types of file formats are described below.

ISRP File Format

The Interactive Survey Reduction Program (ISRP) (Birkemeier 1984)[*] uses a file format commonly known as ISRP format. Because of the extensive use of ISRP format for storage of beach profile data, the SBEACH-32 interface includes the capability for importing ISRP-format files. The ISRP file format is summarized in Table A1.

Table A1 Explanation of ISRP File Format	
Position	**Description of Entry**
Line One (optional)	
1-80	Line describing the data in the file
First Data Line in Each Record	
1-5	Profile Location Number
6-10	Blank
11-16	Date of Survey (year, month, day)
17-21	Time of Survey (e.g., 1250 = 12:50)
22-24	Number of coordinate pairs in the survey
25-29	Minimum elevation in the survey
30-40	Blank
41-80	First four distance-elevation pairs Elevation values have one significant digit while distance values have zero

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[*] References cited in this appendix may be found in the reference list at the end of the main text.

	significant digits (e.g., 90 45 - Horizontal Distance 90 units, Elevation 4.5 units
Following Data Lines in Each Record	
1-10	Same as first data line
11-80	Seven distance-elevation pairs

Free-Format Files

The SBEACH-32 interface is capable of importing three different types of "free-format" data files. The file may contain one or two columns of data (depending on the type of data being imported) that begin on line one of the data file. The file may also contain two columns of data beginning on line two, with the first line reserved for the number of coordinate pairs in the file. Note this option is not available for one-column data files. The file may also be an MS-DOS SBEACH 2.0/3.0 data file. This file allows for multiple header lines that have the letter 'C' in the first position of the line, ended by a header line with the letter 'E' in the first position of the line. Below is an illustration of three different files that produce the same result when imported by the SBEACH-32 interface:

Table A2.	
Two-column free-format file.	
0.00	5.00
10.00	0.00
20.00	-4.00
30.00	-12.00
40.00	-8.00
50.00	-17.00

Table A3.

Two-column free-format file with number of coordinate pairs on first line.

6	
0.00	5.00
10.00	0.00
20.00	-4.00
30.00	-12.00
40.00	-8.00
50.00	-17.00

Table A4.

MS-DOS SBEACH 3.0 data file.

```
C>  Test Profile
C>
C> Distance(ft)    Elevation(ft)
E>-----------------------------------
6
0.00            5.00
10.00           0.00
20.00           -4.00
30.00           -12.00
40.00           -8.00
50.00           -17.00
```

Appendix B - Run-Time Errors

Table B1 lists the run-time errors that may be encountered while running the SBEACH-32 model.

Table B1 SBEACH-32 Model Run-Time Errors	
Error #	**Error Description**
1	Project: Unexpected Error: Invalid Units Specification
2	Reach: The elevation ###.## does not exist on the initial profile
3	Seawall: Invalid Seawall Location
4	Reach: Insufficient Number of data in Measured Profile
5	Reach: Insufficient number of data in initial profile
6	Reach: Initial profile data does not cover range of simulation
7	Reach: Current maximum for calculation cells is 1000
8	Reach: Unexpected error: Grid Type invalid
9	Initial Profile: X values not in ascending order
10	Reach: Total number of cells in variable grid must equal specified number of calculation cells
11	Reach: Number of Intermediate time steps cannot exceed 10
12	Reach: Time steps must be in the range of one to specified total number of time steps
13	Reach: Unexpected error: Presence of measured profile invalid
14	Reach: Transport rate coefficient must be in the range 0.5E-6 to 2.5E-6
15	Reach: Coefficient for slope-dependent term must be in the range 0.001 to 0.005

Table B1
SBEACH-32 Model Run-Time Errors

Error #	Error Description
16	Measured Profile: X values not in ascending order
17	Hard Bottom: X values not in ascending order
18	Storm: Unexpected error: Wave Type
19	Storm: Unexpected error: Wave height and period input
20	Storm: Unexpected error: Wave angle input
21	Storm: Wave angle must be in the range -90 to 90 degrees
22	Storm: Unexpected error: Randomization of wave height
23	Storm: Seed value for randomizer must be a four digit integer
24	Storm: Percent of variability must be in the range 0 to 100
25	Storm: Unexpected error: Total water elevation input
26	Storm: Unexpected error: Wind speed and angle input
27	Beach: Unexpected error: Type of input profile
28	Beach: Location of landward boundary must be less than or equal to position of landward boundary relative to initial profile in Reach Configuration
29	Beach: Elevation of foreshore must be less than 0
30	Beach: Depth corresponding to landward end of surf zone must be in the range 0.15 to 0.5m
31	Beach: Depth corresponding to landward end of surf zone must be in the range 0.5 to 1.6ft
32	Beach: Effective grain size diameter must be in the range 0.15 to 1.0 mm
33	Beach: Max. profile slope prior to avalanching must be in the range 14 to 90 degrees
34	Beach Fill: Unexpected error: Beach fill present
35	Beach Fill: Start location of beach fill must be greater than or equal to position of

Table B1
SBEACH-32 Model Run-Time Errors

Error #	Error Description
	landward boundary relative to initial profile in Reach Configuration
36	Beach Fill: Number of representative points between start and end of beach fill must be in the range 1 to 10
37	Beach Fill: Location of representative points relative to the initial profile must be between start and end of beach fill
38	Beach Fill: Beach fill locations must be ascending
39	Seawall: Unexpected error: Seawall present
40	Seawall: Unexpected error: Seawall failure
41	Hard Bottom: Unexpected error: Hard bottom presence
42	Hard Bottom: Coefficient for growth of transport rate downdrift exposed hard bottom must be greater than 0
43	Reach: Number of grid cell regions cannot exceed 10
44	Reach: Transport rate decay coefficient multiplier must be in the range 0.1 to 0.5
45	Reach: Water temperature must be in the range 0.0 to 40.0 C
46	Hard Bottom: Insufficient number of data in hard bottom
47	Hard Bottom: Hard Bottom does not cover range of simulation
48	Avalanching beyond seaward boundary at time step ###
49	Avalanching beyond landward boundary at timestep ###
50	Outside range
51	Integration not valid
52	Input file to model corrupted; Contact programmer!
53	Unexpected run-time error: Contact programmer!
54	Wave: Insufficient number of data records

Table B1 SBEACH-32 Model Run-Time Errors	
Error #	**Error Description**
55	Wave Angle: Insufficient number of data records
56	Water Elevation: Insufficient number of data records
57	Wind: Insufficient number of data records
58	Run-time error: one or more input files are corrupted; contact programmer!