



**Final Report for Technical Assistance for an Ecological Evaluation of
the Southwest Florida Feasibility Study**

SWFFS Estuaries Modeling Interface User's Guide: Version 1.0

By Frank J. Mazzotti, Leonard G. Pearlstine, Kevin Chartier, Tomma Barnes and Donald
DeAngelis

Joint Ecosystem Modeling Laboratory
Technical Report Series

FINAL REPORT

for

Technical Assistance for an Ecological Evaluation of the Southwest Florida Feasibility Study

SWFFS ESTUARIES MODELING INTERFACE USER'S GUIDE: VERSION 1.0

Prepared By:

Frank J. Mazzotti¹, Leonard G. Pearlstine¹,
Kevin Chartier¹, Tomma Barnes², and Donald DeAngelis³

¹University of Florida
Ft. Lauderdale Research and Education Center
3205 College Ave
Davie, FL 33314
(954) 577-6304

²Post, Buckley, Schuh and Jernigan
3501 North Causeway Blvd., Suite 725
Metairie, LA 70001
(504) 862-1481

³United States Geological Survey
University of Miami, Dept. of Biology
1301 Memorial Dr. RM 215
Coral Gables, FL 33146

Prepared For:

South Florida Water Management District
Fort Myers Service Center
2301 McGregor Blvd.
Fort Myers, FL 33901

United States Geological Survey
1301 Memorial Dr. RM 215
Coral Gables, FL 33146
(305) 284-3974

Cooperative Agreement No. 1434-00HQAG0212
Account No. 728525712

MAY 2006

University of Florida

This report should be cited as:

Mazzotti, F.J., Pearlstine, L.G., Chartier, K., Barnes, T. and DeAngelis, D. 2006, SWFFS Coastal Biological Modeling Interface User's Guide: Version 1.0 JEM Technical Report. Final report to the South Florida Water Management District and U.S. Geological Survey. University of Florida, Florida Lauderdale Research and Education Center, Fort Lauderdale, Florida, 17 pages.

Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the University of Florida.

Although this report is in the public domain, permission must be secured from the individual copyright owners to reproduce any copyrighted material contained within this report.

Table of Contents

INTRODUCTION	5
SOUTHWEST FLORIDA FEASIBILITY STUDY	5
C43 WEST RESERVOIR	5
FORECASTING MODELS	5
HABITAT SUITABILITY INDICES	6
MODEL APPLICATIONS	6
RUNNING THE SPECIES MODELS	7
THE MODEL VIEWER INTERFACE	8
APPENDIX 1: EXPORTING MAPS, HSI VALUES AND HABITAT UNITS	12
APPENDIX A2: SETUP INSTRUCTIONS	18
I – INSTALLING THE APPLICATION	18
II – INSTALLING THE SHARED MODEL DATA	19
III – DOWNLOADING AND EXTRACTING THE SALINITY GRIDS	20
IV – DOWNLOADING AND EXTRACTING THE FLOW INFORMATION	22
V – RUNNING THE HYDROLOGY PREPARATION UTILITY	23

List of Figures

FIGURE 1. THE OPENING DIALOG BOX FOR RUNNING NEW MODELS	10
FIGURE 2. THE VIEWER INTERFACE	11
FIGURE 3. MULTI-YEAR MODEL DATA STORAGE STRUCTURE (MONTHLY TIMESTEP)	14
FIGURE 4. EXAMPLE EXPORT FILE OF MONTHLY HABITAT UNITS IN THE _M_ TEXT FILE. THE FIRST COLUMN IS THE YEAR/MONTH. THE SECOND COLUMN IS AVERAGE HSI FOR THAT MONTH. THE THIRD COLUMN IS THE TOTAL HABITAT UNITS IN ACRES FOR THAT MONTH. THE FILE IS TAB-DELIMITED FOR EASY IMPORT TO OTHER PROGRAMS SUCH AS MS EXCEL	15
FIGURE 5. EXAMPLE TAB-DELIMITED TEXT FILE FOR YEARLY OUTPUT. THE _Y_ REPORT GENERATES A FREQUENCY HISTOGRAM OF HABITAT UNITS FOR EACH YEAR IN THE MODEL RUN. THE COLUMNS ARE THE AREA IN ACRES OF HABITAT WITH HSI VALUES OF ZERO, GREATER THAN 0 TO 0.2, GREATER THAN 0.2 TO 0.4, GREATER THAN 0.4 TO 0.6, GREATER THAN 0.6 TO 0.8, AND GREATER THAN 0.8 TO 1.0	16

SWFFS Estuaries Modeling Interface User's Guide: Version 1.0

By Frank J. Mazzotti, Leonard G. Pearlstine, Kevin Chartier, Tomma Barnes and Donald DeAngelis

Introduction

A key component in adaptive management of Comprehensive Everglades Restoration Plan (CERP) projects is evaluating alternatives. Regional hydrological and ecological models will be applied to evaluate restoration alternatives and the results will be applied to modify alternatives. A user interface for running coastal southwestern Florida HSI models and analyzing their results is presented here.

Southwest Florida Feasibility Study

The Southwest Florida Feasibility Study (SWFFS) is a component of the Comprehensive Everglades Restoration Plan (CERP). The SWFFS is an independent but integrated implementation plan for CERP projects and was initiated in recognition that there were additional water resource issues (needs, problems, and opportunities) within Southwest Florida that were not being addressed directly by CERP. The SWFFS identifies, evaluates, and compares alternatives that address those additional water resource issues in Southwest Florida. An adaptive assessment strategy is being developed that will create a system-wide monitoring program to measure and interpret ecosystem responses. The SWFFS provides an essential framework to address the health and sustainability of aquatic systems. This includes a focus on water quantity and quality, flood protection, and ecological integrity.

C43 West Reservoir

The purpose of the C43 Basin Storage Reservoir project is to improve the timing, quantity, and quality of freshwater flows to the Caloosahatchee River estuary. The project includes an above ground reservoir with a total storage capacity of approximately 160,000 acre-feet and will be located in the C-43 Basin in Hendry, Glades, or Lee Counties. The initial design of the reservoir assumed 20,000 acres with water levels fluctuating up to 8 feet above grade. The final size, depth and configuration of this facility will be determined through more detailed planning and design.

Forecasting Models

Forecasting models bring together research and monitoring within ecosystems of Southwest Florida and place them into an adaptive management framework for the evaluation of alternative plans. There are two principle ways to structure adaptive management: (1) passive adaptive by which policy decisions are made based on a forecasting model and the model is

revised as monitoring data becomes available and (2) active adaptive by which management activities are implemented through statistically valid experimental design to better understand how and why natural systems respond to management (Wilhere 2002).

In an integrated approach of both passive and active adaptive management, a forecasting model simulates system response and is validated by monitoring programs to measure actual system response. Monitoring can then feedback as a passive adaptive management tool for recalibration of the forecasting model. Directed research driven by model uncertainties is an active adaptive management strategy for learning and the reduction of uncertainties in the model. The forecasting models for the C43 West Reservoir Project and the Southwest Florida Feasibility Study consist of a set of stressor response (habitat suitability) models for individual species. These stressor response models have been developed principally with literature, expert knowledge, and currently available field data.

Habitat Suitability Indices

Habitat Suitability Indices (HSI) models were developed with each stressor metric portrayed spatially and temporally across systems of the study area at scales appropriate to the organism or community being portrayed. The HSI models have been incorporated into a GIS to portray responses spatially and temporally to facilitate policy decisions. That is, the model describes a response surface of habitat suitability (HS) values that vary spatially according to stressor levels throughout the estuary and temporally according to temporal patterns in stressor variables. Areas predicted to be healthy and those predicted to be disturbed should be targeted for additional sampling as part of the model validation and adaptive management process.

The species selected for modeling (focal species) are ecologically, recreationally or economically important and have a well established linkage to stressors of management interest. They may also make good focal species because they engage the public in caring about the outcome of restoration projects. The habitat suitability models (HSI) were developed by choosing specific life stages of each species with the most limited, restricted, or tightest range of suitable conditions, in order to capture the highest sensitivities of the organisms to the environmental changes associated with the planned restoration activities.

Model Applications

The user interfaces for the habitat suitability models are presented in this document. The applications were designed to be user-friendly tools to assess the sustainability of aquatic systems using pre-determined components.

The first of these applications allows a user to create new habitat suitability model output based on hydrology scenario input. The interface of this application is illustrated in Figure 1. All outputs of the model are saved as ESRI grid files, and summary statistics (such as habitat units and average HSI) are saved as text files to allow for use in spreadsheet or other data-analysis programs.

The second application allows the user to examine the output of models that have been created with the first application. This interface allows a user to examine multiple scenarios for a single species, one year at a time. This interface is depicted in Figures 2A and 2B.

Running the Species Models

1. Refer to Figure 1. Begin the application by opening SWFFS.exe.
2. Click the folder icon to the right of the “data path” dialog box to select the directory where the project files are stored. The input files should be in a subdirectory called ‘input’. These are ESRI grid files and tables of flow, temperature, and other physical parameters as required by the individual models.
3. When the project directory is selected, the interface will automatically display the alternative hydrological model runs available.
4. Select the species models to run. Multiple species models can be selected to be run.
5. Type the starting year in the “starting year” dialog box. In the current version, it is the responsibility of the user to know what years are available for modeling.
6. Type the ending year in the “ending year” dialog box.
7. Select the alternatives to run. Multiple hydrology scenarios can be selected to be run.
8. Click the “run model” button to begin. If a run has already been completed, the user will receive a message stating such. The user may then choose to cancel the model run or continue. If the user does not respond within 30 seconds, the message will be closed and the model run will be initiated. This is to prevent such a message from halting a set of model runs that a user has initiated and left unattended.

The panels on the right hand side of the form will keep track of the model’s progress.

The ‘output’ folder will contain separate folders for each species, each alternative under a species and each year under an alternative. The output files are ESRI GIS grids of habitat suitability for each month of the year and a yearly average. Intermediate grids of some variables may also be stored, depending on the species. The ‘reports’ folder, also within the ‘output’ folder, contains the text files with summary data about each model run that has been completed. Each model run will generate two text files (Figures A1-2 and A1-3), prefixed with ‘M’ and ‘Y’ to denote whether the data have been summarized on monthly or yearly timesteps, respectively.

Exit the application by clicking on  in the upper right-hand corner of the form. To view the results of a model run, the user must first open the application viewer.exe.

The Model Viewer Interface

Figure 2 illustrates the interface of the model viewer application. This interface allows the user to display the spatial distribution of suitability values for each species as yearly or monthly distributions. The interface allows users to see more than just a single final value for each alternative scenario. It helps them understand where that value came from and the distribution of preferred habitats across the study area. In addition to mapping habitat scores, the individual component scores, such as salinity and flow, are mapped so user's can quickly assess their contribution to the overall score.

1. Refer to Figure 2. Begin the application by opening viewer.exe.
2. When the viewer starts, a dialog box opens for selecting inputs.
 - a. Use the "browse for folder" dialog box to select the data folder which should be in a subdirectory called "outputs" that was created when the models were run.
 - b. Select one species to view. Only one species can be viewed at a time.
 - c. Type the year to view in the "year" dialog box. Only one year can be viewed at a time.
 - d. Select one or more alternatives to view and click the "load data" button to load the model data into the viewer. Any number of alternatives can be selected to view in the interface. As each alternative is added, a new container of viewers is added to the display.
3. Click the "Load new data" button to redisplay the dialog box for selecting species, years, and alternatives. The new selection replaces the models currently being displayed.

Alternatives can be compared by scrolling up and down, minimizing alternatives you want to temporarily set aside, and moving alternatives up and down on the stack of containers. Controls for these operations are indicated in Figure 2.

Yearly average HSI models are shown when the models first load to the viewers (Figure 2A). When users select a location by clicking on it in the map on the left-hand side, the HSI value and all the component values that make up that HSI at that location are graphed for each month of that year.

Selecting an individual month in the toolbar at the top of the form changes the map to display modeled HSI values for the selected month. Figure 2B illustrates the monthly view for

one model run (seagrasses in this case). Each scenario is displayed in a container with spatial viewers that map the distribution of HSI values for that species in that month on the left-hand side and the distribution of values for each component that leads to the HSI scores on the right-hand side. Double-clicking on any map in the right-hand side viewers brings it up in the larger left-hand side viewer. Text boxes within the viewers show values at locations selected by users by clicking on the map. Non-spatial inputs to the HSI scores are displayed in a separate text box at the far right.

The thumbnail viewer at the top of the form and right of the legend allow users to zoom the displayed maps in order to focus in on specific areas. Clicking and dragging inside the thumbnail viewer will create a rectangular selection box and the viewers for each of the alternatives will zoom to the area outlined by the selection box. Clicking on the globe in the lower right-hand corner of the thumbnail viewer will return the maps to display of their full extent.

Exit the application by clicking on  in the upper right-hand corner of the form.

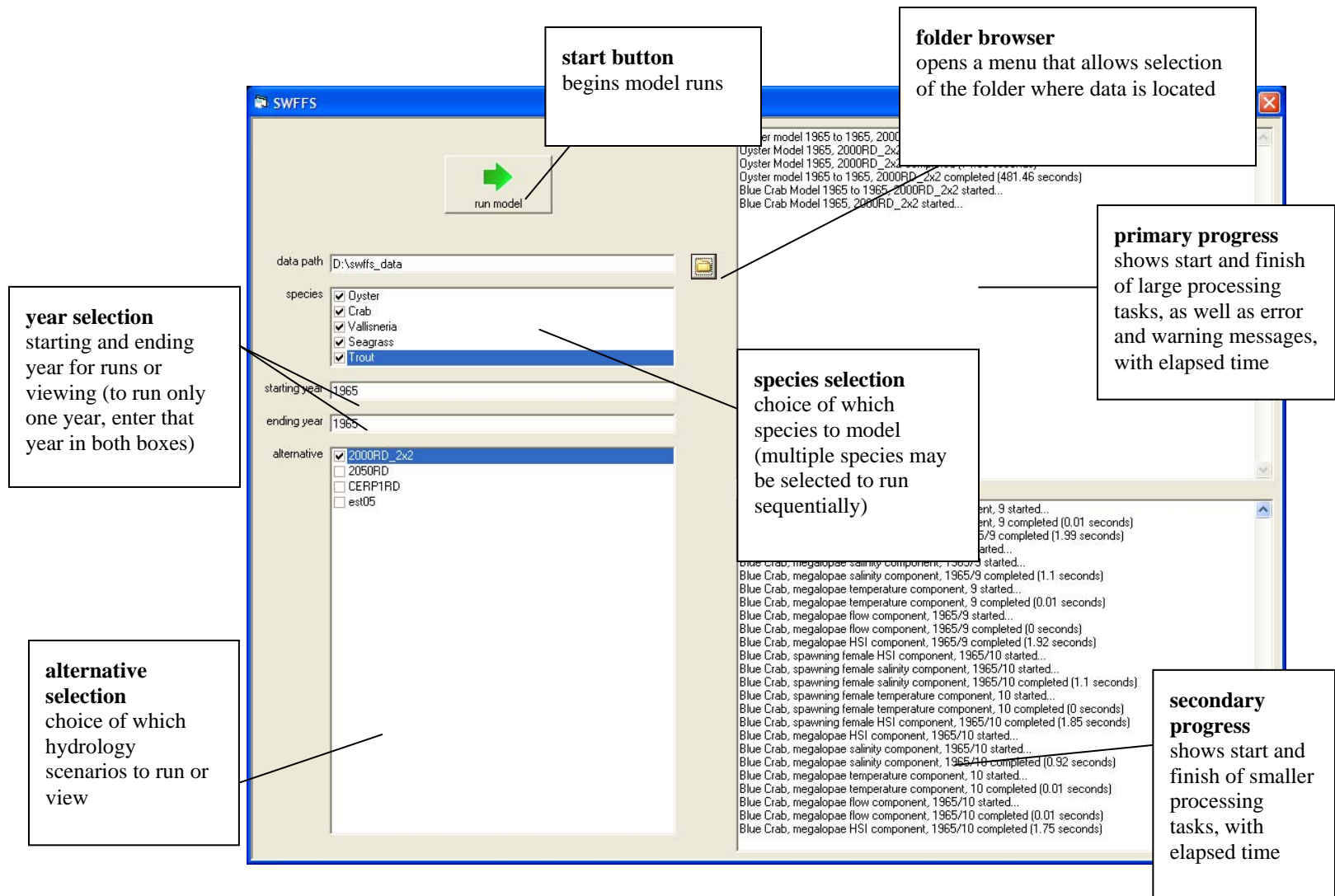


Figure 1. The opening dialog box for running new models.

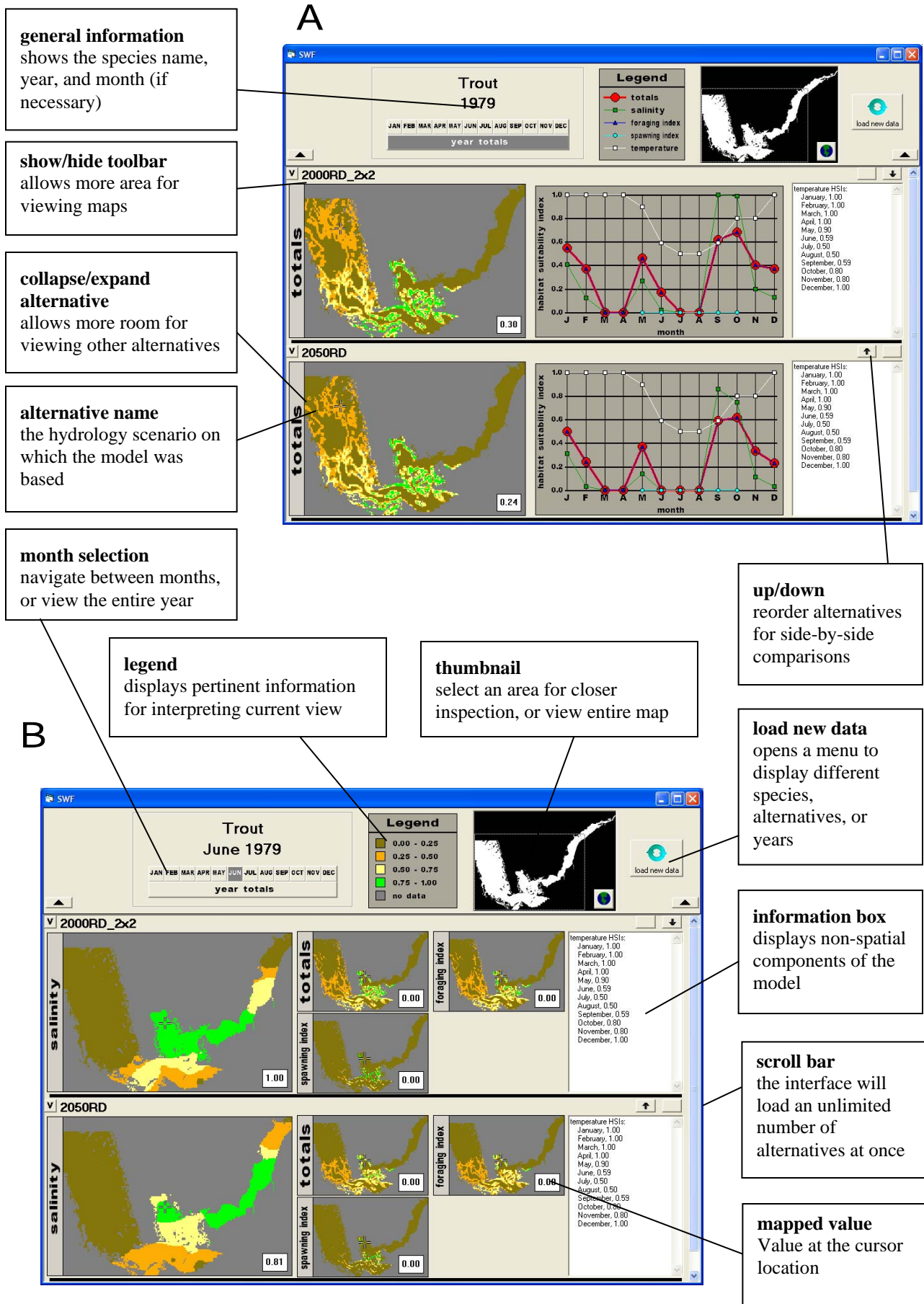


Figure 2. The viewer interface.

References Cited

Wilhere, G.F. 2002. Adaptive management in habitat conservation plans. *Conserv. Biol.* 16(1): 20-29.

Appendix 1: Exporting Maps, HSI Values and Habitat Units

All of the model inputs and outputs are organized into a simple hierarchical data structure to ease retrieval of the files by the interface and users. The user does not need to be aware of this file structure to use the interface. The interface handles file organization and retrieval transparently. However, they will need to understand this structure to retrieve maps and text files for reports and other applications outside of the interface.

Under the SWFFS modeling directory are two folders labeled 'Input' and 'Output'. The Input folder contains all of the GIS and text files required for model runs of all of the species for all of the alternatives. The 'Output' folder contains all of the results of model runs for the selected species over the selected time period for the selected alternatives. The remainder of this discussion will focus on the 'Output' folder. Figure A1 is a flow chart of the folder structure.

Under the **Output** folder are the following folders:

Reports

<**Species**> e.g., "Crab", "Oyster", etc

<**Alternative**> e.g., "2000", "est05", etc

<**Year**>

<**Component**> e.g., "Salinity", "Substrate", etc

Totals

So, if the user wants the spatial distribution of Crab HSI scores for June 1988 using the est05 alternative, the ESRI grid format GIS file of that output can be found at:

./Output/Crab/est05/1988/Totals/hsi6

The yearly average of the spatial output would be found at:

./Output/Crab/est05/1988/Totals/yearhsi

And the suitability values of the salinity component for that event are at:

./Output/Crab/est05/1988/Salinity/salinitym6

Because the crab HSI models suitability for the megalopae and spawning females separately and then combines the scores, the folder of monthly outputs and component outputs also retains the GIS files for megalopae and spawning female HSI values. This additional output will vary with the species being modeled.

The output directories will also contain tab-delimited ASCII text files after the model runs. The 'Reports' folder, in the output folder, contains two reports for every multiyear run that is initiated, one report on a monthly timestep, and another on a yearly timestep. This is a sample filename for one of these reports:

_Y_Crab_est05_1965_2000.txt

The first part of the filename 'Y', denotes that this report is on a yearly timestep. 'M' is used for the monthly timestep report. The next part 'Crab' indicates that this is the report for a run of the Crab HSI model. The next component 'est05' indicates the hydrology alternative that was used for input, and the final two components indicate the years for which the model was run. If a model is run for only a single year, these numbers would be the same (e.g. 1970_1970). Figures A1-2 and A1-3 illustrate the output of the text files.

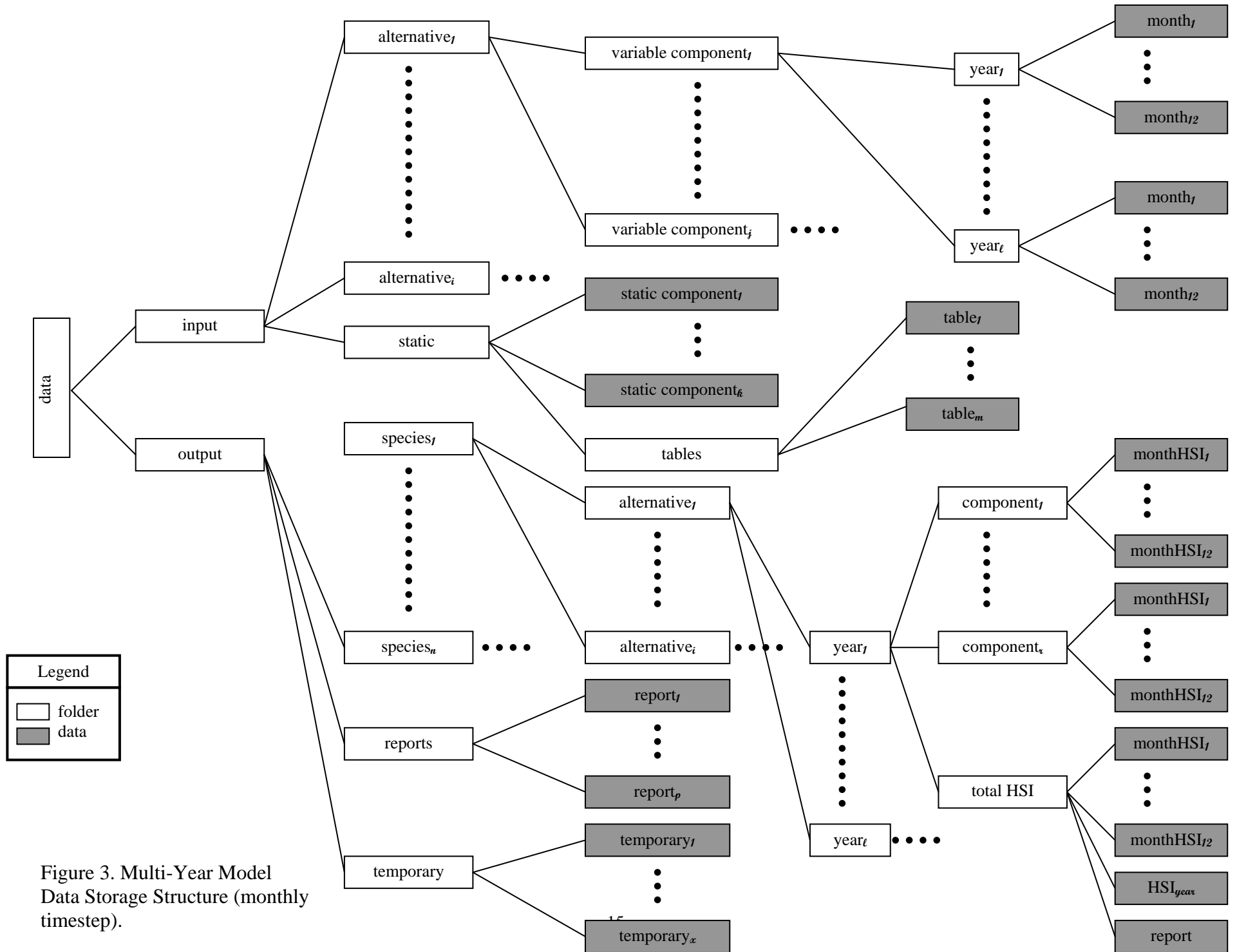


Figure 3. Multi-Year Model Data Storage Structure (monthly timestep).

the unit of area for HU is acre

month	HSI	HU
1965/3	0.98	57522
1965/4	0.88	51845
1965/5	0.72	42488
1965/6	0.66	38961
1965/7	0.66	39139
1965/8	0.63	37417
1965/9	0.74	43340
1965/10	0.82	48414
1965/11	0.95	55748
1965/12	0.84	49624
1966/3	0.96	56280
1966/4	0.93	54589
1966/5	0.72	42551
1966/6	0.66	38905
1966/7	0.55	32778
1966/8	0.52	30576
1966/9	0.6	35441
1966/10	0.88	51582
1966/11	0.92	53889
1966/12	0.84	49384
1967/3	0.98	57871
1967/4	0.86	50850
1967/5	0.71	42147
1967/6	0.76	44725
1967/7	0.64	37716
1967/8	0.67	39246
1967/9	0.74	43616
1967/10	0.82	48334
1967/11	0.93	54716
1967/12	0.85	50278
1968/3	0.91	53483
1968/4	0.86	50847
1968/5	0.75	44363
1968/6	0.61	35732
1968/7	0.52	30471
1968/8	0.66	38653
1968/9	0.73	42832
1968/10	0.88	51634
1968/11	0.97	56794

Figure 4. Example export file of monthly habitat units in The _M_ text file. The first column is the year/month. The second column is average HSI for that month. The third column is the total habitat units in acres for that month. The file is tab-delimited for easy import to other programs such as MS Excel.

the unit of measure is acre, except average HSI

0.0: cell = 0.0
0.2: 0.0 < cell <= 0.2
0.4: 0.2 < cell <= 0.4
0.6: 0.4 < cell <= 0.6
0.8: 0.6 < cell <= 0.8
1.0: 0.8 < cell <= 1.0

year	0.0	0.2	0.4	0.6	0.8	1.0	HSI	HU
1965	0	0	0	1906	23573	33062	0.79	46695
1966	0	0	422	2524	20272	35322	0.76	44828
1967	0	0	0	15	22585	35940	0.8	47193
1968	0	0	68	2027	32529	23916	0.78	45729
1969	0	2297	934	4842	9600	40867	0.74	43853
1970	0	0	0	4948	23626	29968	0.76	44708
1971	0	0	0	0	36505	22036	0.78	46197
1972	0	0	0	0	25173	33369	0.8	46836
1973	0	0	0	0	24523	34018	0.8	47279
1974	0	0	0	1510	40154	16877	0.76	44569
1975	0	0	0	15	30707	27819	0.79	46399
1976	0	0	0	0	23726	34816	0.81	47472
1977	0	0	0	0	25516	33025	0.8	47073
1978	0	0	0	0	34504	24037	0.8	46931
1979	0	0	0	1800	23288	33453	0.78	46026
1980	0	0	0	0	25363	33178	0.79	46791
1981	0	0	0	0	29387	29155	0.79	46512
1982	0	0	1135	6199	14886	36321	0.74	43598
1983	0	0	2133	4266	11295	40846	0.76	44610
1984	0	0	0	459	31404	26678	0.78	46159
1985	0	0	0	0	26863	31679	0.79	46516
1986	0	0	0	36	33490	25014	0.8	46921
1987	0	0	0	2096	6754	49691	0.8	47256
1988	0	0	0	0	27396	31145	0.79	46407
1989	0	0	0	0	24956	33585	0.8	47111
1990	0	0	0	0	29376	29165	0.78	46190
1991	0	0	0	1520	32270	24750	0.79	46348
1992	0	0	0	1716	16312	40513	0.79	46726
1993	0	0	0	1151	23567	33823	0.8	47154
1994	0	1251	1204	2276	11327	42483	0.76	44725
1995	0	2122	438	8729	8343	38908	0.73	43266
1996	0	0	0	2133	26255	30153	0.79	46460

Figure 5. Example tab-delimited text file for yearly output. The `_Y_` report generates a frequency histogram of habitat units for each year in the model run. The columns are the area in acres of habitat with HSI values of zero, greater than 0 to 0.2, greater than 0.2 to 0.4, greater than 0.4 to 0.6, greater than 0.6 to 0.8, and greater than 0.8 to 1.0.

Appendix A2: Setup Instructions

I – Installing the application

In this section, you will save the modeling application to your computer. In order to run this application, you will need to have ArcGIS installed on your computer. After this application is saved to your computer, you will be guided through the installation of the data necessary to run the models.

1. Open the following Web site (hold down the “Ctrl” key and click the link with your mouse):

<http://jem.ifas.ufl.edu/swffs/>

2. *Right-click* on “Download SWFFS application.” Select “Save Target As” or “Save Link As” from the pop-up menu (this selection varies based on the browser you are using).
3. If you are given the option to run or save the file, choose to save it. The file may be saved in any location; choose a location where it will be easy to find the file later.

II – Installing the shared model data

In this section, you will install the shared model data to your computer. This is the data that is required by the models, regardless of the input hydrology scenario. Following this, you will be guided through the installation of the hydrology data, after which you will be able to complete runs of the models.

1. Open the following Web site, if it is not still open from the previous section:

<http://jem.ifas.ufl.edu/swffs/>
2. *Right-click* on “Download shared model data.” Select “Save Target As” or “Save Link As” from the pop-up menu (this selection varies based on the browser you are using). Save the file in any location.
3. *Right-click* on the file you just downloaded (SWFFS_data.zip), and select “Extract All.”
4. You may receive a message stating that the compressed folders utility must be associated with zip files in order to work properly. If you do not receive this message, skip to step 5. If you do receive this message, click “Yes” on this message box and go to step 5 (this will not make any changes to your computer).
5. On the first step, click “Next.”
6. In the text box under “Files will be extracted to this directory,” replace the default directory with “C:\SWFFS”
7. Click “Next.”
8. A progress bar will appear to show you how much of the extraction process has completed. Wait for this process to complete. *Do not click the “Next” button again.*
9. You will see a message stating that the process has completed successfully. If the box next to “Show extracted files” is checked, click on it to remove the check mark.
10. Click “Finish.”

III – Downloading and extracting the salinity grids

Sections III through V guide you through the process of downloading a hydrology scenario and preparing it for the model. Sections III and V need to be completed for every hydrology scenario, while section IV only needs to be completed once.

1. Open the following Web site, if it is not still open from the previous section:

<http://jem.ifas.ufl.edu/swffs/>

2. Click on the link “Hydrology data, provided by the United States Army Corp of Engineers.” This will bring you to the Corp site that has the hydrology data for these models. Depending on the browser, this may open in a new window, or it may open in your current window.
3. If you are using Internet Explorer, you may be unable to see the full names of the files. If this happens, click on the “View” menu at the top of the window, and select “Details.”
4. If you are using Internet Explorer, go to step 5. If you are using Mozilla Firefox, go to step 6. If you do not know which browser you are using, it is probably Internet Explorer.
5. Download the hydrology zip file. *Right-click* on the file, and select “Copy.” Then, go to the folder where you want to save this file (or your desktop), *right-click* on an empty space, and select “Paste.”
6. Download the hydrology zip file. *Right-click* on the file, and select “Save Link As.” In the dialog box that appears, choose the location for the file, and click “Save.”
7. *Right-click* on the file you just downloaded, and select “Extract All.”
8. You may receive a message stating that the compressed folders utility must be associated with zip files in order to work properly. If you do not receive this message, skip to step 9. If you do receive this message, click “Yes” on this message box and go to step 9 (this will not make any changes to your computer).
9. On the first step, click “Next.”
10. In the text box under “Files will be extracted to this directory,” replace the default directory with “C:\SWFFSHydro*hydrology_name*”. Replace “*hydrology_name*” with a name that describes the hydrology scenario you are extracting (e.g. *2000 base, 2050 base, Alt3c NAI, etc.*)
11. Click “Next.”

12. A progress bar will appear to show you how much of the extraction process has completed. Wait for this process to complete. *Do not click the “Next” button again.*
13. You will see a message stating that the process has completed successfully. If the box next to “Show extracted files” is checked, click on it to remove the check mark.
14. Click “Finish.”

IV – Downloading and extracting the flow information

If you have completed this section for a previous hydrology scenario, you may skip to section V now. In this section, you will download the flow information for the models and place this information in the same location where you extracted the salinity information in the previous section. Following this section, you will run the hydrology preparation utility, after which you will be able to run the model.

1. Open the following Web site, if it is not still open from the previous section:

<http://jem.ifas.ufl.edu/swffs/>

2. *Right-click* on “Download flow data.” Select “Save Target As” or “Save Link As” from the pop-up menu (this selection varies based on the browser you are using). Save the file in any location.
3. *Right-click* on the file you just downloaded (flows.zip), and select “Extract All.”
4. You may receive a message stating that the compressed folders utility must be associated with zip files in order to work properly. If you do not receive this message, skip to step 5. If you do receive this message, click “Yes” on this message box and go to step 5 (this will not make any changes to your computer).
5. On the first step, click “Next.”
6. In the text box under “Files will be extracted to this directory,” replace the default directory with “C:\SWFFSHydro”
7. Click “Next.”
8. A progress bar will appear to show you how much of the extraction process has completed. Wait for this process to complete. *Do not click the “Next” button again.*
9. You will see a message stating that the process has completed successfully. If the box next to “Show extracted files” is checked, click on it to remove the check mark.
10. Click “Finish.”

V – Running the hydrology preparation utility

The final step in this process will prepare the hydrology data you previously downloaded for input into the model. After this section, you may run the model.

1. Open the following Web site:

<http://jem.ifas.ufl.edu/swffs/>

2. *Right-click* on “Download hydrology utility.” Select “Save Target As” or “Save Link As” from the pop-up menu (this selection varies based on the browser you are using).
3. If you are given the option to run or save the file, choose to save it. The file may be saved in any location.
4. Open the file you just saved (double-click the file – “hydro.exe”).
5. Click on the folder icon on the line labeled “salinity grids.” This will open a “Browse for Folder” dialog box.
6. Browse to the location where you extracted the salinity grids in section III. This is of the form “C:\SWFFShydro\hydrology_name,” where “hydrology_name” is the name of the hydrology scenario that you specified in that section. Click to highlight the “hydrology_name” folder, and click “OK.”
7. Click on the folder icon on the line labeled “flow file.” This will open another “Browse for Folder” dialog box.
8. Browse to the location where you extracted the flow data in section IV. This folder should be “C:\SWFFShydro\flows.”
9. Click to highlight the flow file that corresponds to the salinity data you selected in step 6. Click “OK.”
10. Click on the folder icon on the line labeled “model data path.” This will open a “Browse for Folder” dialog box.
11. Browse to the location where you extracted the shared model data in section II. This should be “C:\SWFFS.” Click to highlight the “SWFFS” folder, and click “OK.”
12. Click once on the green arrow button.
13. The text boxes on the right side of the window show the progress of the preparation of hydrology data.

14. The progress box on the right side will say “ALL OPERATIONS COMPLETE.”

You have completed all steps necessary to allow you to run the SWFFS modeling application. You may now open “SWFFS.exe,” which you saved to your computer in section I.