RSMGUI
User Guide

Regional Simulation Model Graphical User Interface

RSMGUI Ver. 4.1.7 (64bit)
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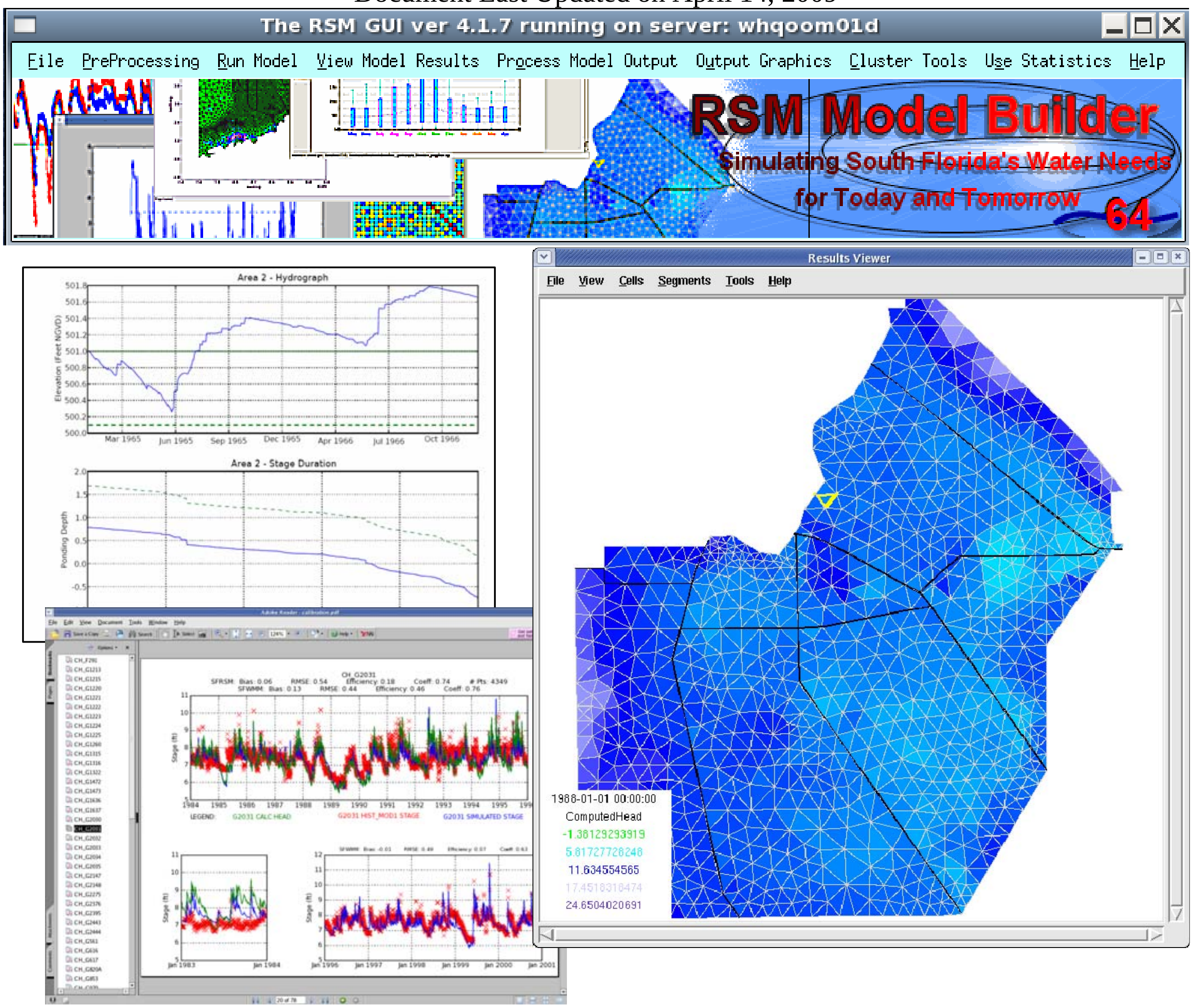

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Revision History for
The Regional Simulation Model (RSM)
Graphical User Interface (GUI) User Guide

Version	Name	Date	Comments
1.0	Rick Miessau	2/9/2007	Initial Version.
3.0.4	Rick Miessau	12/11/2007	Version 3.0.4 Release update
3.0.11	Rick Miessau	3/28/2008	Version 3.0.11 Release update
3.0.13	Rick Miessau	4/18/2008	Version 3.0.13 Release update
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3.0.17	Rick Miessau	6/20/2008	Final 32bit version of RSMGUI 3.0.17b
3.0.17b	Rick Miessau	6/30/2008	Updated to reflect all tools in the final 32bit version
4.0.0	Rick Miessau	6/30/2008	Version 4.0.0 64bit Release Update
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4.1.4	Rick Miessau	2/4/2009	Version 4.1.3 update Updated cover, Google Earth Animation New: Vector QA, Parameter Sensitivity, Google Mesh Variable
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4.1.7	Rick Miessau		Version 4.1.7 update Updated: waterbody_PLOT, CAT, watermover _PLOT, CAT

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Preface

This document is a guide to using the Regional Simulation Model (RSM) Graphical User Interface (GUI). The RSM GUI is a collection of tools and data methods organized under a common toolbar to aid and simplify preparing and analyzing an RSM model run. A geographic information system (GIS) has been utilized to capture and organize the data representing the physical features in the model such as; the mesh, canals, structures and complex interconnectivity of the features in the hydrologic system. At the time of this writing, the RSM GUI helps automate approximately 90% of the input files and provides 66 post-processing features. Version 4.0.0 is the first 64bit version of the RSM GUI. Users on a 32bit computer can run the rsmgui32 command to access an older version of the RSM GUI that is unsupported, but should run on a 32bit computer.

Acknowledgements

The South Florida Water Management District gratefully acknowledges the contributions of the professionals who have made this project a reality. The RSM Graphical User Interface has been evolving over several years and many people have contributed to this development effort.

Project Manager: Rick Miessau, Project Manager has organized and led this effort while trying to keep pace with the evolving state of the RSM and changing needs of the RSM model implementers. While diligently sticking to a requirements driven approach the GUI development has been carried out following a rapid or extreme programming methodology.

Principal Engineers: Michael “Clay” Brown, Sr. Hydrologic Modeler and Dr. Eric Flaig PhD, Sr. Engineer and Dr. Ruben Arteaga, Lead Hydrologic Modeler were the principal engineers from whom the high level requirements were gathered. Clay has provided the GUI development team with a combined perspective of both an implementer of the RSM, a developer of GIS and a GUI application developer. Eric has provided training support, engineering insight and quality assurances throughout the life of this effort.

Development Team: The RSM GUI has been designed and developed by Aimond Alexis, Joseph Rodrigues, Mike Warner, Charles Haynes and Bruce Hammond (contractor) and incorporates contributions from other very talented programmers. Vic Kelson is especially recognized for contributing the design and XML interface for the original RSM GUI.

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Chapter 1

Introduction

The Regional Simulation Model (RSM) is a regional hydrologic model developed principally for application in South Florida. The RSM simulates the coupled movement and distribution of groundwater and surface water throughout the model domain using a Hydrologic Simulation Engine (HSE) to simulate the natural hydrology and a Management Simulation Engine (MSE) to provide a wide-range of operational capability. The RSM has been developed on a sound conceptual and mathematical framework that allows it to be applied generically to a wide range of hydrologic situations. The RSM HSE Users Manual should be consulted for the guiding principals and engineering specifics on how an RSM model should be set up to properly model hydrologic alternatives. This RSM GUI User Manual has been written as a companion to the RSM HSE User Manual. New users of the RSM should attend the RSM Training class after which this manual will offer practical assistance and step-by-step instructions on how to pre- and post-process an implementation of the RSM.

1.1 RSM GUI Programming Information

The RSM GUI has been written using the Python programming language. The RSM GIS Toolbar, which a collection of pre-processing tools has been written in C-sharp (C#) and runs inside of ESRI's ArcGIS 9.2. As the RSM continues to evolve and take on new the RSM GUI will also evolve to meet the changing needs of the modelers.

As of March 2009, the RSM GIS Toolbar contains 37 pre-processing functions. The RSM GUI contains 67 features to run and post-process RSM data.

All sample data referenced within this manual can be found on the **whqoom01d** server in:

➲ **`/opt/local/share3/share/samples/`**

1.2 Programming Dependencies on the Geodatabase

Early on in the design phase of the RSM GUI an ESRI ArcGIS personal geodatabase was chosen to be the primary repository for all spatial data. This geodatabase contains descriptions and attributes pertaining to all physical features being simulated by an RSM run. Once the attributes in the geodatabase have been setup to represent the desired conditions to be modeled, the GUI tools read the geodatabase and automate assembly of the RSM input files. Work is under way to migrate the RSM personal geodatabase to an Arc SDE versioned database.

The data elements stored in the RSM geodatabase were selected based on the needs of the modelers and the prescribed content of the model input files. The geodatbase schema was designed to facilitate development of applications to automatically generate the RSM files. While the database schema must be adhered to for the RSM GUI tools to work, the schema can also be expanded to fit each modelers specific application of the RSM. A guiding principle of implementing a standard data schema and offering flexible user options has strongly influenced the GUI development. The RSM geodatabase schema can be reviewed via the published geodatabase report in Appendix A.

1.3 How Are RSM Input Files Generated?

Input files for the RSM can be created a number of different ways: by-hand, by running custom scripts, by the RSM GIS tools or copied from other users. The recommended method for creating RSM input files is to assemble a geodatabase based on the RSM schema and generate the files using the RSM GIS tools. This ensures consistency of formatting and the use of documented methods. The resulting files can be verified and are self-documenting using contents in the geodatabase used to create the files.

Once the modeler is satisfied with the data parameters the GUI has been designed to function very efficiently against the data schema and offer a fully automated process to generate the files needed to assemble an RSM run. Several of the tools are single click applications, yet they perform full geo-processing and generate files base on geospatial relationships within the geodatabase. By generating all RSM input files from a geodatabase the files themselves become expendable and can always be easily re-generated from the database using the GUI. The RSM GIS tools provide self-documenting header information to help identify the geodatabase from which the resulting files were generated.

1.4 How This Manual Should Be Used

This RSM GUI Manual does not make any attempt to guide or explain engineering principles behind setting up a model run; rather it covers the steps taken by a modeler while setting up a simulation only after the conditions to be reflected in the model have been chosen. The template geodatabase has been designed to contain sufficient information to represent the range of conditions and interactions expected to be included in the south Florida hydrologic network.

Following the steps in this manual should help guide a modeler in setting up their own RSM run using their own data. Given the flexibility in the RSM and the broad-range of ways to configure a run we tried to choose the best examples offering some of the most common ways the model is being used at the time of writing this manual. By following the examples in this manual, modelers should gain a basic understanding of how to assemble RSM input files using the RSM GUI.

Figure 1 is a workflow diagram showing how the data is assembled in the geodatabase during the setup of a typical RSM simulation.

SYMBOLS

▶ Indicates steps taken to perform a specific task and should be tried by the reader of this manual

➲ Indicates a valuable tip containing specific requirements, conditions or assumptions

SFWMD ONLY Indicates features only available to users on the SFWMD network

The examples used in this manual are intended to provide a step-by-step example on how to use each tool in the RSM GUI. The examples chosen are based on the RSM benchmarks and an implemented C-111 basin run. All sample data used in these examples are available on the server where the RSM GUI is being run or they can be found on the RSM DVD.

➲ Sample GIS Data Location: /opt/local/share3/share/samples/

Chapter 2

General Overview

2.1 RSM GUI Vision Statement

The vision statement for the RSM GUI is to deliver a graphical interface that will help make the RSM the most admired and widely used hydrologic model. The RSM GUI will be a comprehensive, easy-to-use modeling interface that will deliver output from the RSM in support of the DISTRICT's scientific, engineering and decision making processes.

2.2 Some Important Things to Know

There are some tips to keep in mind when building an RSM implementation. Understanding some of these important details and concepts will hopefully help modelers avoid making costly and time consuming mistakes.

Tip 1: Every new RSM implementation should have an accompanying RSM compliant geodatabase that organizes the mesh, and physical features being represented in the model.

Tip 2: When it is necessary to make changes to RSM input files, the changes should be applied to the geodatabase and then the RSM input files should be regenerated using the RSM GIS Tools.

Tip 3: The RSM geodatabase can be added to but DO NOT remove any of the attributes that are part of the original template geodatabase. If the required features in the geodatabase are deleted or changed the RSM GIS pre-processing tools will not function correctly.

Tip 4: The RSM GIS Toolbar is primarily maintained to run in GIS 9.2 on the SFWMD Citrix server.

Tip 5: To run the RSM GUI from your Linux workspace, your environment setup files should contain the latest updates which can be found in: /opt/local/share3/bin/
.cshrc, .login, .bashrc, .bash_profile

2.3 RSM Basics

To help orient new users, the following describes, in an overly simplified manner, the basic steps to building an implementation of the RSM.

Step 1: Build a Mesh
Currently GMS is the preferred method for building an RSM mesh. The mesh should be exported from GMS as a .2dm file.

Steps 2-7 assume you have access to an ESRI ArcGIS9.2 environment.

Step 2: Build RSM Geodatabase
Using ArcGIS9.2, open the RSM GIS Toolbar and select the Mesh Import tool. Import the .2dm file from GMS and combine it with the RSM Template Geodatabase. The resulting new geodatabase will use the .2dm mesh file to cookie-cut data layers from the template geodatabase.

Step 3: Intersect Mesh with Desired attributes
Open the RSM GIS Toolbar and select the Mesh Intersect Tool. This tool provides a method to populate the mesh with attributes such as soil_type, landuse_type, topo_elevation, etc.

Step 4: Assign Canal Attributes
Use the basic GIS functionality to select and assign attributes to the canal network such as width, slope, bottom_elevation, mannings_coefficient, etc.

Step 5: Assign Structure Attributes
Use the basic GIS functionality to select and assign attributes to the structures such as length, diameter, discharge_coefficient, etc.

Step 6: Assign Levee and Boundary Conditions
Use the basic GIS functionality to select and assign attributes to the mesh_framework layer to define boundary conditions and levees. Assign a levee type or boundary type and set the condition to enabled.

Step 7: Generate the RSM Input Files
Open the RSM GIS Toolbar and select the Generate XML Menu. These tools provide a method to easily generate RSM compliant XML files from information in the geodatabase.

The remaining steps assume you are working from a Linux workspace.

Step 8: Gather Standard Input Files
Several input files are "standard" for all RSM implementations. These files should be gathered from appropriate sources: ETp_recomputed_tin.bin, Rain_v2.0-global.bin, mannings_prop.xml, evap_prop.xml, DSS input files, etc.

Step 9: Setup Model Run
Setup a directory for your model based on a previous run. Sub-folders such as: input, run_template and workspace should be created. Copy your newly created input files into the appropriate locations.

Step 10: Create the Run XML
Copy an existing run.xml to use as a template. Open the RSM GUI and select the Scenario Builder Tool from under the PreProcessing Menu which will help build XML blocks that can be copied into your run.xml. Start simple and add complexity. Make sure path references are correct.

Step 11: Run the RSM
Run your model. Make sure you are using a current version of the HSE and DTD files.

Step 12: View Your RSM Output
Open the RSM GUI and select from the variety of post-processing tools under the View Model Results Menu, the Process Model Output Menu, or the Output Graphics Menu.

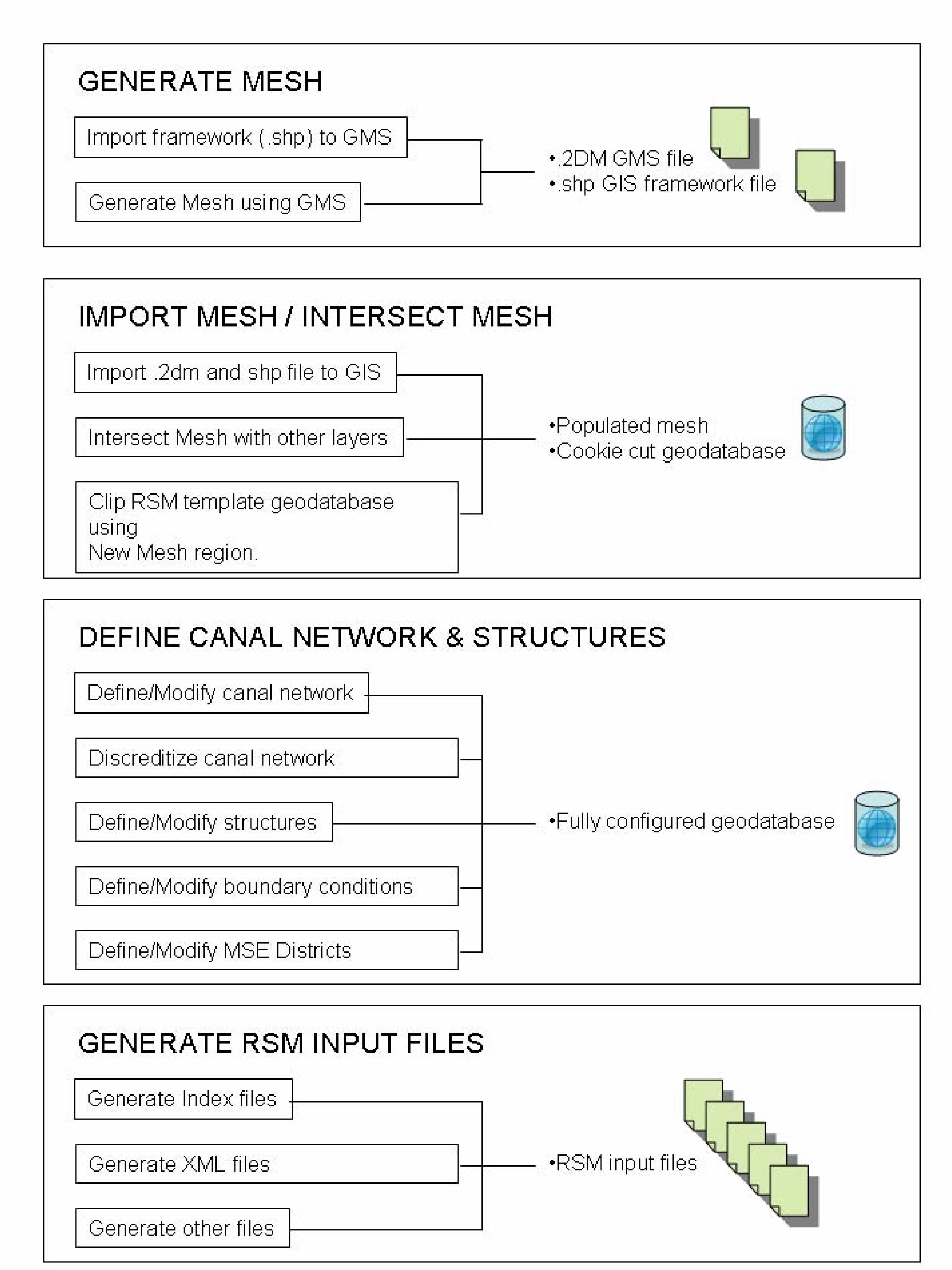


Figure 1: RSM GUI GIS Workflow Diagram.

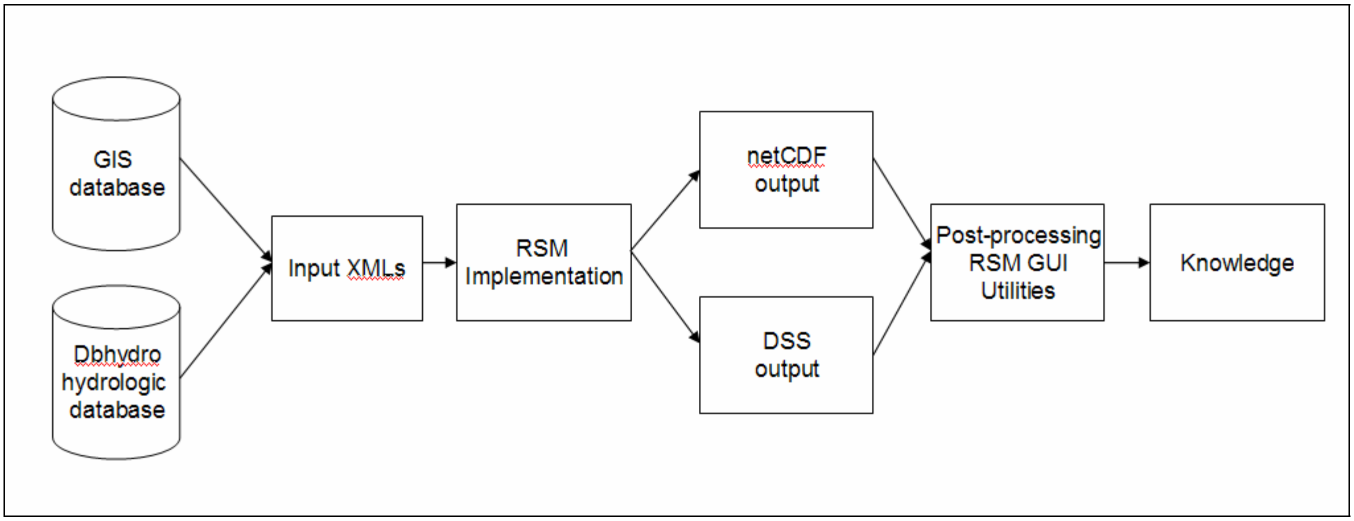


Figure 2: RSM Process Flow Diagram

Chapter 3

Getting Started in GIS and Accessing the RSM GIS Toolbar

This chapter describes the pre-processing steps and usage of the tools in the RSM Geographic Information System Toolbar (RSM GIS TOOLBAR) to generate the input files needed to execute the Regional Simulation Model.

The first step in preparing an RSM model is to start ArcGIS and assemble the spatial data into an RSM compliant personal geodatabase schema. The RSM GIS TOOLBAR can be accessed via the SFWMD Citrix GIS environment. If you are a new GIS user it would benefit you to attend SFWMD GIS I and II training classes. Ideally, modelers will also have attended the GIS for RSM Overview Training Class which helps orient new GIS users to the specific terminology and data elements used as part of RSM. This chapter will cover getting started in Citrix, accessing the RSM Toolbar and some of the fundamental RSM GIS terminology.

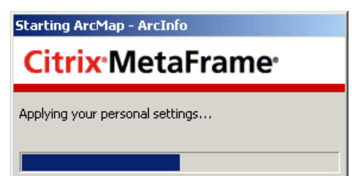
➲ The RSM GIS Toolbar can also be installed locally for users running on a local copy of Arc GIS 9.2. Contact a member of the RSM GUI Development team to request help installing the RSM GIS Toolbar on your local PC.

3.1 Open RSM Template Geodatabase in ArcGIS Using Citrix

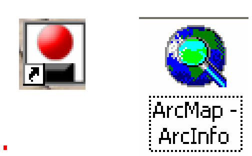
An ArcGIS template geodatabase with a geometric network is used to store the RSM geographic data representing the mesh, canal network, watermovers and boundary conditions. Associated tables within the geodatabase contain information describing all features and attributes and can be queried to view conditions that will be represented in the RSM. You must have your own copy of the personal geodatabase to allow write access to the data.

Copy the sample RSM Geodatabase from this location: \\opt\local\share3\share\samples\gis\c-111_12_5a.mdb and copy it to a location where Citrix can access it such as your local harddrive.

SFWMD ONLY



- Start Citrix on the SFWMD network
- From the users desktop locate and open the icon called Citrix Program Neighborhood.
- Open the folder named ArcGIS v9
- Open the folder named ArcInfo
- Open double-click the icon named ArcMap-ArcInfo
- When ArcGIS opens, select “A New Empty map” and click OK.
- When the new map opens, right-click on Layers, under the Source tab, on the right side of the window and select Add Data.
- Navigate to your copy of c-111_12_5a.mdb. Select the icon at the top of the window to “Connect to Folder”. Select C$ on ‘Client’ (V:) Find and double click the geodatabase on your local drive.
- Select all features in the geodatabase by left-clicking on the first feature, hold down the shift button on your keyboard and then left-click the last feature in the list. Then click add.



- After the map has drawn, zoom to the mesh by right-clicking on the layer named “mesh” and selecting “Zoom to Layer”.
- Finally uncheck the boxes next to the layers named: sfrsm_gis_Net_Junctions, mesh_node, mesh_pnt, sfrsm_gis_Net2_Junctions, and watersheds.

Your personal copy of the Master RSM Geodatabase contains the RSM scheme and all the base attribute information and hydrologic network necessary for the RSM. The database schema within the geodatabase is required in order to use the custom RSM GIS tools. Explore the attribute tables and view the relational tables.

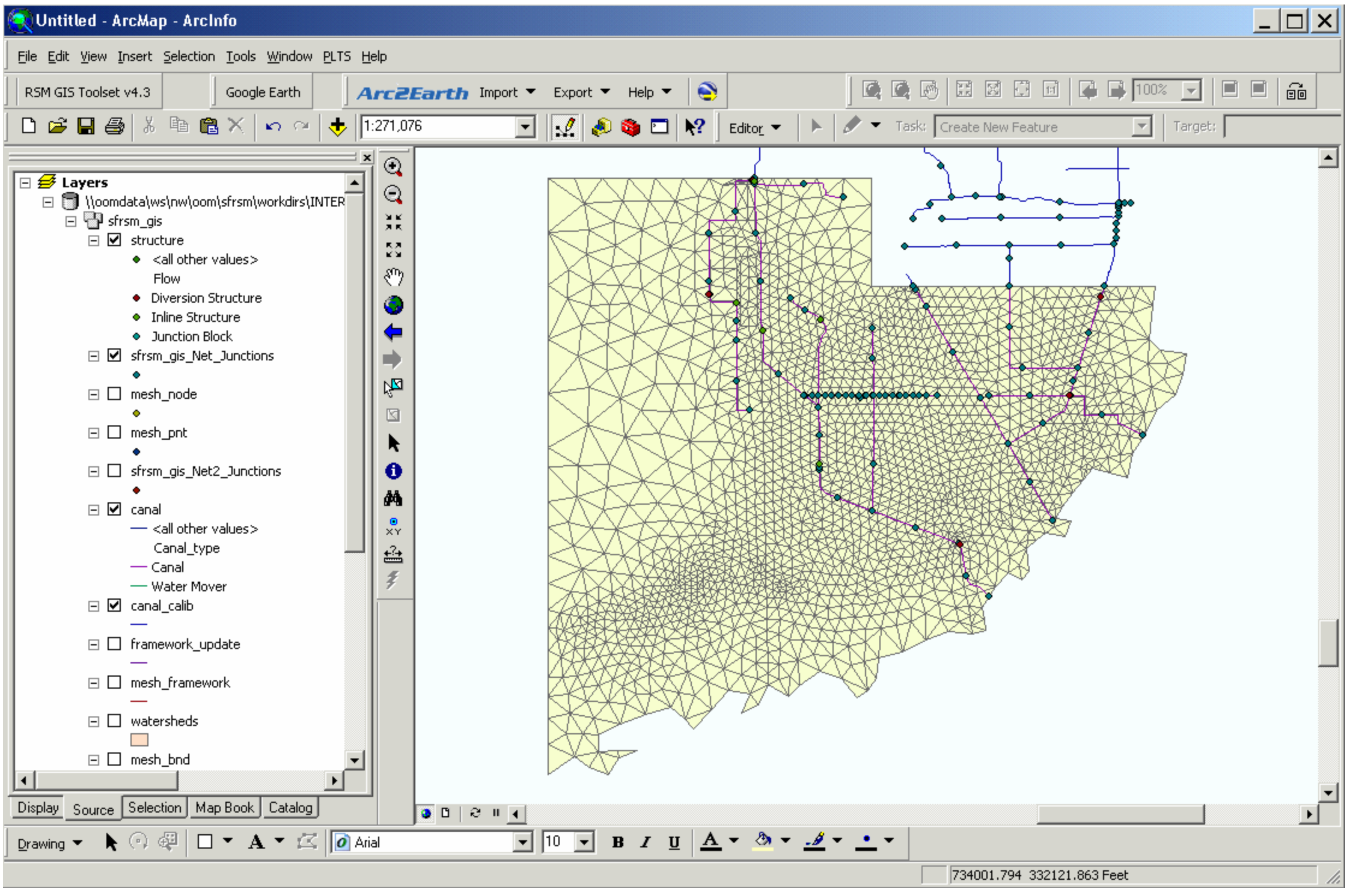


Figure 3: View of the c-111_12_5a.mdb geodatabase

3.2 RSM GIS Major Elements

The geodatabase (mesh_import_template.mdb) provides a chance to explore the data schema and view the data objects expected to be present in a typical RSM model. The geodatabase has been designed to include class objects, relationship classes, domains, geometric network and attribute field names to help organize and contain the information needed to assemble RSM input files and to also support the development of the RSM GIS customized tools. A complete RSM Geodatabase Report is included in **Appendix F**.

GEODATABASE SUMMARY REPORT			
Object Name	**Object Type**	**Geometry**	**Subtypes**
canal_has_mse_unit	RelationshipClass	Canal->mse_unit	
canal	Complex Edge	Polyline	canal water mover
mesh_bnd	Simple Feature	Polyline	none
mesh_framework	Simple Edge	Polyline	none
mesh_node	Simple Junction	Point	none
mesh_pnt	Simple Feature	Point	none
mesh	Simple Feature	Polygon	none
sfrsm_gis_net_junctions	Simple Junction	Point	none
sfrsm_Net	Geometric Network		
sfrsm_gis_Net2_junctions	Simple Junction	Point	none
Sfrsm_gis_Net2	Geometric Network		
structure_has_culvert_box	RelationshipClass	structure->culvert_box	none
structure_has_culvert_circular	RelationshipClass	structure->culvert_circular	
structure_has_fixed_weir	RelationshipClass	structure->fixed_weir	
structure_has_mes_unit	RelationshipClass	structure->mse_unit	
structure_has_pump	RelationshipClass	structure->pump	
structure_has_spillway	RelationshipClass	structure->spillway	
structure_has_variable_weir	RelationshipClass	structure->variable_weir	
structure	Simple Junction	Point	Diversion Structure Inline Structure Junction Block
watersheds	Simple Feature	Polygon	None
culvert_box	Table	none	None
culvert_circular	Table	none	None
fixed_weir	Table	none	None
genstruc	Table	none	None
mse_const	Table	none	None
mse_dss	Table	none	None
mse_inout	Table	none	None
mse_node	Table	none	None
mse_rc	Table	none	None
mse_unit	Table	none	None
pump	Table	none	None

spillway	Table	none	None
variable_weir	Table	none	None
boundary	Domain	Coded Value	
EnabledDomain	Domain	Coded Value	
rc_domain	Domain	Range	
vaule	Domain	Coded Value	
WM_type	Domain	Coded Value	

Table 1: Sample RSM Geodatabase Summary Report

➲ Use the GIS ⓘ Identify Tool to select and view features on the screen. Click on any cell in the mesh and view the attributes.

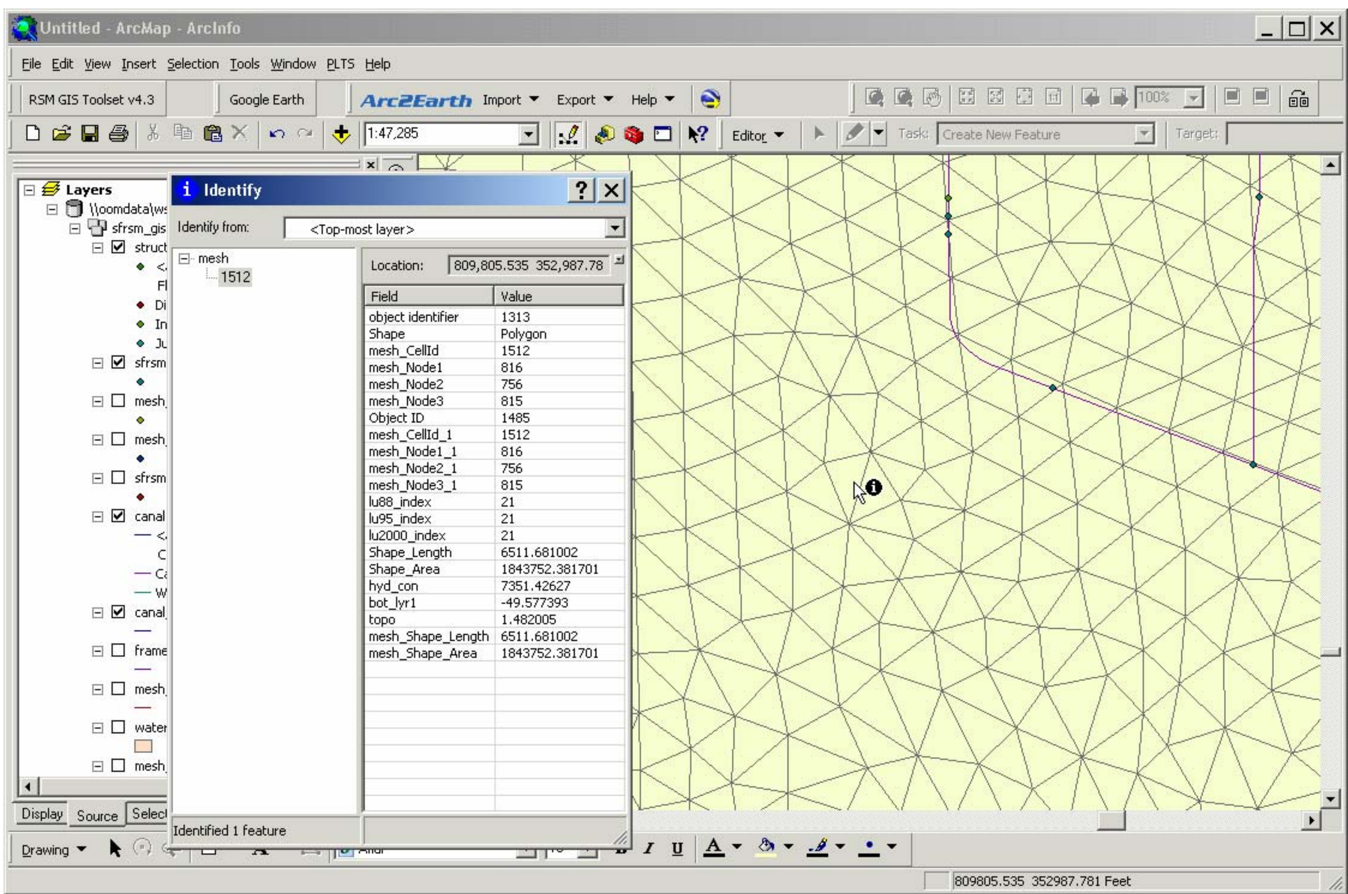


Figure 4: Using the GIS Identify Tool

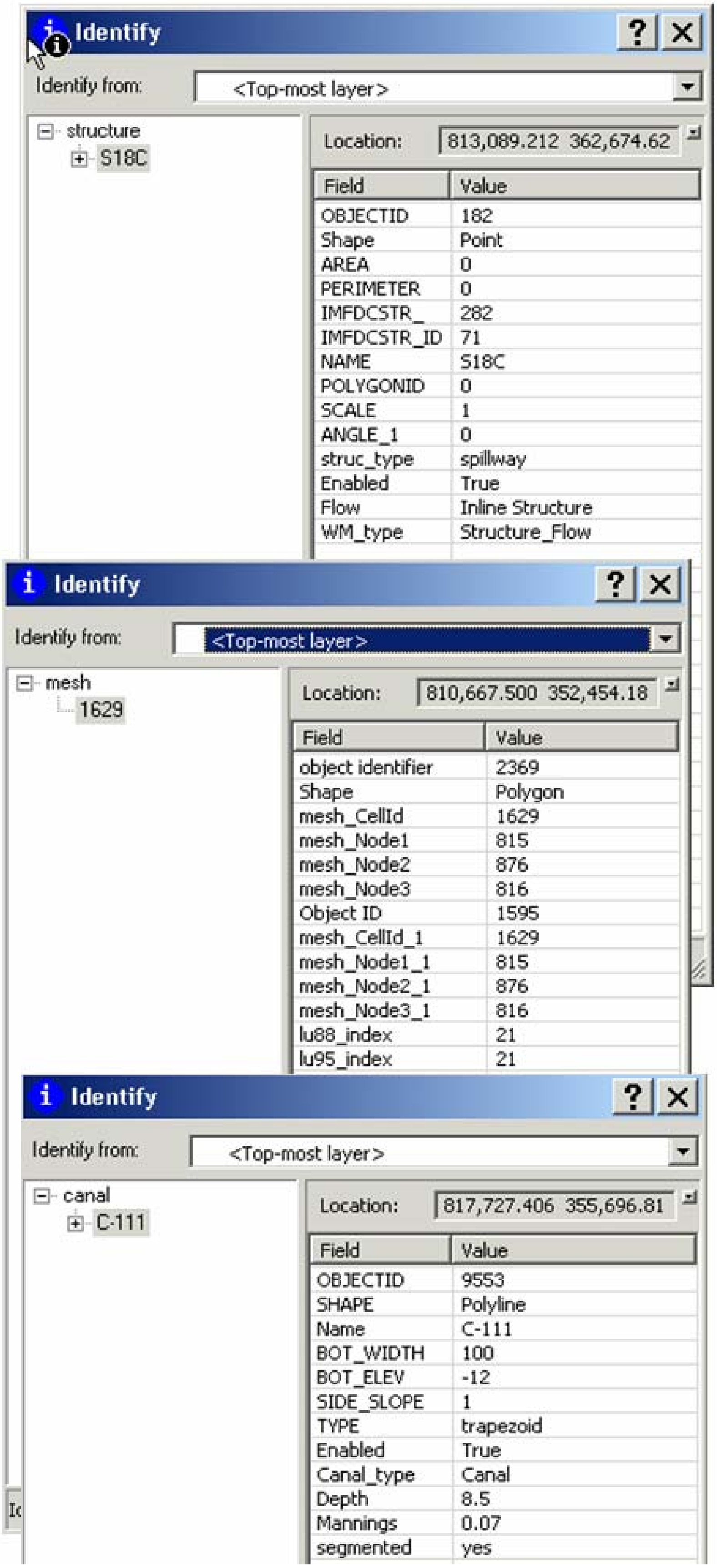


Figure 5: Viewing GIS Attributes

Structure

Structures include pumps, culverts, weirs, and spillways. Each structure can be associated with collection of units and each unit will be defined by attributes. Units such as culverts will have attributes such as: discharge_coefficient, culvert_length, name, manning_coefficient, width, height, diameter, etc.

Mesh

The Mesh is a layer of irregular triangle cells designed to capture the desired level of detail in areas of interest. Mesh cells may contain observation wells, structures, monitoring points. Mesh walls will typically follow geographic boundaries, levees, canals or other features that make up the framework of the region being modeled. Use the GIS ⓘ identify tool and select inside a mesh cell. A typical mesh will be intersected with several other layers so that each mesh cell will contain a variety of attributes such as: bottom elevation, topo, conductivity, and landuse.

Canal

The Canal layer contains all the canal segments in the canal network. Segments are combined to make a canal reach which will span between two junctions. Canals can be made from multiple reaches which in turn can be made up from multiple segments. Each segment is defined by attributes such as: type, depth, slope, bottom_elevation, mannings_coefficient, name, upstream_structure, downstream_structure, etc.

3.3 Accessing the RSM GIS Toolbar

The RSM GIS Toolbar has been created by the RSM GUI Development Team to help organize a collection of custom GIS applications that help assemble the data and generate files needed by the RSM. Built in ESRI ArcGIS geoprocessing capabilities and custom ArcObjects programming have been leveraged to meet the needs of modelers using the RSM. The RSM GIS Toolbar is a custom toolbar which can be activated by the user and will remain present as part of the user settings every time the user starts GIS until it is removed by the user.

To access the RSM Toolbar for the first time, users must:

- select the TOOLS Menu from the top of the GIS window
- select the CUSTOMIZE… option from the menu
- make sure the TOOLBAR tab has been selected
- check the box next to the RSM Toolbar Ver. 4.3

The RSM GIS Toolbar will appear as a new toolbar free floating on the screen. It can be anchored at the top of the GIS window along with the other standard GIS tools.
Being a free floating toolbar it may be hidden behind your other windows.

- Click on the menu button labeled "RSM GIS Toolset v4.3" to view the RSM GIS Toolbar.

It can be dragged around and positioned anywhere on the windows desktop. It may fall behind other windows open on the desktop. If this happens you can click on the toolbar on the lower system tray and it will call the most recent item to the foreground by clicking on it.

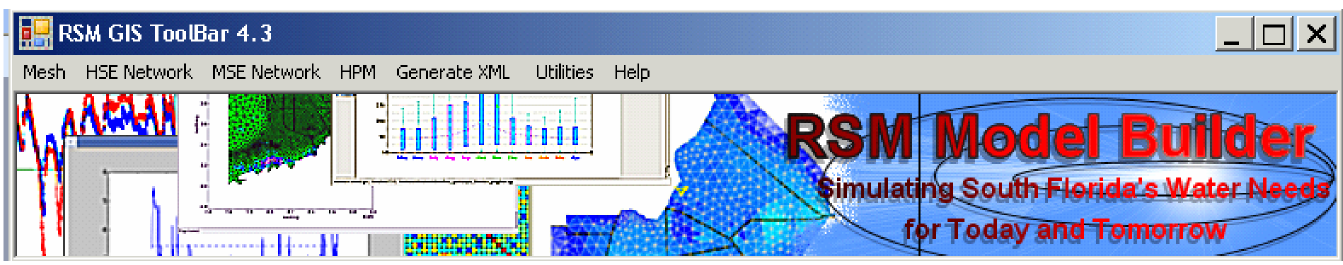


Figure 6: View of RSM GIS Toolbar

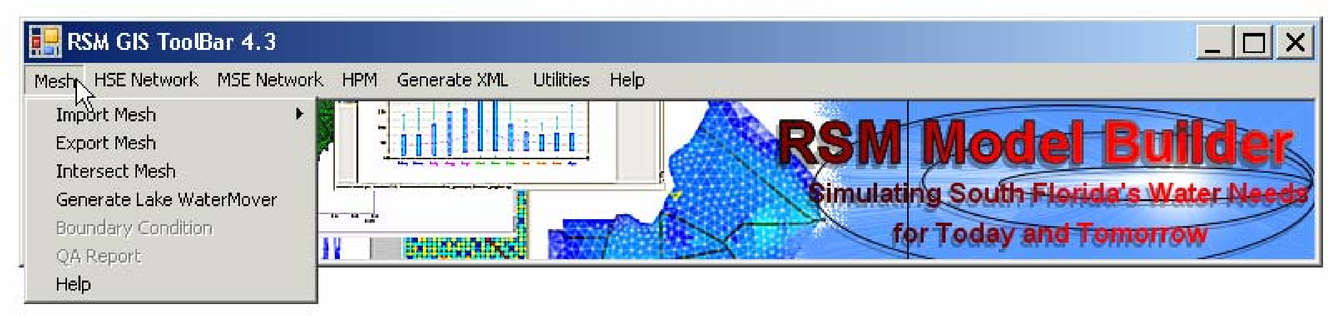
➲ If RSM GIS Toolbar is sometimes hidden behind another CITRIX window, click on the CITRIX tab on the windows application tray and select the RSM GIS Toolbar ver. 4.3 to bring it to the foreground.

The toolbar contains a collection of tools to help manipulate the geodatabase and generate a variety of RSM input files. There are dropdown menus containing tools to help import the mesh, assemble the HSE Network, Generate the XMLs and Help. There are also place holders for future tools such as the MSE Network and to help create HPMs.

Chapter 4

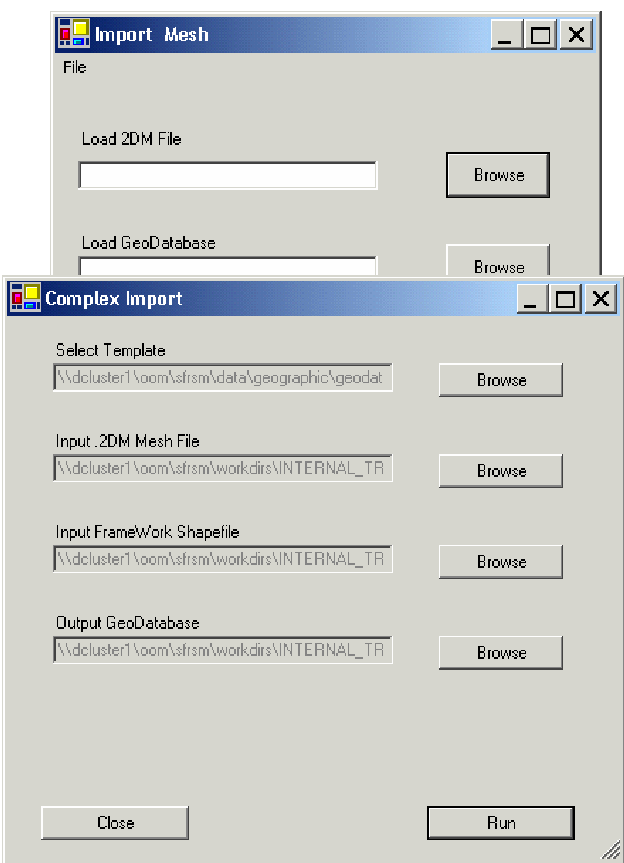
Building an RSM Geodatabase

A new RSM compliant Geodatabase can be created by adding a newly created mesh to the Master Development Geodatabase. The Master Development Geodatabase contains all the regional layers used by the RSM in the standard RSM database schema. The geodatabase layers can be clipped using any mesh to create a new project specific RSM compliant geodatabase suitable for setting up an RSM scenario. Other GIS layers can also be added from a variety of locations. Canal layers and structure layers must comply with the RSM database schema and participate in the RSM hydrologic network to properly function with the RSM GIS tools. Other layers can be added to aid in locating features and analyzing geographic conditions before the scenario is created.



4.1 Mesh Tools

The first set of tools in the RSM GIS Toolbar are the Mesh Tools which assist with importing an irregular triangular mesh (.2dm file) from GMS and populating the mesh with data attributes. To view how these tools work we will start with a blank map and import a GMS mesh. There are two options for importing a mesh: Load SFRSM Template or Load Simple Mesh Tool.



4.2 Load Simple Mesh Tool

The *Load Simple Mesh* tool takes input from the user and imports a GMS .2dm file resulting in a simple GIS mesh. This is a simplified approach to creating a new mesh in GIS.

Import a Simple Mesh

- Select the Import Simple Mesh tool from the Mesh pulldown menu on the RSM GIS TOOLBAR.
- Browse to the desired .2DM file you wish to import.
- Browse to a location and input the name for a new geodatabase you wish to create.
- Click Run

A new geodatabase will be created which will contain three layers to define your new mesh.

4.3 Load SFRSM Template

The *Load SFRSM Template* tool takes input from the user and combines a GMS mesh with a template geodatabase.

This results in a (cookie cut) RSM geodatsabase containing the base data layers and a new mesh.

- `Select the Import SFRSM Template tool from the Mesh pulldown menu on the RSM GIS TOOLBAR.`
- `Browse to the default geodatabase template or specify your own custom geodatabase`
- `Browse to the desired .2DM file`
- `Browse to the corresponding .SHP file used to create the GMS framework`
- `Browse to a writable location and input the name for a new geodatabase you wish to create.`
- `Click Run`

4.4 Export Mesh

The *Export Mesh* tool generates a new GMS .2DM file from a mesh layer that was modified using GIS. The tool requires the user specify the mesh layer and the output location for the new .2DM file.

4.5 Intersect Mesh

After generating a new mesh the next step is to populate the mesh with attributes. The Generate Mesh Attribute tool automates intersecting the mesh with existing data layers from which the mesh will inherit new attributes.

- `Browse to the location of the target geodatabase containing the mesh and select the mesh-poly layer which will receive the new attributes.`
- `Browse to the location of a geodatabase containing the desired attribute you wish to add to the mesh and select the desired layer within that geodatabase`
- `Four methods are offered for how the mesh will acquire the new attribute.`
    - Mesh Centered – (polygon method) the mesh cell will acquire the new value by acquiring the value nearest the centroid of the cell.
    - Node Average – (point method) from nodes falling in the cell the average will be calculated for the attribute and assigned to the cell.
    - Maximum Area – (polygon method) the area of each intersecting polygon will be calculated and the largest will be selected and assigned to the cell.

- o Percentage – (polygon method) the area of each intersecting polygon will be calculated and a weighted average of the attribute value will be assigned to the cell.

▶ Enter a name for the new field (attribute) to be added to the mesh-poly.

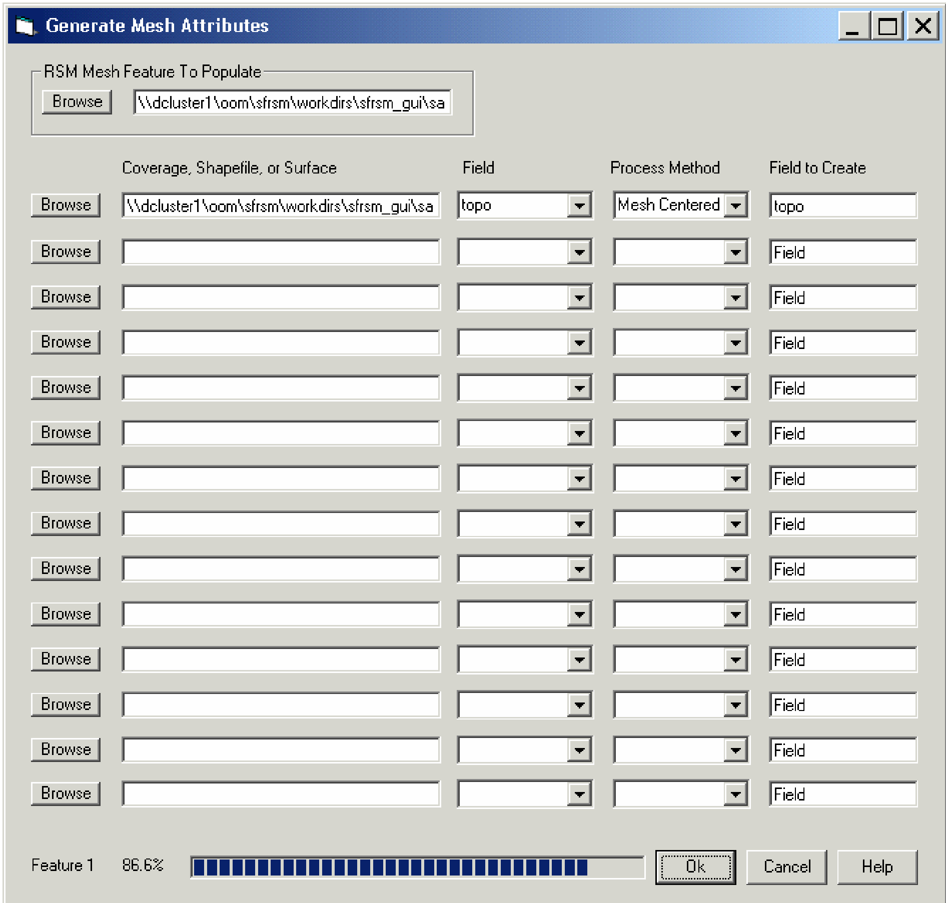


Figure 7: Generate Mesh Attributes Tool

Viewing and Changing GIS Attributes

4.5 Viewing Attributes

The geodatabase contains an extensive array of attribute information. Each structure, canal segment and mesh cell contains unique attributes identifying and describing them and the physical properties of each feature. Structures (watermovers) have related tables containing information pertaining to the individual units at each structure (spillway, culvert, weir, etc.). Several features have an attribute called “active” which controls if the feature is to be represented in the output files being generated. By setting active equal to false, essentially that feature will be deactivated and ignored when the output files are generated and it will not be represented in the model.

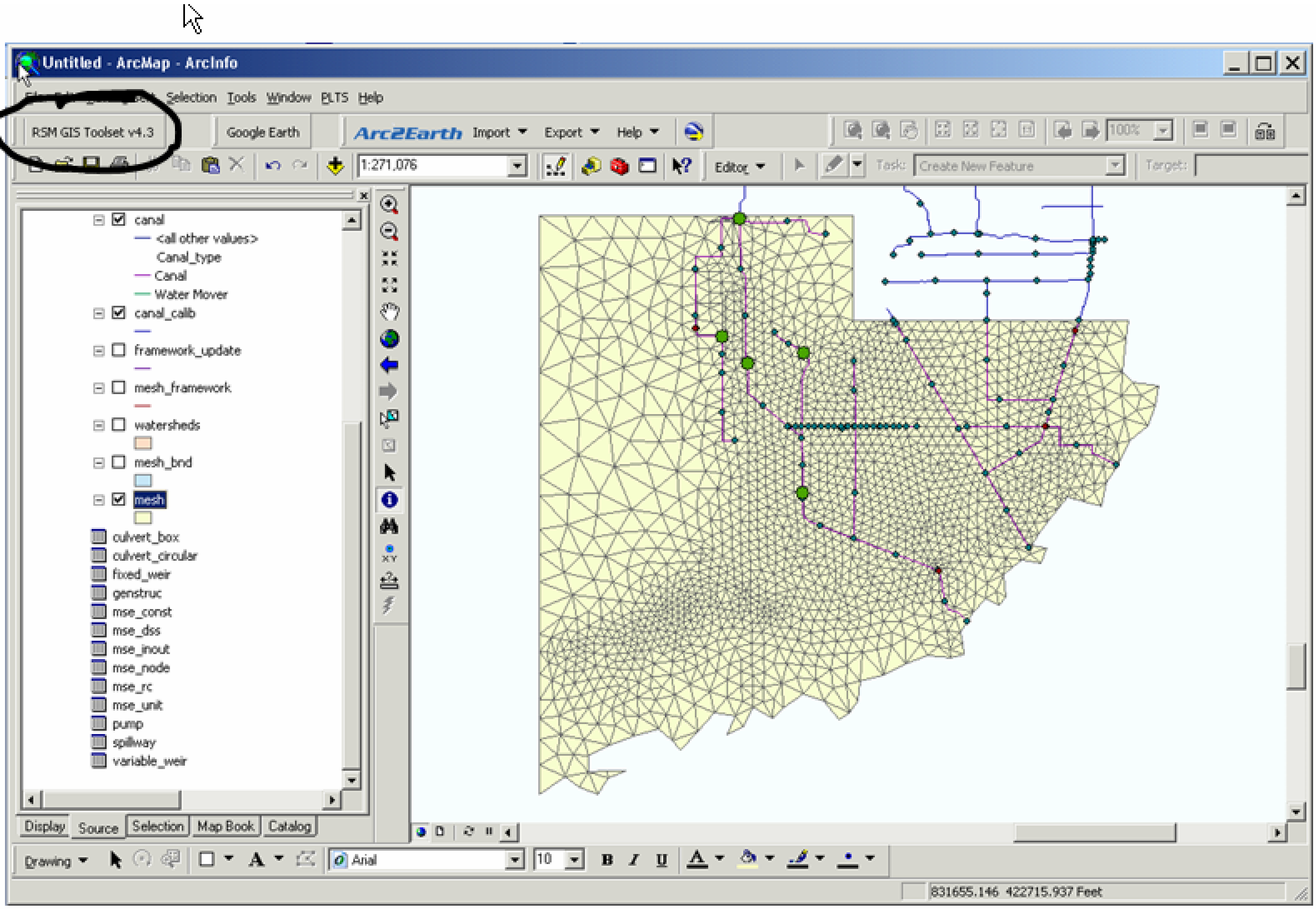
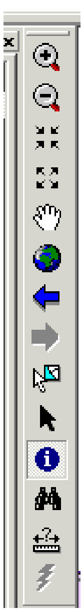


Figure 8: GIS Map Showing the Active Layers and Anchored RSM Toolbar



- From the center bar in the GIS window locate the basic GIS tool icons. Select the “Zoom In” tool at the top and zoom in to view a smaller area.
- Select the information tool ⓘ.
- Move the mouse over a feature on the geodatabase such as a mesh cell or canal segment and left- click. An attribute table will be displayed for the selected feature. To ensure a certain layer is being selected, when the feature table is visible a menu in the upper right corner a box for identifying the layer being shown.

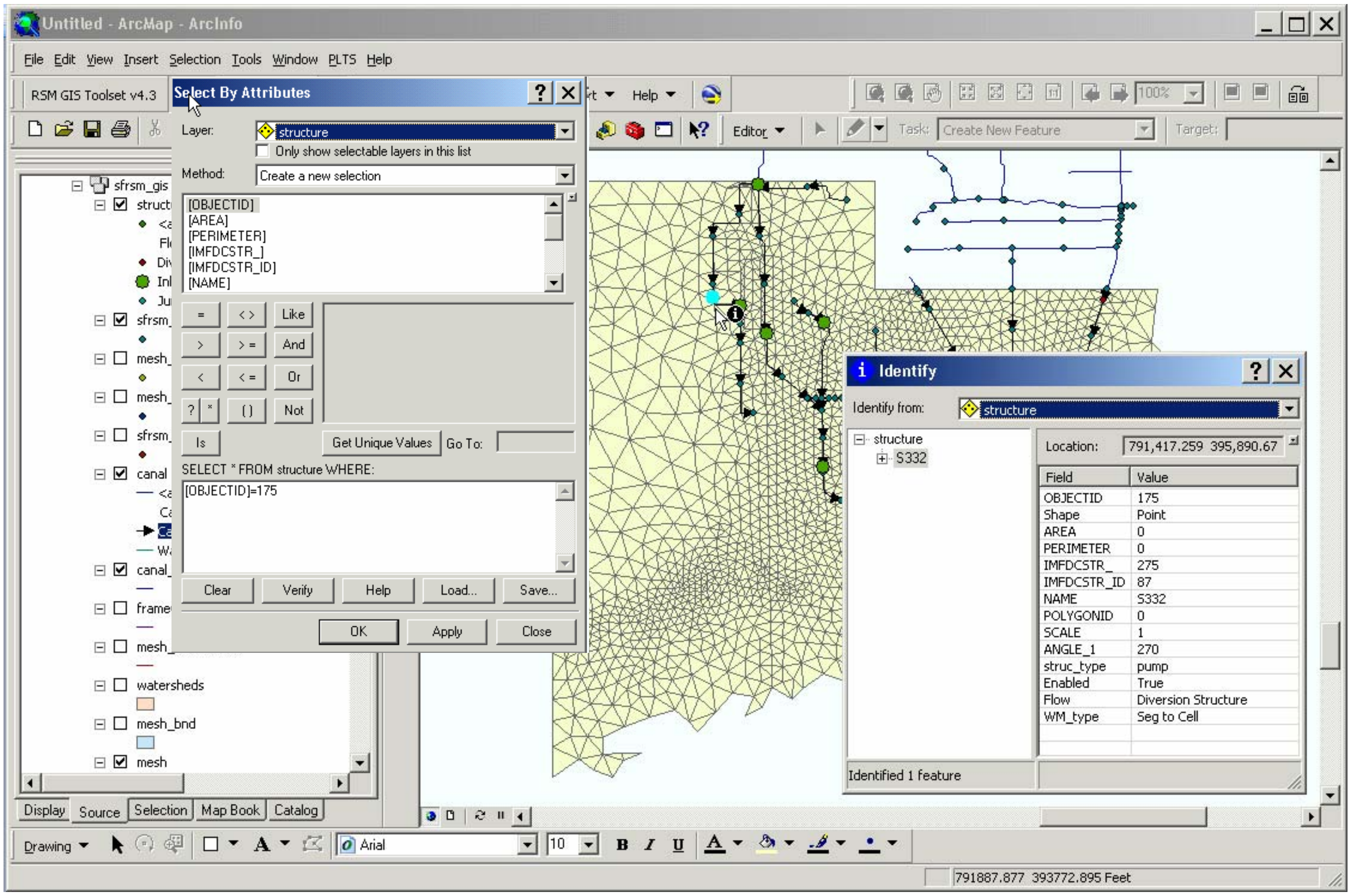
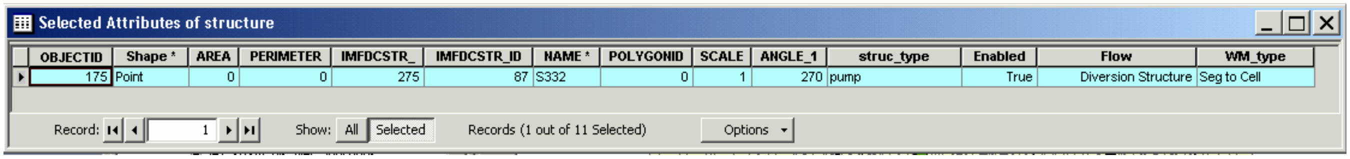


Figure 9: View of Selected Structure Highlighted in Blue and Attribute Information

Selections can be made by specifying attribute values and executing a query.

- From the top GIS menu open the Selection Menu and choose “Select by Attribute”.
- In the dropdown list at the top, select the Layer named “structure”.
- In the bottom part of the window type in the query: OBJECTID=175 and click OK.
- Open the Selection Menu again and click on “Zoom to Selected Features”.
- In the left window under the Display tab, Right-click on the layer named “structure” and choose the option called “Open Attribute Table”.
- At the bottom of the attribute table next to the word Show: click the “Selected” button. This will display the attributes for the selected structure.



4.6 CHANGING ATTRIBUTES

You must first be in Edit Mode to change attributes in the geodatabase.

- In the upper left corner of the GIS window locate and click on the button called Editor▼
- Select the option to Start Editing.
- Return to the attribute window.

If a record is no longer displayed in the attribute window repeat the steps to select OBJECTID=175 using the Selection Select by Attribute method.

- Click on the different attribute fields in the window.

Some attributes are simple text fields that can be changed by typing a new value and some are domains which contain dropdown lists offering acceptable values to choose from.

4.7 Enable and Disable Geodatabase Features

Features in the geodatabase have an attribute called "enabled". This attribute is a domain attribute which can only be set to "true" or "false". Setting this attribute to "false" will disable the feature and it will be ignored when the RSM GIS tools are used to generate the XML files. This method allows users to enable and disable features in the geodatabase before generating the files to be used as input to the RSM. This is much easier than deleting features that are temporarily not desired to be included in the XML files.

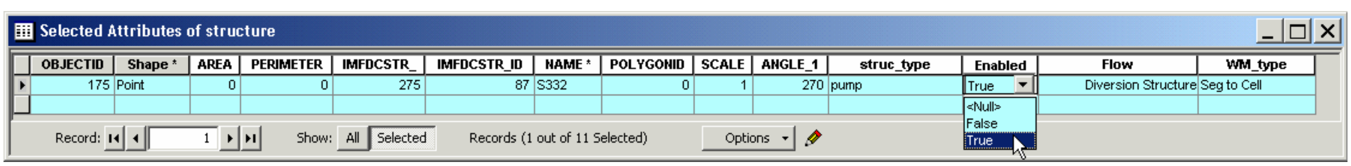
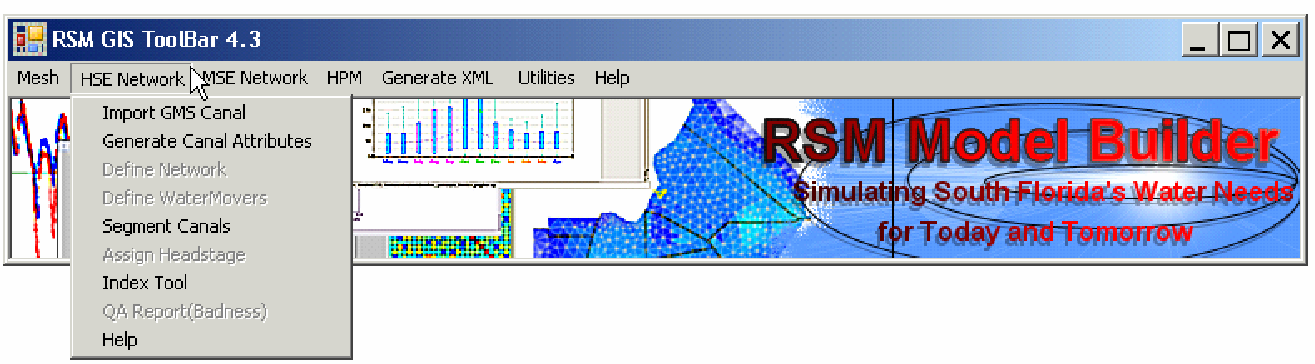


Figure 10: Enabled Attribute Field



4.8 Segmenting Canals

After all desired changes are made to the attribute tables the canals can be segmented to a specified length. An ideal scenario will contain canals consisting of at least two segments and all segments within a reach are of equal length. Canals are organized into reaches. Each segment contains an attribute called reach which indicates which canal they are a member. The Segmentation Tool offers a means to segment canals while preserving the physical properties of the canal (mannings roughness coefficient, volume and other attributes). The tool offers an automated way to segment the entire canal network or one canal reach at a time.

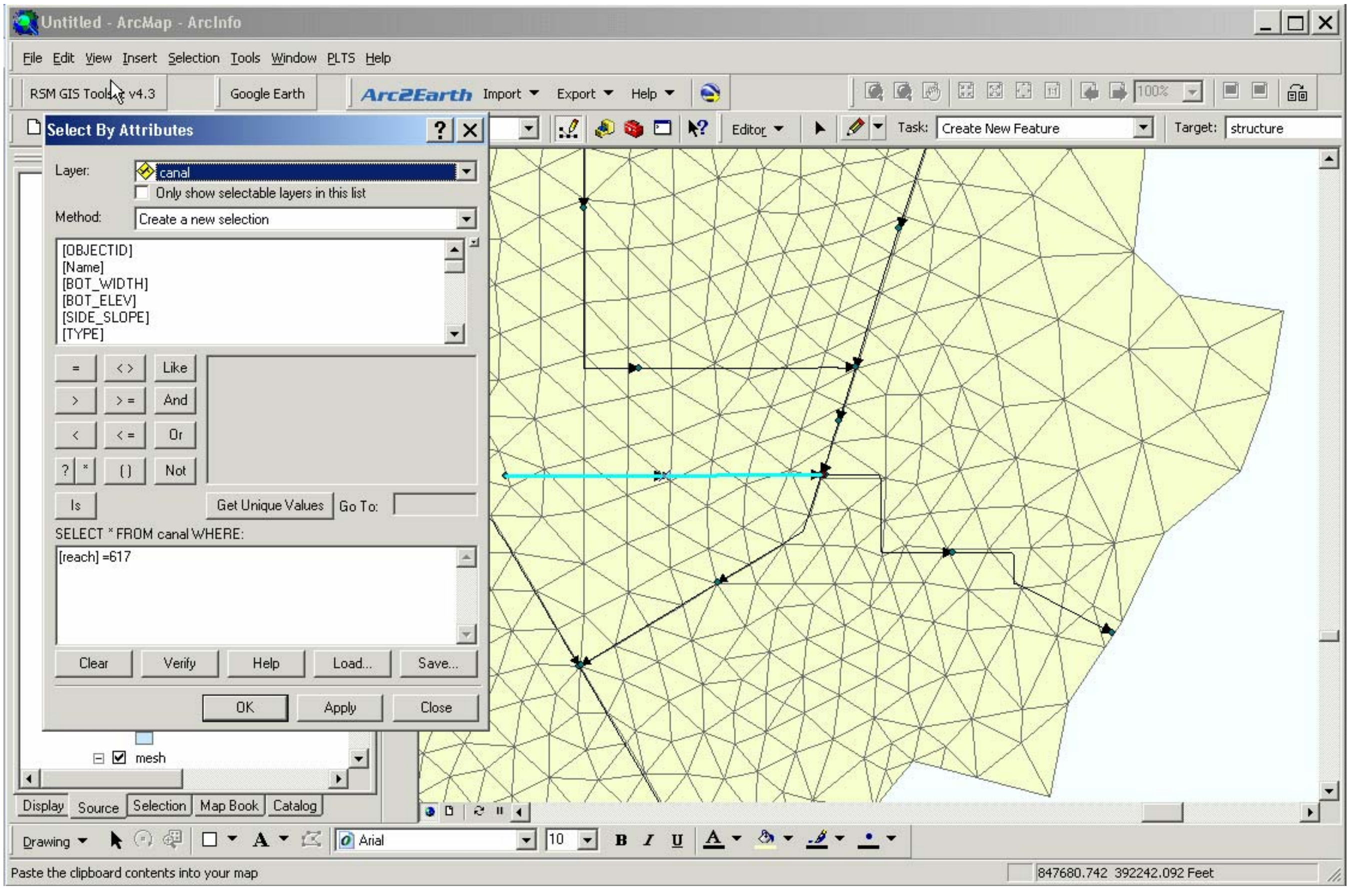
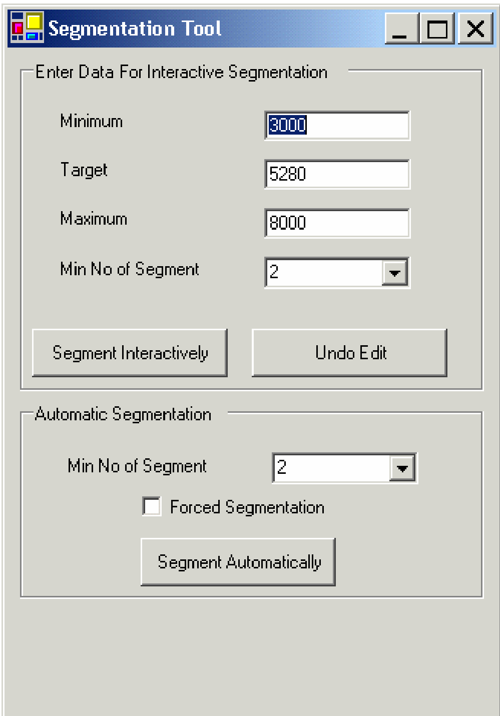


Figure 11: Reach 617 Before Segmenting

➲ **You must first be in ✐EDIT MODE.**

- Using the Selection menu, select the option to "Clear Selected Features".
- Next select the option "Select by Attribute" to make a new selection.
- From the Layer dropdown list select the canal layer and enter this query:
- reach = 617
- Apply your selection criteria.
- Close the Selection window and your selection will appear highlighted in the main GIS window.
- From the Selection menu, select "Zoom to Selected Features".

There will be four (2) canal segments selected as part of reach 617. Each segment has a length of 7,826ft before segmenting.



- From the RSM GIS Toolbar click on the HSE Network menu and select the option called Segment Canals.

This tool offers options to set a desired range for segmenting (min, max, target) and minimum number of segments desired.

- Set the minimum = 3000 target = 5280, maximum =8000 and Min. No. of segment = 2.
- Click on the Segment Interactively button and the tool will alert you to the optimum segmentation length based on your input. In this case the optimum length will be 5217 feet and the final result will change the two segments in reach 617 into 3 segments of equal length.

The segmentation can be undone and the user can try again if the results are not satisfactory. After a reach is segmented it can not be segmented again.

Figure 12: Segmentation Tool

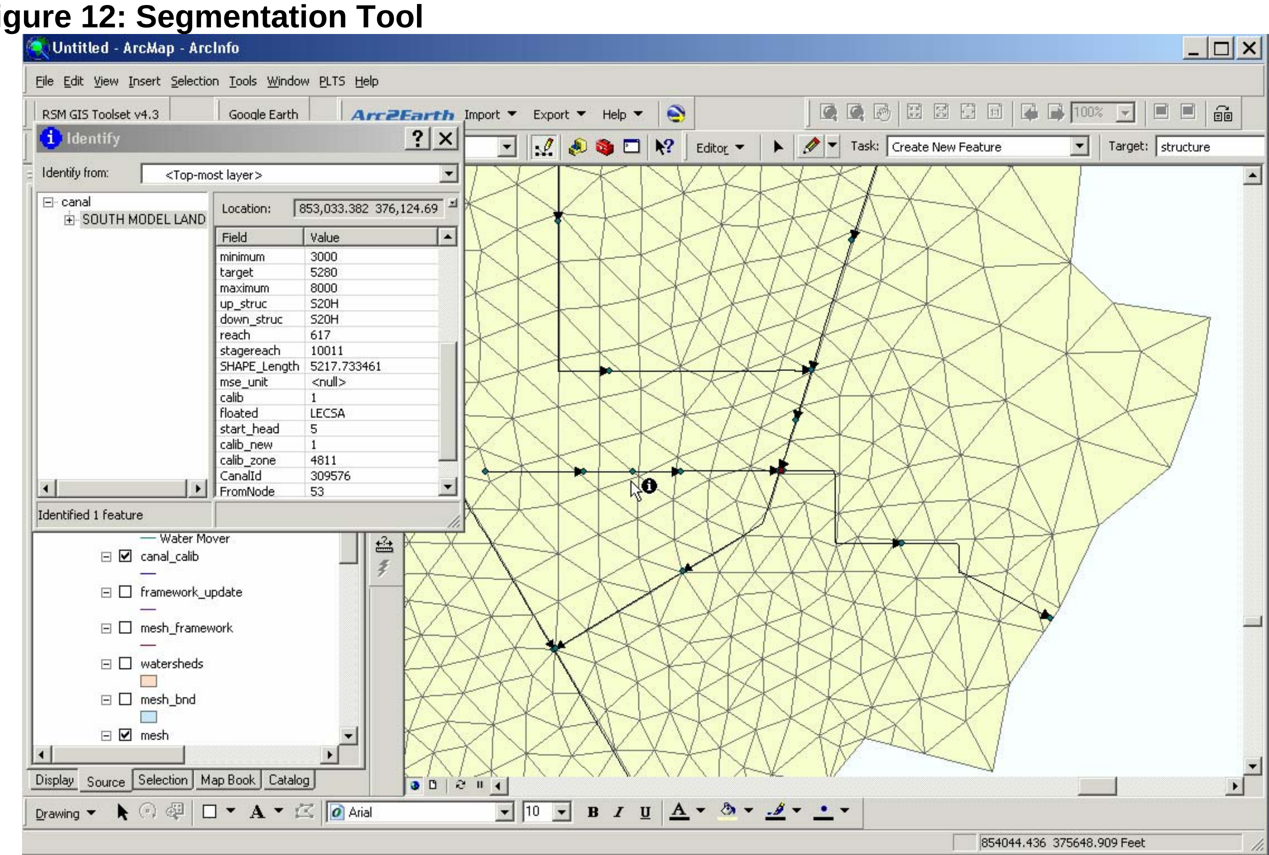


Figure 13: Reach 617 After Segmentation

4.9 Index Tool

The *Index tool* generates RSM index files from the information in the geodatabase. An index file is a file containing header information and an ascending list of attribute information about a GIS layer.

▶ From the RSM GIS Toolbar click on the HSE Network menu and select the option called Index Tool.

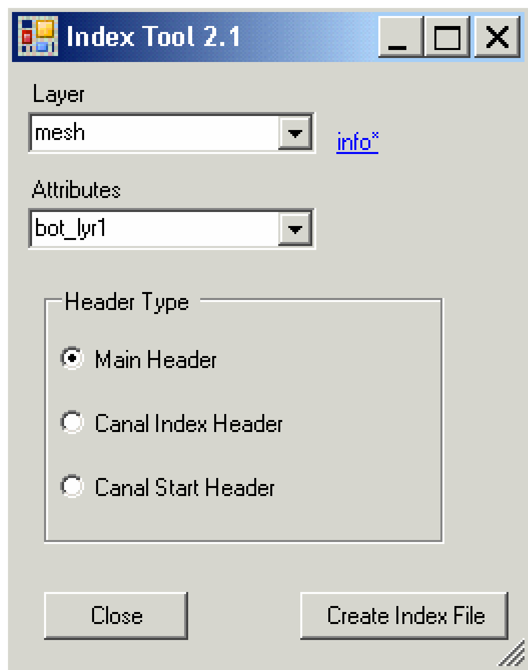
Any layer in the geodatabase can be selected and any attribute from that layer can be used to generate an index file. To generate an index of mesh bottom layers:

▶ Select the layer called mesh

▶ Select the attribute called bot_lyr1.

The resulting file will contain an ascending list of mesh bottom layer elevations. This is a generic tool which can be used to generate a variety of index files for any layer in the GIS geodatabase such as:

- mesh_index.dat
- canal_index.dat
- canal_start_head.dat
- lu_index.xml
- bot_lyr.xml
- parameter_zones.xml

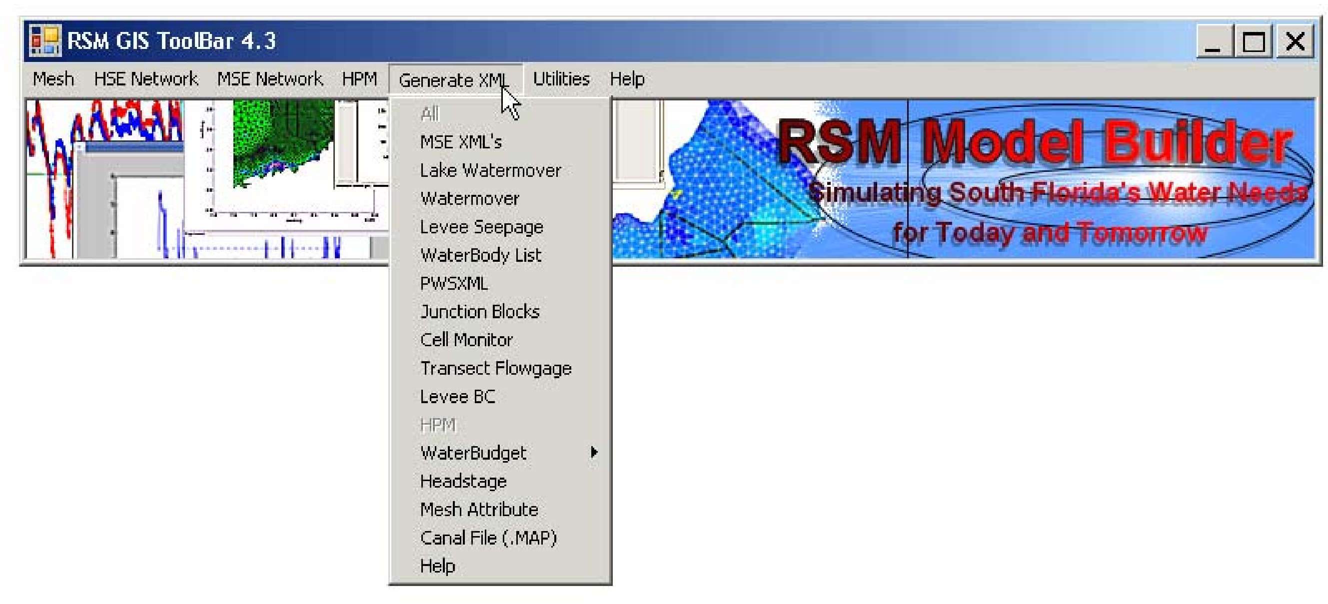



```
DATASET
OBJTYPE 'mesh'
BEGSCL
ND 27604
NAME 'cellid'
TS 0 0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
```

CHAPTER 5

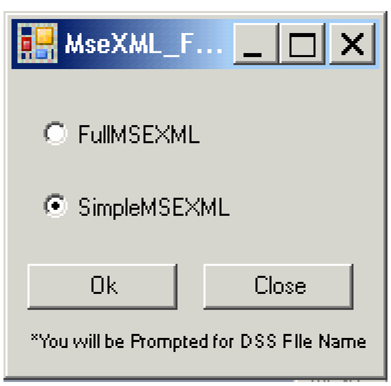
Generate XML Files

There are a number of RSM GIS tools that aid in generating files to be used as input to the RSM. Generally the files produced are XML files or ASCII data files. These tools operate in a variety of ways. Some prompt users for input options and others are automated single click tools. The end result is a formatted XML or ASCII file to be used as input to an RSM scenario. These tools can be found under the Generate XML menu on the RSM GIS Toolbar.



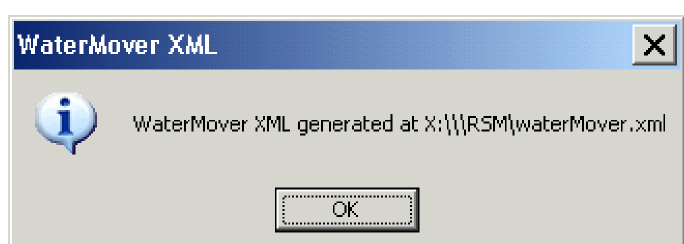
5.1 Generating the MSE (Water Control Unit) XML's

The *MSE XML* tool prompts the user to select either Simple MSE or Full MSE XML format. This tool is not currently being used by RSM modelers due to changes in the RSM MSE code.



The MSE has undergone changes but this GUI feature is still used by modelers. The file will require editing before it can be used in an RSM run. Future updates to the GUI will enhance the MSE XML tool and include the latest changes as implemented in the HSE.

The geodatabase must conform to the current geodatabase schema and must contain valid MSE attribute information.



~~5.2 Lake Watermover XML~~

~~This tool is not currently in use.~~

5.3 Watermover XML

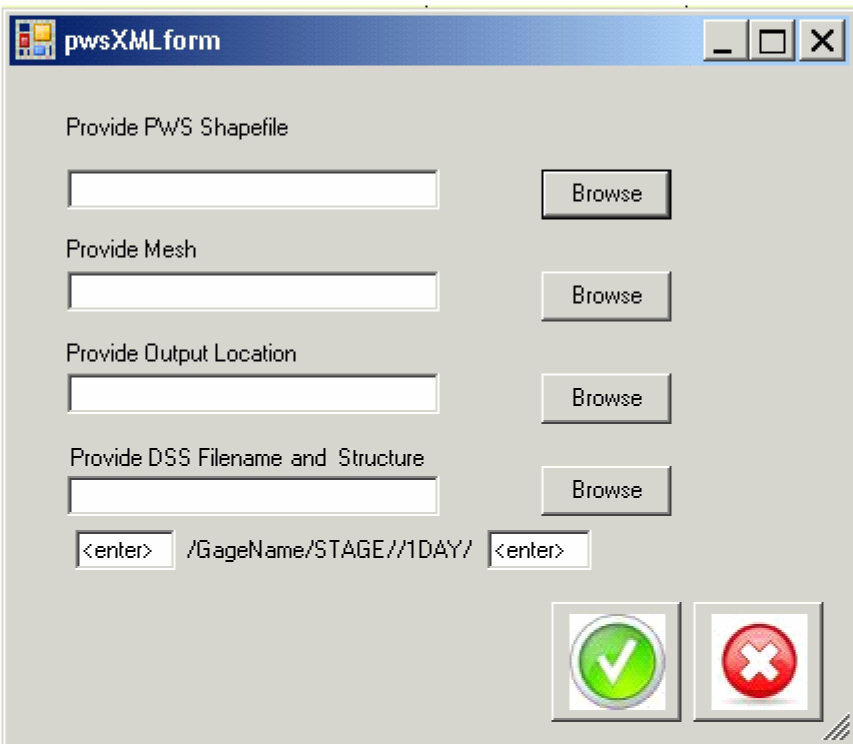
The *WaterMover* tool is a simple point and click tool which reads the geodatabase and generates the watermover XML file. It will only output information for water movers that are designated as "active".

5.4 Levee Seepage XML

The *LeveeSeepage* tool is a simple point and click tool which reads the geodatabase and generates the levee_seepage XML file. It will only output information for levees that are designated as "active".

5.5 Waterbody List

The *Waterbody List* tool is a simple point and click tool which reads the geodatabase and generates a list of waterbody IDs for each water control district (WCD). This tool requires a layer named WCD to perform the operation. The WCD layer is expected to contain the associated water control district for each mesh cell.

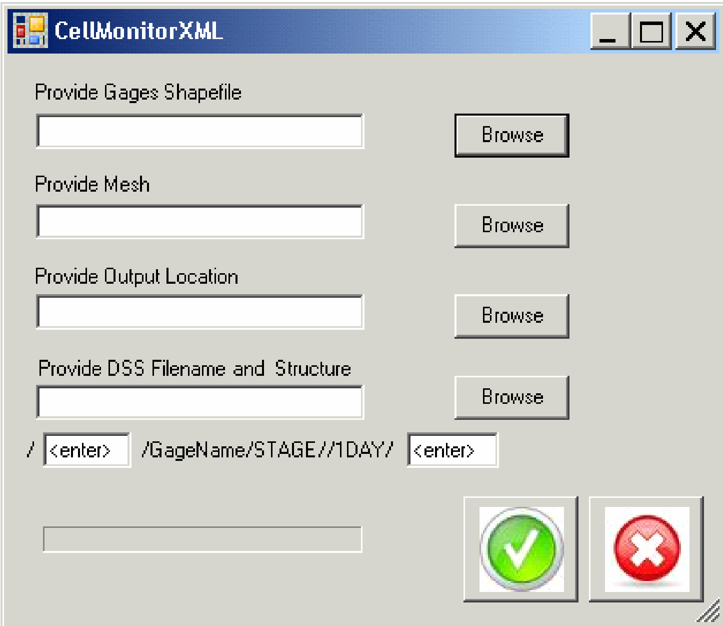


5.6 PWS XML

The *PWS XML* tool generates a public water supply (PWS) monitoring XML for the RSM, by extracting information from a PWS shapefile, the mesh layer and writing the HEC-DSS output lines. This tool requires input for the location of the PWS shapefile, a HEC-DSS filename and output location where the model output will be written and the default DSS path for each PWS monitor to be written. The gage name will be used by default in the DSS path.

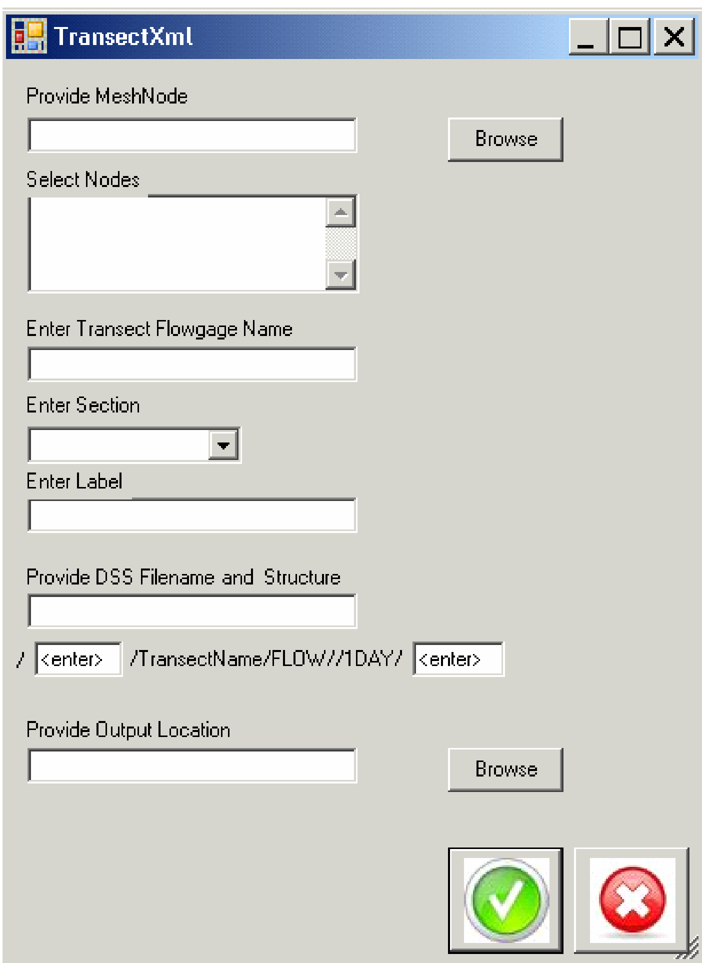
5.7 Junction Blocks

The *JunctionBlock* tool is a simple point and click tool which reads the geodatabase and generates the juntionblock XML file. It will only output information for junction blocks that are designated as "active".



5.8 Cell Monitors

The *Cell Monitors* tool reads the geodatabase and generates a cell monitor XML creating a cell monitor for each cell containing a monitoring gage. This tool requires input for the location of the monitoring gage shapefile, a mesh layer, the HEC-DSS output filename and location where the model will write the output and the default DSS path structure for each gage monitor output to be written. The name of each gage will be used by default in the DSS path.

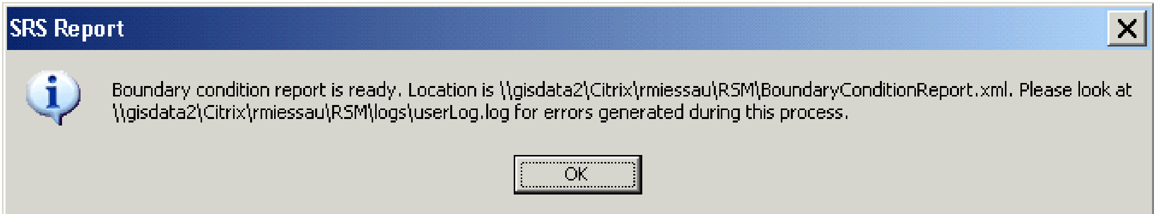


5.9 Transect Flowgage

The *Transect Flowgage* tool reads the geodatabase and generates a transect flowgage monitor XML. This tool requires input for the layer containing the mesh nodes, a list of mesh node IDs, transect name, section, label, a filename and location where the model will write the HEC-DSS output file and the default DSS path structure for each transect monitor that will be written. The gage name will be used by default in the DSS path.

5.10 Levee BC

The *LeveeBC* tool is a simple point and click tool which reads the geodatabase and generates the leveeBC XML file. It will only output information for boundary conditions that are designated as "active".



~~5.11 Waterbudget~~

~~The *WaterBudget* tool is not currently being used by RSM modelers. It previously was used to generate an XML file that was used to run the RSMBUD tool which is also no longer being used.~~

~~5.12 Headstage~~

~~The *Headstage* tool is not currently being used by RSM modelers. It previously was used to generate an XML file that was used to run the Headstage tool which is also no longer being used.~~

5.13 Mesh Attribute

The *Mesh Attribute* tool can output GIS attribute information to a formatted file which is then saved, named as an XML and used as input to the RSM. The mesh attribute file contains header information pertaining to the layer used to supply the information and it contains a sorted list of attribute values.

The Mesh attribute tool can be used to create:

- topo.xml
- lu_index.xml
- bot_lyr.xml
- parameter_zones.xml
- hyd_con.xml

5.14 Canal File (.MAP)

The *Canal File (.MAP)* tool can output GIS attribute information to a formatted file which is then saved, and used as input to the RSM. The .MAP file contains header information pertaining to the layer used to supply the information and it contains geospatial data descriptions for each segment in the canal network.

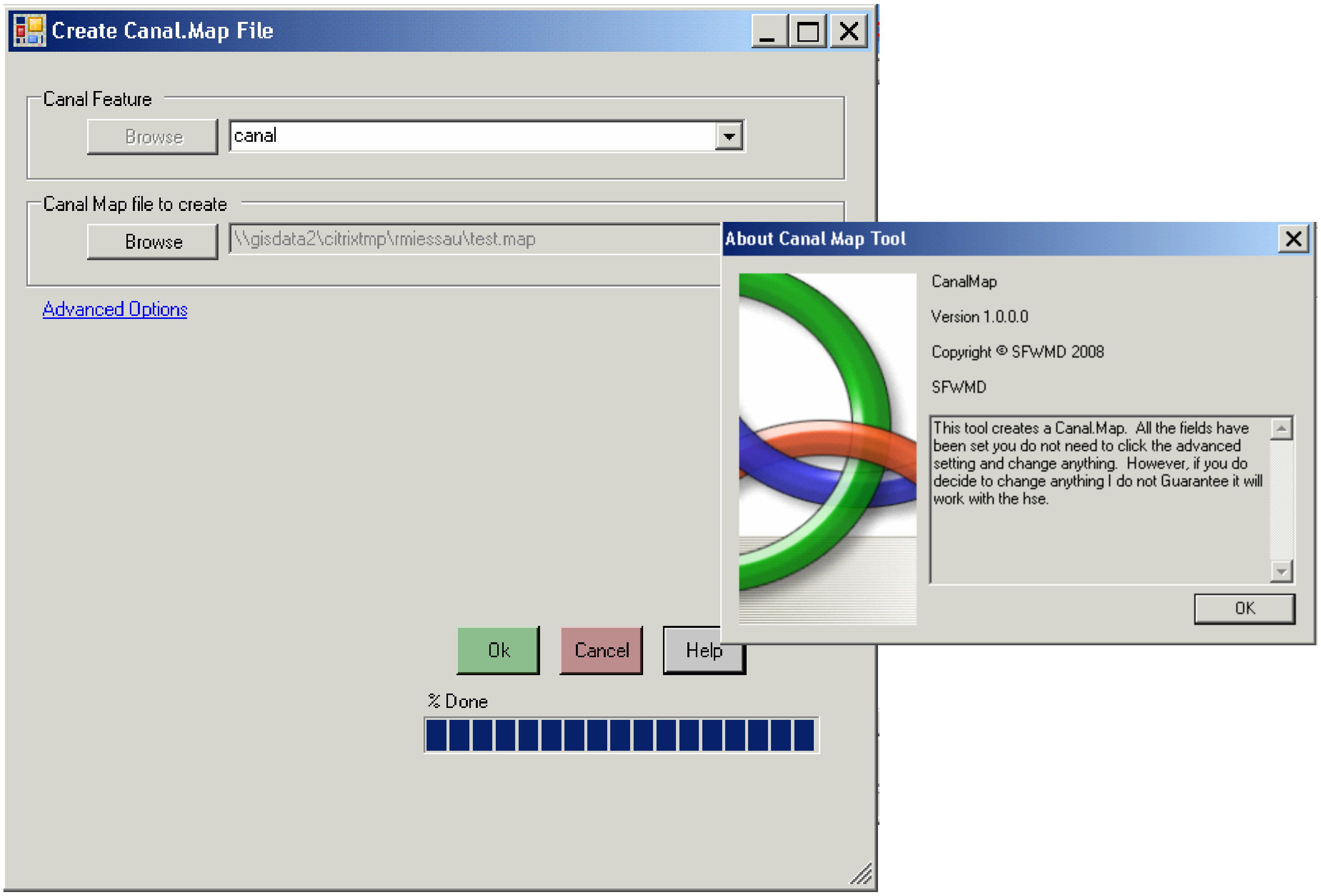


Figure 14: Canal .MAP Tool (default view)

NOTE: This tool MUST be opened prior to opening the geodatabase to be used. This tool will open the geodatabase and it will remain opened after the tool has completed. Opening the geodatabase prior to running this tool will result in the database being locked and the tool will not function properly.

The *Canal File (.MAP)* tool prompts the user to select a canal feature from a geodatabase and the user must also provide an output file location. The tool also offers Advanced Features which use filters to process the selection and then outputs the selected attribute information into an .MAP (ASCII) file.

➲ The Advance Options offers user specified options to modify the information output ot the .MAP file. The default option will output infroamtion for all enabled canals in the geodatabase.

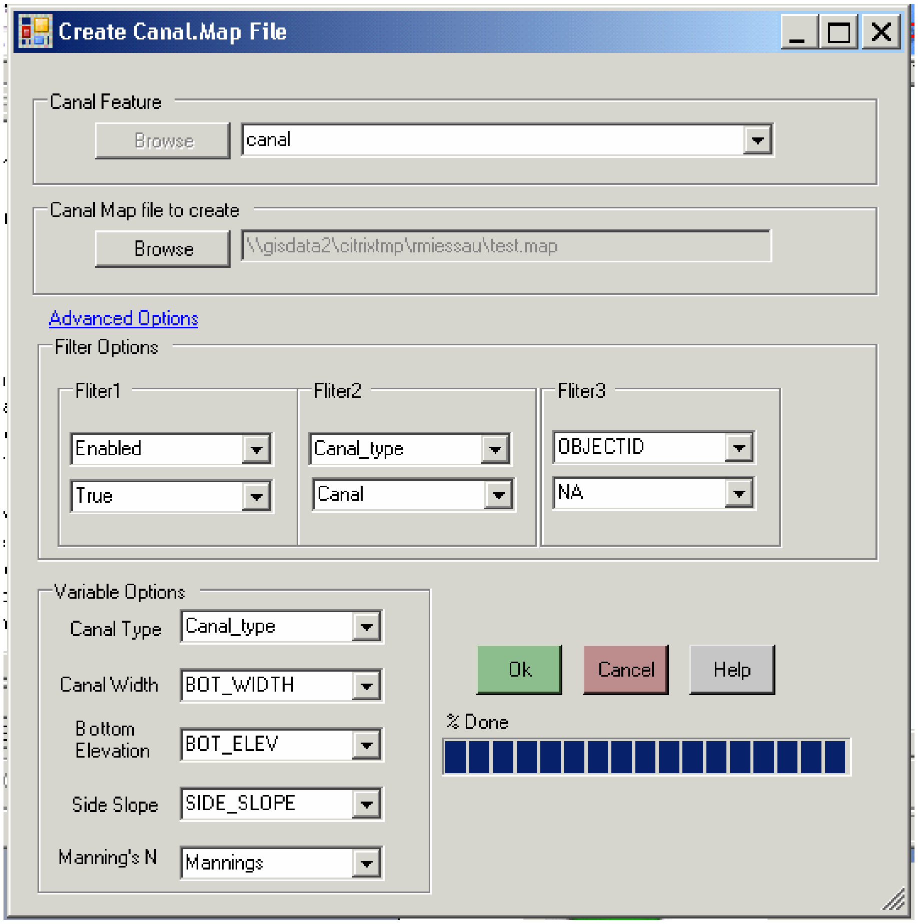


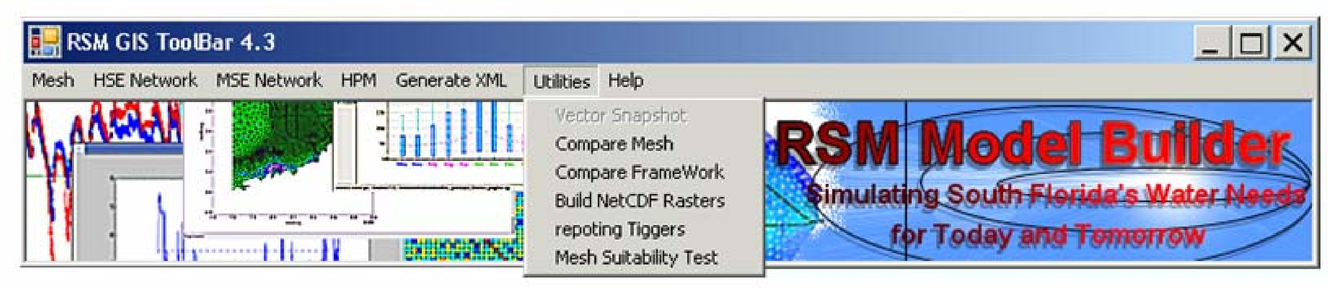
Figure 15: Canal .MAP Tool (advanced Options View)

- Close any open geodatabases. Start with a blank map.
- Open an RSM geodatabase. The tool will automatically select the canal layer.
- Specify an output location and name for the .MAP file.
- Click the Advance Options link to view the options.
- Click OK to generate the .MAP file

CHAPTER 6

Utilities

There are a number of RSM GIS tools that aid in evaluating and producing output from an RSM mesh. These tools can be found under the Utilities menu on the RSM GIS Toolbar. Features in this menu include the Mesh Suitability test (a.k.a. badness test) and NetCDF Rastor animations.



6.1 Compare Mesh

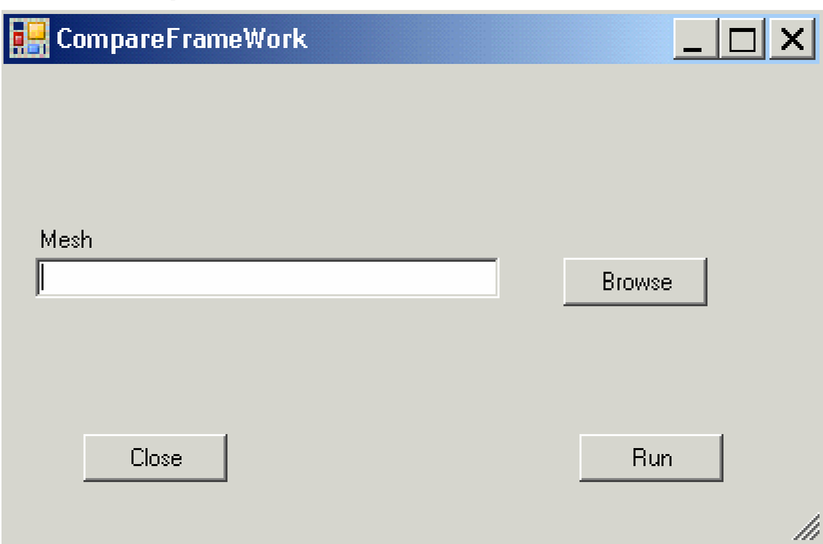


Figure 16: Compare Mesh Tool

6.2 Compare Framework

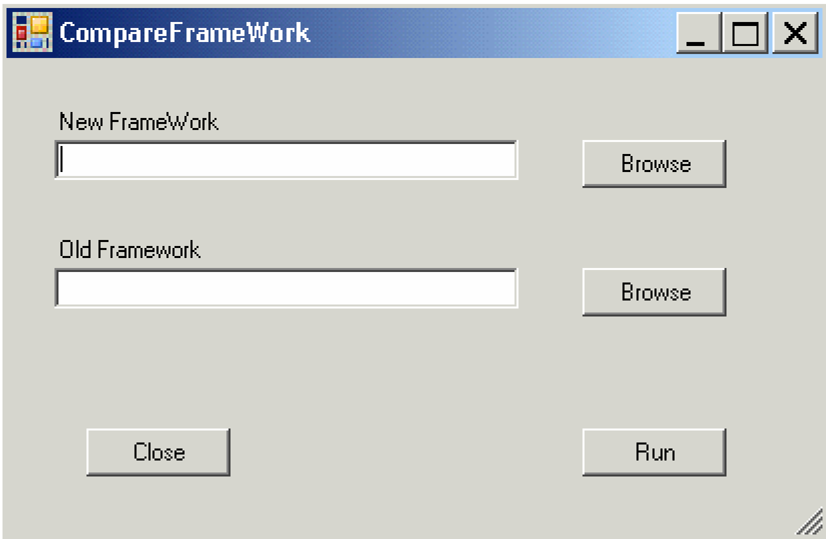


Figure 17: Compare Framework Tool

6.3 Build NetCDF Rasters

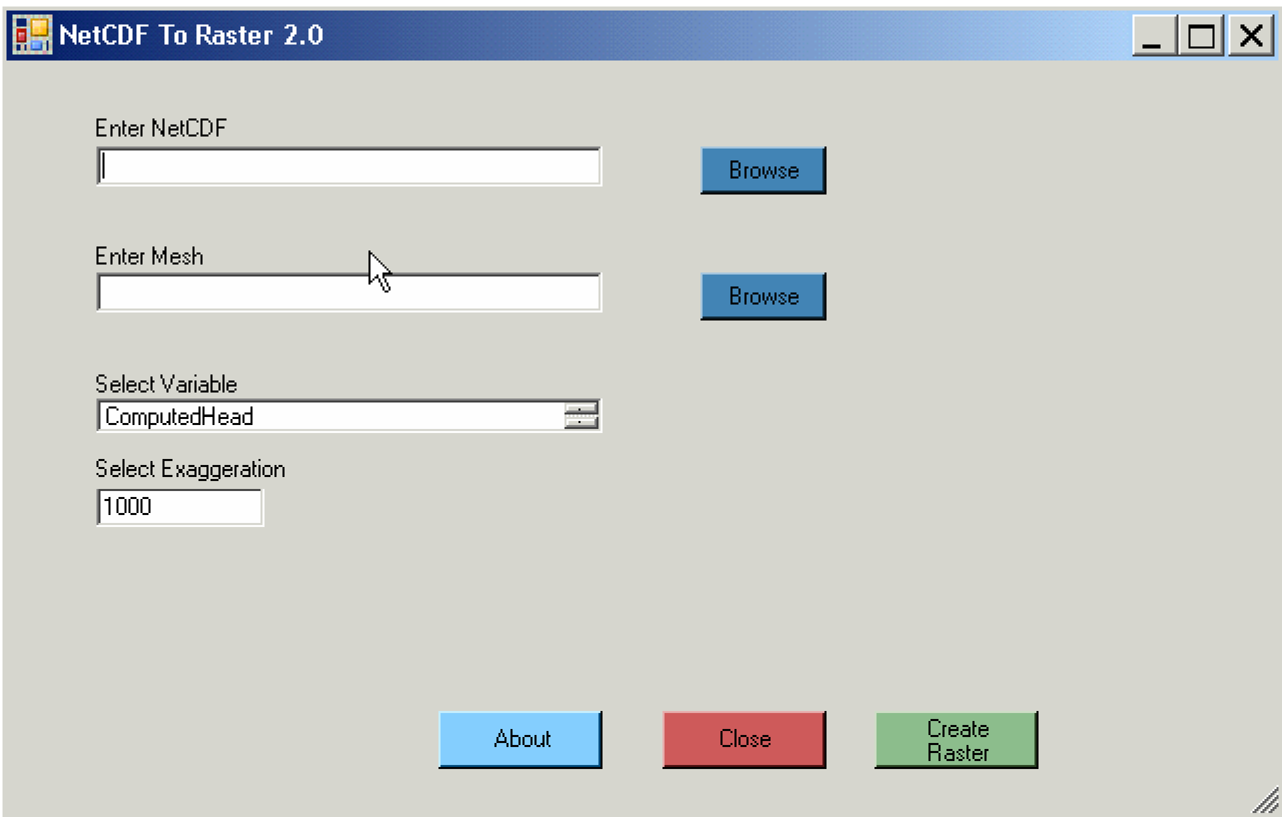


Figure 18: Build NetCDF Rasters Tool

6.4 Reporting Triggers

Figure 19: Reporting Triggers Tool

6.5 Mesh Suitability Test

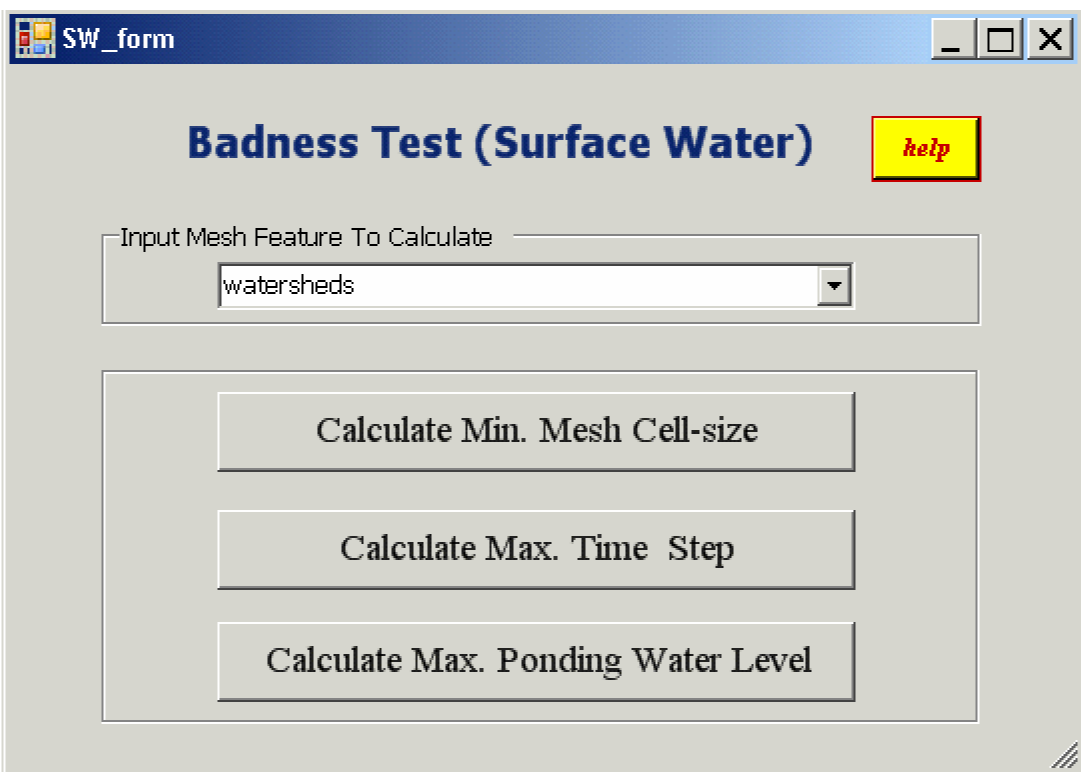


Figure 20: Mesh Suitability Tool

CHAPTER 7

SFWMD ONLY

Browser Based GIS Tools

ArcGIS Server9.2 has been implemented to offer a browser interface to the RSM GIS pre-processing tools. To date GIS server provides a means to examine attributes in a geodatabase and generate the RSM input XML files. As of February 2008, work is underway to migrate the RSM personal geodatabase schema to a versioned SDE geodatabase. This will enable for further development and deployment of the full RSM GIS Toolbar capabilities including the geo-processing tools.

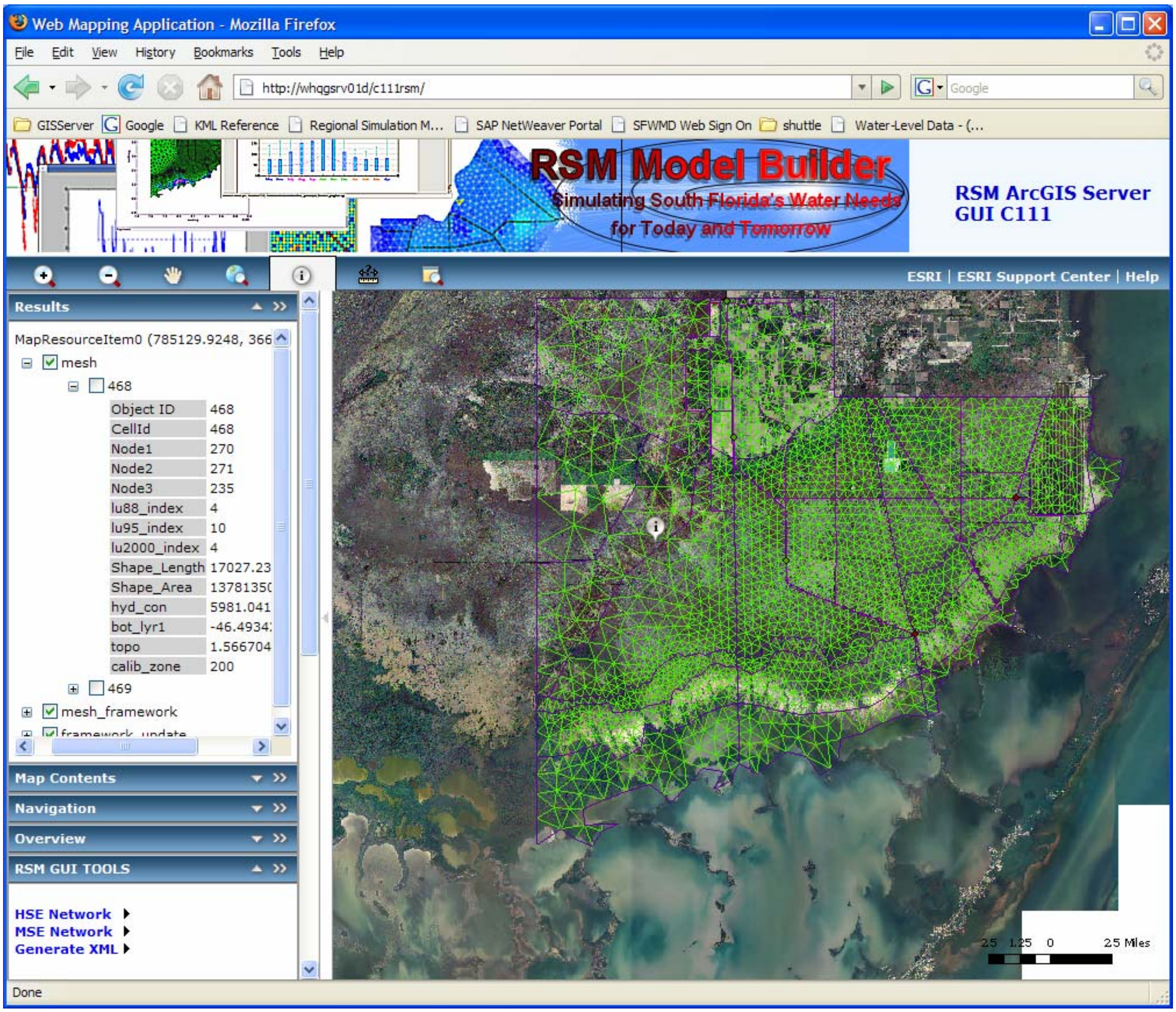


Figure 21: ArcGIS Server 9.2 Application Displaying the C-111 Geodatabase

7.1 Arc GIS Server Usage and Capabilities

ArcGIS Server is a new package in the ESRI ArcGIS suite of applications. The browser based capability holds very high value for users of the RSM as it allows the SFWMD to web enable the RSM pre-processing tools. To access the current ArcGIS applications use Windows Internet Explorer 7.x or Firefox and navigate to:

http://whqgsrv01d/c111RSM
or
http://whqgsrv01d/lecsa_gladesRSM

Implemented Tools/Features include:

- Navigation and display of geodatabase layers
- Identification and display of layer attribute information
- Index Tool (makes several XML files used by the RSM)
- Junction Block XML Tool
- Levee XML Tool
- Watermover XML Tool

7.2 Uploading an RSM Geo-database

At this time users must contact the RSM GUI Development team to upload an RSM geo-database to the ArcGIS Server. In this initial phase, modeling teams will each be given a URL to access their own geo-database. The database can then be shared and viewed by an unlimited number of users on the SFWMD internal computer network.

7.3 RSM GIS Server9.2 Main Navigation Buttons

The modeler will use Internet Explorer 7.X or Firefox 2.X to view the main RSM Model page for their geo-database. There are known issue when using older versions of these browsers.

► `Using your browser navigate to this URL: http://whqgsrv01d/c111RSM`

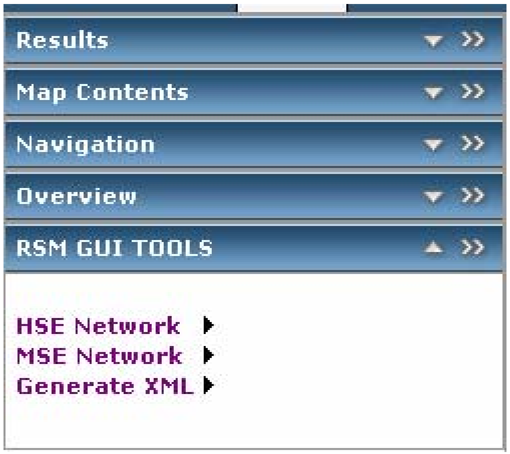
The main navigation buttons are located along the top of the main viewing area. They offer buttons to zoom in/out pan, zoom to full extent, identify features, measure distances between features and a magnifier window.

Navigation Buttons

Zoom In, Zoom Out, Pan, Full Extent, Identify, Measure, Magnifier

7.4 RSM GIS TOOL MENU

The RSM GIS tools are organized in a menu along the left side of the browser window where dropdown lists organize the tools into MENU CATEGORIES.



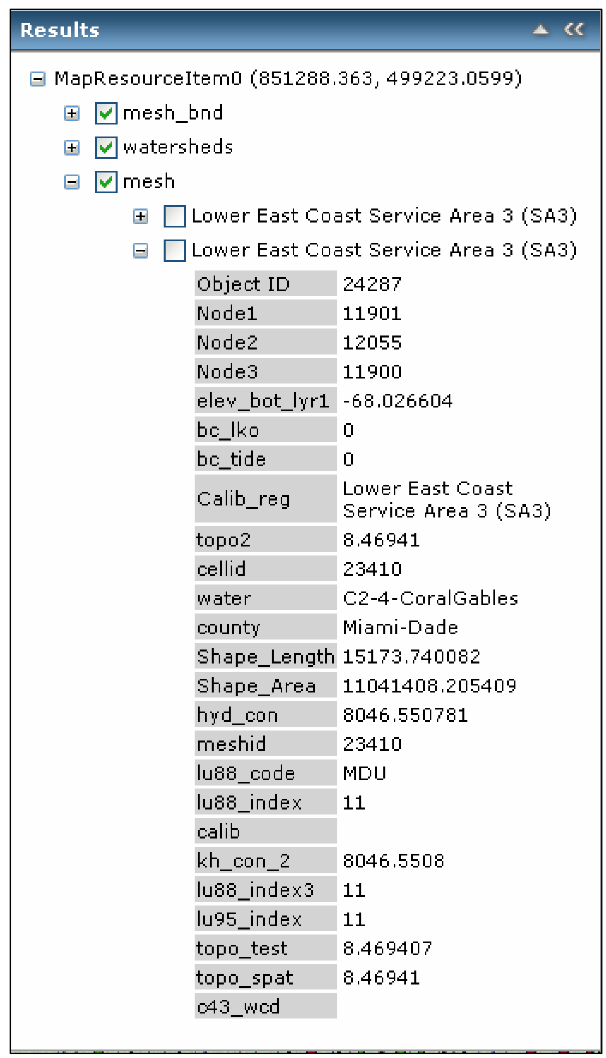
The main menu categories offer tools for: viewing attributes, controlling which layers are viewable, and tools for generating RSM XML files. Each menu can be detached and relocated on the screen as a free-floating menu by clicking on the >> icon. Free-floating menus offer the ability to locate the menu anywhere on the screen and they can be resized. The RSM GUI Tool menu offers a second level of dropdown menus organizing the tools into 3 sub-categories HSE, MSE and XML.

7.5 Results Menu

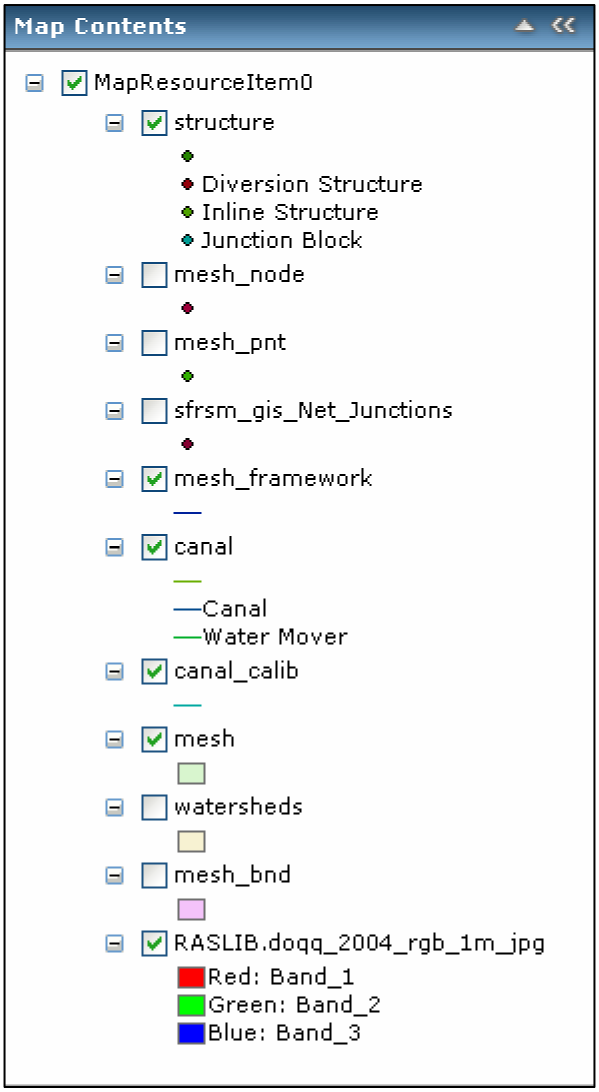
The Results Menu displays output from using the identity button.

▶ Use the Identify button to select a feature in the main viewing window.

A series of expandable lists organize the different levels of information about the features classes retrieved from the geodatabase. Similar to a windows folder system users can navigate by expanding and collapsing the categories by clicking on a series of check boxes to view the levels of information.

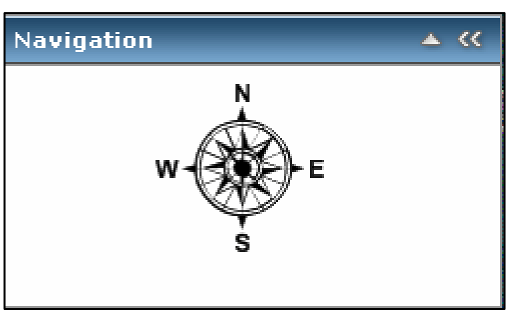


7.6 Map Contents Menu



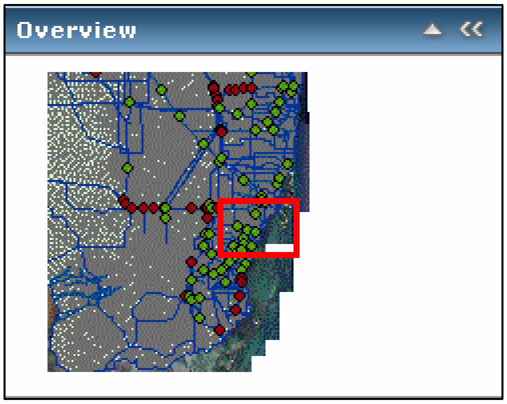
The Map Contents menu will display the table of contents for the data layers shown on the screen. Layers can be turned on or off by clicking on the box next to each layer name. Each layer in the table of contents can be expanded to display more detailed information about the display settings such as color, line type, etc.

7.7 Navigation



The Navigation Menu offers a compass rose which helps navigate within the main map window.
Using the mouse, clicking the left button while hovering over the N will pan north.
Using the mouse, clicking the left button while hovering over the S will pan south, and so on.

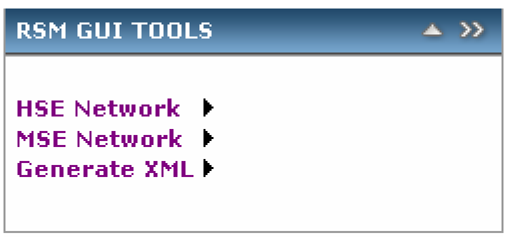
7.8 Overview Menu



The Overview Menu offers a window showing the present location of the map, relative to the overall extent of the data.

7.9 RSM GUI Tools Menu

The RSM GUI Tools Menu organizes the custom GIS tools into groups for pre-processing the HSE canal network, pre-processing the MSE network and for generating XML's. The groupings are made available through an interface of dropdown menus. These are the primary tools used by modelers preparing an RSM run. The tools extract data from the geodatabase and assemble the information into XML's formatted for use in the RSM. Header information and comments are also added to the file (where allowed) to <u>self-document</u> the files to aid with post-processing and model output analysis.



XML's generated from the RSM GUI can easily be identified by the header information and can be traced to the originating geodatabase.
Selection of the Index Canal tool will present the user with a set of choices the other XML generating tools are fully automated single-click tools, and only prompt the user for an output file location. Future development work is expected to expand the number of tools offered through this interface and completely replace the need for modelers to use ArcGIS desktop or Citrix software.

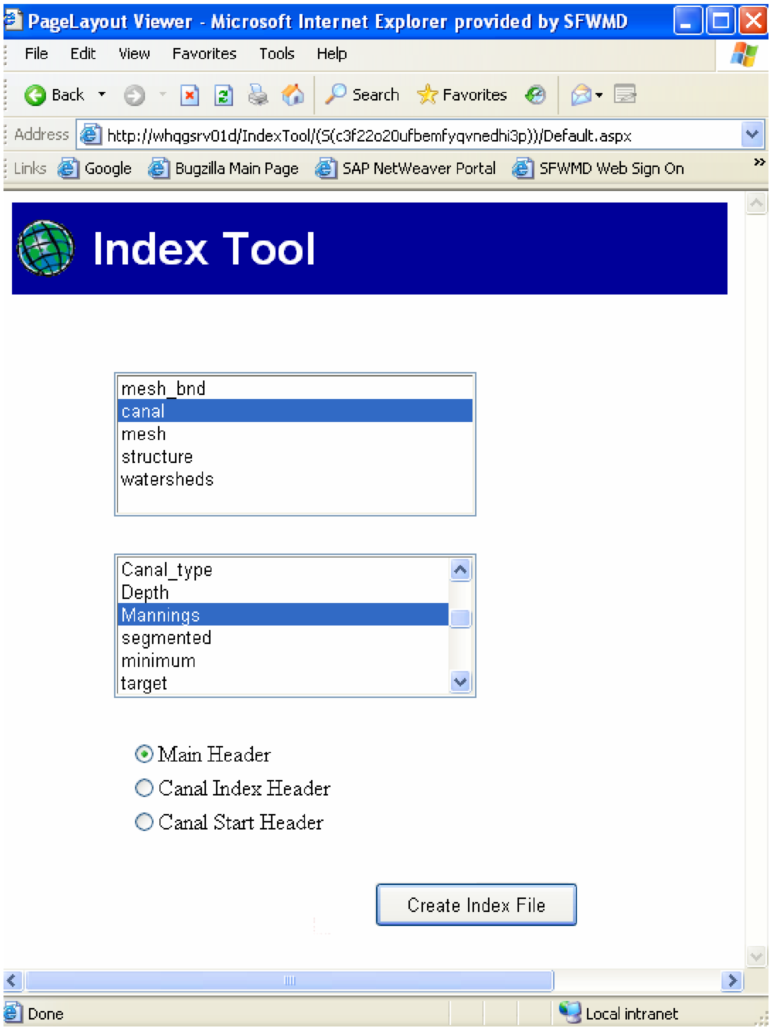
The ArcGIS Server deployed tools can be made available to any user, but the ability to upload a geodatabase is expected to be controlled by a smaller set of administrative users who will control the information made available for use through this interface.

7.10 HSE Network Tools Menu

HSE Network ▶ Segment Canals

Not available at this time. Requires versioned geo-database using ArcSDE.

HSE Network ▶ Index Canal

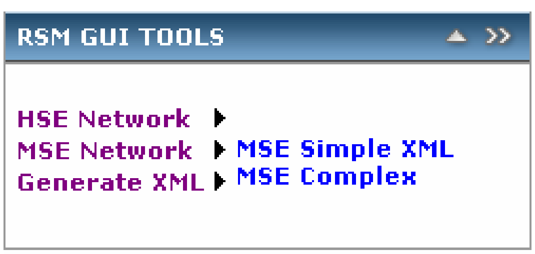


The *Index Tool* presents a forms interface for users to selects a GIS Layer and an associated attribute from that layer to generate an Index XML. Typical usage of this tool is for generating the canal_index XML. The user can select from three header formats for the XML which allow this tool to also be used for generating other index files:

- canal_index.dat
- hyd_con.xml
- lu_index.xml
- topo.xml
- bot_lyr1.xml

After selecting the desired options the user clicks on the Create Index File button and they are prompted to provide a location to save the resulting XML file.

7.11 MSE Network Tools Menu



The *MSE Network* tools offer assistance in generating two versions of the MSE XML: Complex and Simple. These XML's are further edited by the modelers to produce an MSE XML suitable for use in the RSM.
In order for this tool to function there must be water control units (WCU) defined in the geo-database. The MSE XML organizes the attribute information for nodes, segments and junctions in each water control unit.

MSE Network ▶ MSE Simple XML

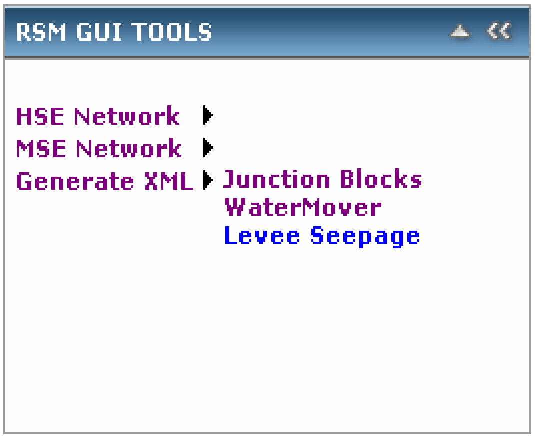
Single-click tool used to generate the mse_simple.xml
Not available at this time. Requires versioned geo-database using ArcSDE

MSE Network ▶ MSE Complex XML

Single-click tool used to generate the mse_complex.xml
Not available at this time. Requires versioned geo-database using ArcSDE

7.12 Generate XML Tools Menu

The generate XML tools offer several single-click fully automated tools used for generating XML's for use in an RSM run.



Generate XML▶ Junction Blocks
Single-click tool used to generate the junction_block.xml

Generate XML ▶ Watermover
Single-click tool used to generate the watermover.xml

Generate XML ▶ Levee Seepage
Single-click tool used to generate the levee_seepage.xml

Generate XML ▶ Boundary Condition
Single-click tool used to generate the bc.xml

CHAPTER 8

The RSM GUI

8.1 Starting the RSM GUI

The RSMGUI has been created to organize a set of applications and tools that help modelers with the final steps assembling an RSM scenario, running the model and processing output from the model. The vision for the RSMGUI is to eventually be the single source for all RSM pre- and post-processing. Further development using Arc GIS Server9.2 for pre-processing RSM data will allow us to retire the GIS Toolbar and provide one comprehensive RSMGUI for all RSM user needs.

From a Linux PC

To run the RSMGUI from any 64bit SFWMD Linux computer, the user must secure shell login to the "whqoom01d" server:

▶ `ssh –Y whqoom01d`

Execute the command to start the RSMGUI:

▶ `/opt/local/share3/bin/rsmgui`

➲Optionally users on older computers can run the 32bit RSMGUI by executing the "rsmgui32" command.

From a Windows PC Using Xming

➲Using Xming, start the Xlaunch application using the settings: One Large Window, XDMCP, whqoom01d and accept the defaults to finish the setup.

➲ If you need to have Xming installed contact someone from the RSM GUI Development Team for assistance.

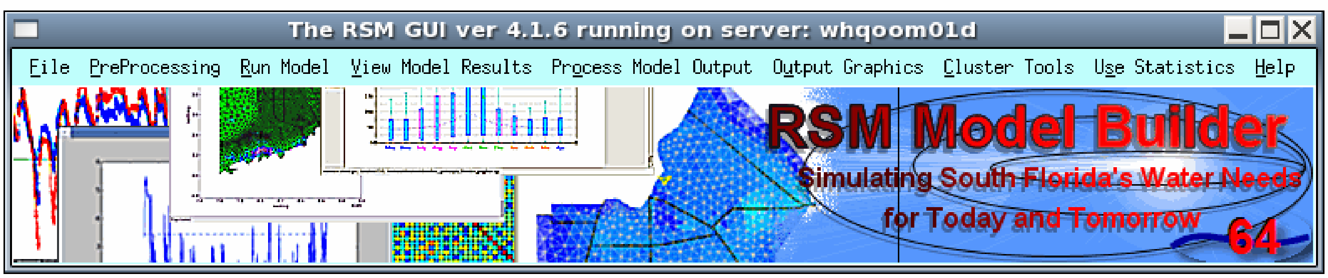


Figure 22: The RSM GUI Python Toolbar

The RSMGUI is organized using dropdown menus grouping the (currently 66) features based on the type of function they provide. Typically only one feature can be run at a time. Links under each menu will call open a window to run the selected feature. RSM GUI features are categorized as follows:

- TOOLS: Custom written Python tools
- SYSTEM CALLS: calls to Linux system commands
- BROWSER LINKS: Links to browser based files (PDF, HTML, etc.)
- APPLICATION LINKS: Links to Linux commercial applications (DSSVue, OpenDX, etc.)
- GIS SERVER APPLCATIONS: Browser based GIS tools using ArcGIS 9.2

Each feature in the RSM GUI will be explained in this manual.

8.2 File Menu

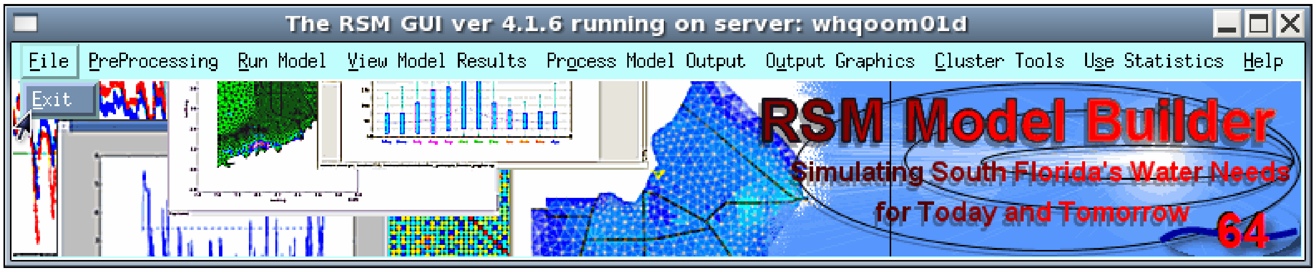


Figure 23: The RSM GUI File Menu

The first dropdown menu on the RSMGUI is the *File* menu. This menu offers only one option, Exit, to exit the RSMGUI. The RSMGUI establishes several environment settings when it starts. Future development is planned to offer interactive settings menus so users can customize their environment and retain preferences within the RSMGUI.

8.3 Exit Feature

The most reliable way to quit the RSMGUI is to use the Quit option under the File Menu.

- On the RSMGUI under the File menu, select ***Exit*** to exit the RSMGUI and to terminate all RSMGUI background processes.

CHAPTER 9

PreProcessing Menu

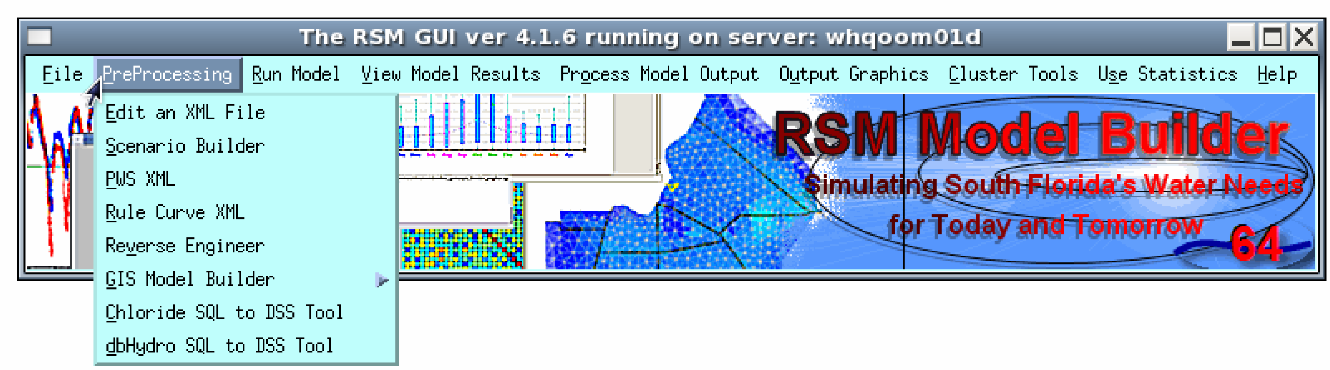


Figure 24: The PreProcessing Menu

9.1 Edit an XML File Tool

The *Edit an XML File* feature calls the nedit utility to edit an XML file. Other text editors are available within Linux but nedit is one of the more basic and simple to use.

➲Other editors you may like to try are: gedit, xemacs, and kedit

9.2 Scenario Builder Tool

The *Scenario Builder* gives assistance in generating blocks of XML assembled from manual user input, reading input files and from user selections from dropdown menus. There are 22 features in the Scenario Builder.

The RSM employs a very open and highly customizable framework. XML input files must adhere to rules and are expected to contain certain information but they can be assembled and combined to create an endless variety of configurations. To help modelers create their XML files the GUI offers a means to generate blocks of XML. These XML blocks can be saved as files or copy and pasted into other XML files. The MAIN XML, which refers to the XML used to run an RSM scenario, has several customizable blocks. The scenario builder helps assemble several of the blocks so they can be quickly generated and assembled together. At a minimum this tool helps generate consistently formatted XML blocks that are readable, contain and it helps avoid typing errors over creating and XML entirely by hand.

▶ On the RSM Toolbar under the Pre-processing menu select the *Scenario Builder tool.*

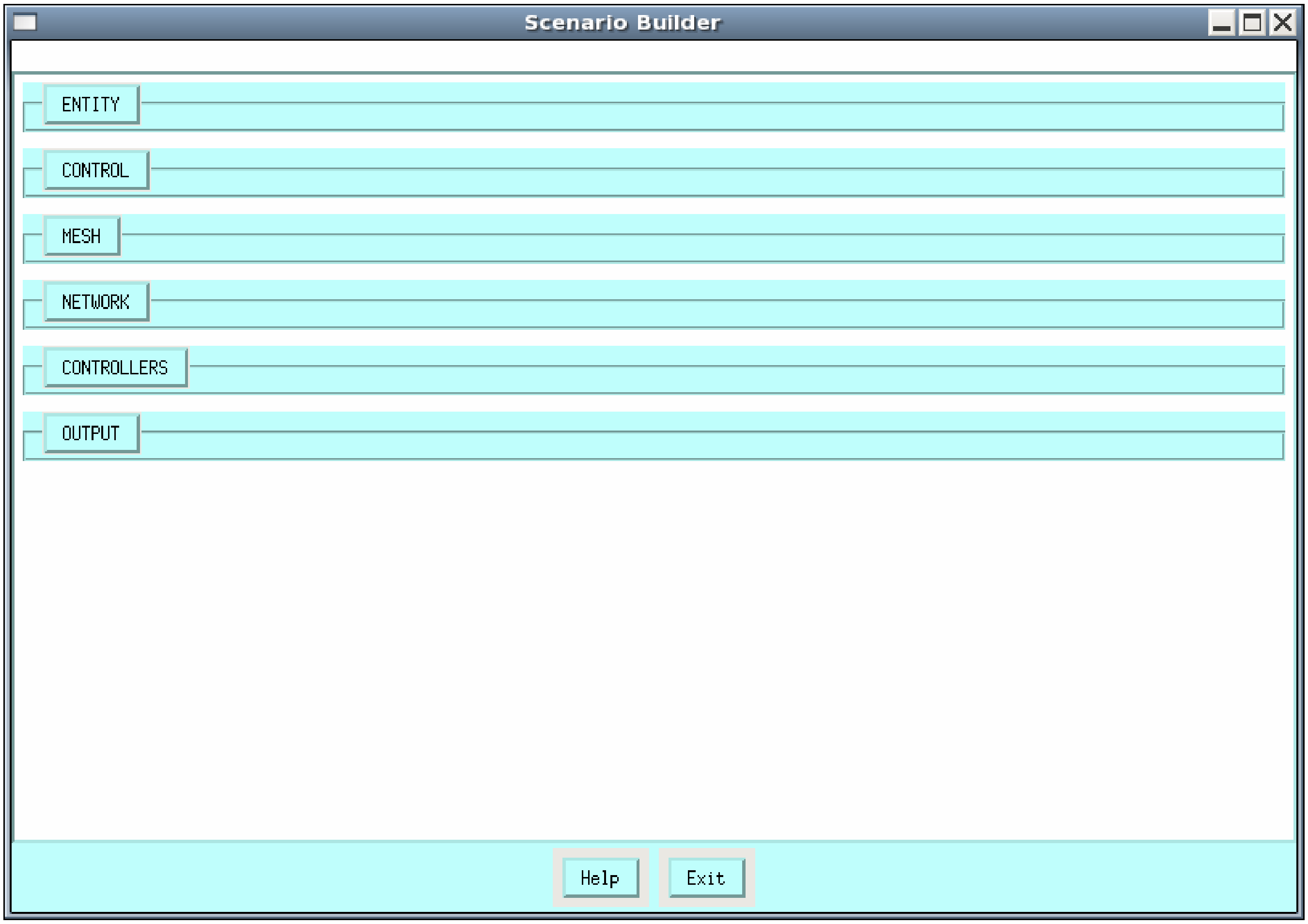
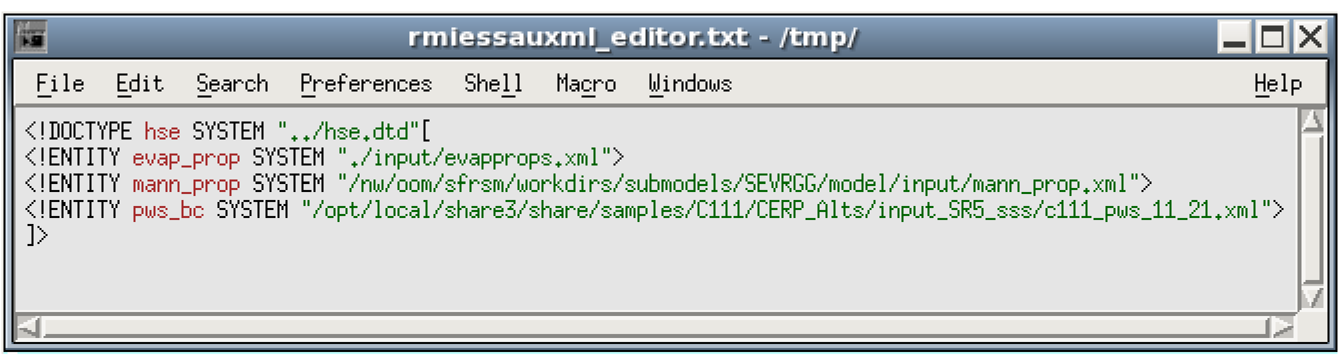


Figure 25: Scenario Builder Tool

9.2.1 Entity

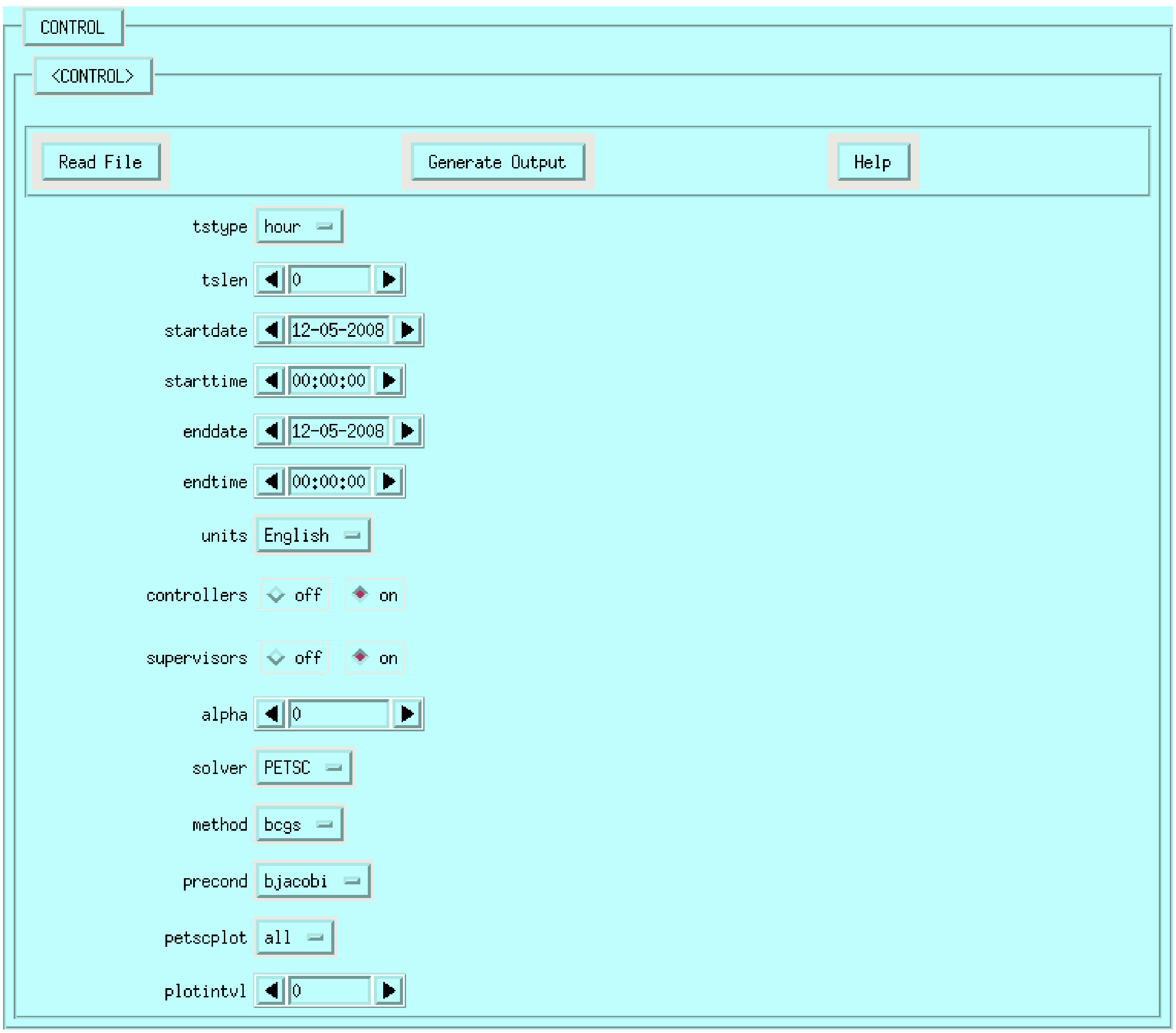
The Entity Tool generates the <entity> portion of the MAIN XML. This block of XML specifies the associated files used to create the RSM. Entity is similar to an <include> statement as used in other mark-up languages. Users can browse to a file for the pre-specified entities or 6 custom entities can be created where users can browse to a file and specify their own entity names. A relative path can be typed in or by browsing the literal path will be captured also verifying the existence of the file. Once browsed to the path can be edited to form of a relative path. The READ FILE button will read and generate entities from an existing XML. The GENERATE OUTPUT button will generate the output form this tool.

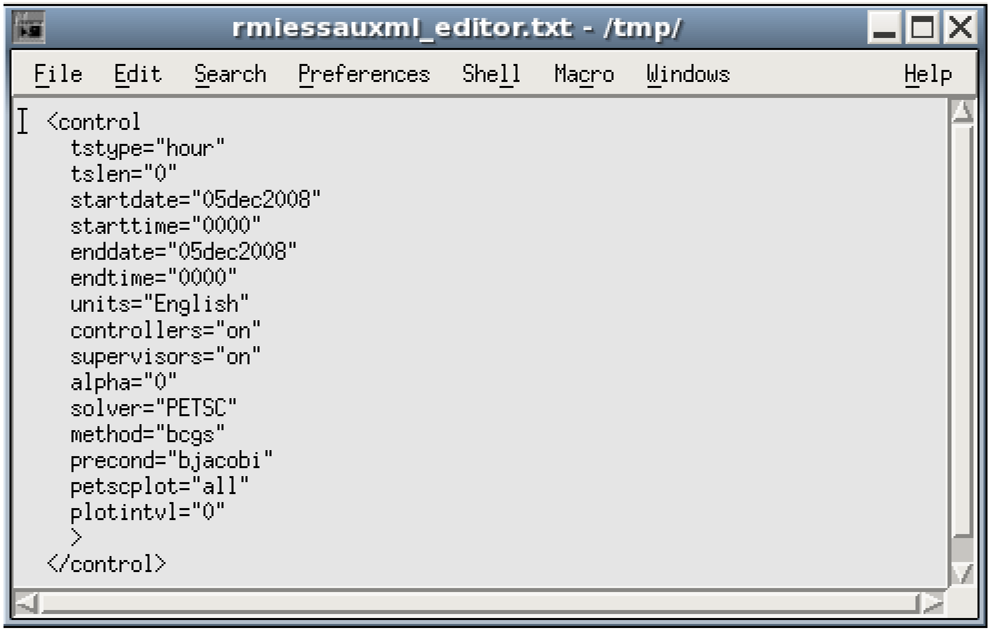

ENTITY
<ENTITY>
Read File
Generate Output
Help
hse ../hse.dtd Browse...
evap_prop ./input/evapprops.xml Browse...
mann_prop /nw/oom/sfrsm/workdirs/submodels/SEVRGG/model/input/mann_prop.xml Browse...
pws_bc /opt/local/share3/share/samples/C111/CERP_Alts/input_SR5_sss/c111_pws_11_21.xml Browse...
levee_bc Browse...
canal_bc Browse...
levee-seep Browse...
network_bc Browse...
junction_blocks Browse...
struc_ops Browse...
bnd_flux Browse...
ol_gw_flow Browse...
canalfixed_head Browse...
canal_stage Browse...
cell_stage Browse...
dss_output1 Browse...
assessors Browse...
controllers Browse...
Browse...
Browse...
Browse...
Browse...
Browse...
Browse...


rmiessauxml_editor.txt - /tmp/
File Edit Search Preferences Shell Macro Windows Help
<!DOCTYPE hse SYSTEM "../hse.dtd"[
<!ENTITY evap_prop SYSTEM "./input/evapprops.xml">
<!ENTITY mann_prop SYSTEM "/nw/oom/sfrsm/workdirs/submodels/SEVRGG/model/input/mann_prop.xml">
<!ENTITY pws_bc SYSTEM "/opt/local/share3/share/samples/C111/CERP_Alts/input_SR5_sss/c111_pws_11_21.xml">
]>

9.2.2 Control

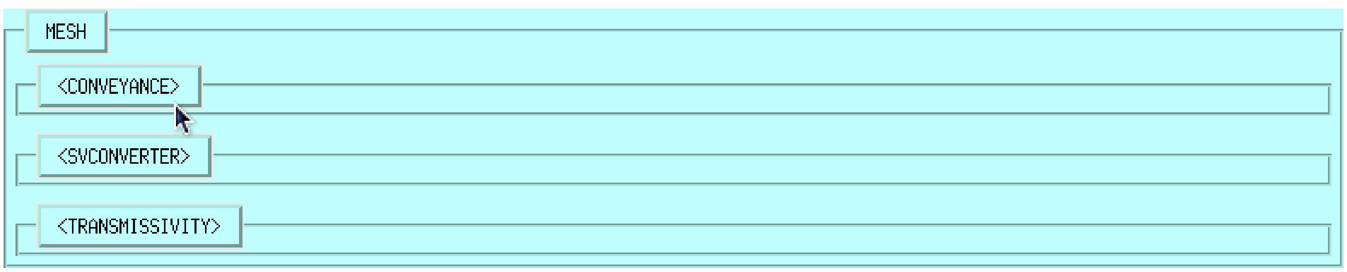
The Control Tool generates the <control> portion of the MAIN XML. This block of XML specifies the options used to run the RSM. By choosing form dropdown list, radio button and selcting options the user can avoid time consuming mistakes of typing incorrect options or incorrect format. The READ FILE button will read and generate control settings from an existing XML. By using this tool the order by which the control settings appear in the XML will be consistent and easier to read by modelers who are familiar with these standard settings. The GENERATE OUTPUT button will generate the output form this tool.






```
<control
  tstype="hour"
  tslen="0"
  startdate="05dec2008"
  starttime="0000"
  enddate="05dec2008"
  endtime="0000"
  units="English"
  controllers="on"
  supervisors="on"
  alpha="0"
  solver="PETSC"
  method="bcgs"
  precond="bjacobi"
  petscplot="all"
  plotintvl="0"
  >
</control>
```

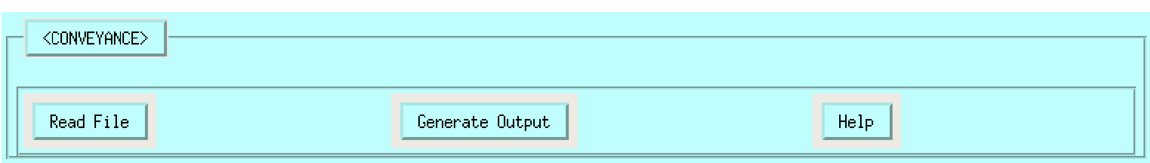
<MESH>

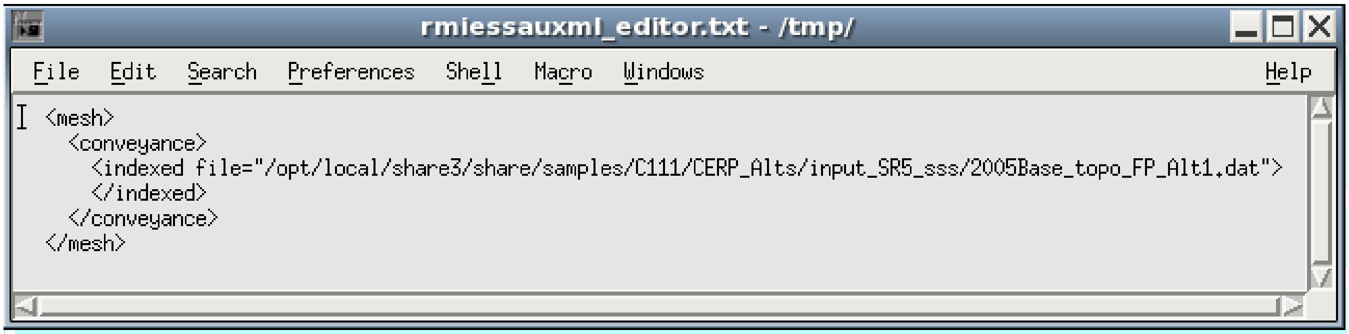


9.2.3 Conveyance Tool

Writes: conveyance.xml

The conveyance tool reads in an existing XML containing a conveyance xml block and extracts jus the conveyance block and presents the data for viewing and editing. Conveyance consists of one index file.

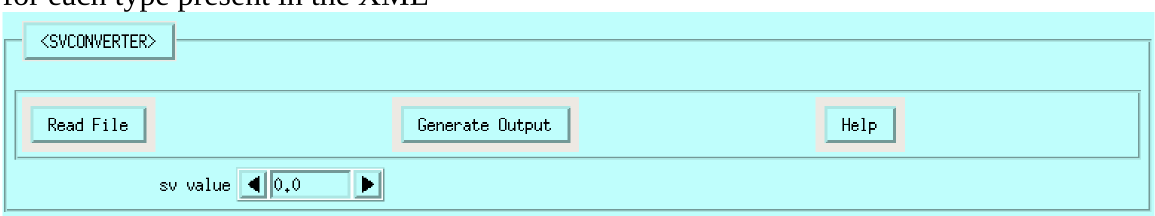




9.2.4 Svconverter

Writes: svconverter.xml

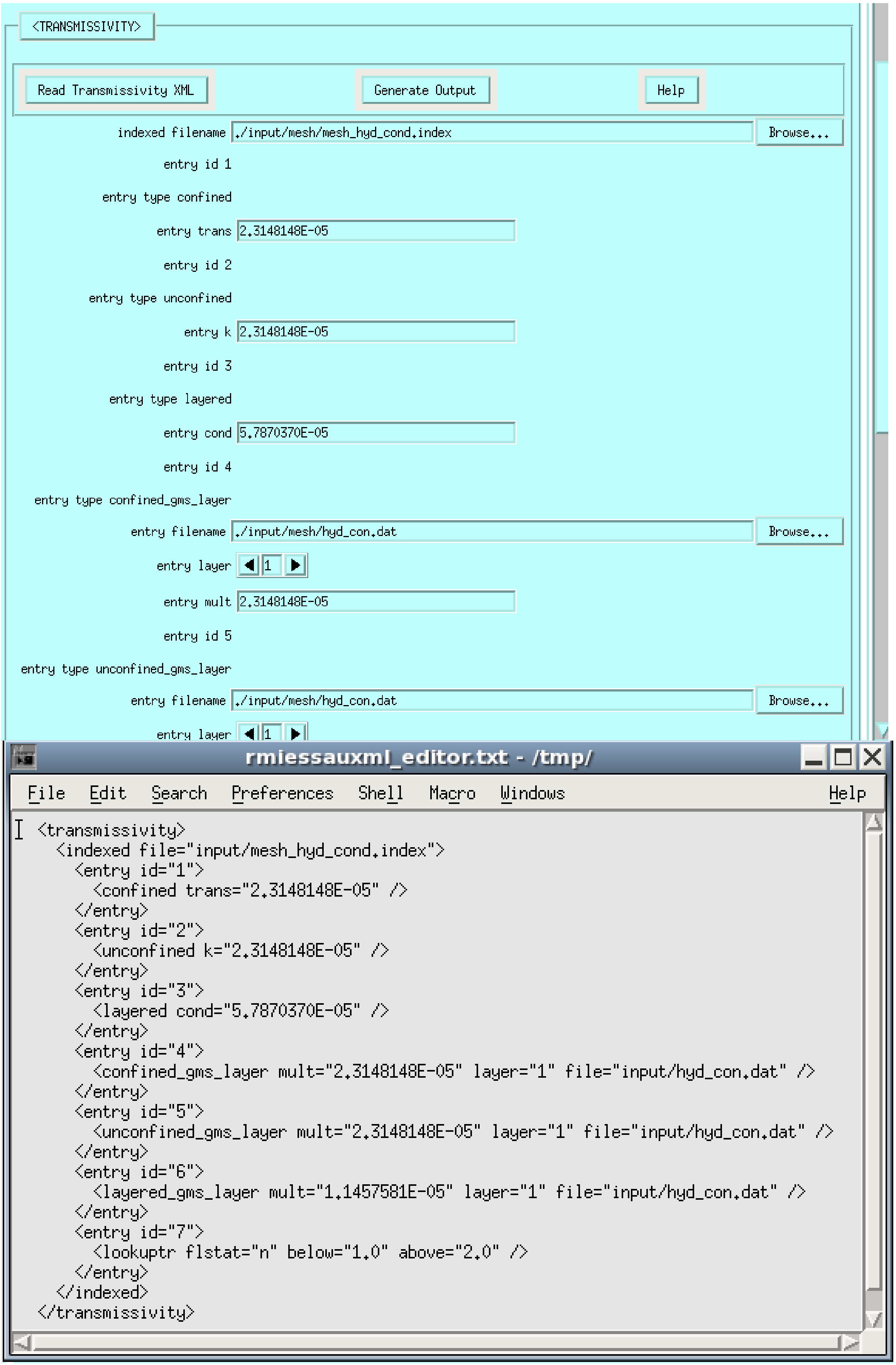
The svconverter reads in an existing svconverter xml and presents the data in an easy to navigate menu for viewing and editing. Svconverter consists of one type or a mix of types such as: confined, unconfined, unconfined_gms_layer, or layered. This tool utilizes the DTD to ensure proper formatting for each type present in the XML



9.2.5 Transmissivity Tool

Writes: transmisivity.xml

The transmissivity tool reads in an existing transmissivity xml and presents the data in an easy to navigate menu for viewing and editing. Transmissivity can consist of one type or a mix of types such as: confined, unconfined, unconfined_gms_layer, or layered. This tool utilizes the DTD to ensure proper formatting for each type present in the XML.


<TRANSMISSIVITY>
Read Transmissivity XML
Generate Output
Help
indexed filename ./input/mesh/mesh_hyd_cond.index
Browse...
entry id 1
entry type confined
entry trans 2.3148148E-05
entry id 2
entry type unconfined
entry k 2.3148148E-05
entry id 3
entry type layered
entry cond 5.7870370E-05
entry id 4
entry type confined_gms_layer
entry filename ./input/mesh/hyd_con.dat
Browse...
entry layer 1
entry mult 2.3148148E-05
entry id 5
entry type unconfined_gms_layer
entry filename ./input/mesh/hyd_con.dat
Browse...
entry layer 1
rmiessauxml_editor.txt - /tmp/
File Edit Search Preferences Shell Macro Windows Help
<transmissivity>
<indexed file="input/mesh_hyd_cond.index">
<entry id="1">
<confined trans="2.3148148E-05" />
</entry>
<entry id="2">
<unconfined k="2.3148148E-05" />
</entry>
<entry id="3">
<layered cond="5.7870370E-05" />
</entry>
<entry id="4">
<confined_gms_layer mult="2.3148148E-05" layer="1" file="input/hyd_con.dat" />
</entry>
<entry id="5">
<unconfined_gms_layer mult="2.3148148E-05" layer="1" file="input/hyd_con.dat" />
</entry>
<entry id="6">
<layered_gms_layer mult="1.1457581E-05" layer="1" file="input/hyd_con.dat" />
</entry>
<entry id="7">
<lookuptr flstat="n" below="1.0" above="2.0" />
</entry>
</indexed>
</transmissivity>

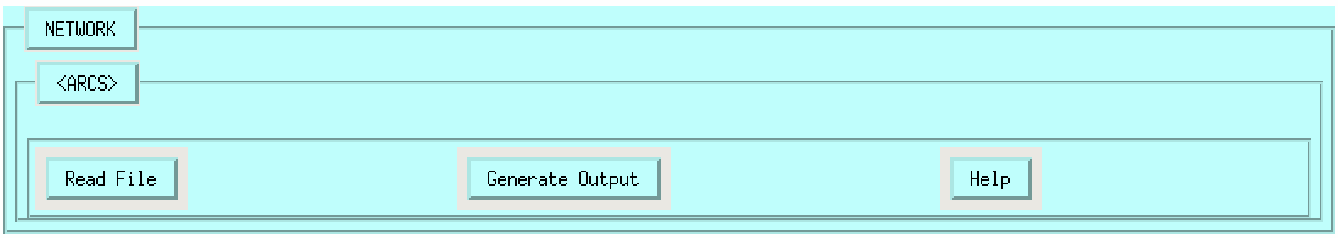
<Network>

The network XML assigns all the information pertaining to the canal network such as: geometry, initial stage conditions, network boundary conditions, segment sources, junctions, and connectivity.

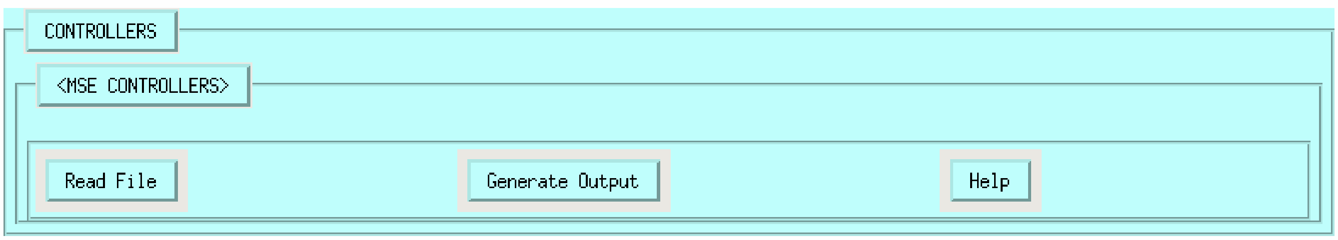
9.2.6 arcs (xsentry)

Writes: arcs xml

This RSMGUI tool reads the main XML, acquires xsentry and parses it for editing.



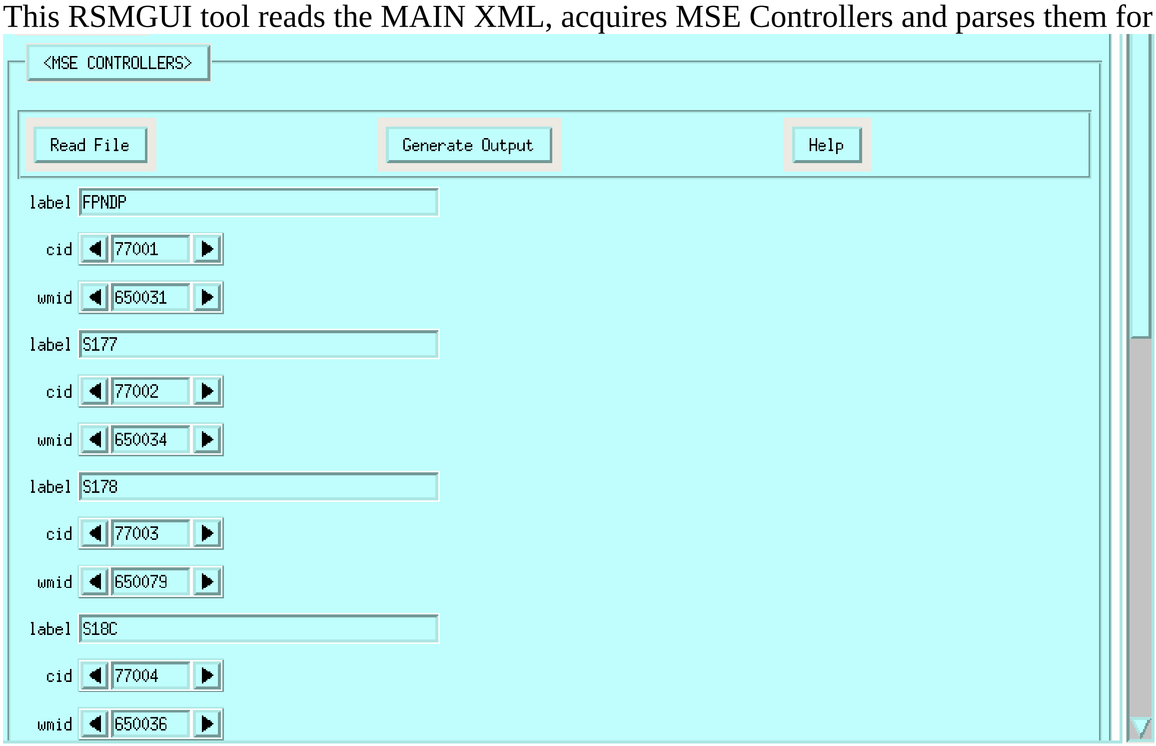
<Controllers>



9.2.7 MSE Controllers

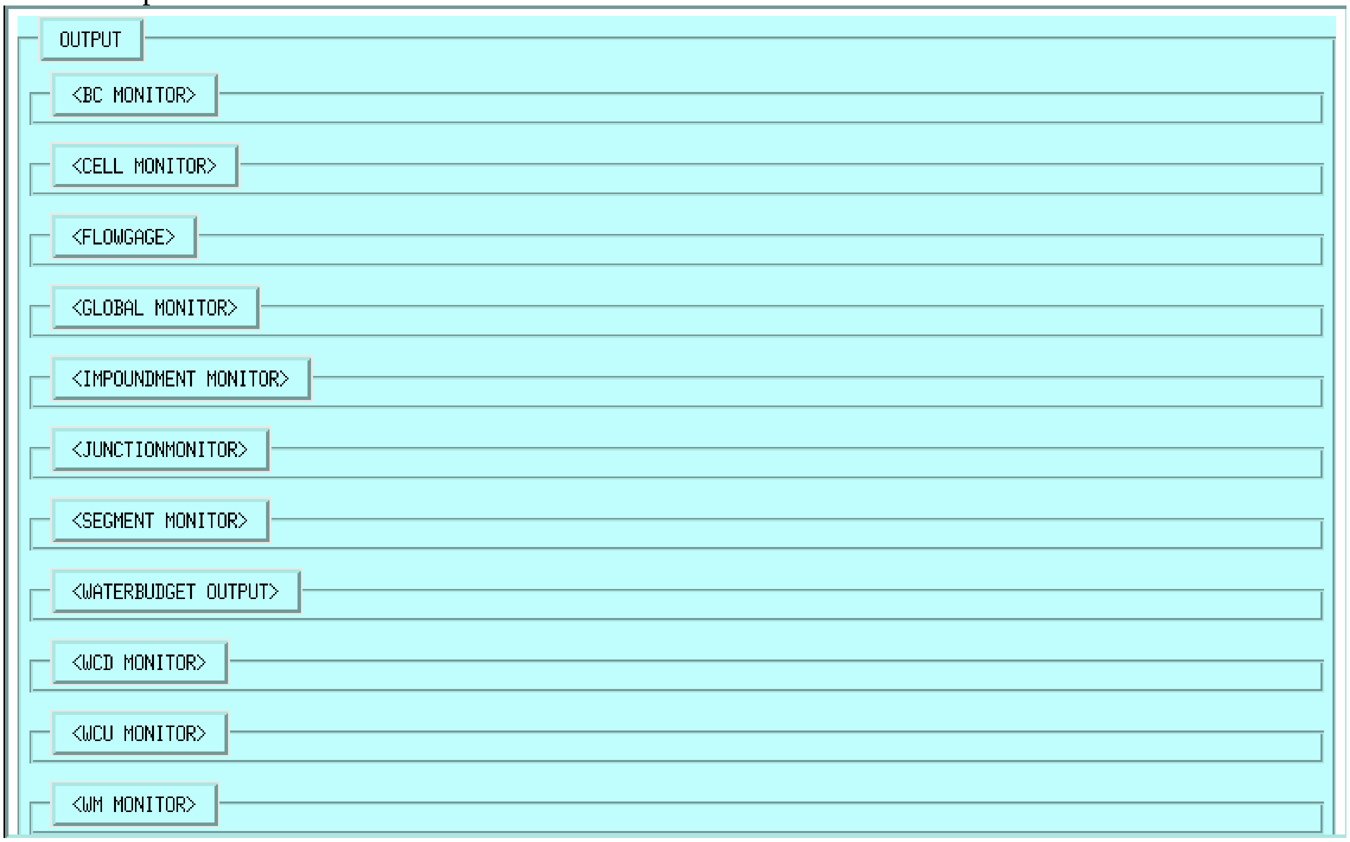
Writes: controllers.xml

This RSMGUI tool reads the MAIN XML, acquires MSE Controllers and parses them for editing.



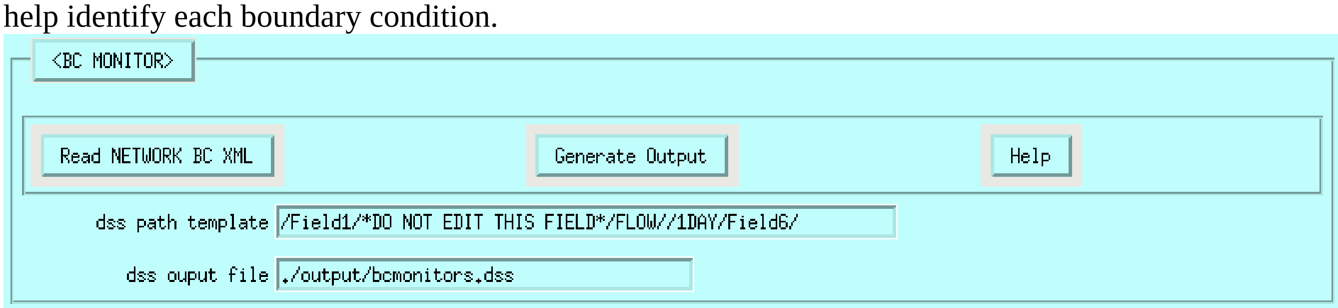
<Output>

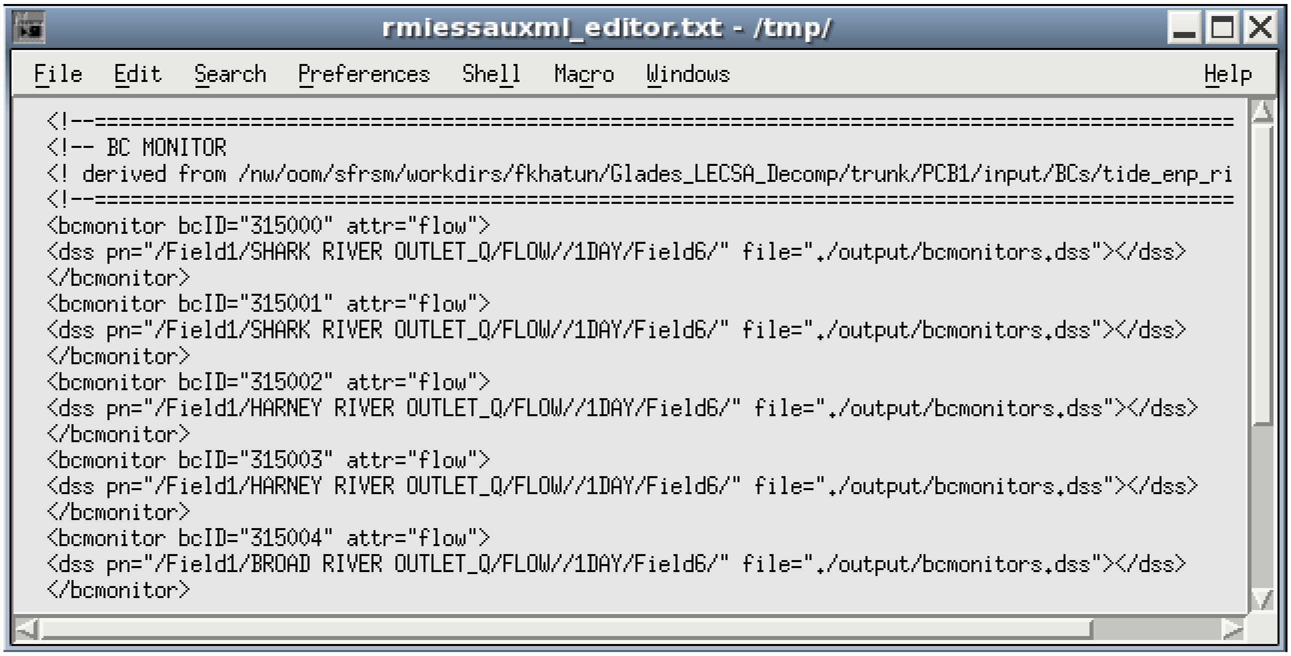
The output tools assist with creating XML blocks for generating output from the RSM by placing them in the <output> section of the MAIN XML.



9.2.8 BC Monitor

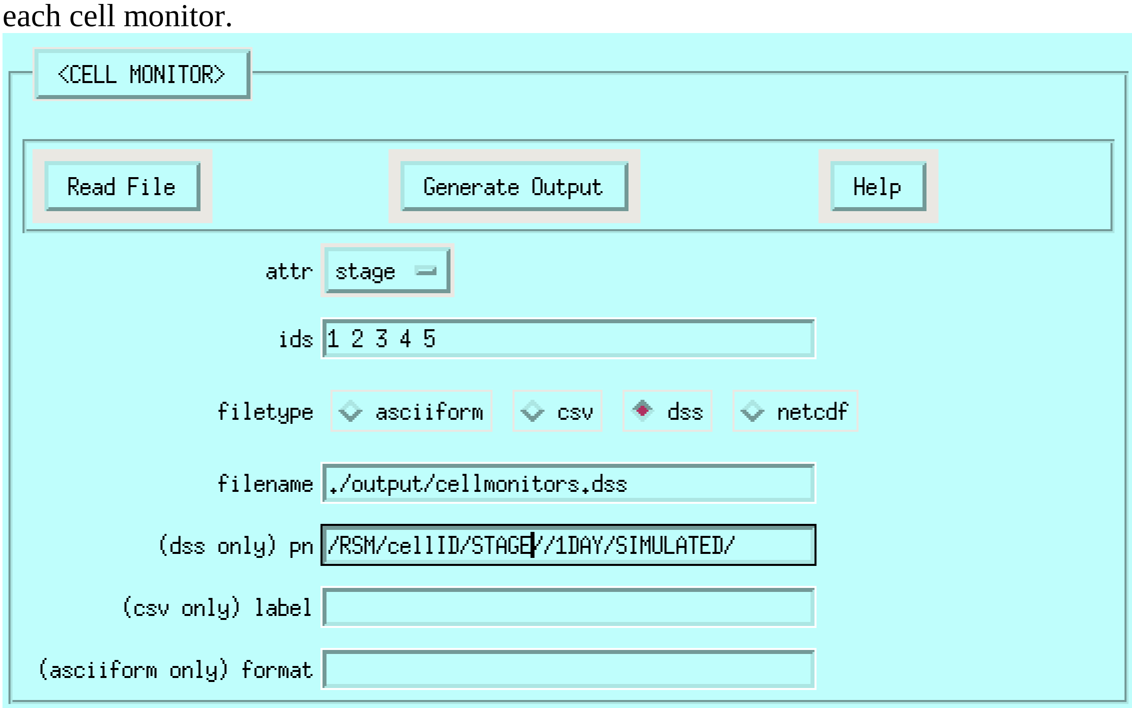
This RSMGUI tool reads the BC XML, acquires information for every boundary condition and generates the BCMONITOR XML block. Users are prompted to specify the DSS output path and the default fields in the HEC-DSS path. The BC label is automatically used for field 2 in the DSS path to help identify each boundary condition.

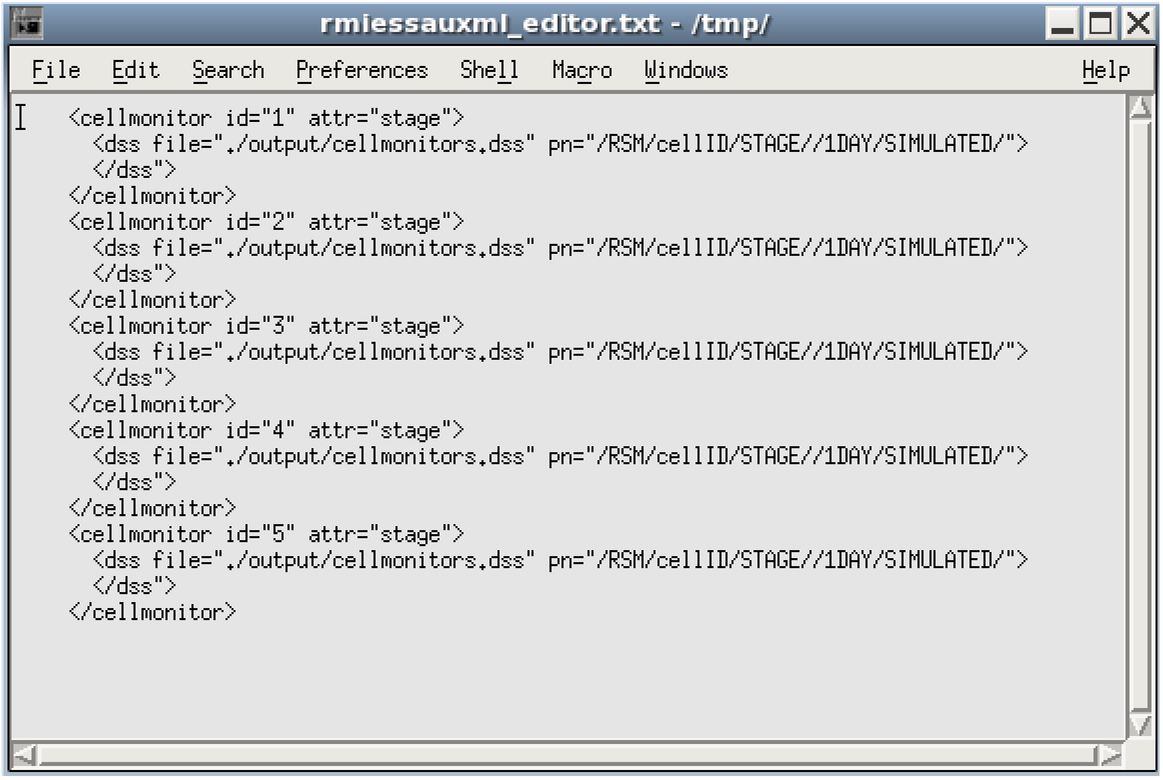




9.2.9 Cell Monitor

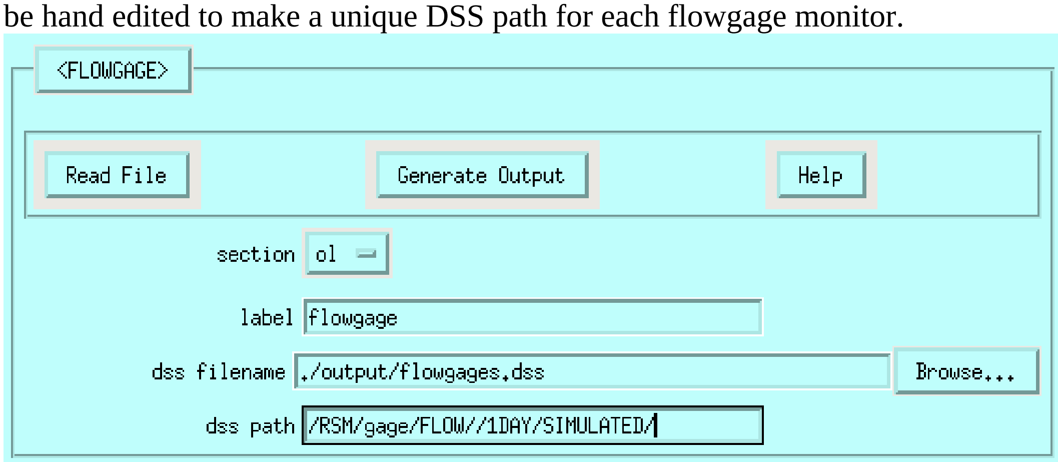
This RSMGUI tool generates the CELL MONITOR XML block. Users are prompted to enter a list of cell IDs or a list can be read in from a file containing a single column of IDs. Users are prompted to specify the DSS output path and the default fields in the HEC-DSS path. The cell ID is automatically used in the id for each cell monitor. The DSS path can be hand edited to make a unique DSS path for each cell monitor.

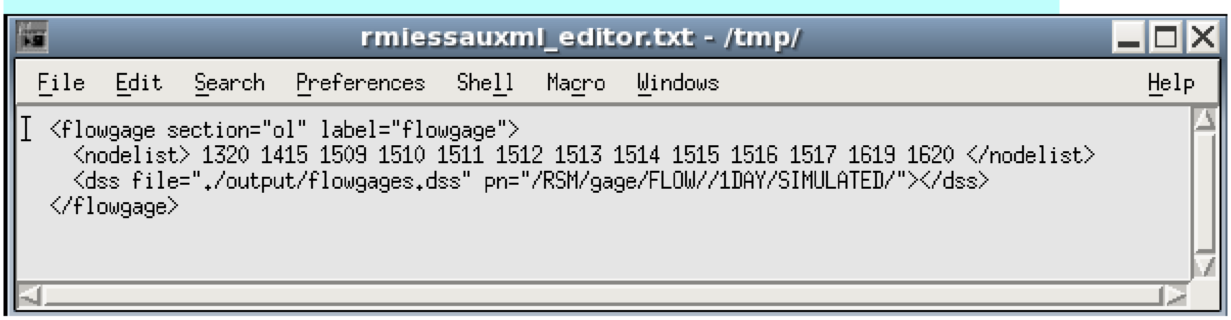




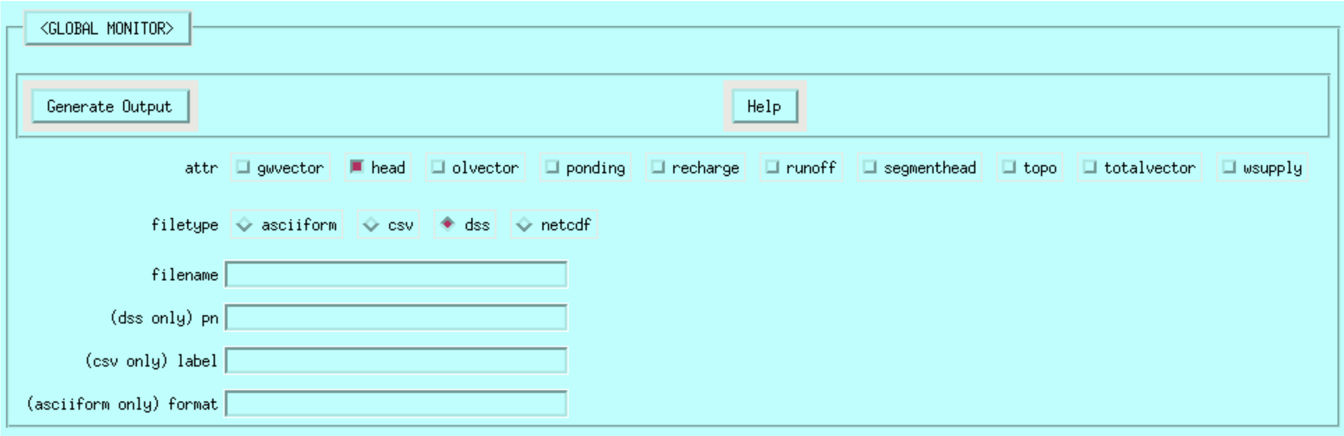
9.2.10 Flowgage

This RSMGUI tool generates the FLOWGAGE MONITOR XML block. Users are prompted to enter a list of node IDs or a list can be read in from a file containing a single column of IDs. Users are prompted to specify the DSS output path and the default fields in the HEC-DSS path. The DSS path can be hand edited to make a unique DSS path for each flowgage monitor.

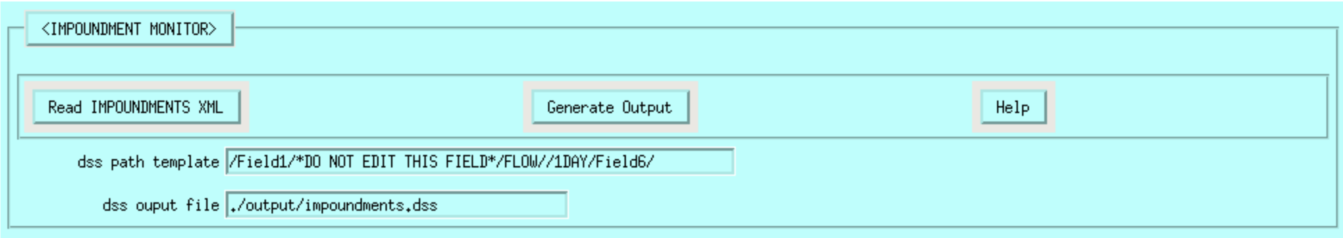




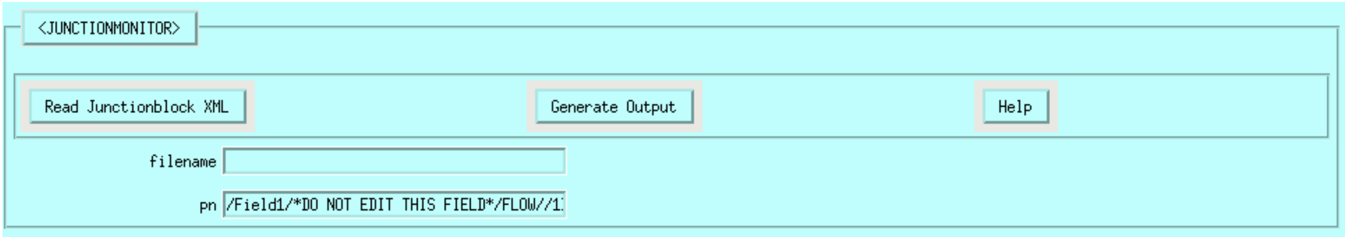
9.2.11 Global Monitor



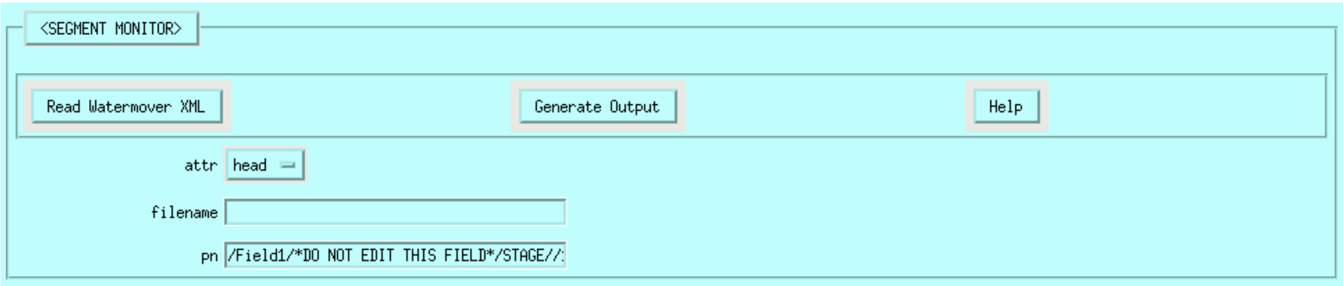
9.2.12 Impoundment Monitor



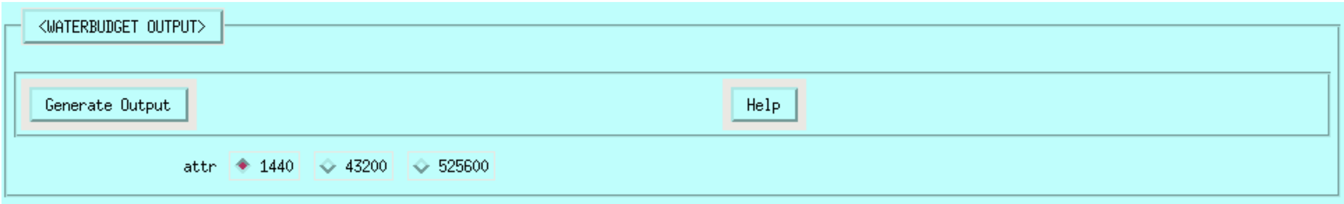
9.2.13 Junction Monitor

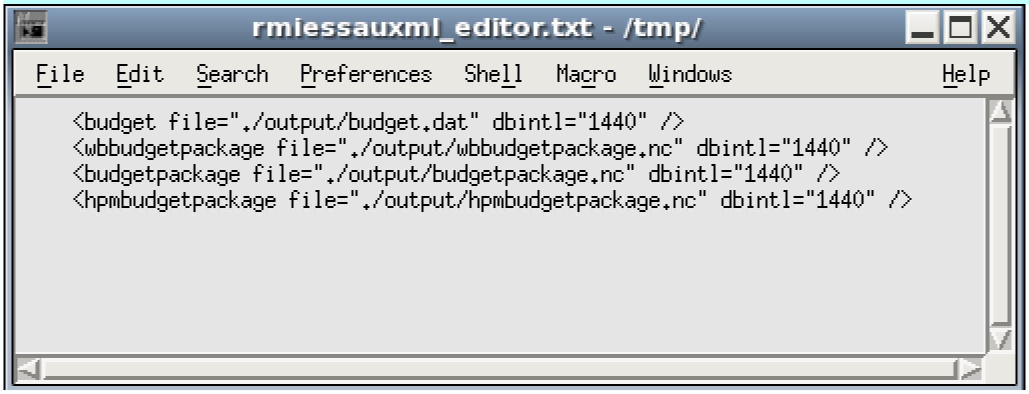


9.2.14 Segment Monitor

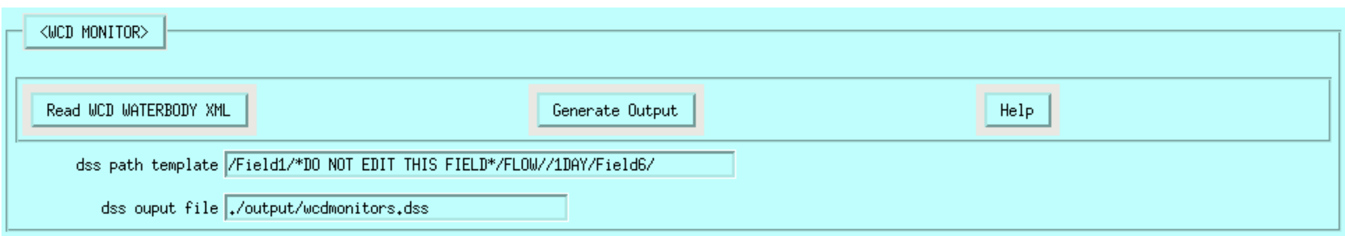


9.2.15 Waterbudget Output

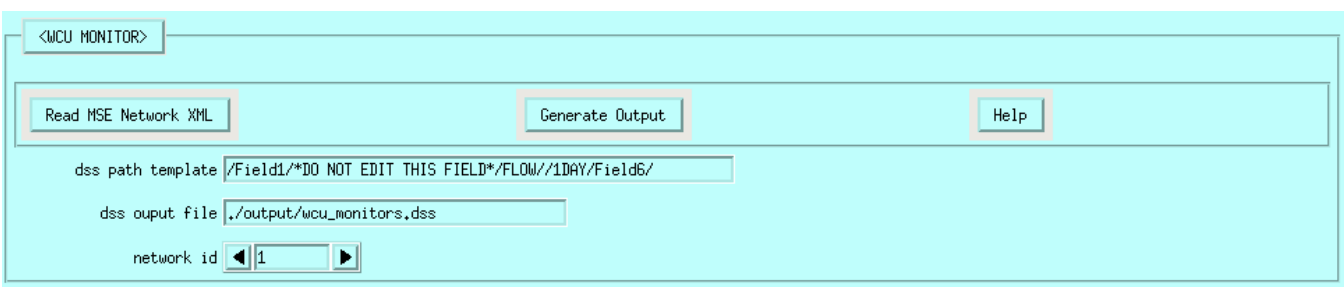




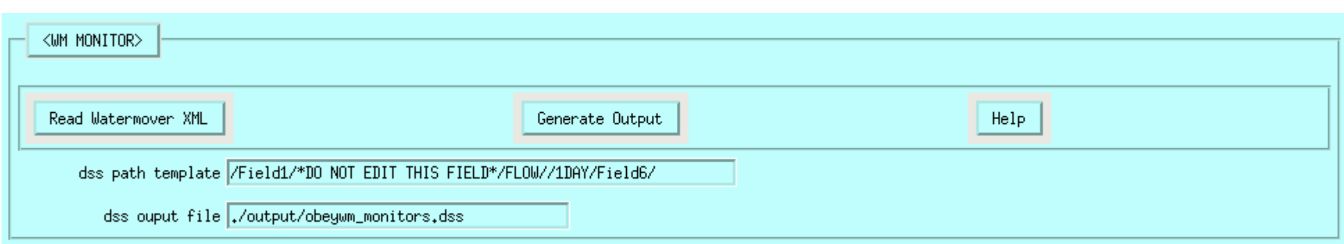
9.2.16 WCD Monitor



9.2.17 WCU Monitor



9.2.18 WM Monitor



9.3 PWS XML Tool

The *Public Watersupply Well XML (PWS XML)* tool helps build the public water supply XML. This tool reads in a list of well ID's, a list of cell ID's, offers a means to set attributes for the PWS XML and then generates a well XML block.

▶ On the RSM Toolbar under the Pre-processing menu select the *PWS XML Tool*.

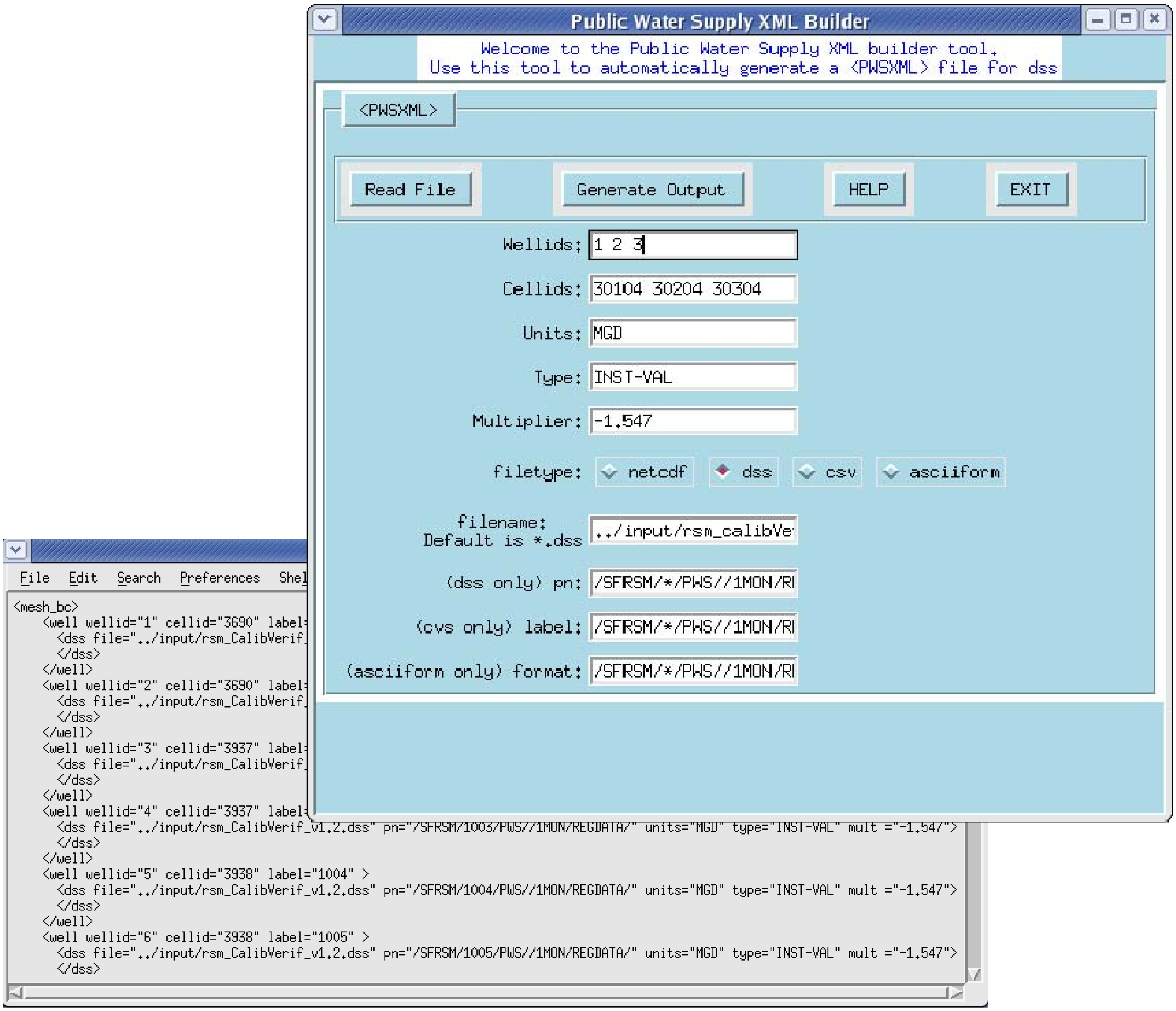


Figure 26: PWS XML Tool and PWS XML file

▶ Click the Read File button.
▶ Select /opt/local/share3/share/samples/pws/pws_inputfile.csv
▶ Click the generate Output button.

9.4 Rulecurve XML

The *Rulecurve XML* tool helps build a rule curve XML. This tool prompts the modeler to first generate a generic rule or standard wet/dry season curve. The user is prompted to set the ID, label and units for the rule curve and then provides inputs start/end for each elevation. After a rule is finished additional rules can be added to the same XML. The output is a rulecurves XML with one or many rc entries.

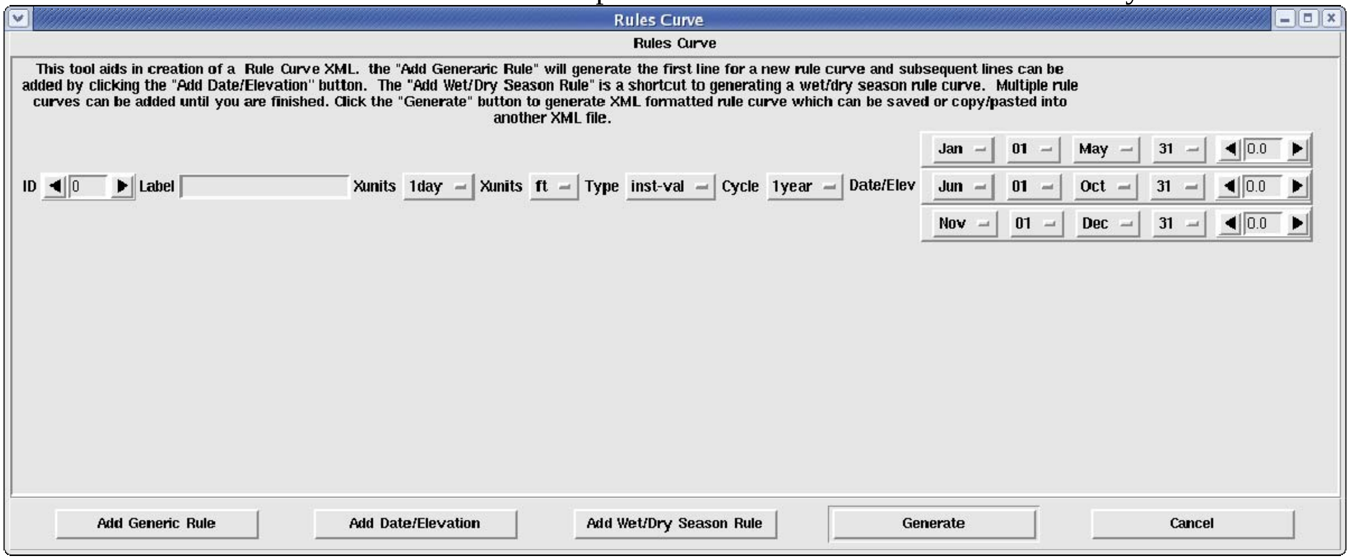


Figure 27: Rule Curve Tool

9.5 Reverse Engineer

The *Reverse Engineer* tool was created to traverse an RSM Main XML and generate containing all references to GIS attributes that are present in the XML (an included XMLs). There has been very limited use of this tool, redesign is being considered and no sample data is available.

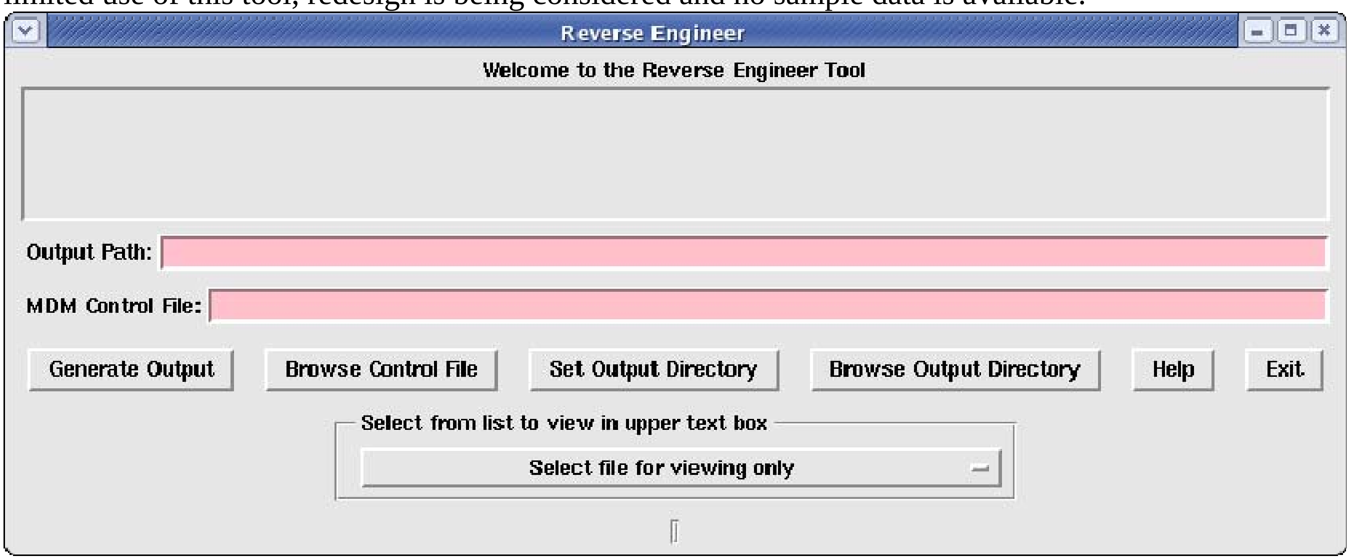
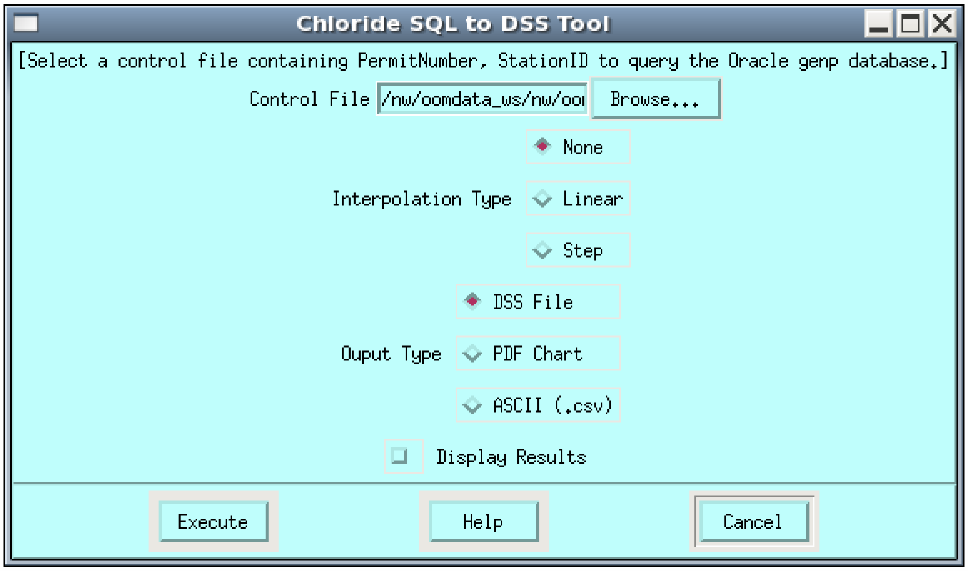


Figure 28: Reverse Engineer Tool

9.6 Chloride SQL to DSS

The *Chloride SQL to DSS* tool was created to help users extract chloride data from Oracle and export it to a HEC-DSS file to be used as model input. The user provides a control file consisting of comma delimited rows of permit numbers and station IDs. Output options include choices to interpolate missing data, output to HEC-DSS, ASCII or to generate graphs in PDF format. PDF graphics can be displayed automatically when the tool completes the operation.

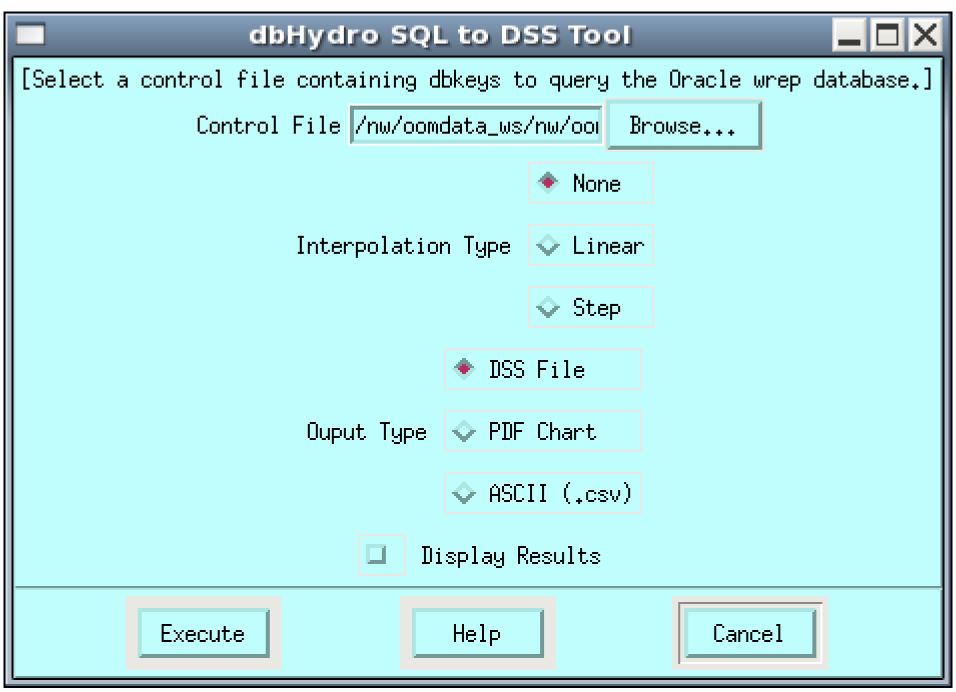
Sample control file :
06-01474-W, 41584
06-01474-W, 19644



9.6 DBHYDRO SQL to DSS

The *DBHYDRO SQL to DSS* tool was created to help users extract data from DBHYDRO and export it to a HEC-DSS file to be used as model input. The user provides a control file consisting of signle column of DBHYDRO DBKEYs. Output options include choices to interpolate missing data, output to HEC-DSS, ASCII or to generate graphs in PDF format. PDF graphics can be displayed automatically when the tool completes the operation.

Sample control file:
06-01474-W, 41584
06-01474-W, 19644



Chapter 10

Run Model Menu

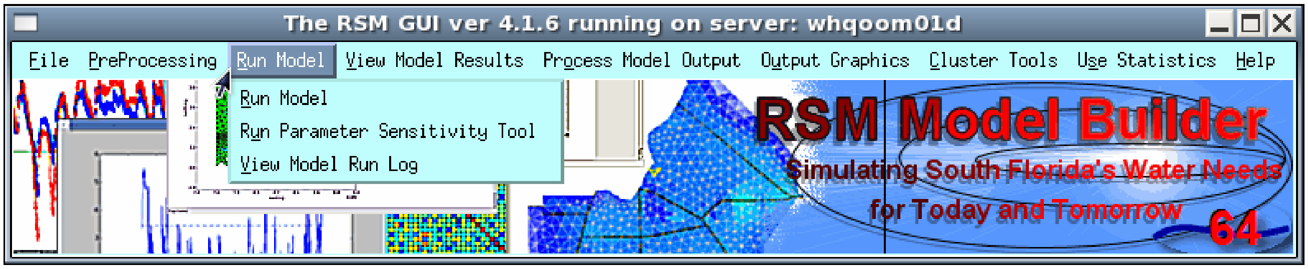


Figure 29: The Run Model Menu

After all files have been assembled the model can be run via the Run Model menu on the toolbar. The Run Model interface offers input options to browse to the compiled HSE version of the model, the calibration XML to be used to control the scenario and it also has optional comment fields to help catalog the model run. Statistics from each run are captured and stored in the Model Log, which can also be found under the Run Model menu on the toolbar.

10.1 Run Model Tool

The Run Model tool provides an interface to help run the model, capture information about the run, and send an email notification when the run is completed successfully.

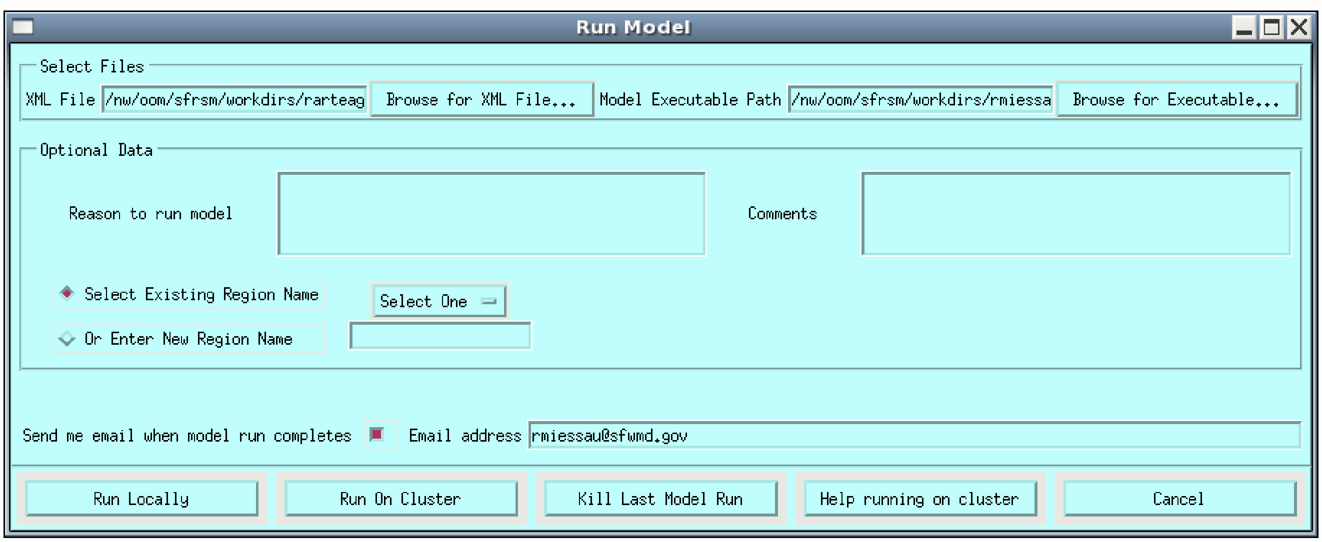


Figure 30: Run Model Tool

The input files for a scenario are typically stored on dcluster1 (whqoom01d) under the workdirs directory. The model directory will contain an input and output subdirectory. In addition the modeler will specify the location of a compiled version of the HSE to be used to make the run. The MAIN XML controls how the scenario will be executed. The MAIN XML contains references to the DTD (data type definition) file, the location and names of the input files, the location and names for output files, and all externally referenced files.

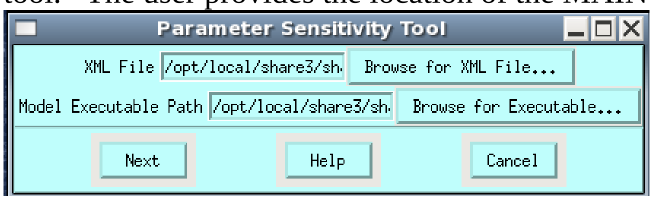
Features in the Run Model tool include:

- **XML File**: the MAIN XML to be used to make this run.
- **Model Executable Path**: the compiled HSE executable
- **Reason to Run Model**: optional comment to document the reason for making this run
- **Comments**: optional comments about this run
- **Select Existing Region Name**: select the region (names) for this run from a dropdown list of previously made runs
- **Enter New Region Name**: input the region (name) for this run and it will be added to the dropdown list for future use in this tool
- **Send Email**: email address where an automated email notice will be sent upon completion of the run
- **Run Locally**: execute this run on the server where the RSMGUI is being run
- **Run On Cluster**: execute this run on the compute cluster dcluster1

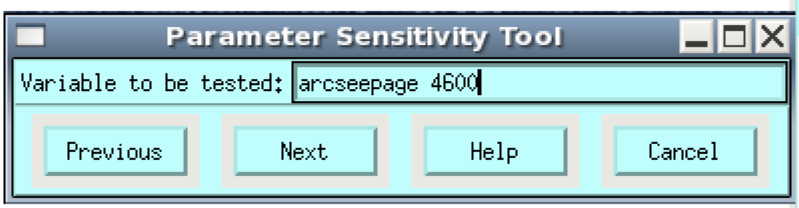
See Appendix D for a description of all the files used to execute a sample RSM implementation.

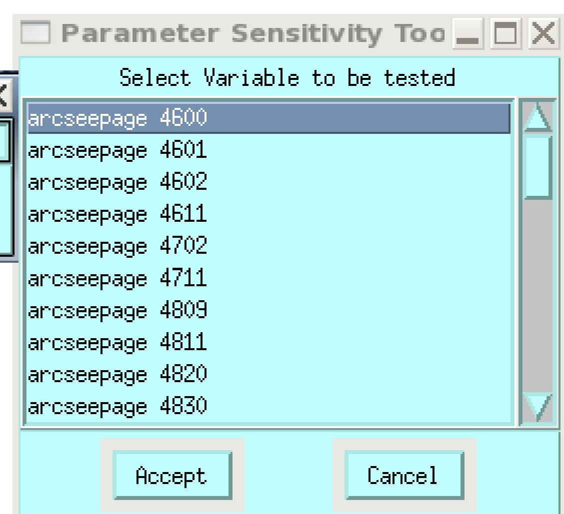
10.3 Parameter Sensitivity Tool

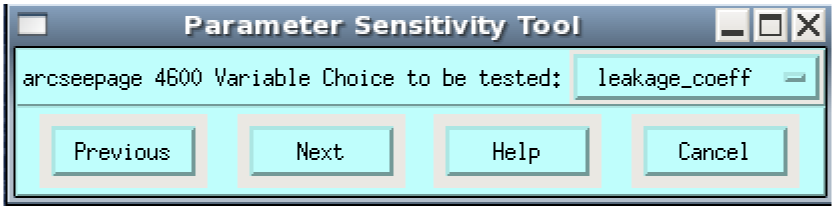
The parameter Sensitivity tool provides a means to prescribe a value range for a parameter to be tested, execute up to 10 runs of the RSM, capture output the test results into a DSS file and plot a graph comparing the results. The model implementation can be modified, executed and analyzed using this tool. The user provides the location of the MAIN XML and the path the HSE executable.



The user is then presented with a choice of variables that can be tested in the run. The user can click on the first variable shown in the text box and then a selection window will open giving the user a choice from all variables found in the run.



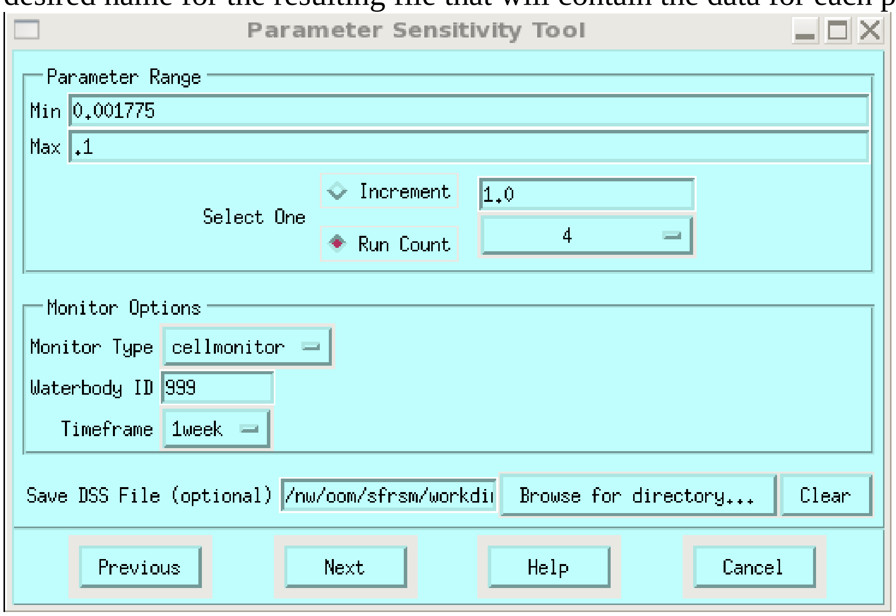




After the variable has been selected, the next menu gives a choice of the parameters associated with the chosen variable. Valid variable types and parameters include:

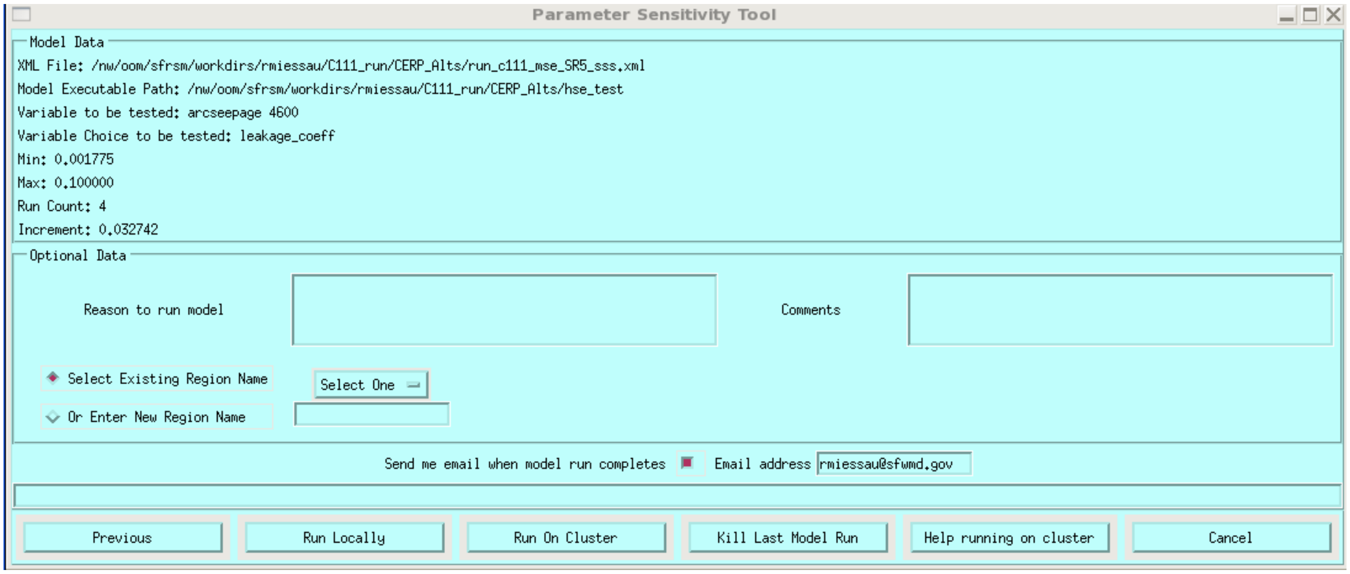
Variable	Parameters
Mannings	a, b, detent
Leakage_coeff	coeff
Seepage_coeff	coeff

The next menu allows the user to prescribe a range to be tested for the chosen parameter by selecting a min and max value. Increments can be set by specifying the increment or by choosing the number of runs to be made and letting the tool calculate the increment. The user then creates a monitor to capture and compare the results. Users must be familiar with the RSM implementation being run in order to know what monitor will be impacted by the parameter being tested. Options include creating a cell_monitor, segment_monitor, junction_monitor, or a wm_monitor. The monitor can be set for the default time of the model or a longer timeframe (dbintl) and the resulting DSS file can be saved to a named location. A browse button helps locate a suitable location and then the user is expected to enter a desired name for the resulting file that will contain the data for each parameter interval to be tested.



The final menu displays the settings for the model run(s) to be made: Path the main XML, Path the HSE, Variable name, Parameter name, Parameter min & max, Number of runs to be made and the Parameter increment.

The user can also enter optional information about the run and choose to have an email sent to an address when the runs are complete.
The run can be executed locally where the RSMGUI is being run from or on the DCLUSTER if the user is on the SFWMD network and the run is stored on the Storage Area Network (SAN).



NOTE: DCLUSTER runs must be made using a model that is on the SFWMD network and is stored on the Storage Area Network (SAN).

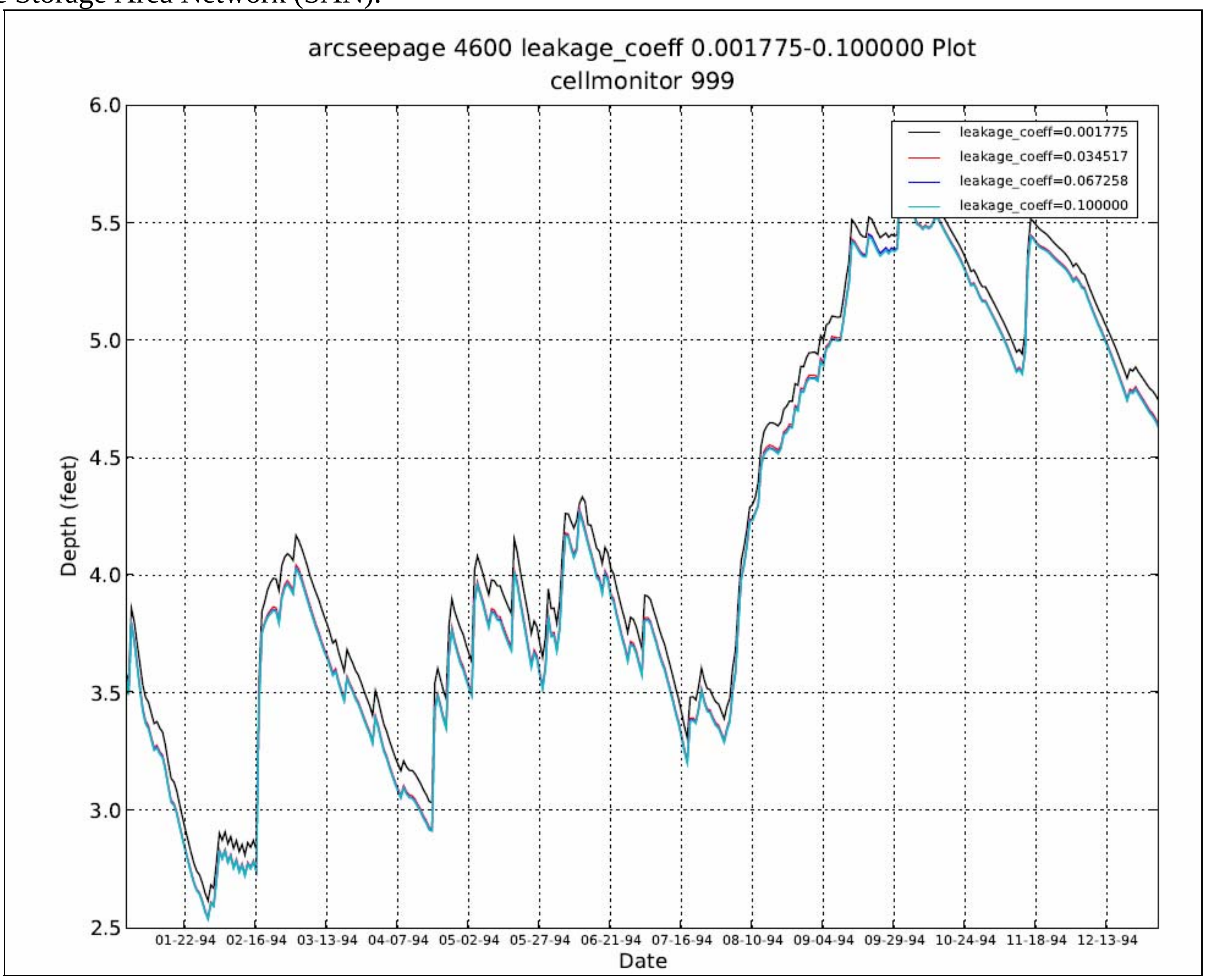


Figure 31: Output from Parameter Sensitivity Tool

10.2 View Model Log

After a run has been made using the Run Model tool, information about the run is stored in a Model Log file. If the RSMGUI is run while off of the SFWMD network, the model log file is stored locally and then copied to the RSMGUI Master Model Log the next time the GUI is started while the computer is connected to the SFWMD network.

The Model Log can be searched using the following options:

- **All Users**: this will display the entire Model Log.
- **Single User**: enter the name of a user in field provided to search for runs made that user
- **Region Name**: select the name of a region from a dropdown list to search for runs associated with that region
- **Display**: execute the search
- **Cancel**: dismiss the tool\
-

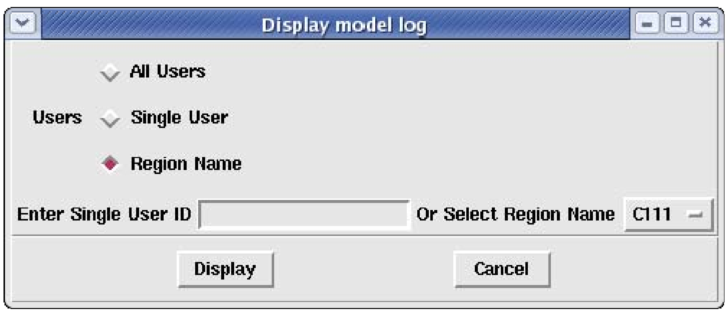
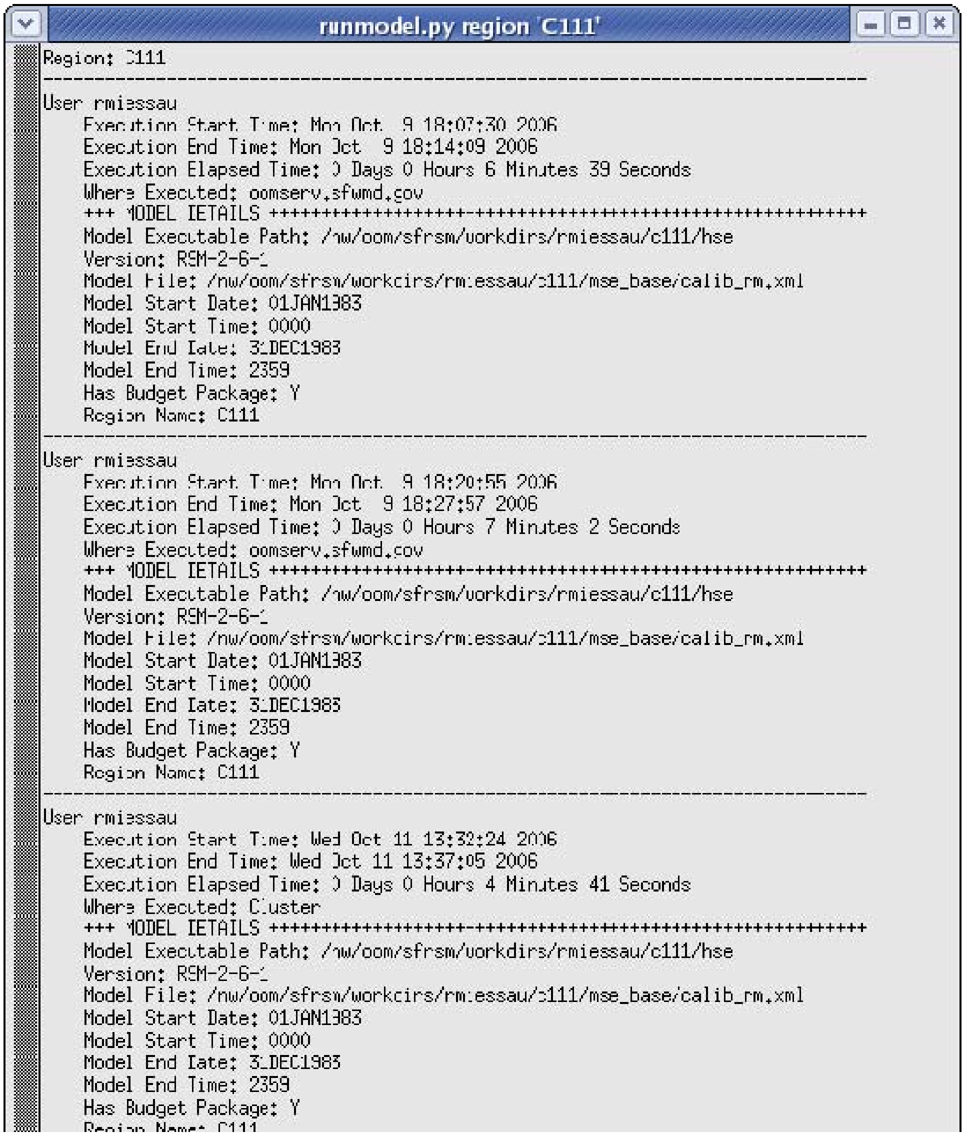


Figure 32: Interface Used to Search the Model Log


runmodel.py region 'C111'

```
Region: C111
--------------------------------------------------------------------------------
User rmiessau
    Execution Start Time: Mon Oct  9 18:07:30 2006
    Execution End Time: Mon Oct  9 18:14:09 2006
    Execution Elapsed Time: 0 Days 0 Hours 6 Minutes 39 Seconds
    Where Executed: oomserv.sfwmd.gov
    +++ MODEL DETAILS ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
    Model Executable Path: /nw/oom/sfrsm/workdirs/rmiessau/c111/hse
    Version: RSM-2-6-1
    Model File: /nw/oom/sfrsm/workdirs/rmiessau/c111/mse_base/calib_rm.xml
    Model Start Date: 01JAN1983
    Model Start Time: 0000
    Model End Date: 31DEC1983
    Model End Time: 2359
    Has Budget Package: Y
    Region Name: C111
--------------------------------------------------------------------------------
User rmiessau
    Execution Start Time: Mon Oct  9 18:20:55 2006
    Execution End Time: Mon Oct  9 18:27:57 2006
    Execution Elapsed Time: 0 Days 0 Hours 7 Minutes 2 Seconds
    Where Executed: oomserv.sfwmd.gov
    +++ MODEL DETAILS ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
    Model Executable Path: /nw/oom/sfrsm/workdirs/rmiessau/c111/hse
    Version: RSM-2-6-1
    Model File: /nw/oom/sfrsm/workdirs/rmiessau/c111/mse_base/calib_rm.xml
    Model Start Date: 01JAN1983
    Model Start Time: 0000
    Model End Date: 31DEC1983
    Model End Time: 2359
    Has Budget Package: Y
    Region Name: C111
--------------------------------------------------------------------------------
User rmiessau
    Execution Start Time: Wed Oct 11 13:32:24 2006
    Execution End Time: Wed Oct 11 13:37:05 2006
    Execution Elapsed Time: 0 Days 0 Hours 4 Minutes 41 Seconds
    Where Executed: Cluster
    +++ MODEL DETAILS ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
    Model Executable Path: /nw/oom/sfrsm/workdirs/rmiessau/c111/hse
    Version: RSM-2-6-1
    Model File: /nw/oom/sfrsm/workdirs/rmiessau/c111/mse_base/calib_rm.xml
    Model Start Date: 01JAN1983
    Model Start Time: 0000
    Model End Date: 31DEC1983
    Model End Time: 2359
    Has Budget Package: Y
    Region Name: C111
```

Figure 33: Sample Output from the Run Model Log

Additional system information is captured when the RSM runs are made using the Run Model tool. Information is captured pertaining to two different areas about the run, System Information and Model Information.

System Information:

- Name of the user who made this run
- Execution start date/time
- Execution end date/time
- Elapsed system execution time
- Server name

Model information:

- Path to the HSE used
- Path to the MAIN XML used
- Model simulation start date & time
- Model simulation end date/time
- Budget package invoked (yes or no)
- Region name

Chapter 11

View Model Results Menu

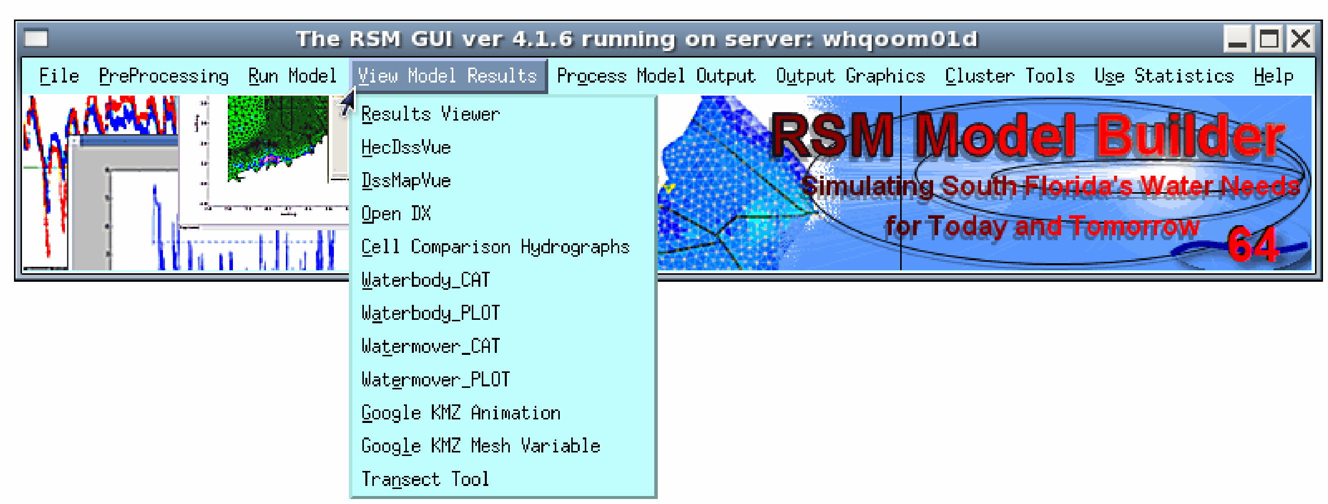


Figure 34: The View Model Results Menu

11.1 Results Viewer

The *Results Viewer* feature is a Python tool. It contains over 33 features organized with its own system of dropdown menus. This is one of the earliest GUI tools developed for the RSM. A Help Menu within the Results Viewer provides detailed instructions on usage for many of the features it contains. When the Results Viewer first starts it prompts the user for an RSM netCDF file. Optionally, a second netCDF file can be specified and a GIS shape (.shp) file can be specified to be displayed along with the netCDF data.

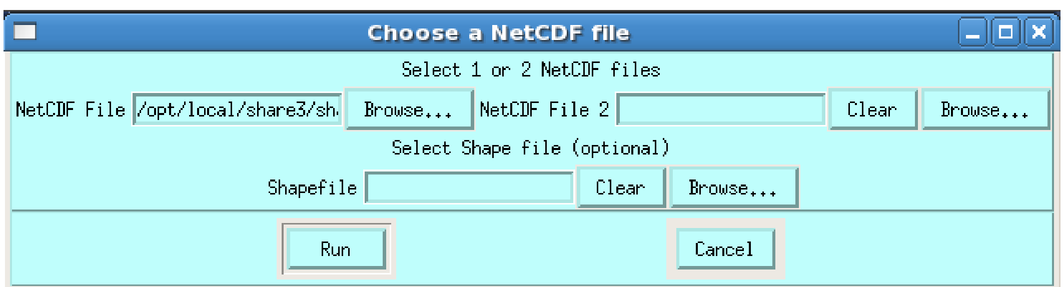


Figure 35: ResultsViewer start-up interface

After specifying the netCDF file(s) the user clicks the Run button and three display windows will open on the screen:

- The main window (canvas) will display the mesh
- The Time Navigator Window offers buttons to move forward and back in the timesteps
- The Info Window displays information about the data being displayed on the screen.

▶ Run the ResultsViewer tool using: /opt/local/share3/share/samples/results_viewer/C111_PIR1_Alt2Db.nc

▶ Under the View menu check the box next to Flow Vectors.

▶ Under the Tools menu Change the Change Flow Vector Grid Size to 50.

➲ It may be necessary to move the windows on the screen to view all three at the same time.

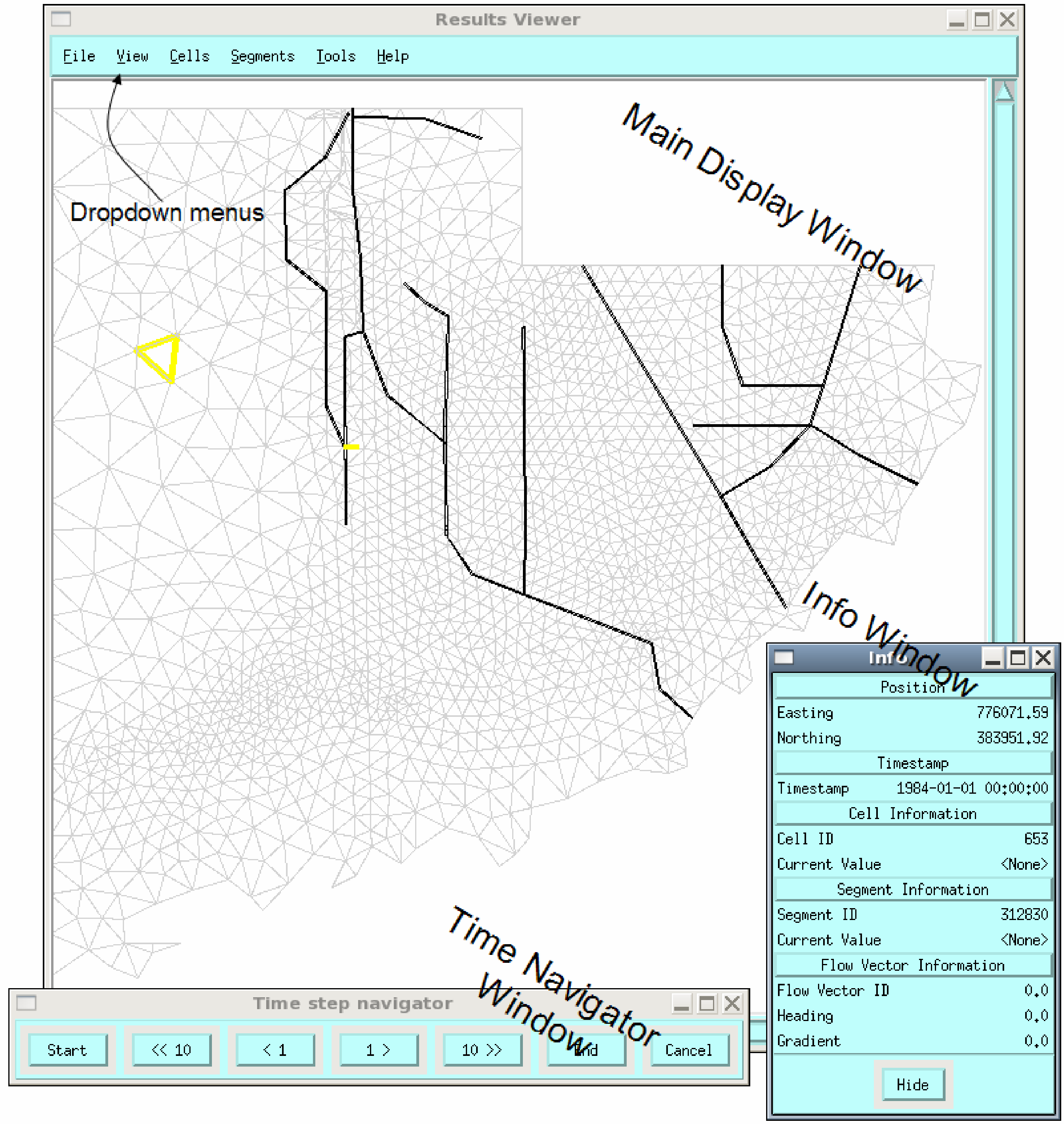


Figure 36: Results Viewer Display Windows

The following is an inventory of the features available in the Results Viewer:

File Menu:

- Export – export screen captures of the main display window

View Menu

- Zoom – zoom in/out (also works using: page-up, page-down)
- Flow Vector – display flow vectors from the netCDF which are created by using the <globalmonitor attr="olvector"> output option.
- Legend – display a legend for cell colorflood shading

Cells Menu

- Show Cells – non-functioning feature
- Cell Colorflood – displays colorflood of ponding depth or computed head elevations

Segments Menu

- Show Segments – non-functioning feature
- Segment Color flood - non-functioning feature

Tools Menu

- Digitize ROI – select a Region of Interest (ROI) to only colorflood a sub-region of the model
- Cell Colorflood Tools - non-functioning feature
- Time Tools – Display the time navigator and the time converter
- Misc Tool – A collection of tools to display a colorflood Movie, Calibration, Hydrographs, Segment Viewer, Summary Statistics, and a Pest Visualization tool.
- Segment Colorflood Tools - non-functioning feature
- Change flowvector Grid Size – Change the size of the grid which is overlayed on the mesh to select the flowvector arrows to be displayed.

Help Menu

- Show HTML Help – displays an HTML help manual for the features in the Results Viewer

11.1.1 Pest Visualization

Within the Results Viewer there are 2 features to help visualize PEST output. These tools display Jacobian Matrix (.jco) and Correlation Matrix (.rec) output from PEST.

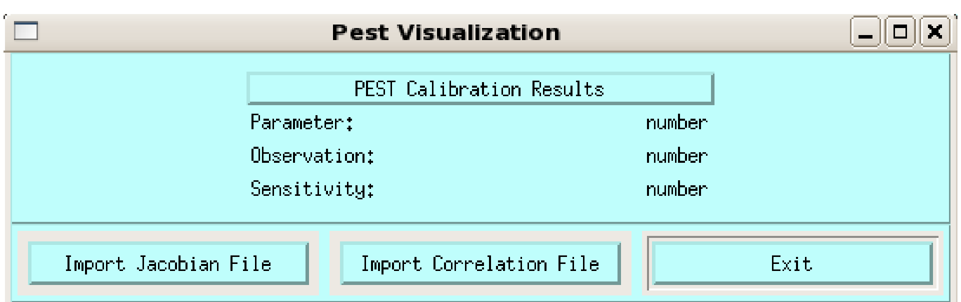


Figure 37: Pest Visualization Options Menu

▶ At the top of the Results Viewer main window, select the Tools Menu
▶ Select the Misc Tools Option
▶ Select the Pest Visualization Tool

- Select to view the corresponding Jacobian or Correlation Matrix file from the NC file you are viewing in the Results Viewer
- Select to view the file: /opt/local/share3/share/samples/results_viewer/bbw_95_jsc.jco
- Select to view the file: /opt/local/share3/share/samples/results_viewer/bbcw_9.rec

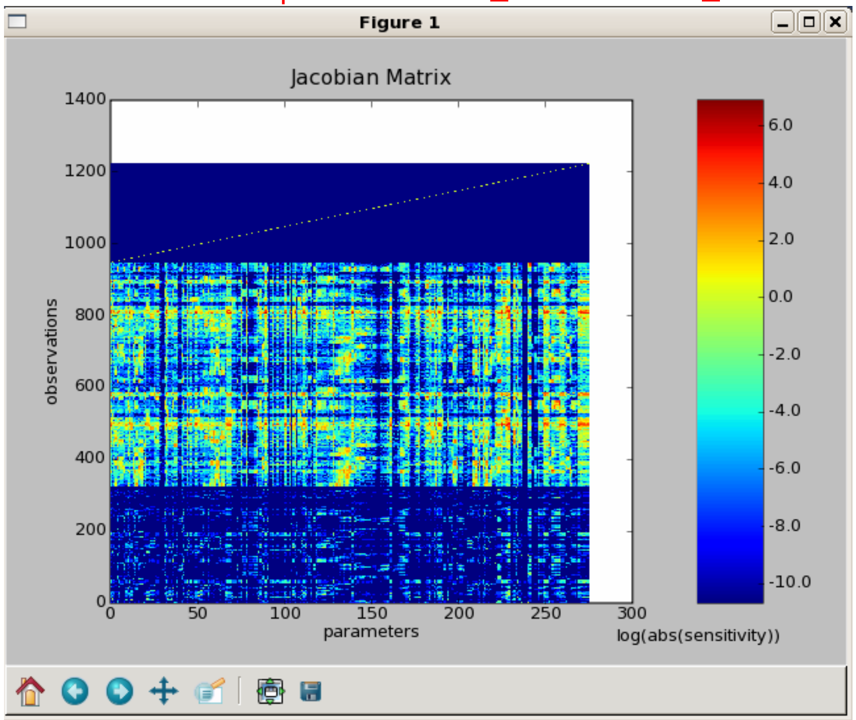


Figure 38: Viewing Jacobian Matrix Output from PEST

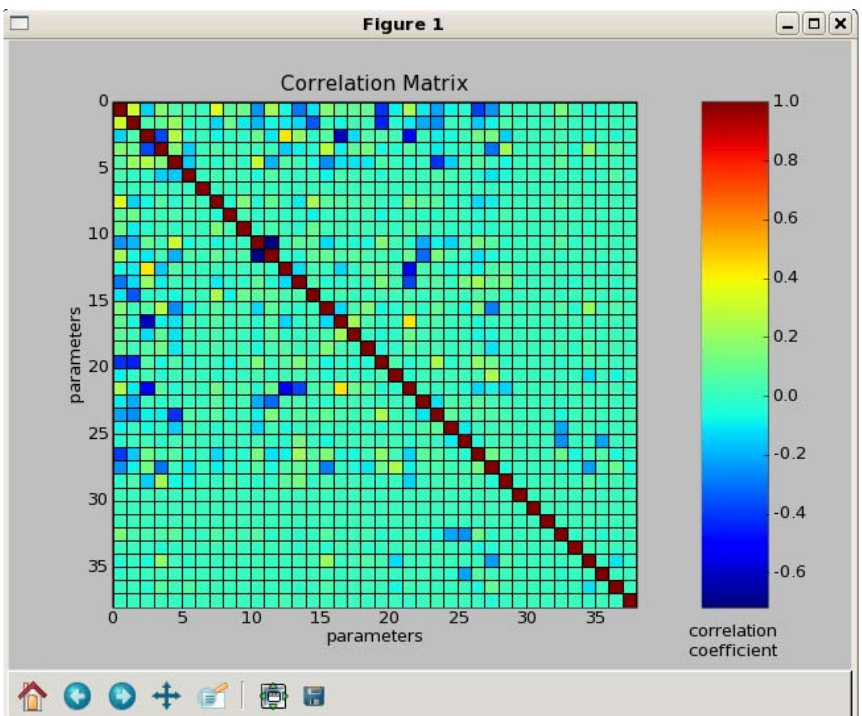


Figure 39: Viewing Correlation Matrix Output from PEST

11.2 ncBrowse

The *ncBrowse* feature is an application link to the ncBrowse application written by the National Oceanographic & Atmospheric Administration (NOAA.) ncBrowse is a netCDF binary file browser utility.
http://www.epic.noaa.gov/java/ncBrowse/
Command Line Option: /opt/local/share2/bin/ncBrowse

- Select to view the file: /opt/local/share3/share/samples/nc_diff/C111_Alt6-Base_94-95.nc
- Select the to view the ComputedHead variable from the list on the right (double-click)
- The settings window will appear.
- Change the start value for cells to be the same as the end value (3544)
- Click the Graph Variable button to view a hydrograph for waterbody ID 3544.

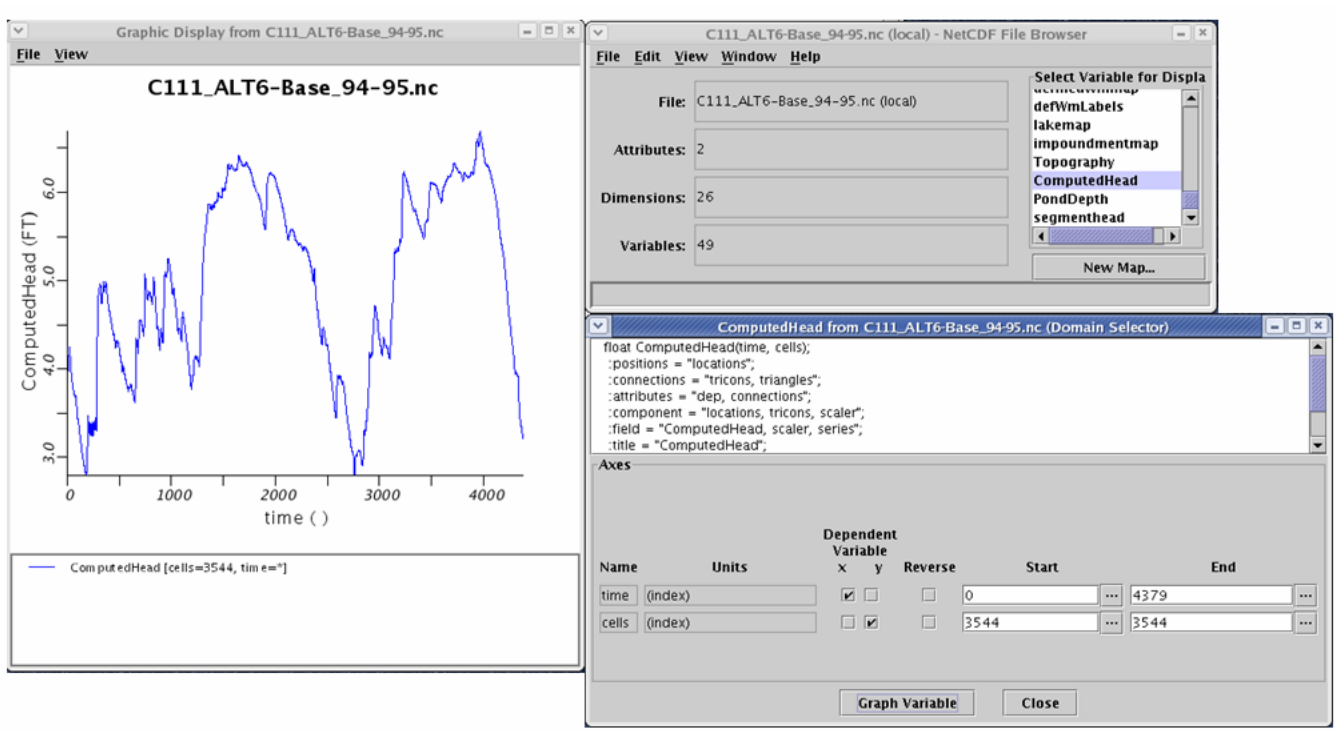


Figure 40: ncBrowse Tool

11.3 HecDSSVue

The *HecDSSVue* feature is an application link to the Hydrologic Engineering Center's Data Storage System Visual Utility Engine (HecDSSVue) application written by the U.S. Army Corps of Engineers (USACE). HecDSSVue is a DSS binary file browser utility.
http://www.waterengr.com/HECDSSVue/hecdssvue.html
Command Line Option: /opt/local/share2_64/bin_32/dssvue

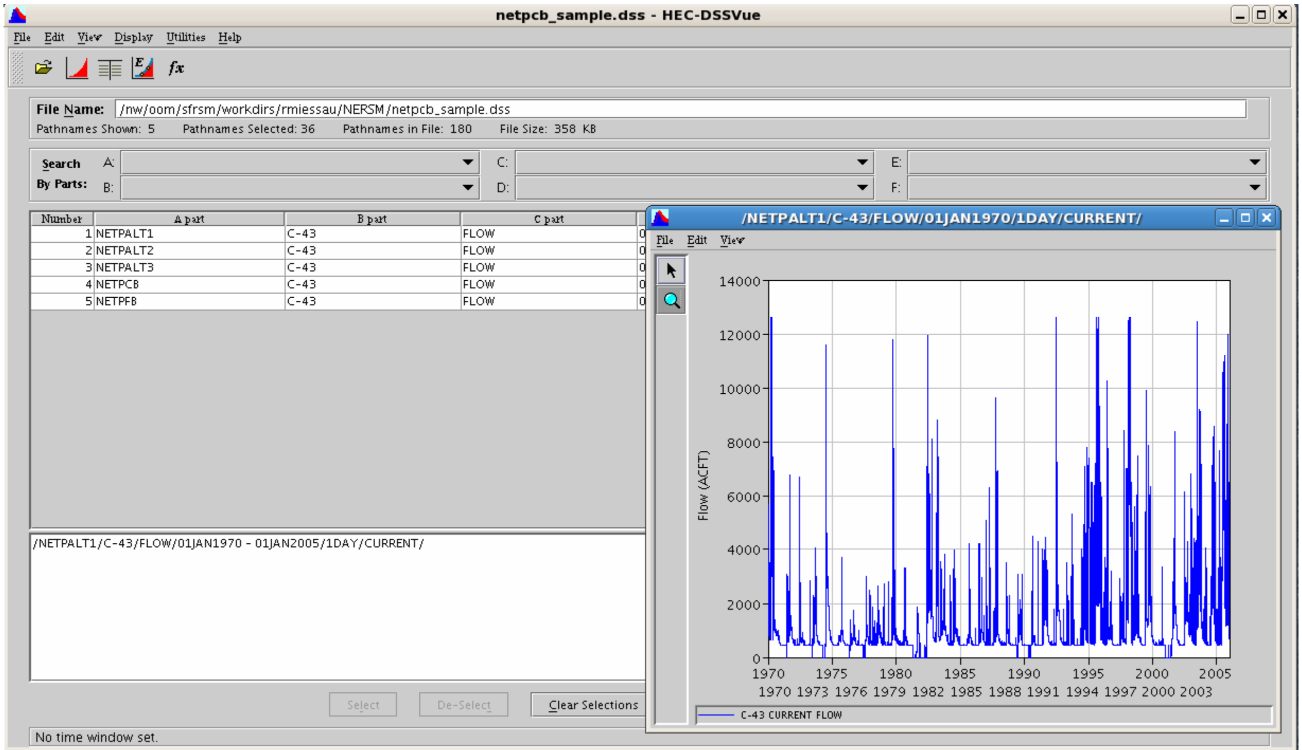


Figure 41: Hec-DSSVue Tool

11.4 DSSMapVue

The *HecDSS MapVue* feature is an application link to the Hydrologic Engineering Center's Data Storage System Mapping Visual Utility Engine (Hec-DSS MapVue).
Command Line Option: /opt/local/share2/bin/dssmapvue

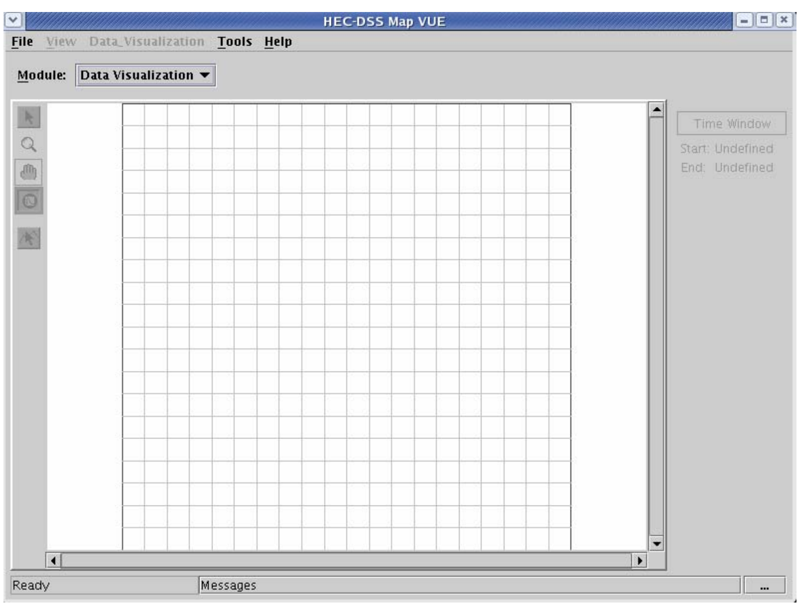


Figure 42: Hec-DSS MapVue Tool

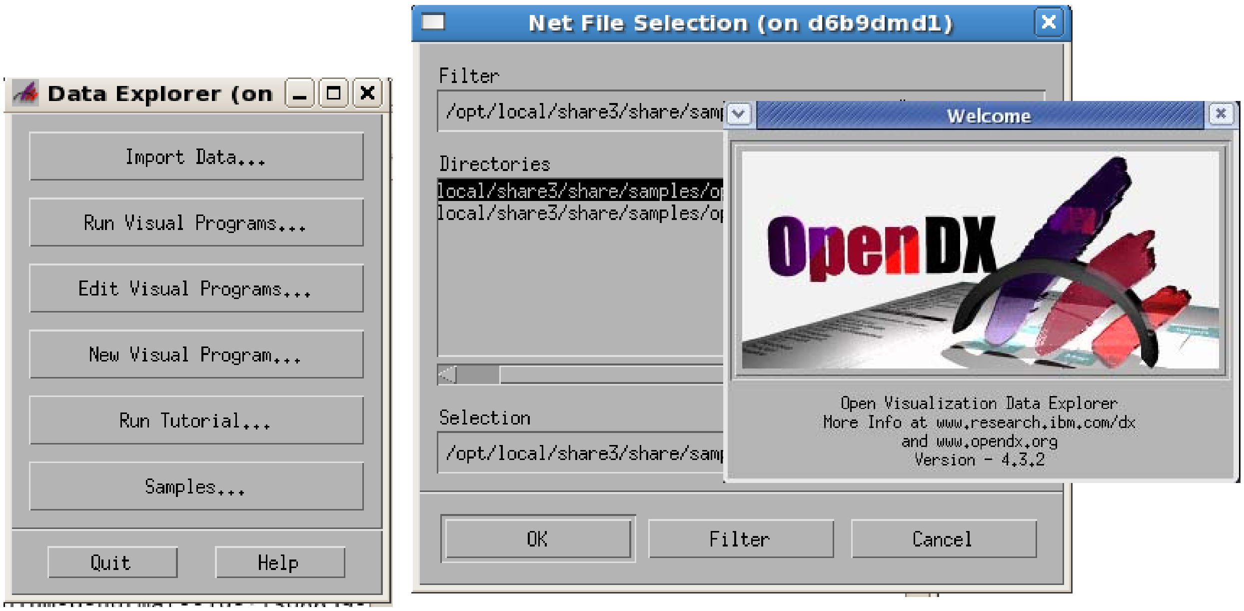
MapVue ver 1.0 for Linux has been installed based on a request by Ruben Arteaga. No other information is available on the usage of this tool.

11.5 OpenDX

The *OpenDX* feature is an application link to Open Visualization Data Explorer (OpenDX). OpenDX is an opensource application used by RSM modelers to view netCDF output files and display 3D animations.

http://www.opendx.org/

Command Line Option: /opt/local/share2/bin/dx



- After Open DX starts click on the button to "Edit Visual Program".
- Open the file "/opt/local/share3/share/samples/open_DX/pretty_plot.net"
- A graphic window will open displaying the pretty_plot.net program.
- Within the graphic window double-click on the icon labeled as "Import"
- On the right side of the menu make sure:
    - o the file name is "/opt/local/share3/share/samples/open_DX/bbw_test.nc"
    - o variable is set to "ComputedHead"
    - o format is set to "netCDF"
- Click the "Apply" button
- Click the "OK" button
- Select Execute from the top menu choices in the graphic window
- Click on the choice called "Sequencer"
- Click the Play button "▶"in the sequencer to start the animation.

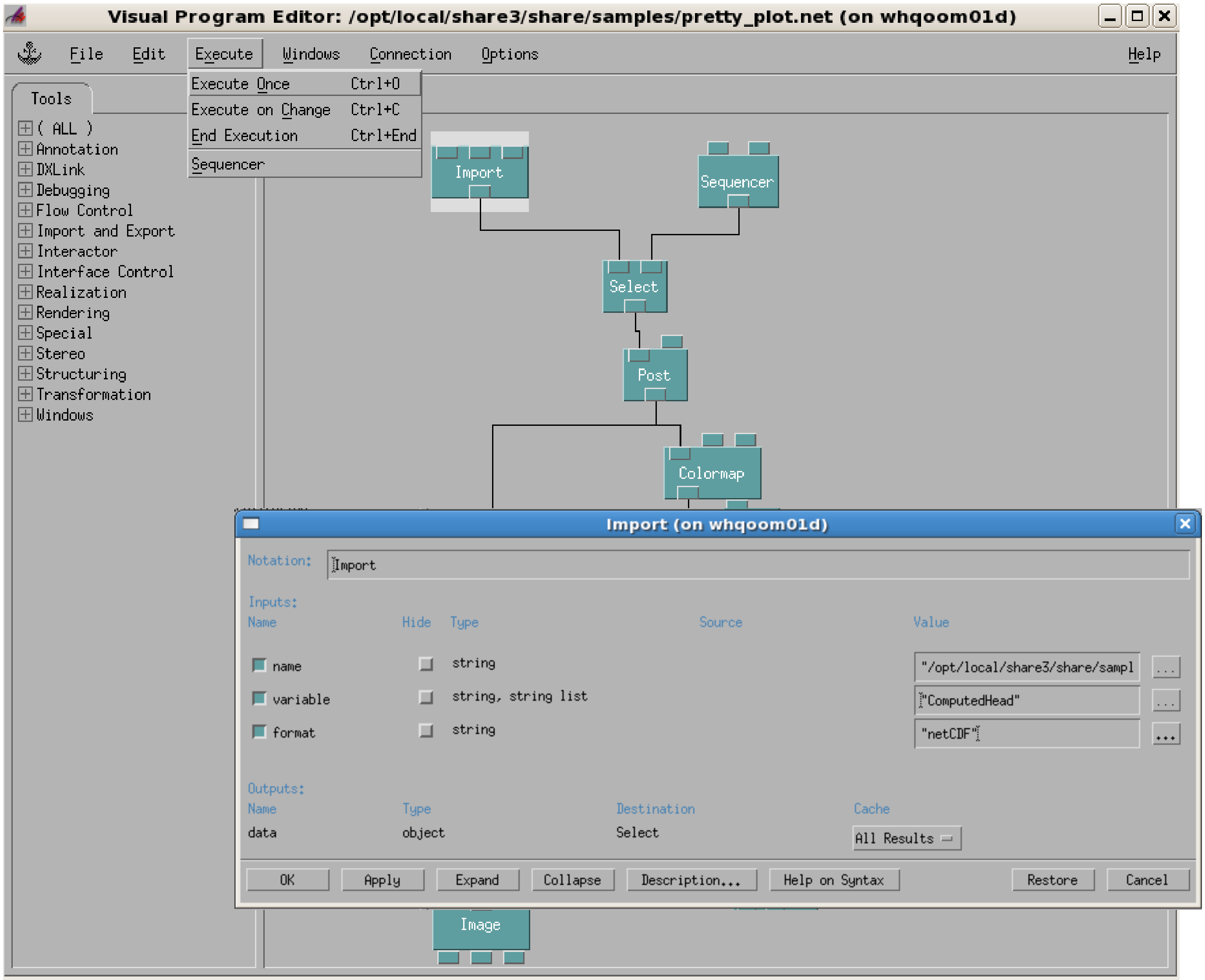


Figure 43: Open_DX Graphic Window

Open DX Sequencer

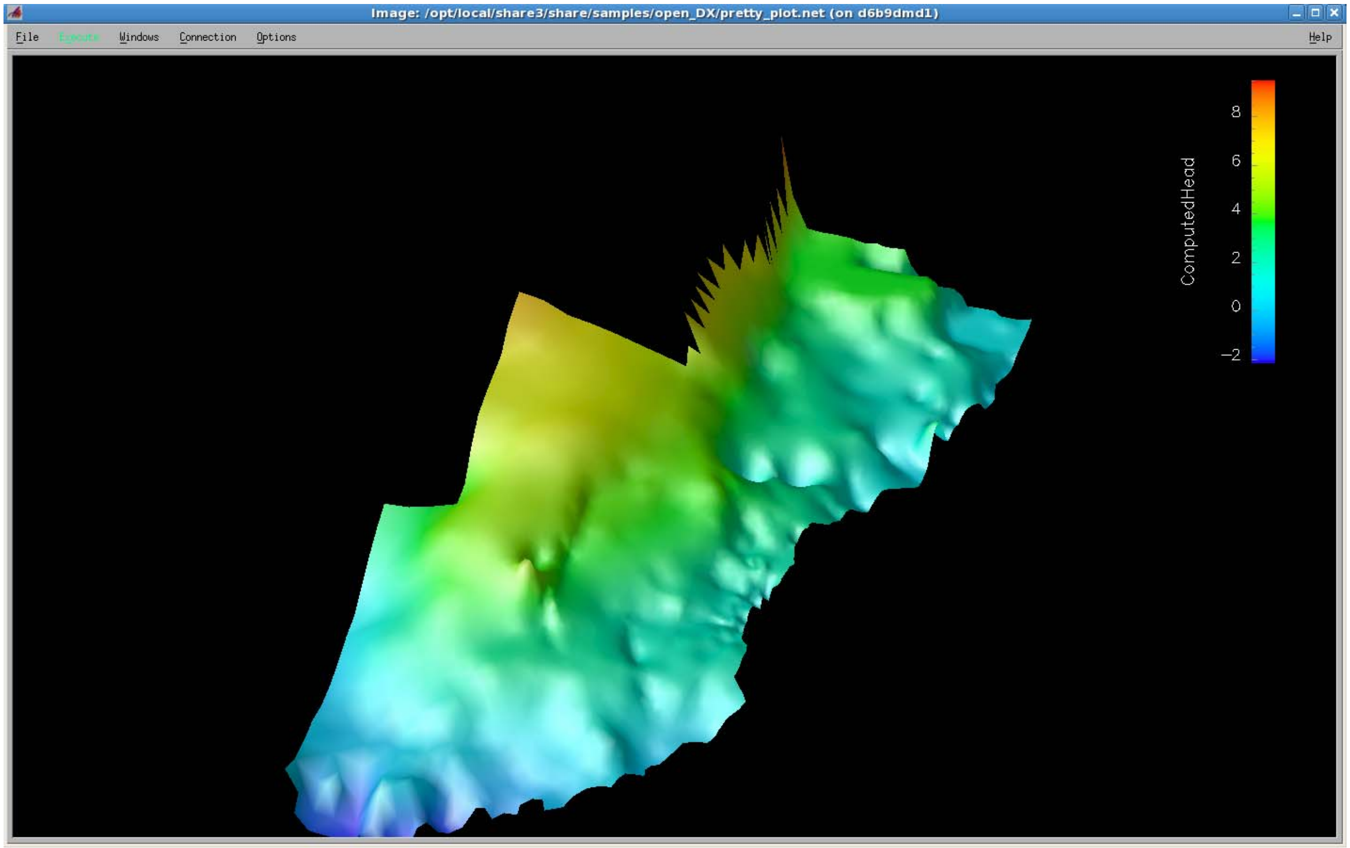
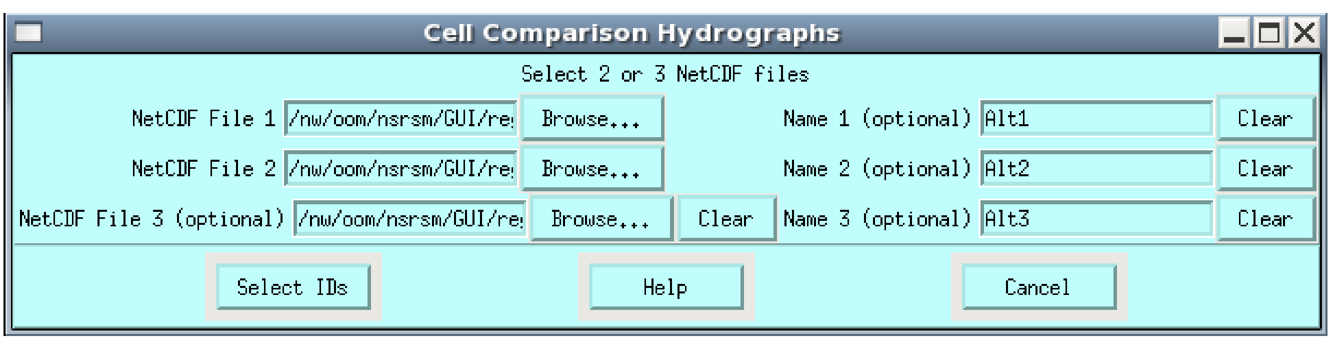


Figure 44: Open_DX Animation Output

11.6 Cell Comparison Hydrographs

The *Cell Comparison Hydrograph* feature is a Python tool under the View Model Results menu. This tool has been created to provide an easy means to compare indicator cells from 2 or 3 model runs from the same implementation. The tool accepts 2 or 3 Globalmonitor netCDF files which must contain HEAD and TOPOGRAPHY global monitor output or optionally PONDING output can also be used. The final result is a hydrograph and a duration curve for each selected cell.



Using the Cell Comparison Tool

The first input menu captures the location of 2 or 3 globalmonitor netCDF files and a name for each one which is used to create the legend in each graph.

The second input menu captures the cell IDs and a title for each graph. Cell IDs can be entered by clicking in the text field and selecting an ID form the dropdown list of cells found in the netCDF file. Additional cell IDs can be added by clicking the [Add Another ID] button and they can be removed from the list by clicking on [Delete ID] button next to each line.

The file must contain the cell ID and Main Title separated by commas.
Sample input file:
cellid,gage
308, Sawgrass Gage
724, Ridge and Slouge Gage #1
854, Ridge and Slouge Gage #2
Users can select from the Chart Type dropdown menu to choose the variable to be used to create the hydrograph. The duration curve will only display Ponding Depth. If the globalmonitor file does not include ponding output, the pondingdepth will be calculated by subtracting (Computedhead – Topo). This may result in negative (below land surface) ponding values.

The globalmonitor netCDF file <u>MUST</u> contain HEAD and TOPO output.

```
<output>
    <globalmonitor attr="ponding">
      <netcdf file="globalmonitor.nc"></netcdf>
    </globalmonitor>
    <globalmonitor attr="topo">
      <netcdf file=" globalmonitor.nc"></netcdf>
    </globalmonitor>
    <globalmonitor attr="head">
      <netcdf file=" globalmonitor.nc"></netcdf>
    </globalmonitor>
</output>
```

Optionally, the hydrograph can be displayed on one graph for the period of record or it can be split into 2 graphs on one page by clicking on the Split hydrograph button. A title block can be created by adding text into the Title Block field. The title block will appear in the lower right corner of each output page. A maximum of 3 lines should be used for the title block but usage of this feature is optional. There are 3 color choices for the title block (blue, black, green, red).

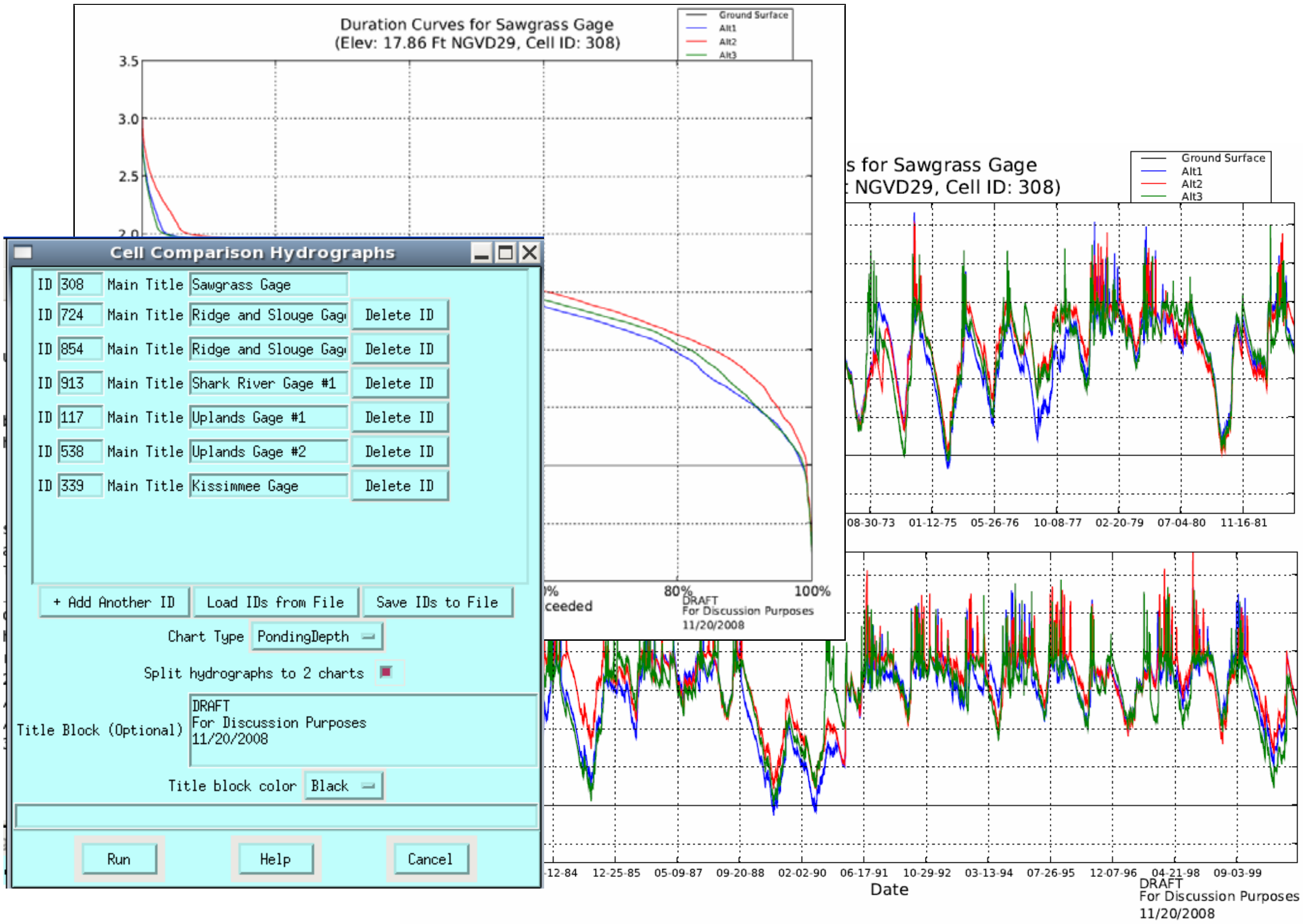


Figure 45: Cell Comparison Hydrograph Tool

11.7 Waterbody_CAT

The *Waterbody_CAT* feature is a Python tool. This tool is used to display waterbody data from a netCDF file in tabular format. The tool prompts the user for a netCDF input file, extracts a list of waterbody IDs the user then selects an attribute type to include in the (.csv) report. The user also has an option to generate a GMS formatted file. The netCDF can be a budgetpackage or wbbudgetpackage file.

- ▶ Select to view the file: /opt/local/share3/share/samples/waterbody_cat/BM54_compbudget.nc
- ▶ Select to view the Cell waterbody type, then click Next
- ▶ Select waterbody ID 1, Select Time Series Variable Type, then click Next
- ▶ Select the WBStorageVolume Attribute Type, click on Generate Report

The final report from Waterbody_CAT includes a header, summarized daily, monthly, annual min/max/mean/sum values and is CSV formatted for importing into Excel.

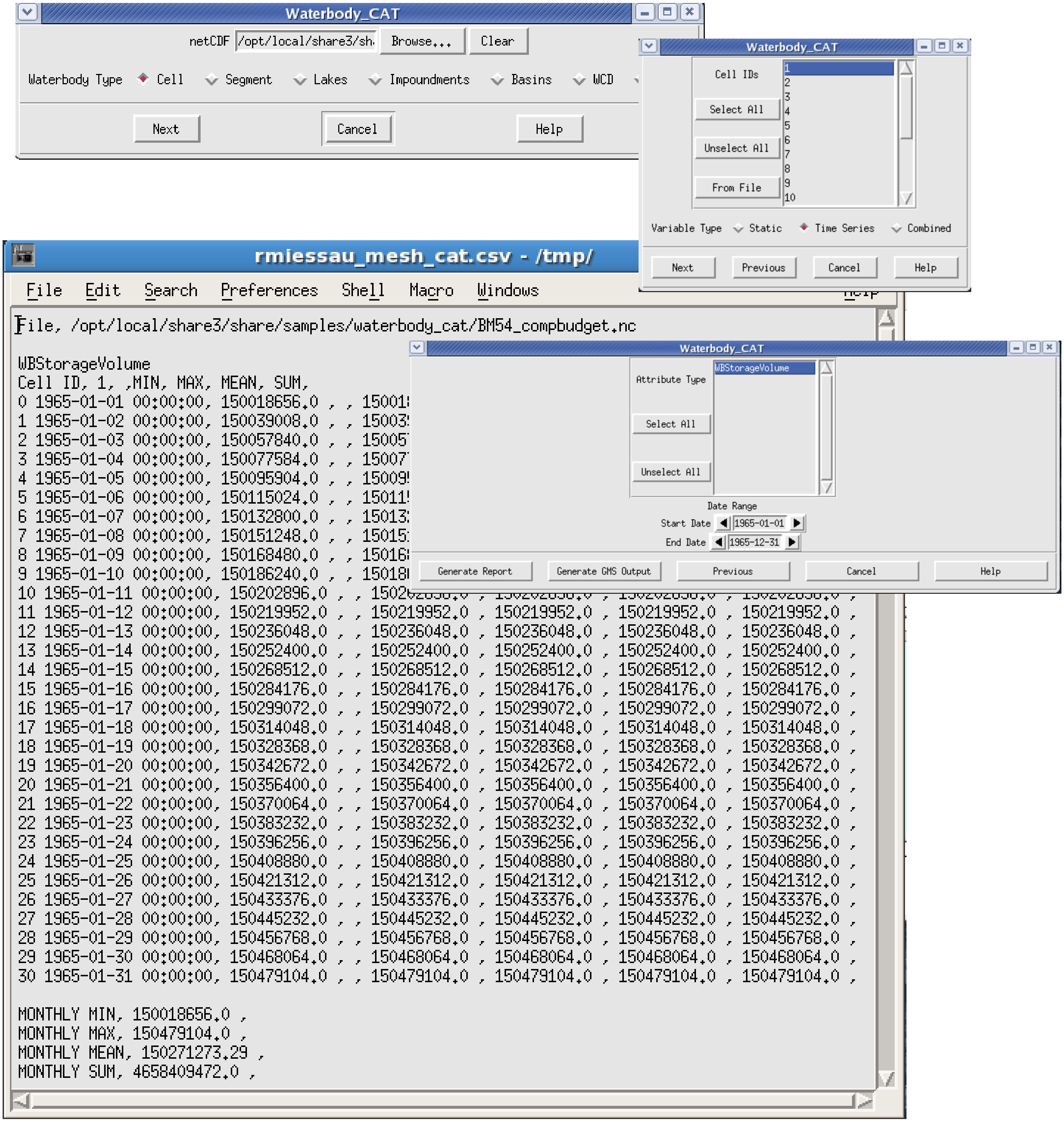


Figure 46: Waterbody_CAT Tool

11.8 Waterbody_PLOT

The *Waterbody_PLOT* feature is a Python tool that is very similar to Waterbody_CAT but it generates a plot from the selected netCDF data rather than a report. The output is in PDF format.

▶ Select to view the file:
/opt/local/share3/share/samples/waterbody_cat/BM54_compbudget.nc

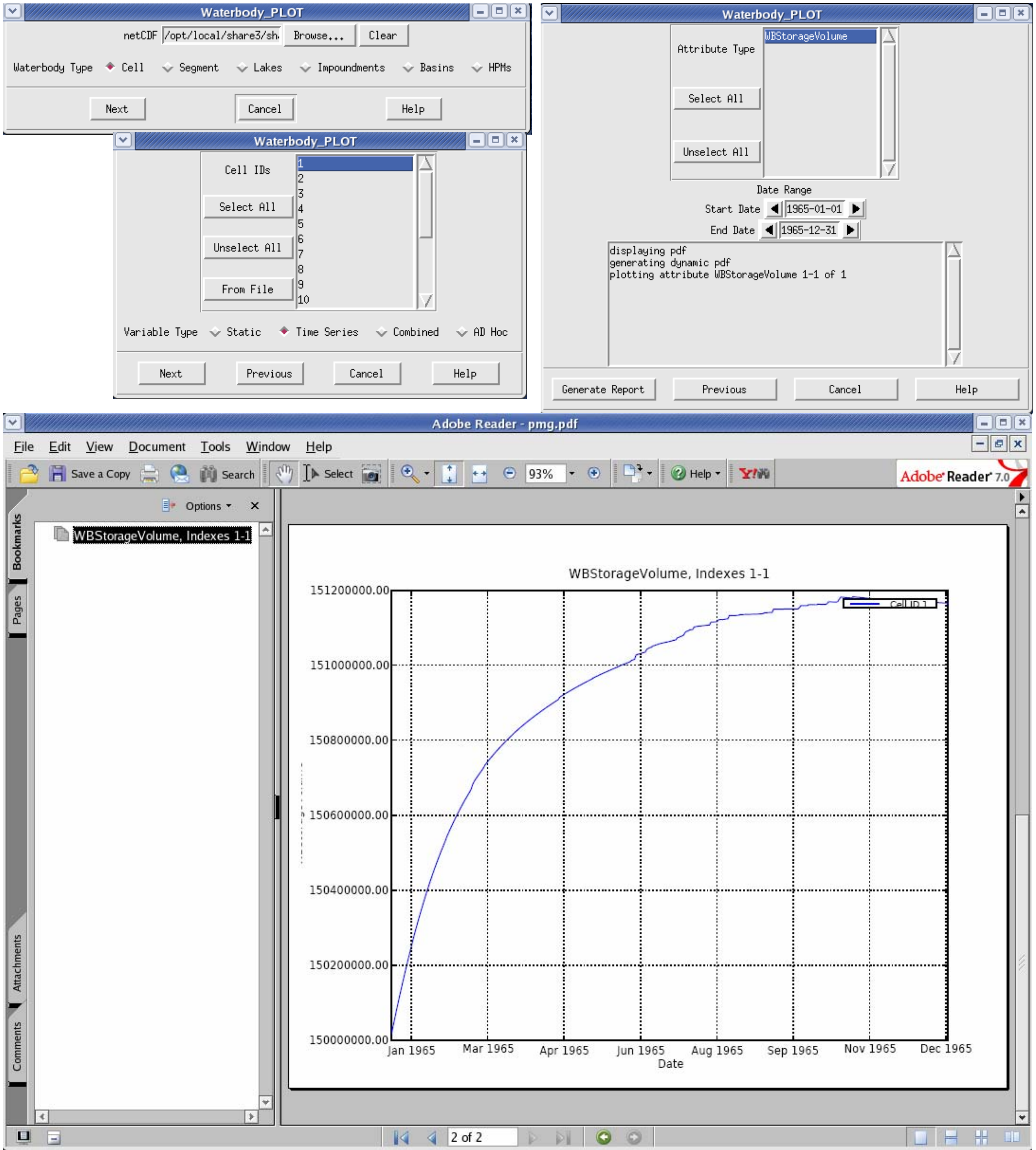


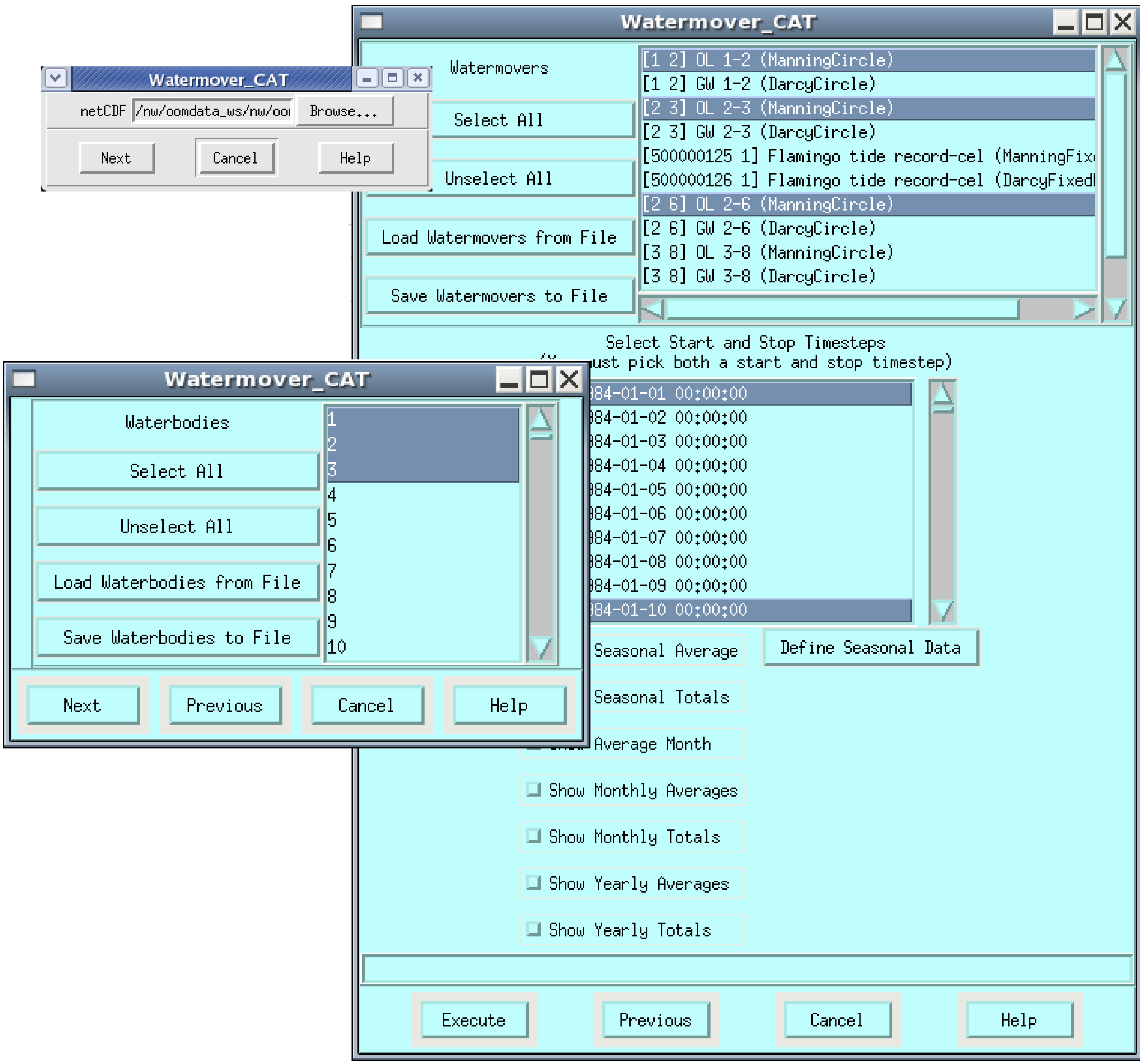
Figure 47: Waterbody_PLOT Tool

11.9 Watermover_CAT

The *Watermover_CAT* feature is used to extract and tabulate a watermover data report from a netCDF file. The tool prompts the user for a wbbudgetpackage netCDF file, extracts a list of waterbodys to choose from. The tool then extracts a list of watermovers and timesteps associated with the selected waterbodies. The user selects the watermovers they wish to report and they select a start and end timestep. There are also options for summarizing monthly, annual or seasonal reports.

The tool generates a report (.csv) report showing the data for the selected watermovers in a column CSV formatted file suitable for viewing in a spreadsheet for analysis.

- Select to view the file: /opt/local/share3/share/samples/watermover_cat/wbbudgetpackage.nc
- Select a watermover from the list of watermovers by clicking on it
- Select a beginning and ending timestep
- Click the Execute button, the tool will generate a report.



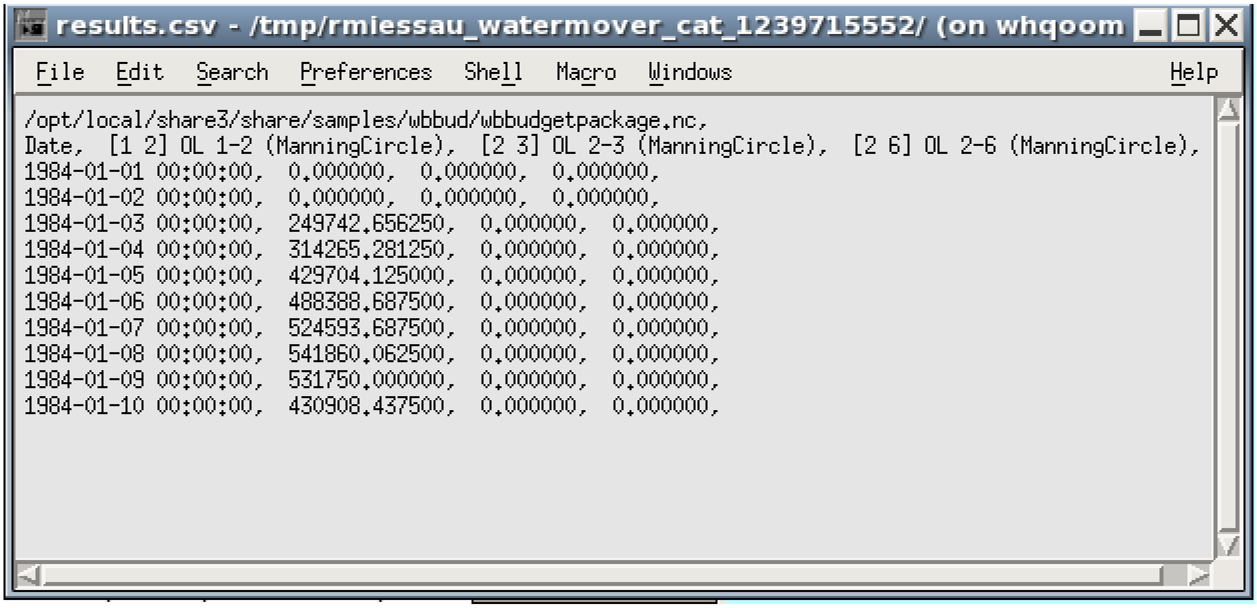
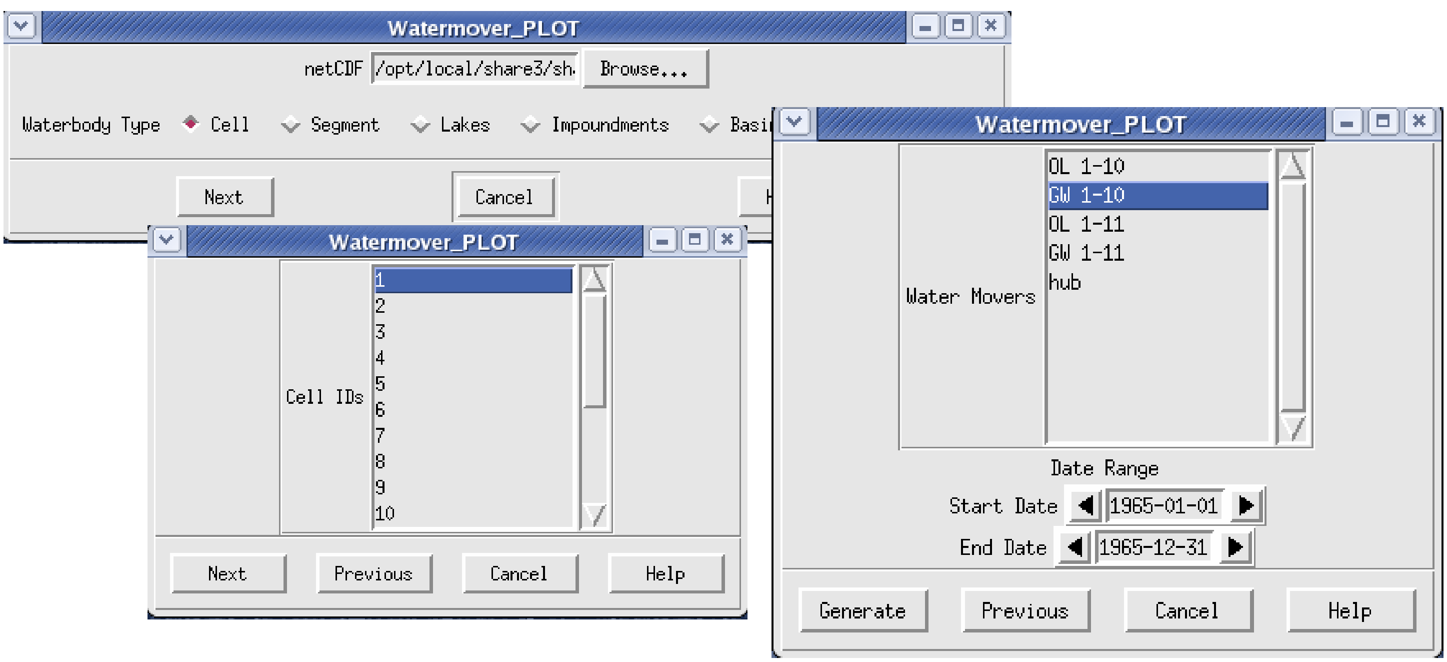


Figure 48: Output from the Watermover_CAT Tool

11.10 Watermover_PLOT

The *Watermover_PLOT* feature is a Python tool that is very similar to Watermover_CAT but it generates a plot from the selected netCDF data rather than a report. The output is in PDF format.

▶ `Select to view the file: /opt/local/share3/share/samples/watermover_cat/BM54_compbudget.nc`



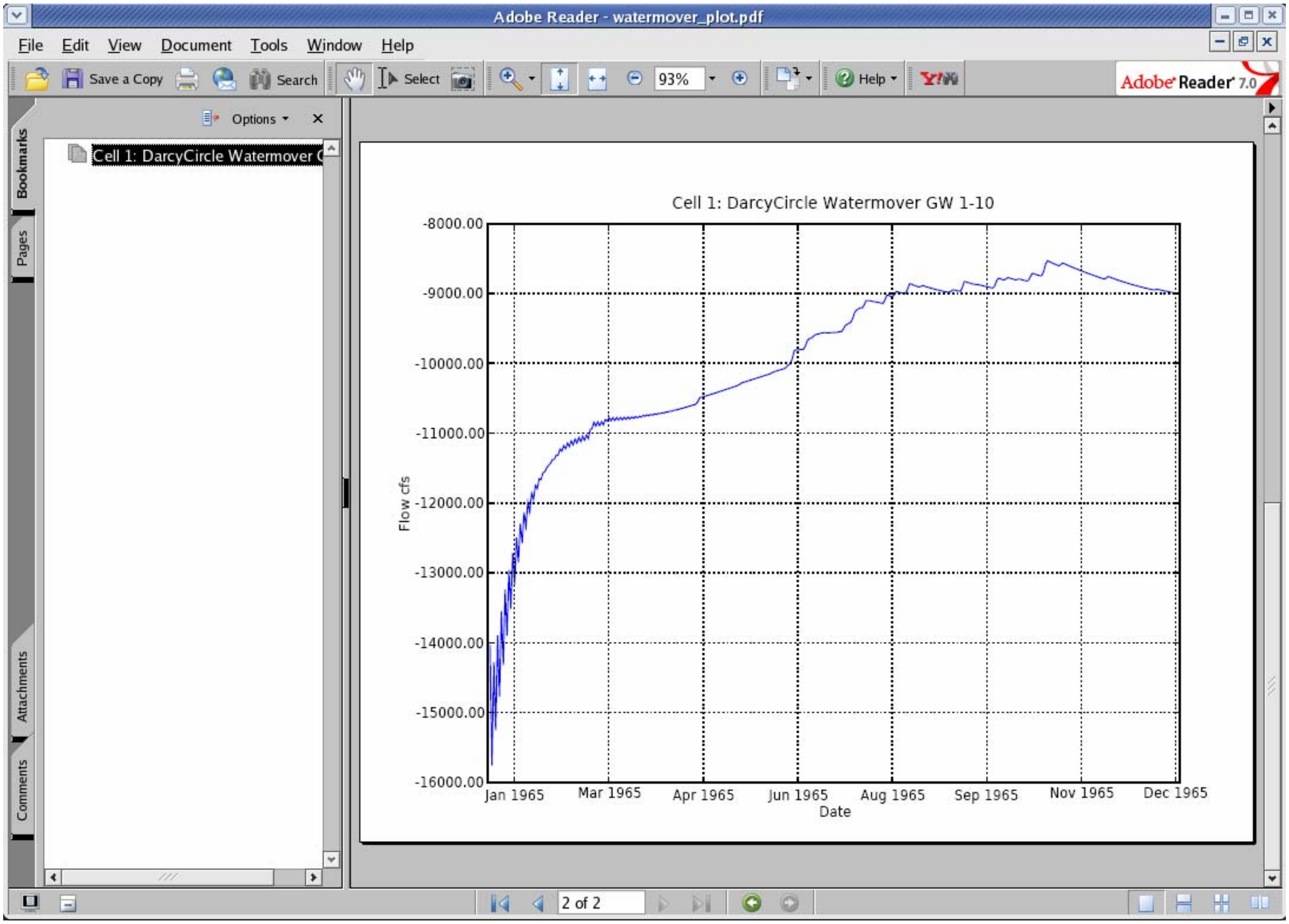


Figure 49: Watermover_PLOT Tool

11.11 Google KMZ Animation

The *Google KMZ Animation* feature is a Python tool that generates a KMZ file that can be viewed using GoogleEarth. This tool uses information from an RSM netCDF file and two files output from GIS to help draw the mesh. The files from GIS provide a base mesh KML file to draw the RSM mesh and a cross-walk file to help translate the mesh object IDs to cell IDs. The KMZ file can be used to display timeseries animations showing ponding depths, computedhead elevations or flow vector arrows. The tool prompts the user for 3 files:

- NetCDF file: a netCDF file containing global monitor data for Ponding or ComputedHead and/or totalvector
- mesh KML file: a KML file generated from Arc2Earth tool in GIS containing the information to draw the mesh.
- Cell ID crosswalk file: an ASCII (.csv) file containing 2 columns of data (cell objID, cellID)

After the files are read, a menu then offers configuration options for building the KMZ file. Options include:

- Date Range: change the start/end date for the animation.
- Timestep type: generate timesteps based on a selected increment (1=every value), or day of the month (31=end of the month for all months).
- Data on/off: include display of cell ID in the KMZ file

- Flow Vectors on/off: generate a layer with flow vector arrows in the KMZ file, (will only work if totalvector is in the netCDF file)
- Flow Vector Grid: flow vector arrows are generated based by overlaying a square grid (25x25 default) on top of the mesh
- Color Ramp Range: 2 pre-set ranges can be used for colorshading the cells or a min/max value can be manually entered. 20 increments are calculated and assigned a pre-set color.
- Output Dir: specify the location for the resulting output file. The name will be generated based on the name of the netCDF file.
- Mesh Type: select the mesh attribute to animate

▶ Select the following 3 files to test this tool:
  - /opt/local/share3/share/samples/googleearth/bbcw-calib.nc
  - /opt/local/share3/share/samples/googleearth/bbcw-mesh.kml
  - /opt/local/share3/share/samples/googleearth/bbcw-crosswalk.csv

▶ Select a date range of 1983-01-01 to 1983-01-05

▶ Set Data = off

▶ Set Flow Vector = on

▶ Set Grid = 25

▶ Set color Ramp Range = Large

▶ Specify a location to save the KMZ file.

▶ Set Mesh Type = ComputedHead

▶ Click the Build Mesh Animation button to run the tool.

▶ The tool will generate an alert when it is complete and give a reminder on where the output file was saved. If a file already exists with the same name the tool will pause and prompt to overwrite the file.

▶ Open Google Earth and view the KMZ file.

➲ DO NOT try to create a KMZ file with more than 30 timesteps. The file size will likely exceed the memory limits of GoogleEarth.

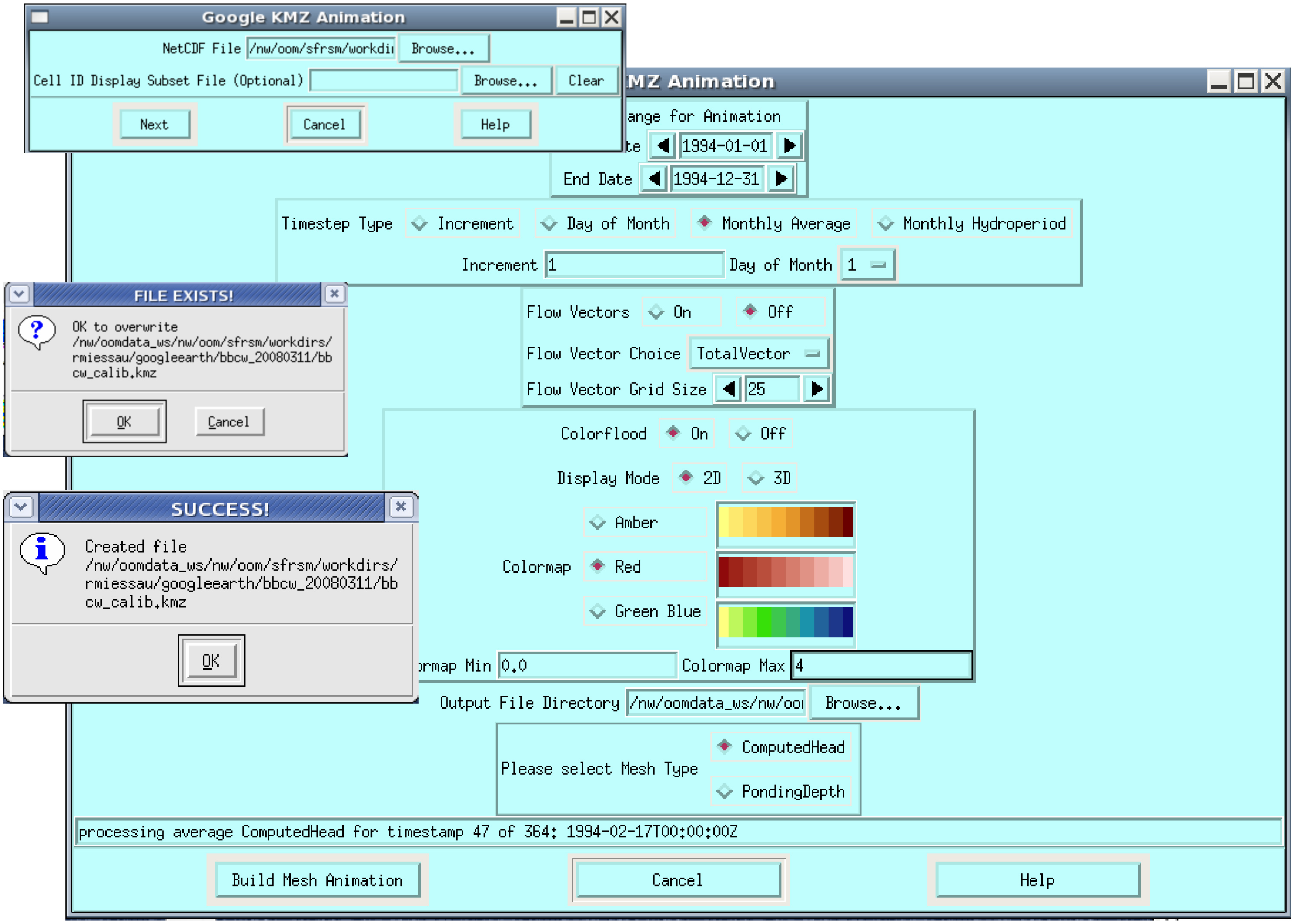


Figure 50: Google Earth Tool

➲ It may be necessary to open the mesh.kml generated by Arc2Earth inside GoogleEarth, save it as a new file and then use the new file as input to this tool.

➲ A sample KMZ file for viewing in GoogleEarth is available at:
/opt/local/share3/share/samples/googleearth/bbcw-calib-mesh.kmz

- Start Google Earth and view the KMZ file.
- GoogleEarth offers controls to play the animation, speed-up, slow-down, zoom in/out, rotate, and tilt the landscape perspective.

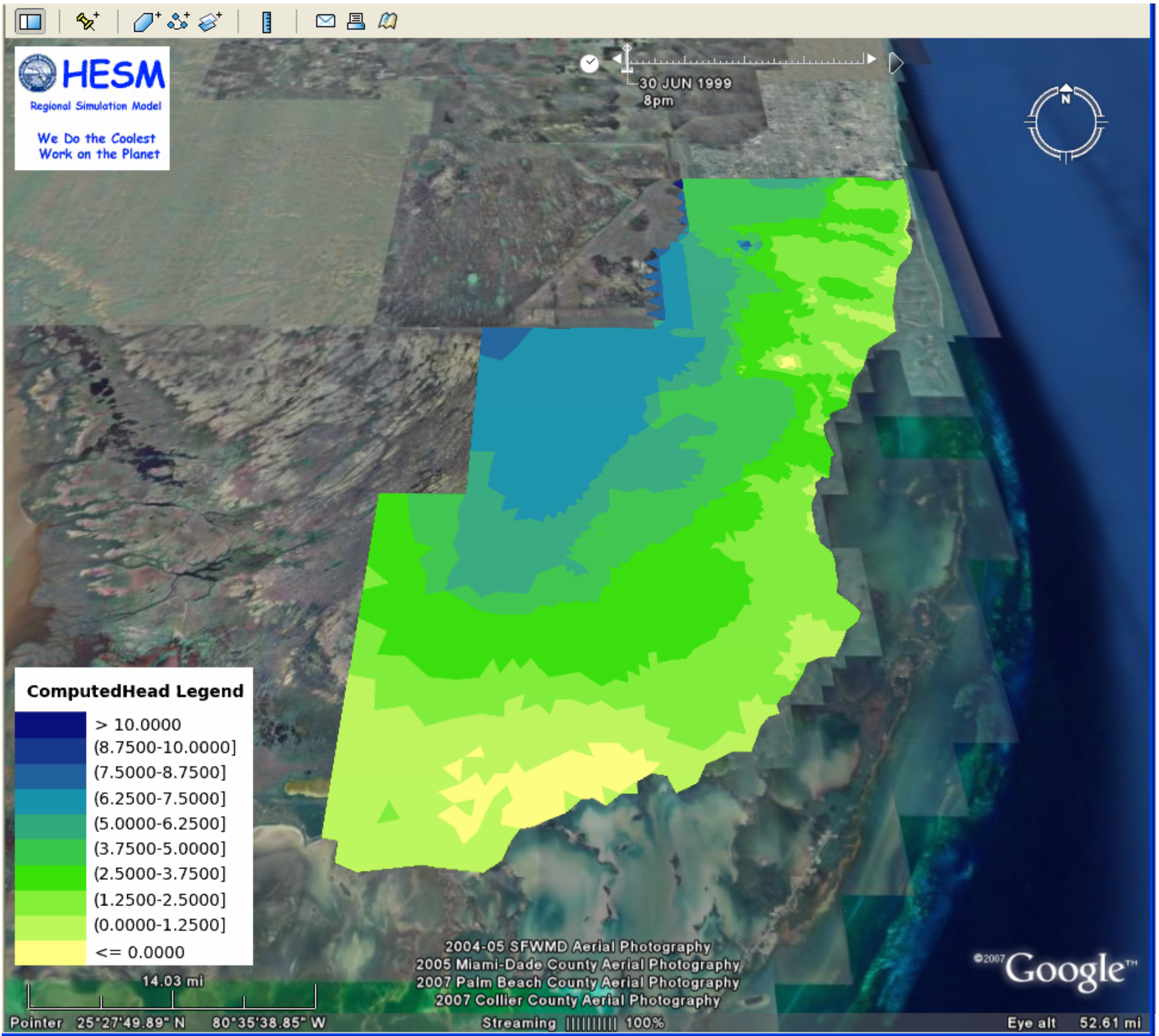


Figure 51: GoogleEarth KMZ Animation Showing ComputedHead Elevations in 2D

While viewing the Google Animation users can click on any cell and select to view the hydrograph which is generated from the model output netCDF file. The first time the hydrograph option is selected a browser window will appear in the Google Earth window and the user must specify the location of the netCDF file to be used. The tool will then remember the file location to be used for viewing other hydrographs from the same file.

The hydrograph will appear in a separate browser window where it can be viewed or saved to a location specified by the user. The hydrograph is presented in PDF format.

11.12 Transect Tool

The *Transect Tool* is a Python tool used to report flows across transects by reading global monitor information from either a budgetpackage or wbbudgetpackage netCDF file and a file containing a list of mesh node IDs. This tool generates a report similar to the output generated by the RSM when transect monitor output is specified in the MAIN XML. If a transect monitor is desired after completing an RSM run, but it was not specified at the time the run was made, the only alternative was to re-run the model. With a wbbudget netCDF file a transect flow report can be generated for any transect in the model.

The mesh nodes define the location of transect. The tool analyzes the netCDF file, extracts the flows across the specified transect and then generates 4 reports:

- Transect Report
- Daily Report

- Monthly Summary Report
- Annual Summary Report

➲ The list of mesh nodes specified by the user is printed at the top of each report [1 6 11 16]. The corresponding IDs in netCDF file have an offset of (-1). Mesh node IDs are selected form the “triple” array in the netCDF file which have IDs that are offset by (-1) from the mesh node IDs used in the RSM geodatabase. The IDs gathered from the netCDF are listed for verification: wall [0 5 10 15].

To generate transect flow output form the RSM this output option must be included as part of the RUN XML to generate similar output as seen in this example.

➲ Specifying transect output in the RSM:

```
<flowgage section=”ol_gw” label=”Transect_olgw”>
     <nodelist>1 6 11 16</nodelist>
     <asciiform file=”./Transect_olgw611.txt” format=”%10.6f”></asciiform>
</fowgage>
```

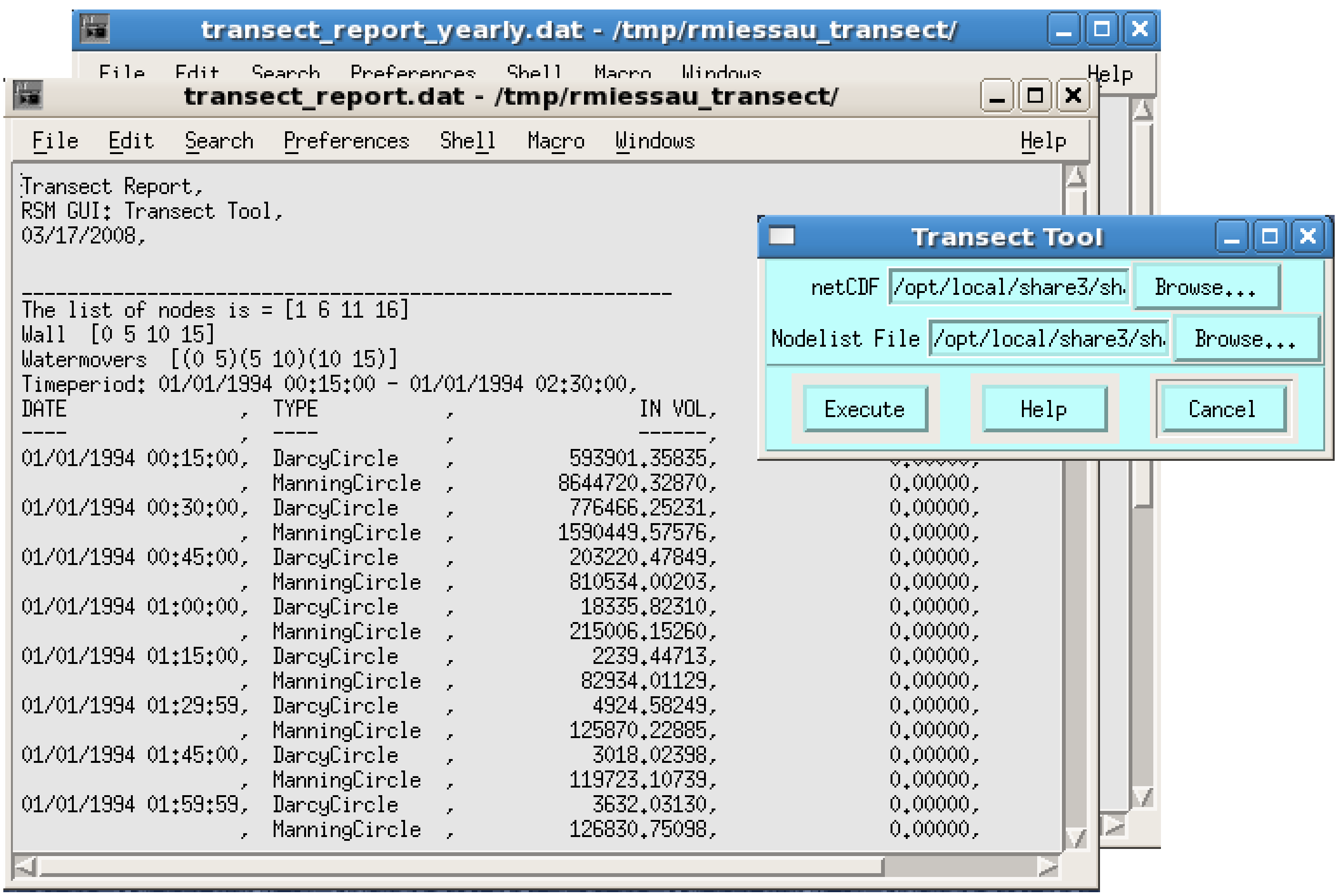


Figure 52: Output from the RSM GUI Transect Tool

▶ Run the tool using these sample files: /opt/local/share3/share/samples/transect/compbudget.nc and nodelist.csv

➲ This tool has been tested using output from ver. HSE2.0.0, 32-bt, 64-bit and against wbbudgetpackage output.

Chapter 12

Process Model Output Menu

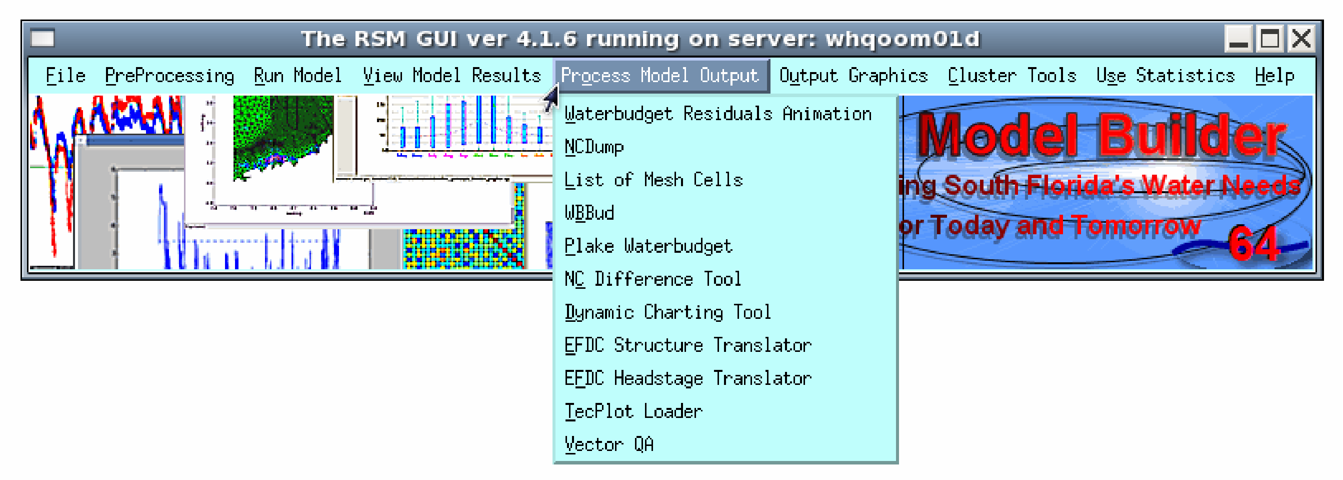


Figure 53: Process Model Output Menu

12.1 Waterbudget Residual Animation

The *Waterbudget* Residual Animation feature is a Python tool that generates a timeseries animation of the model using colors to symbolize the amount of residual for each mesh cell. The tool requires a composite budgetpackage netCDF output file and a wbbudgetpackage netCDF output file. It offers a menu with options to specify how the animation should be formatted. The user is prompted to select waterbody IDs, choose a date range and is given options to control the format of the report. The composite waterbudget report is a combination of waterbody volumes and HPM volumes which should produce a balanced (less than 10^{-4} discrepancy) report.

Format options for the Waterbudget Residual Animation tool include:

- Save Pathname: specify an output location for the output animation
- Show Mesh Border: outline the mesh cells in the animation
- Animate Cells: animate each cell
- Animate Segments: animate each segment
- Colorflood min/max: specify a range to assign 20 color variations
- Timestep Increment: specify a timestep interval to animate (ie. every 5th timestep) or specify a certain day of the month (ie. the 1st day of each month)
- Start/end date: select a start and end time range to animate

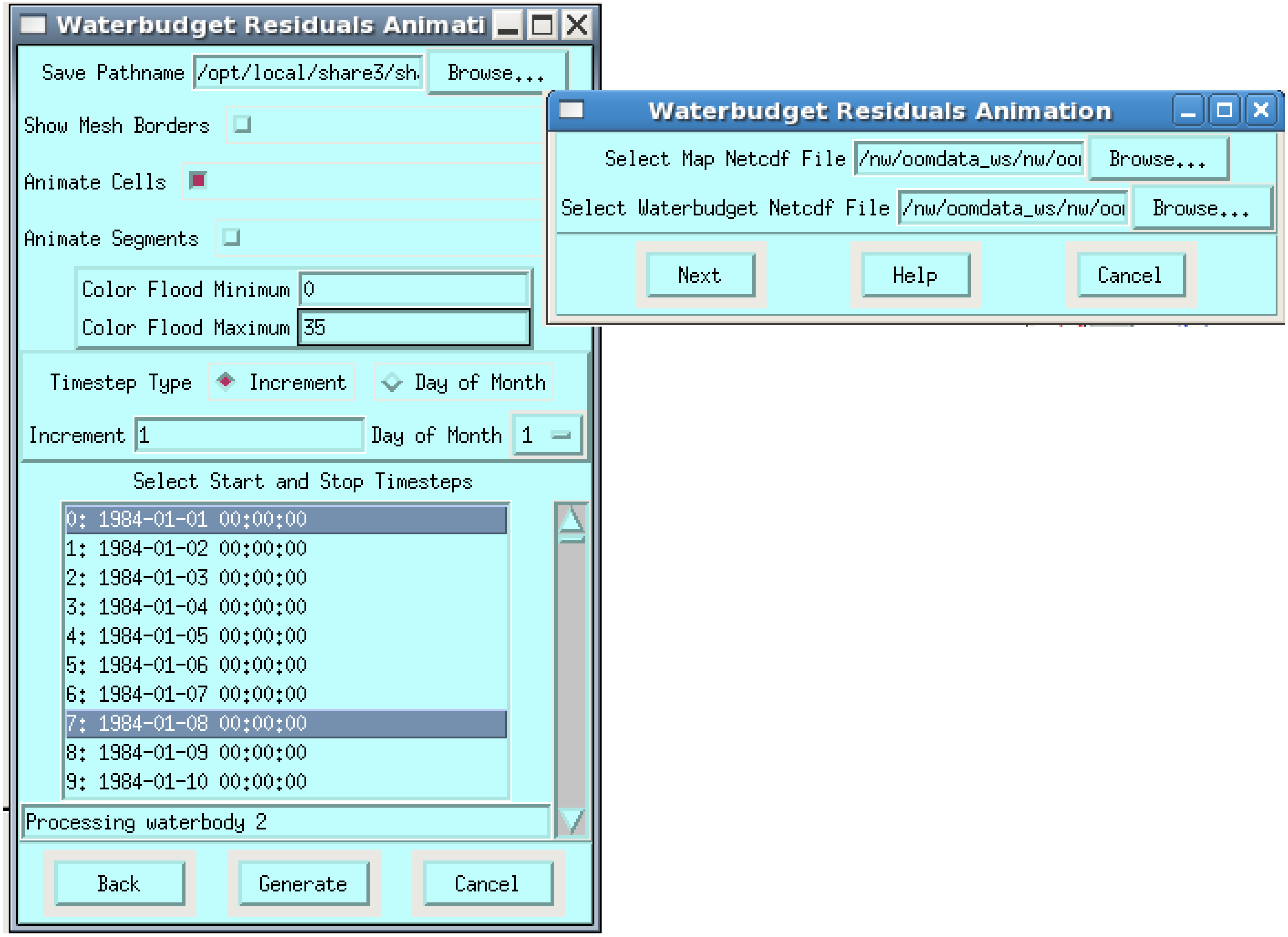


Figure 54: Waterbudget Residual Animation Input Options

Output form the Waterbudget Residual Animation tool is in the form of PNG images that can be viewed in an HTML viewer using any browser. The animation viewer has controls to stop, start, go forward, and to go back. Play speed can be adjusted by specifying the duration each frame will be viewed (1000 milliseconds = 1 second). The display also includes a color legend, the timestep being viewed and meta information documenting the units, file name and variable being displayed.

- ▶ Select the Map netCDF file: /opt/local/share3/share/samples/C111/CERP_Alts/output/SR5_sss/waterbudget_C111_SR5_sss.nc
- ▶ Select the Waterbudget netCDF file: /opt/local/share3/share/samples/C111/CERP_Alts/output/SR5_sss/composite_budget_C111_91_94-95.nc
- ▶ Specify an output directory where you would like to store the output
- ▶ Unclick the Show Mesh Borders option
- ▶ Click the Animate Cells option
- ▶ Specify a 0 to 35 colorflood range
- ▶ Select a timestep increment of 1
- ▶ Select timestep 0 as the start and timestep 9 as the end timestep
- ▶ Click generate to create the waterbudget residual animation

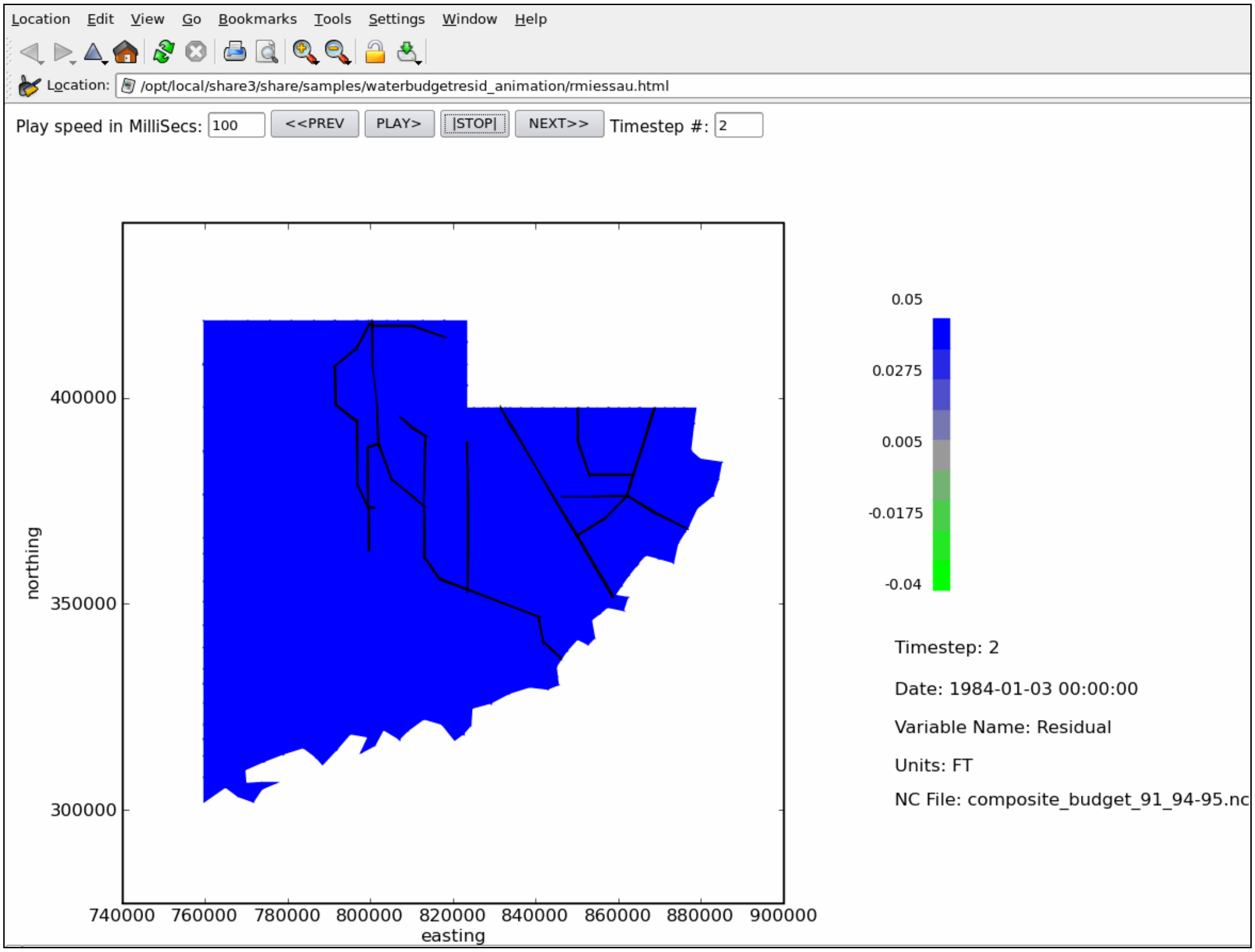


Figure 55: Output from the Waterbudget Residual Animation Tool

12.2 NCDump

The *NCDump* feature is an application link to the Unidata ncdump application. **ncdump** generates an ASCII report from a specified netCDF file. The user is prompted to supply the location of a netCDF file and output is generated to a display window.
http://www.unidata.ucar.edu/software/netcdf/docs/ncdump-man-1.html

12.3 List of Mesh Cells

The *List of Mesh Cells* feature is a Python tool. This tool is used to display a list of Cell IDs contained in a netCDF file. The tool prompts the user for a netCDF input file and extracts a list of cell IDs from the file.

- ▶ Select to view the file:
/opt/local/share3/share/samples/nc_diff/C111_ALT-Base_94-95.nc
- ▶ Click Get Cell Ids and a list of cell IDs in the netCDF file will be displayed (1-3584 in this example).
- ▶ Output from this tool can be saved to a file.

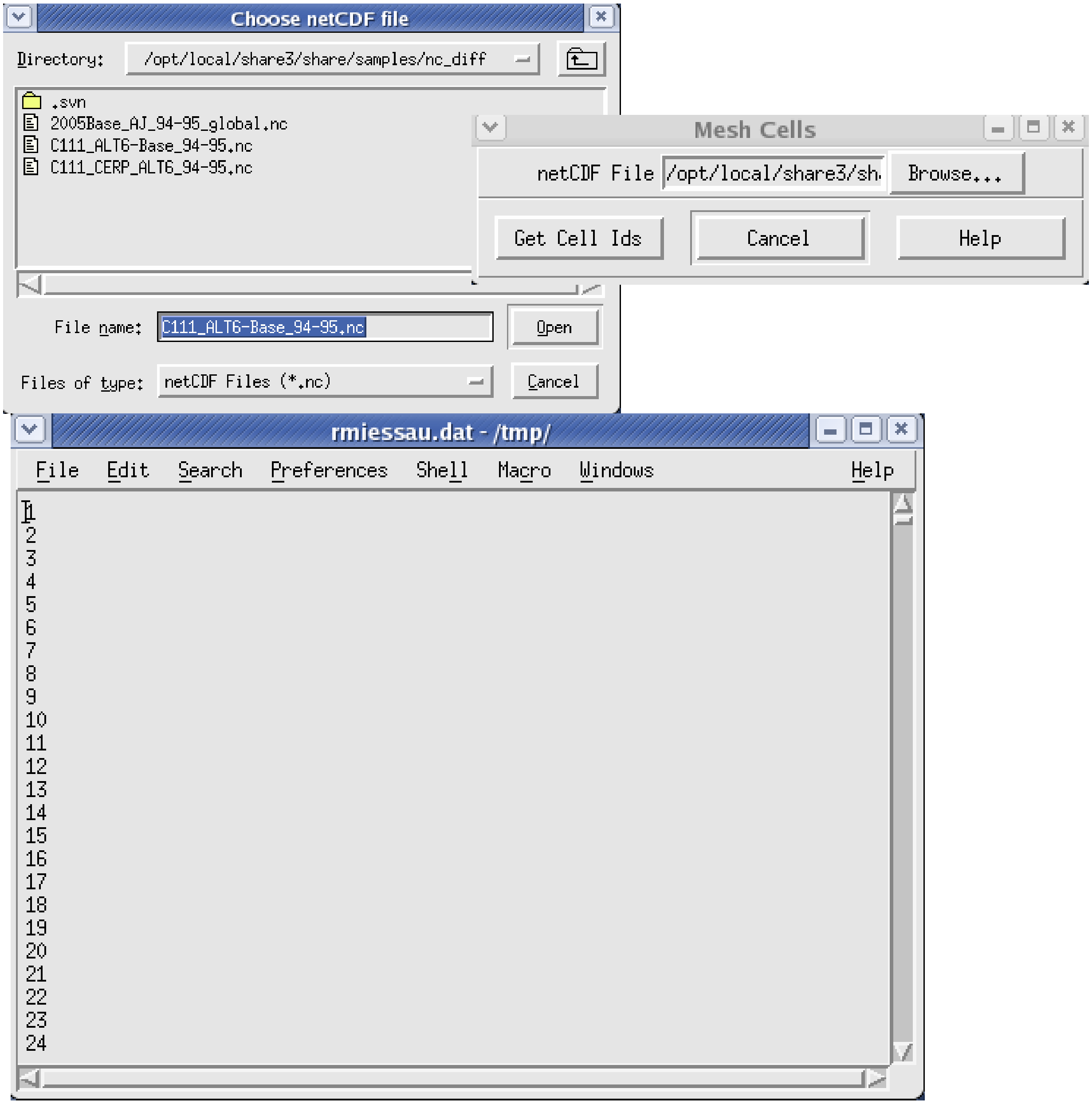


Figure 56: Output from List of Mesh Cells Tool

12.4 WBBUD

The *WBBUD* feature is a GUI interface to the WBBUD utility which has been written in C++ and is part of the RSM. WBBUD reads the wbbudgetpackage netCDF output and generates a composite waterbudget report. The WBBUD utility offers a range of options allowing the user to generate waterbudget reports for a single waterbody, collections of waterbodies or all waterbodies of a particular type. The GUI presents these options convieniently using dropdown menus, built-in checks for syntax and a help option.

WBBUD Options include:
-a: report a summed report for all waterbodies of the specified type
-s: report a summed report for a subset (list) of waterbodies either provided in a file or entered by hand.
-m: Multiply the output (ie. –m 12 to convert inches to feet)
-u: Units to be displayed in the header (required field if using the multiplier option)
-v: Verbose expanded output.
-c: Condensed report
-t: Transform output to volume, rate or Depth
-f: Format the report to summarize all (raw) data, daily, monthly or annual
-j: Julian date conversion

The GUI requires a location and name for the output file that will be generated. There is also an option to immediately display the output when the report is generated.

- Select to the file: /opt/local/share3/samples/C111/CERP_Alts/output/SR5_sss/wbbudget_C111_SR5_sss.nc
- Select the Subset option
- Enter 19 in the IDs Subset input box
- Multiplier should be set to default value of 1.0
- Units should be left blank
- Enter a path and file name in the output box
- Select the Verbose option
- Select the Volume transform option
- Select the Day format option
- Disable the Julian option
- Click Next>>>
- The output will be written to the output file and a window will prompt the user to view the file that has been written.

wbbud can be run from the command line by using the wbbud utility located in trunk/src/budtool/wbbud

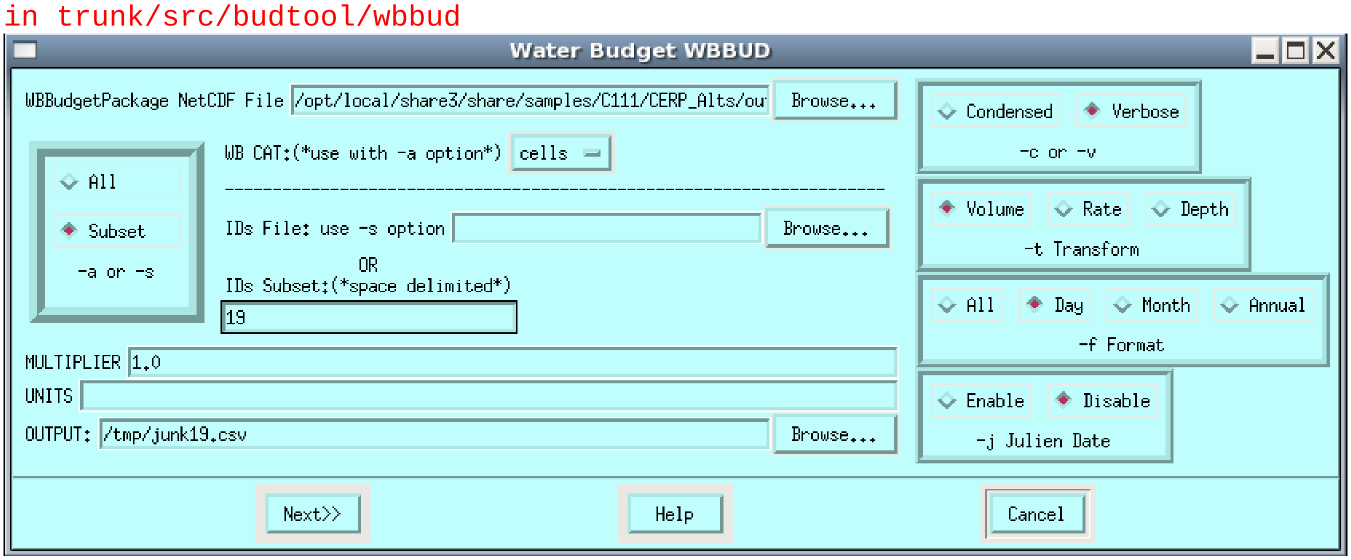
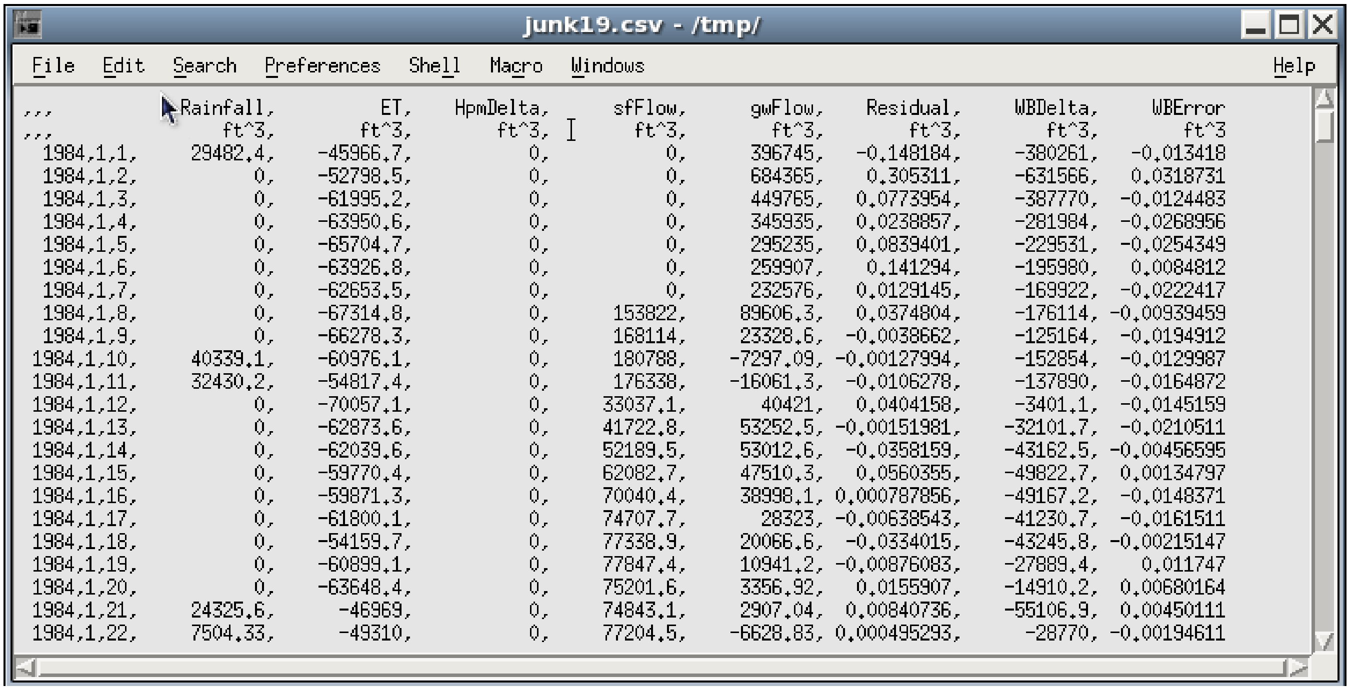


Figure 57: WBBUD Main Options Menu




```
,,,          Rainfall,        ET,  HpmDelta,     sfFlow,     gwFlow,    Residual,    WBDelta,     WBError
,,,              ft^3,      ft^3,      ft^3,       ft^3,       ft^3,        ft^3,       ft^3,        ft^3
 1984,1,1,    29482.4,  -45966.7,         0,          0,     396745,   -0.148184,    -380261,   -0.013418
 1984,1,2,          0,  -52798.5,         0,          0,     684365,    0.305311,    -631566,   0.0318731
 1984,1,3,          0,  -61995.2,         0,          0,     449765,   0.0773954,    -387770,  -0.0124483
 1984,1,4,          0,  -63950.6,         0,          0,     345935,   0.0238857,    -281984,  -0.0268956
 1984,1,5,          0,  -65704.7,         0,          0,     295235,   0.0839401,    -229531,  -0.0254349
 1984,1,6,          0,  -63926.8,         0,          0,     259907,    0.141294,    -195980,   0.0084812
 1984,1,7,          0,  -62653.5,         0,          0,     232576,   0.0129145,    -169922,  -0.0222417
 1984,1,8,          0,  -67314.8,         0,     153822,    89606.3,   0.0374804,    -176114, -0.00939459
 1984,1,9,          0,  -66278.3,         0,     168114,    23328.6,  -0.0038662,    -125164,  -0.0194912
1984,1,10,    40339.1,  -60976.1,         0,     180788,   -7297.09, -0.00127994,    -152854,  -0.0129987
1984,1,11,    32430.2,  -54817.4,         0,     176338,   -16061.3,  -0.0106278,    -137890,  -0.0164872
1984,1,12,          0,  -70057.1,         0,    33037.1,      40421,   0.0404158,    -3401.1,  -0.0145159
1984,1,13,          0,  -62873.6,         0,    41722.8,    53252.5, -0.00151981,   -32101.7,  -0.0210511
1984,1,14,          0,  -62039.6,         0,    52189.5,    53012.6,  -0.0358159,   -43162.5, -0.00456595
1984,1,15,          0,  -59770.4,         0,    62082.7,    47510.3,   0.0560355,   -49822.7,  0.00134797
1984,1,16,          0,  -59871.3,         0,    70040.4,    38998.1, 0.000787856,   -49167.2,  -0.0148371
1984,1,17,          0,  -61800.1,         0,    74707.7,      28323, -0.00638543,   -41230.7,  -0.0161511
1984,1,18,          0,  -54159.7,         0,    77338.9,    20066.6,  -0.0334015,   -43245.8, -0.00215147
1984,1,19,          0,  -60899.1,         0,    77847.4,    10941.2, -0.00876083,   -27889.4,    0.011747
1984,1,20,          0,  -63648.4,         0,    75201.6,    3356.92,   0.0155907,   -14910.2,  0.00680164
1984,1,21,    24325.6,    -46969,         0,    74843.1,    2907.04,  0.00840736,   -55106.9,  0.00450111
1984,1,22,    7504.33,    -49310,         0,    77204.5,   -6628.83, 0.000495293,     -28770, -0.00194611
```

Figure 58: Output report from WBBUD for waterbody 19

12.5 NC Difference Tool

The *NC Difference* feature is a Python tool that calculates the difference between to netCDF files and generates a new netCDF. This tool was created to help analyze the difference between two RSM alternative runs. Two netCDF files are read, the difference is calculated for the selected attribute and the new netCDF file is written.

Users are prompted to provide the location of an alternative netCDF file, a base netCDF file and the location where the new netCDF file will be written. The tool calculates the difference:

Alt – Base = newfile

The user can specify to calculate the difference between PondDepth or ComputedHead. Variable sin the netCDF file.

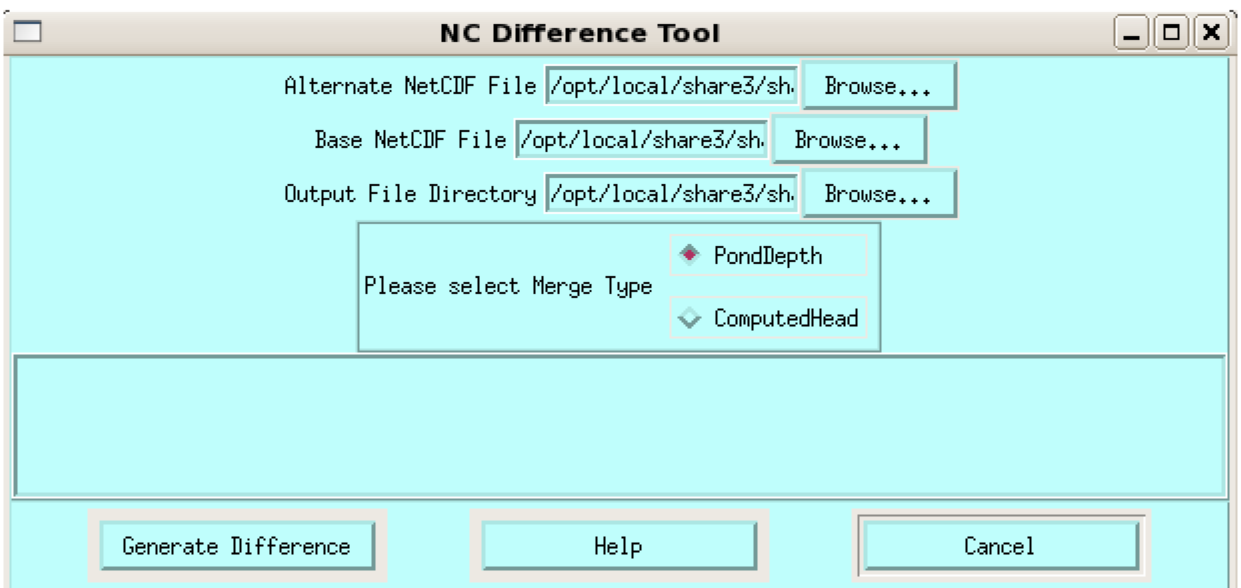


Figure 59: NC Difference Tool Menu

▶ Select to use the files:
/opt/local/share3/share/samples/nc_diff/C111_ALT-Base_94-95.nc
2005Base_AJ_94-95_global.nc

▶ Provide an output location where the resulting new file can be written

▶ Click merge the PondDepth variable

12.6 Dynamic Charting Tool

The *Dynamic Charting* feature is a Python tool that provides an interface for users to chart data from DSS and/or netCDF output files and dynamically change the charting options to achieve the desired output graphic. This tool is inteneded to be a precursor to creating new performance measure graphics allowing the user to specify data, change legends, titles and line symbols.

Users are presented with an interface that prompts for an existing control file or it will assist users in creating a new graphic and save the control file when it is completed. The main menu offers numerous options to select and display data sets.

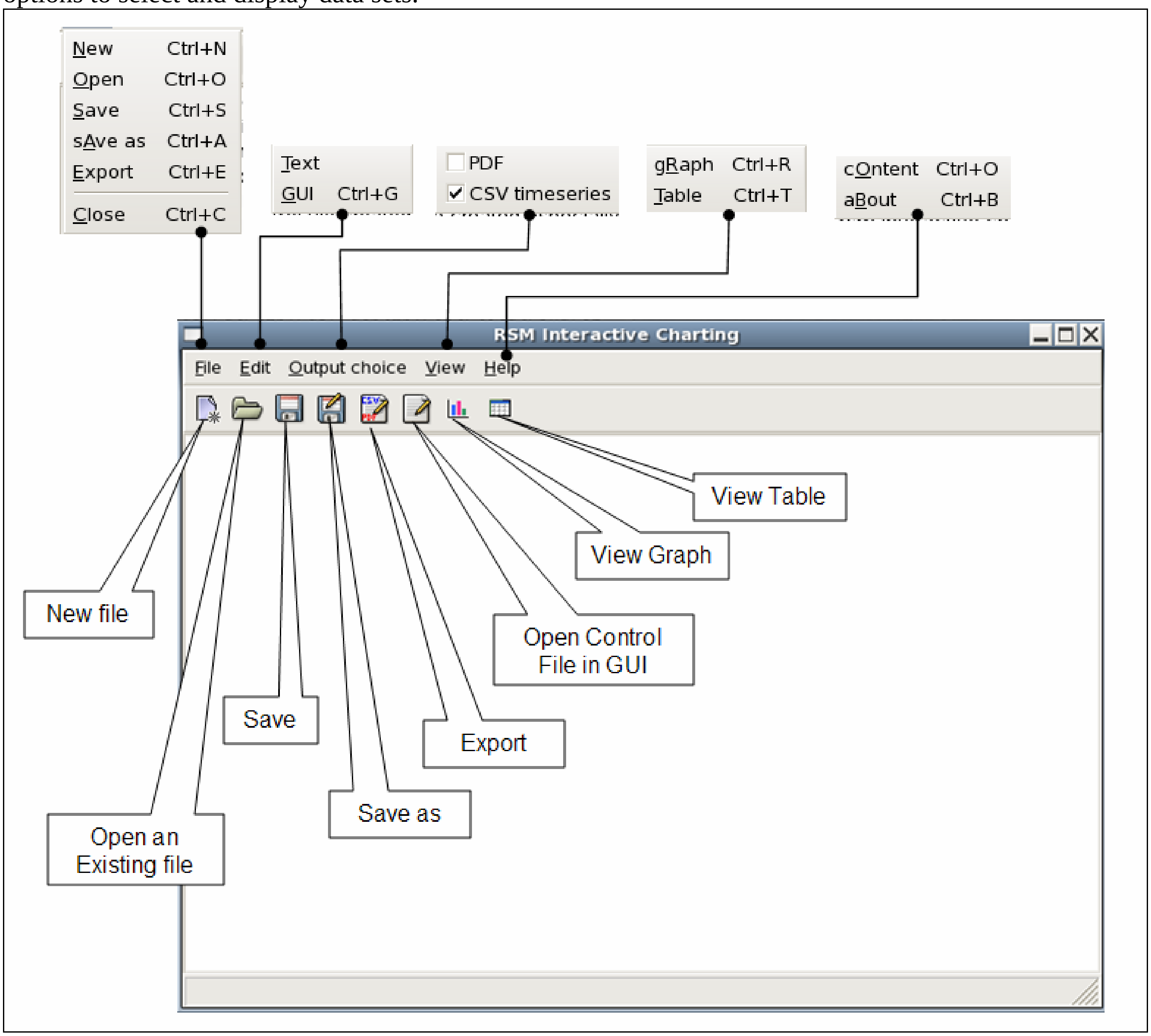


Figure 60: Dynamic Charting Tool Initial menu

The main menu screen offers options to open an existing settings file, start a new session. Once an existing control file is open the user can:

- directly edit the text in the file
- Save the control file to a new name/location
- Export data specified in the control file to a CSV file
- Export the graphical output resulting from use of the control file to a PDF file
- Open the GUI to modify the control file
- View the graphical output.
- View the tabular data resulting from use of the control file

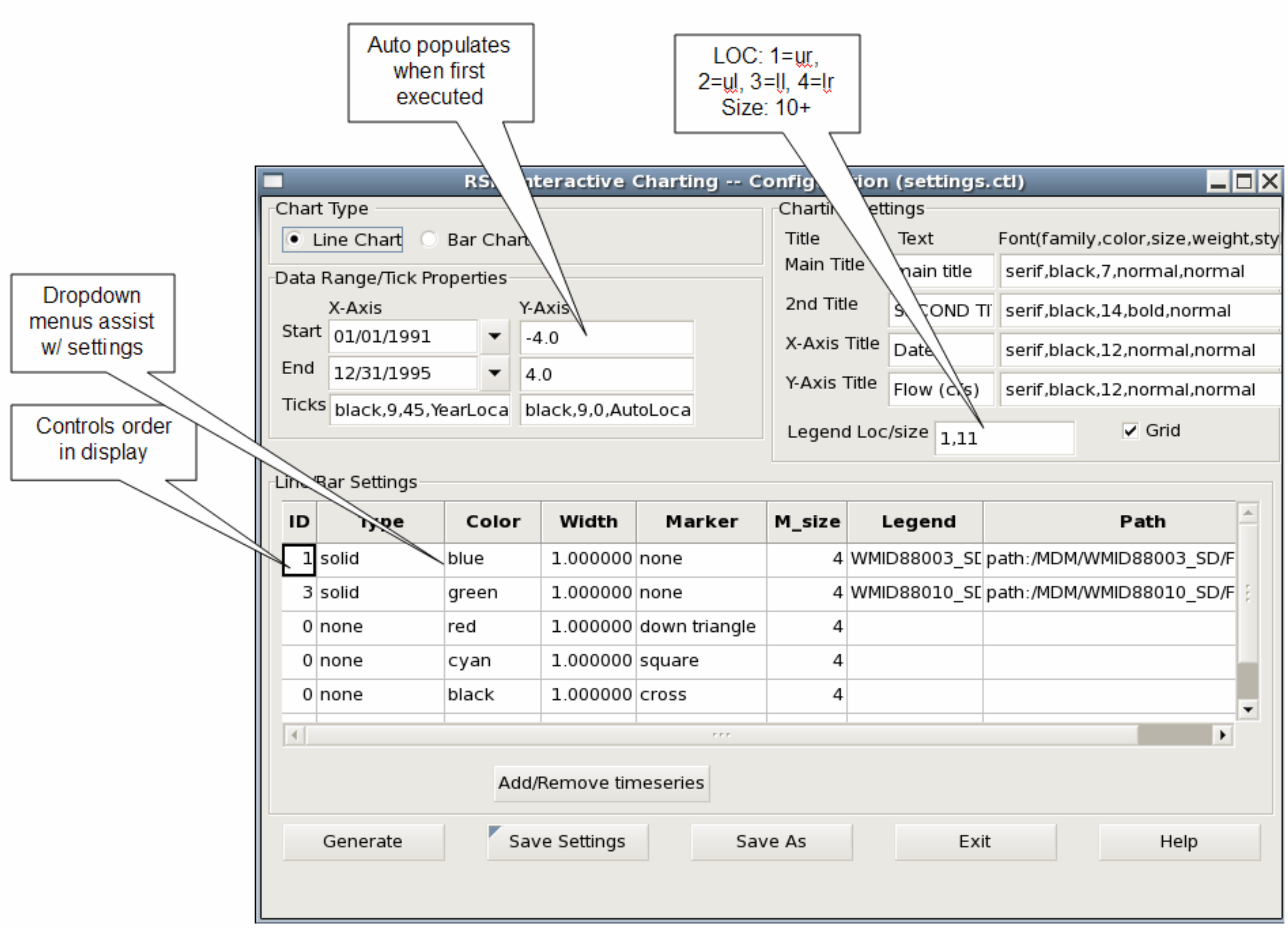


Figure 61: Dynamic Charting main settings menu

Once an existing control file is open the user can open the GUI to modify the control file, directly edit the text in the file or choose to view the graphical output. Options in the GUI allow users to:

- Set the data date range
- Set the Y-axis range
- Control display of tick marks
- Set titles, y-axis and x-axis titles
- Specify location and size of the legend
- Control display of grid lines

- Add/remove (DSS or NC) data sets to be included
- Control display of each data line
    - Line weight
    - Line color
    - Line symbol
    - Legend text
    - Order datasets are shown in the legend

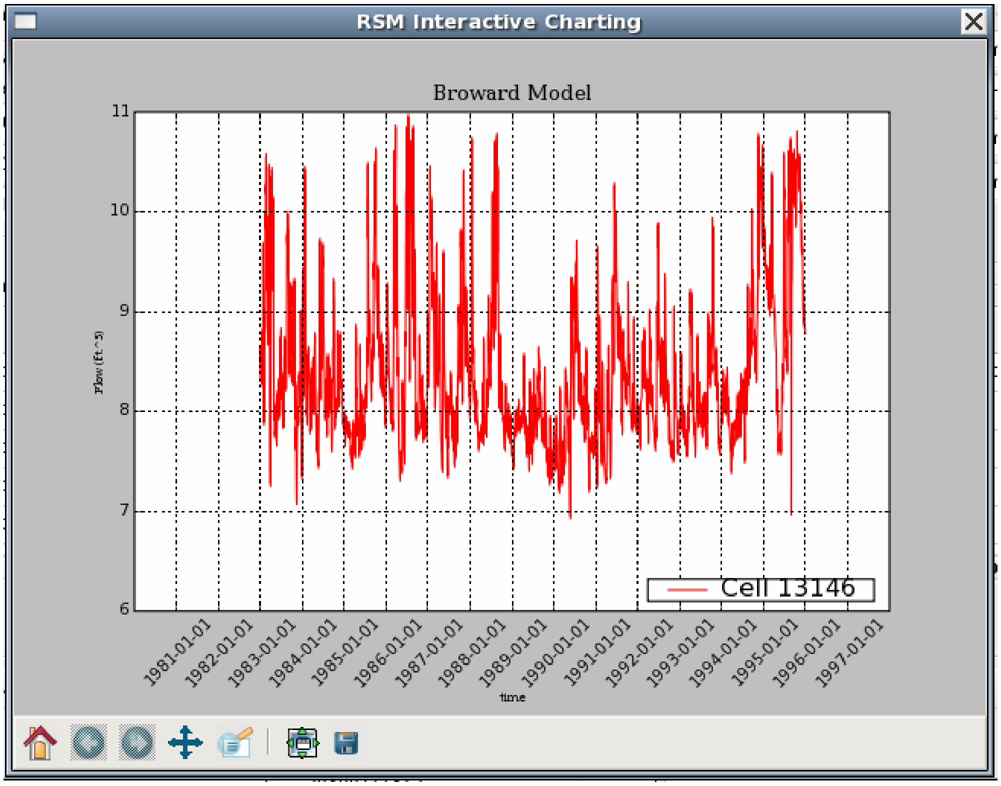


Figure 62: Dynamic Charting sample output

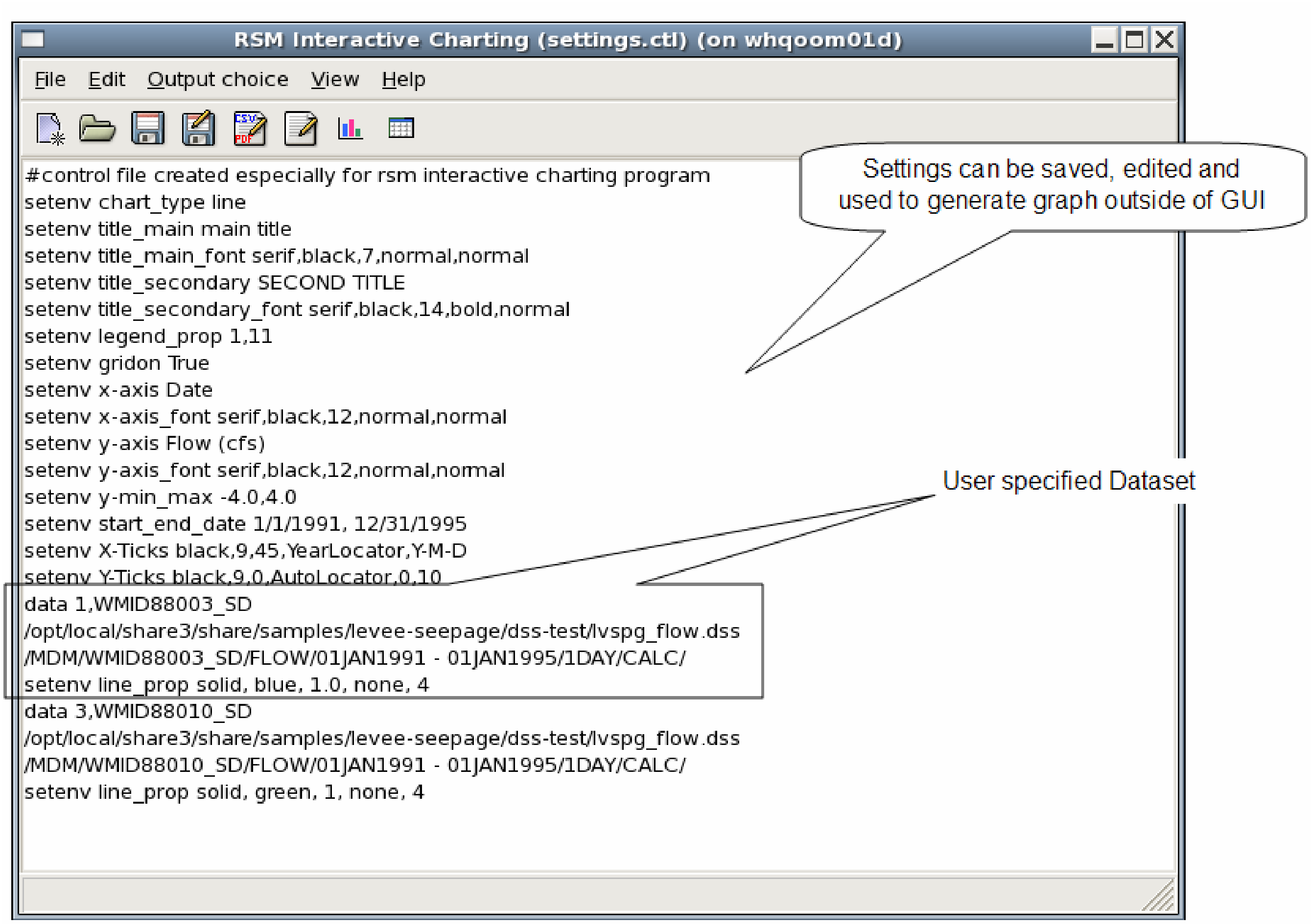
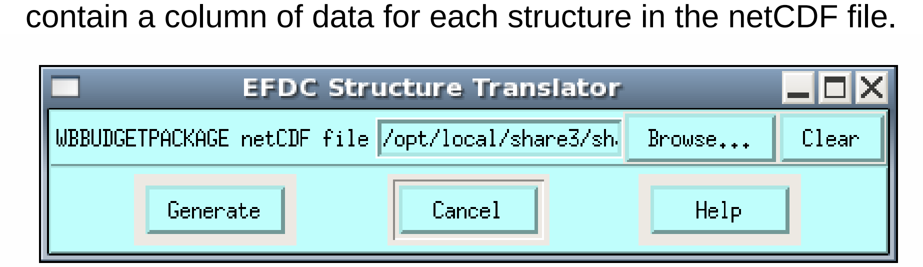


Figure 63: Dynamic Charting settings file

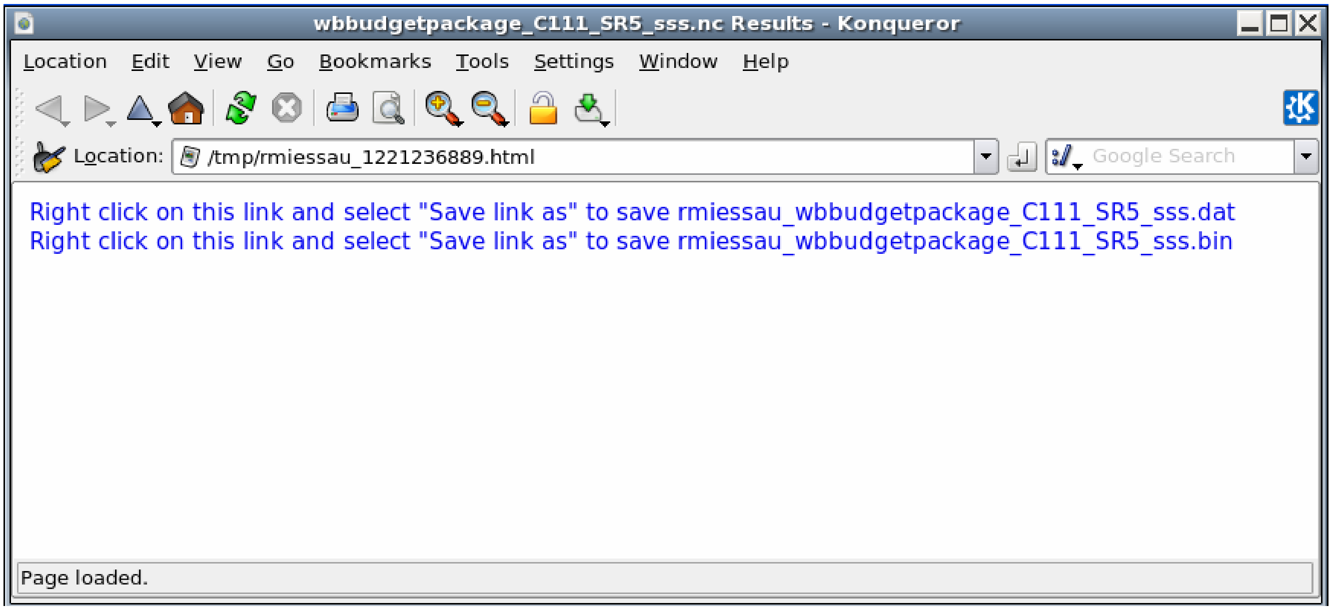
12.7 EFDC Structure Translator

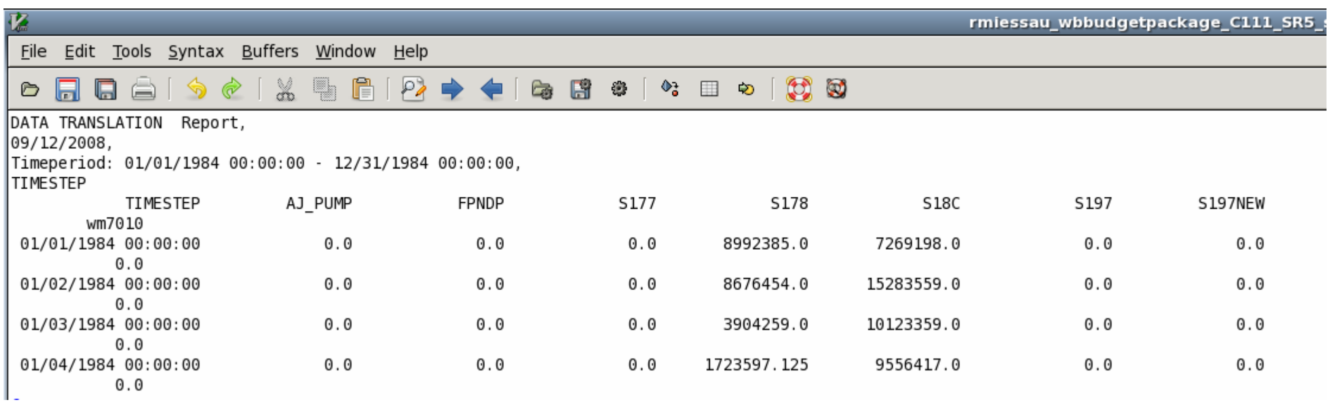
In order to support and promote use of output from the RSM this tool has been created reformat RSM output data into a format readable by the SNOOK model reader being used by Michael Kohler and CERP. NetCDF output form the RSM is read and reformatted into either a structure data set or a headstage dataset. Output from this tool is a binary file and an ascii file.

The EFDC Structure Translator translates data for the structure watermovers from the RSM <wbbudgetpackage> and produces an ascii (.dat) file and a binary (.bin) file. The files contain a column of data for each structure in the netCDF file.



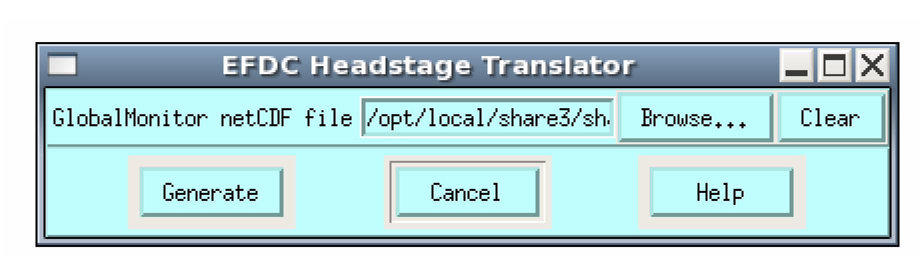
Output from this tool is presented in a browser offering a hypertext link to the binary and ascii file.





12. 8 EFDC Headstage Translator

The EFDC Headstage Translator tool translates computedHead stage data from the RSM <globalmonitor attr=”head”> and produces an ascii (.dat) file and a binary (.bin) file. The files contain an array of data for each waterbody in the netCDF file.



12.9 Tecplot Loader

<information to be added in next release>

Chapter 13

Output Graphics Menu

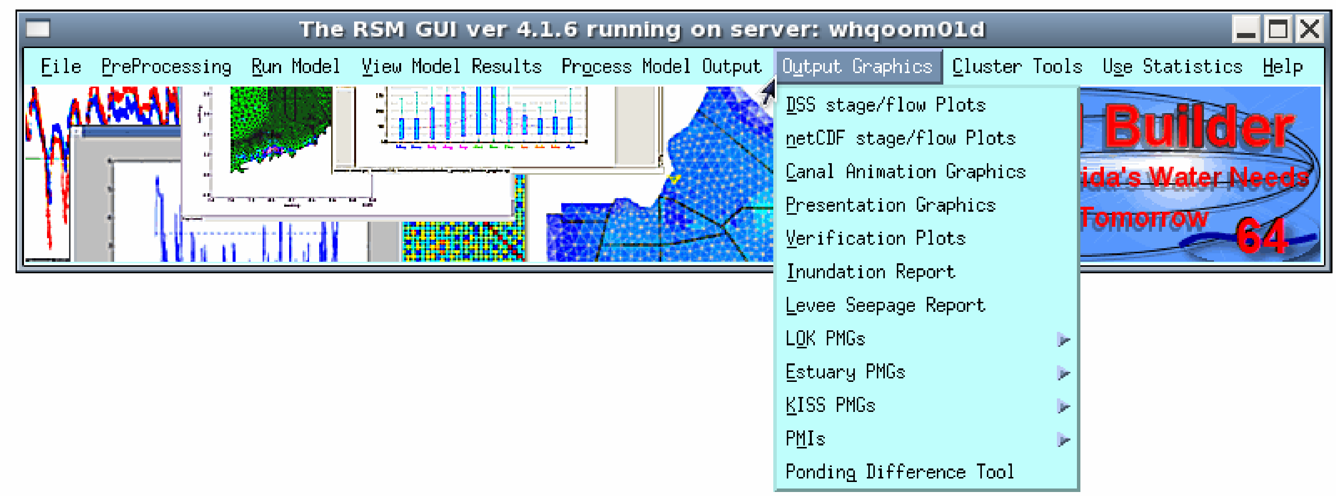


Figure 64: Output Graphics Menu

Several of the tools found under the Output Graphics menu use CONTROL FILES as input. These are ASCII text files designed to contain references to data files, titles and other formatting information that help control the specific application being run. The HELP button on each RSM GUI tool contains a reference where a sample control file can be found. Where it is helpful, these instructions reference how to create each control file.

Control File

This example control file demonstrates how "file" is used to indicate a line containing references to data files. In this case there are 3 files references by using relative paths from where the control file is located. The second line uses "run" to indicate this is a line containing references to dss data for a particular model run. In this case there are 3 DSS data paths which will be retrieved form the 3 files listed on the "file" line. The first string of text after the "run" is CH_EVER1 which is the name of this dataset and it will be used in the main title of the plot.

```
file ./output/glades_lecsa_output.dss   ./output/struct_flow.dss
     ./output/struct_flow.dss
run  CH_EVER1  /GLADES_LECSA/EVER1/STAGE//1DAY/SIMULATED/
     /SFRSM/S2/STAGE//1DAY/CALC/   /SFRSM/S3/STAGE//1DAY/CALC/
```

13.1 DSS Stage/Flow Plots

The *DSS Stage/Flow Plots* feature is a Python tool that reads DSS output from the RSM and produces flow or stage comparison hydrographs. The output also includes statistics comparing the RSM and SFWMM output. The tool reads in a CONTROL FILE which contains references to the DSS files and DSS data paths to be plotted.

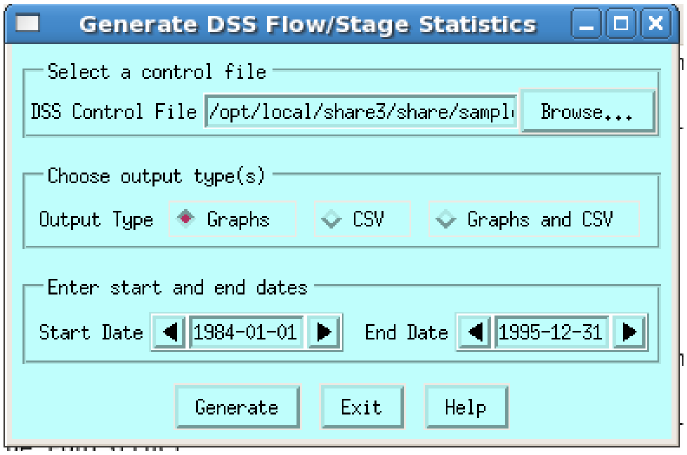


Figure 65: DSS Stage/Flow Plots Input Menu

- ▶ Select to use the file: /opt/local/share3/share/samples/dss_plots/sample.ctl
- ▶ Click to output the Graphs
- ▶ Accept the default start and end dates
- ▶ Click the Generate button to create the DSS Stage/Flow Plots

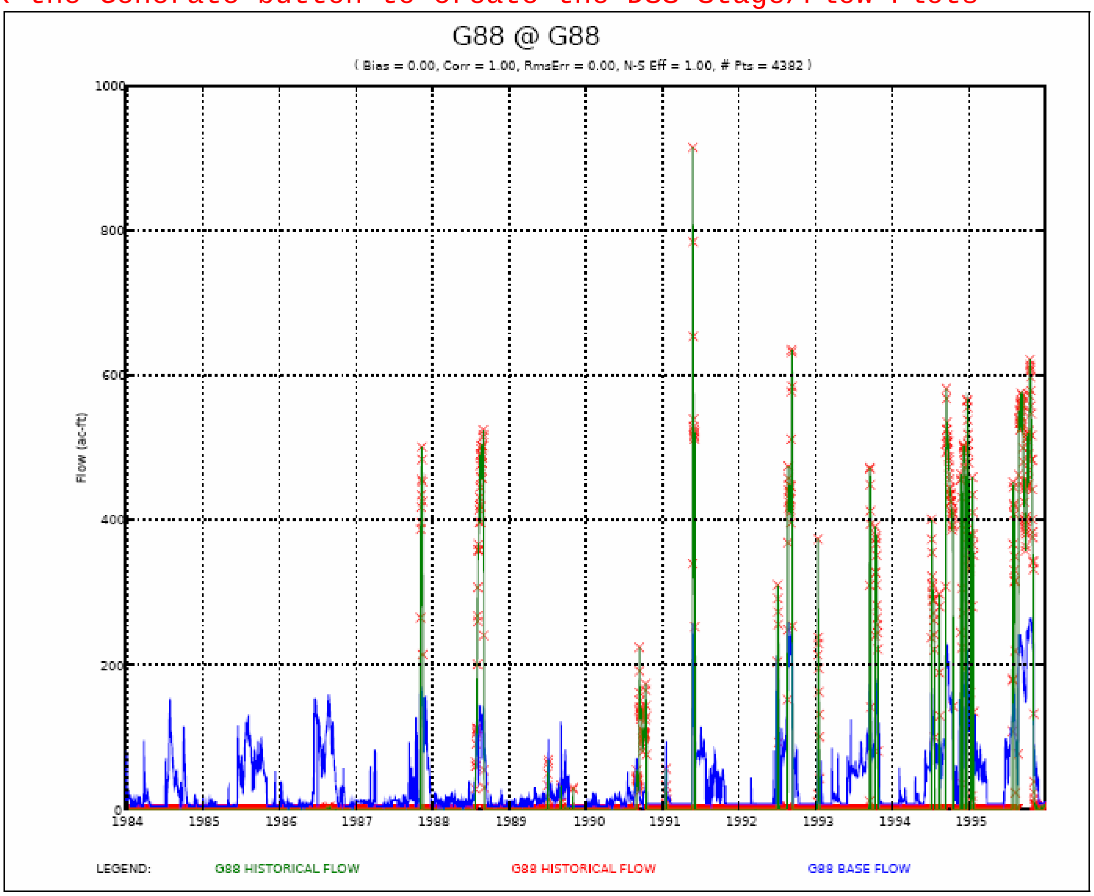
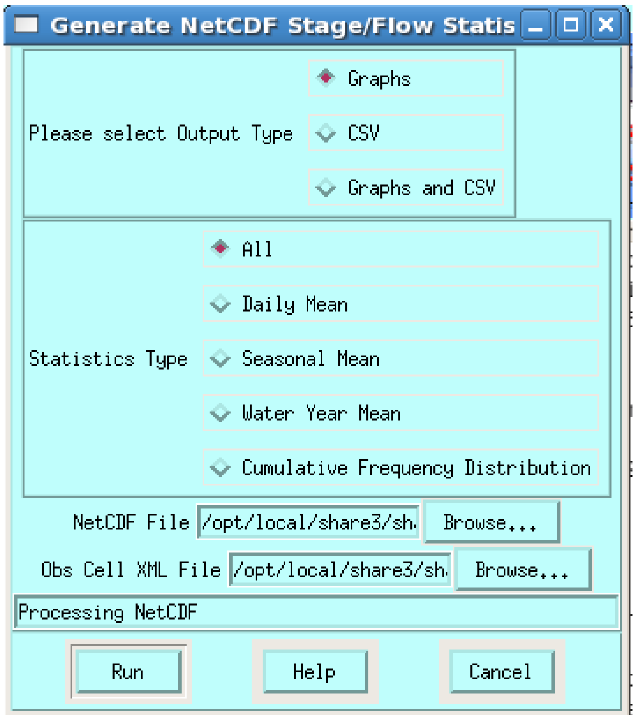


Figure 66: Output from DSS Stage/Flow Plot Tool

13.2 NetCDF Stage/Flow Plots

The *netCDF Stage/Flow Plots* feature is a Python tool that produces a series of 4 plots showing RSM flow and stages for comparison with SFWMM model output. The output also includes statistics comparing the RSM and SFWMM output. The tool reads in an RSM netCDF file and it reads in an OBSERVED CELLS XML file. The OBSERVED CELLS XML file contains information linking DSS data for each gage to a cell in the model.

Users are offered options to generate output graphics, CSV tabular data or both. The user can also select to output all 4 graphics or one type.



▶ Select to use the file:
/opt/local/share3/share/samples/netcdf_plots/broward_bm.nc and obs_cells.xml

➲ Sample CSV file can also be found in this location:
/opt/local/share3/share/samples/netcdf_plots/stageCV_v1.csv

Observed Cells File

The observed cells XML contains an <observations> element which contains a link to a file (stageCV_v1.csv). The XML also contains an <observation> entry for each gage to be used by the netCDF Flow/Stage tool. The station name and id are used to retrieve the associated stage/flow data from the model NC file and DSS files containing the historical and SFWMM comparison data.

```
<observations
   start_date="1991-01-01"
   end_date="1995-12-31" >
   <!-- Gages outside of canal -->
   <file name="stageCV_v1.csv"
      type="csv"
      missing_value="-901.0"
      key="stageData" />
```

```
<observation name="G2030"
   description="G2030, Well"
   stationname="G2030"
   type="cell"
   id="13439"
   variable="ComputedHead"
   weight="1.0"
   file="stageData" />
```

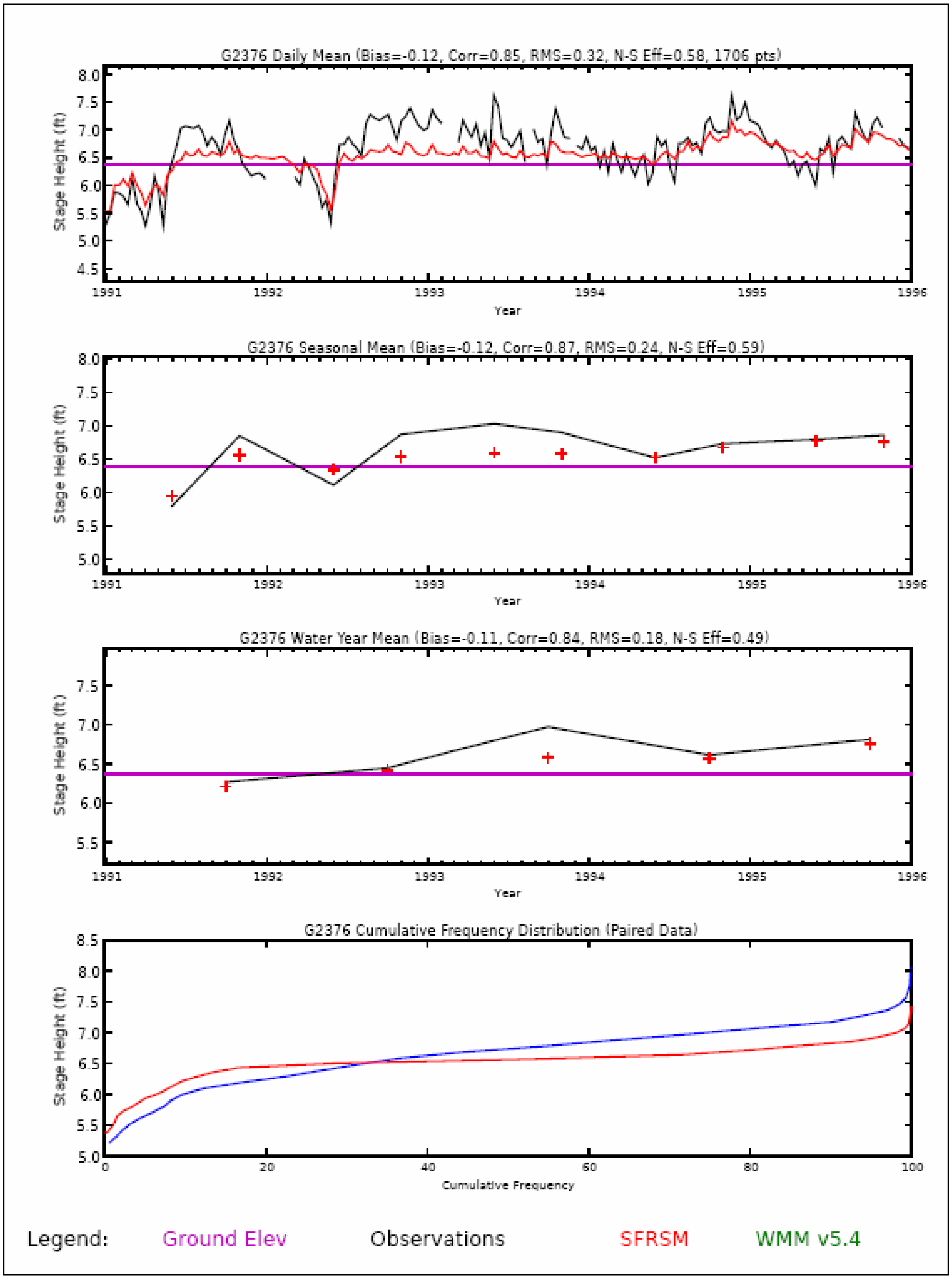


Figure 67: output from the netCDF Stage/Flow Tool

13.3 Canal Animation Graphics

The *Canal Animation Graphics* feature is a Python tool that reads the RUN XML from an RSM run, acquires the <segmentmonitor> output and generates a canal segment animation. The animation displays each segment selected by the user and displays the canal elevation for each timestep. Gaps between segments will be noted by placing the missing canal segment ID in the gap.

The animation viewer has controls to: stop, start, go backup, go forward. The display includes: the timestep being viewed, segment IDs and an optional title input by the user.

This tool takes into account that there are differences in how <segmentmonitors> can be referenced in the RUN XML. For instance:

Shorthand method:

```
<segmentmonitor  id="19" attr="head" label="s19"><dss file="heads"
/></segmentmonitor>
```

Referenced Method:

```
<!ENTITY c111_output     SYSTEM
"./input/c111_hse+mse_output_average_conditions_opened_structures_8inch.xml"
>
<!-- output to dss file -->
 &c111_output;
```

Longhand Method:

```
<segmentmonitor id="309517" attr="head">
      <dss
file="./output/average_conditions_opened_structures_8inch_storm/c111_stage_f
low_monitors_base.dss" pn="/c111/S174_TW/stage//1day/CALC-2005BASE/"> </dss>
    </segmentmonitor>
```

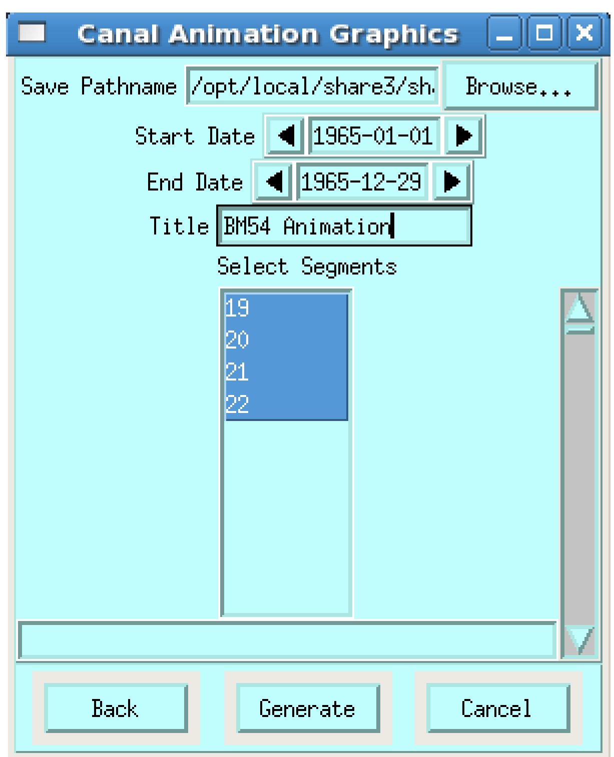


Figure 68: Canal Animation Graphics Menu

An options menu prompts the user for:

- an output location to store the animation
- the start/end dates from the model output to be animated
- supply a title for the animation
- select the segment monitors that were output from the model

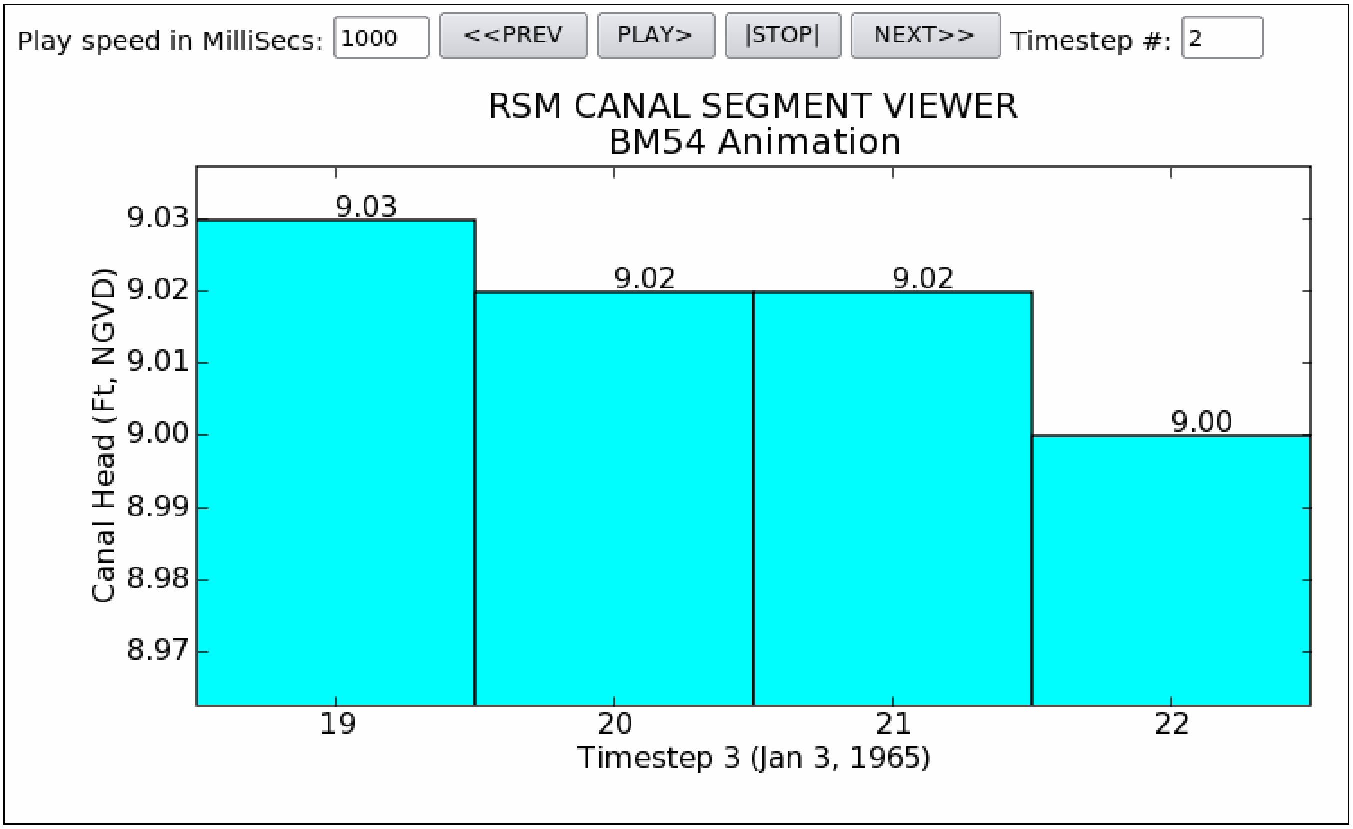


Figure 69: Output from the Canal Animation Graphics Tool

▶ Select to use the file:
/opt/local/share3/share/samples/canal_animation/BM54wcd3/run3x3.xml

➲ Sample output form this example can be found in this location:
/opt/local/share3/share/samples/canal_animation/BM54_animation

13.4 Presentation Graphics

The *Presentation Graphics* feature is a Python tool that reads data from the RSM netCDF file and generates an HTML viewable timeseries animation. The input comes from the global monitor netCDF output which must include either computedHead, PondDepth or PondingDepth can be calculated if topo and computedHead are present in the file. Flow vectors can also be included in the animation if the totalvector data is present in the netCDF file.

The user is given options to:

- Specify a location where the output files will be saved
- Show the mesh lines in the animation
- Include either color shaded flow vectors or scaled flow vectors in the animation
- Increase the scale of the flow vectors (scaled in increments of 1000x)

- Specify the size of a square grid (25x25 is default) that is used to acquire the mesh cells that will provide the flow vector values in the animation
- Specify a colorflood min/max range for assigning 20 bracketed color ranges to the shaded cells in the animation
- Specify the variable to be animated (computedhead, ponddepth or pondingdepth which is a calculation using (topo-computedhead)
- Specify the method for acquiring the timesteps to be animated. Either a timestep increment (5 = every 5th timestep) or day of the month (31=last day of every month)
- Select a color ramp
- Select the start/end timestep from the netCDF model output file

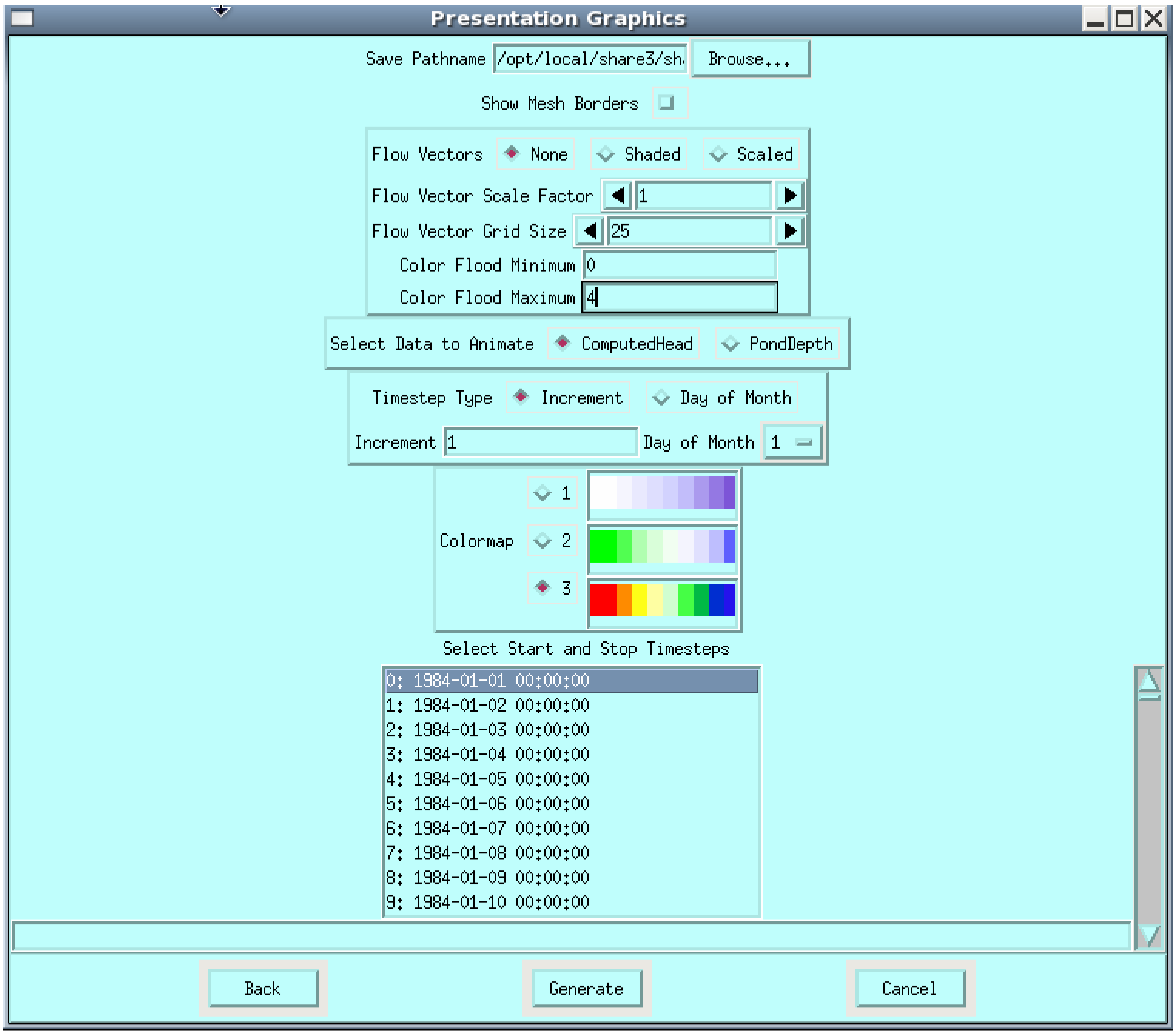


Figure 70: Presentation Graphics Tool Menu

Output from the Presentation Graphics Tool is in the form of an HTML browser viewable animation. Each individual timestep is saved in PNG format and can be viewed in the output directory that was specified when the animation was created. The animation viewer has controls to: stop, start, go backup, go forward. The display includes: a color legend, the timestep being viewed and meta information documenting the units, file name and variable being displayed.

- Select to view the file: /opt/local/share3/share/samples/C111/CERP_Alts/output/SR5_sss/C111_PIR1_Alt2Db.nc
- Specify an output directory where you would like to store the output
- Click the None option for flow vectors
- Select a colorflood min/max of 0 to 4
- Select the ComputedHead data type
- Select a timestep increment of 1
- Select color ramp 3
- Select timestep 0 as the start and timestep 14 as the end timestep
- Click the Generate button to create the animation

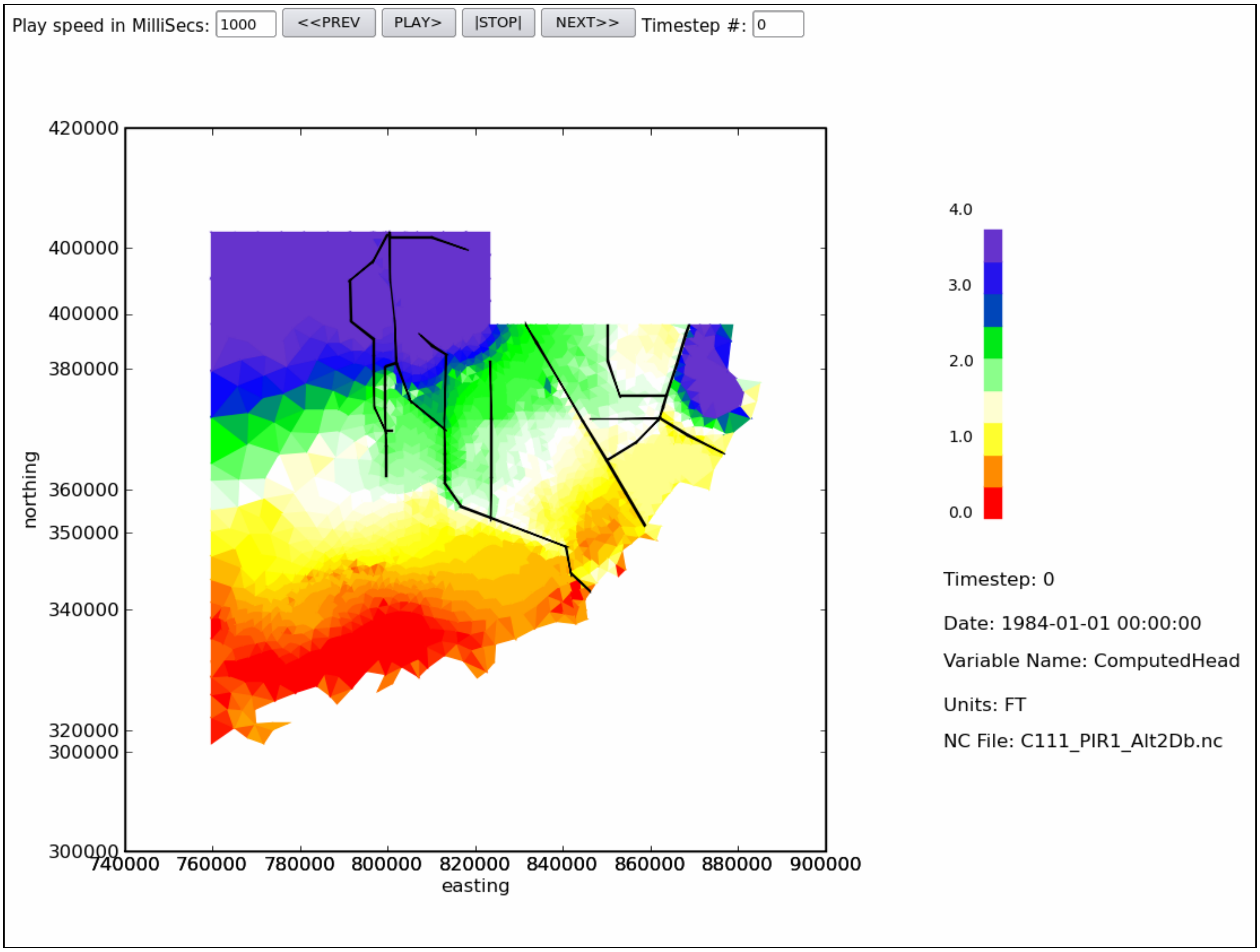


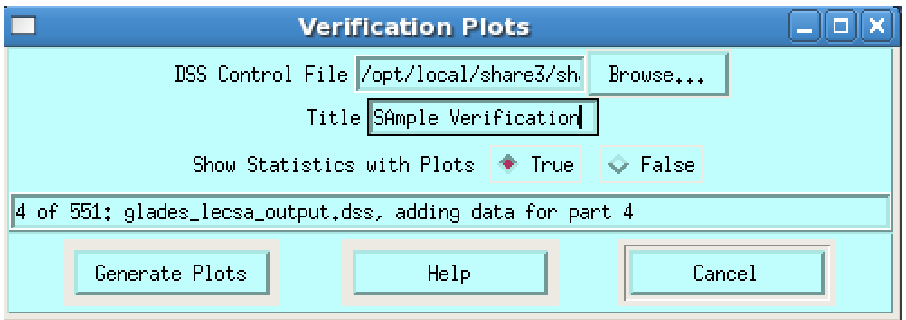
Figure 71: Output from the Presentation Graphics Tool

13.5 Verification Plots

The *Verification Plot* feature is a Python tool that generates a series of three hydrographs showing comparison stages for RSM model output, SFWMM model output and Historical data. The hydrographs are formatted to show data for three specific ranges: 1984-1995, 1981-1983, 1996-2000.
The output also includes statistics comparing the RSM and SFWMM output. The tool reads in an ASCII CONTROL FILE that contains references to data locations. An options menu also offers a choice to turn the display of the statistics on/off and to input a title for the Graph.

CONTROL FILE:

```
file ./output/glades_lecsa_output.dss   ./output/struct_flow.dss
     ./output/struct_flow.dss
run  CH_EVER1  /GLADES_LECSA/EVER1/STAGE//1DAY/SIMULATED/
     /SFRSM/S2/STAGE//1DAY/CALC/   /SFRSM/S3/STAGE//1DAY/CALC/
```



- ▶ Select to view the file: /opt/local/share3/share/samples/verification_plots/sample.ctl
- ▶ Specify a title for the plot
- ▶ Specify to show statistics
- ▶ Click the Generate button to create the Verification Plots.

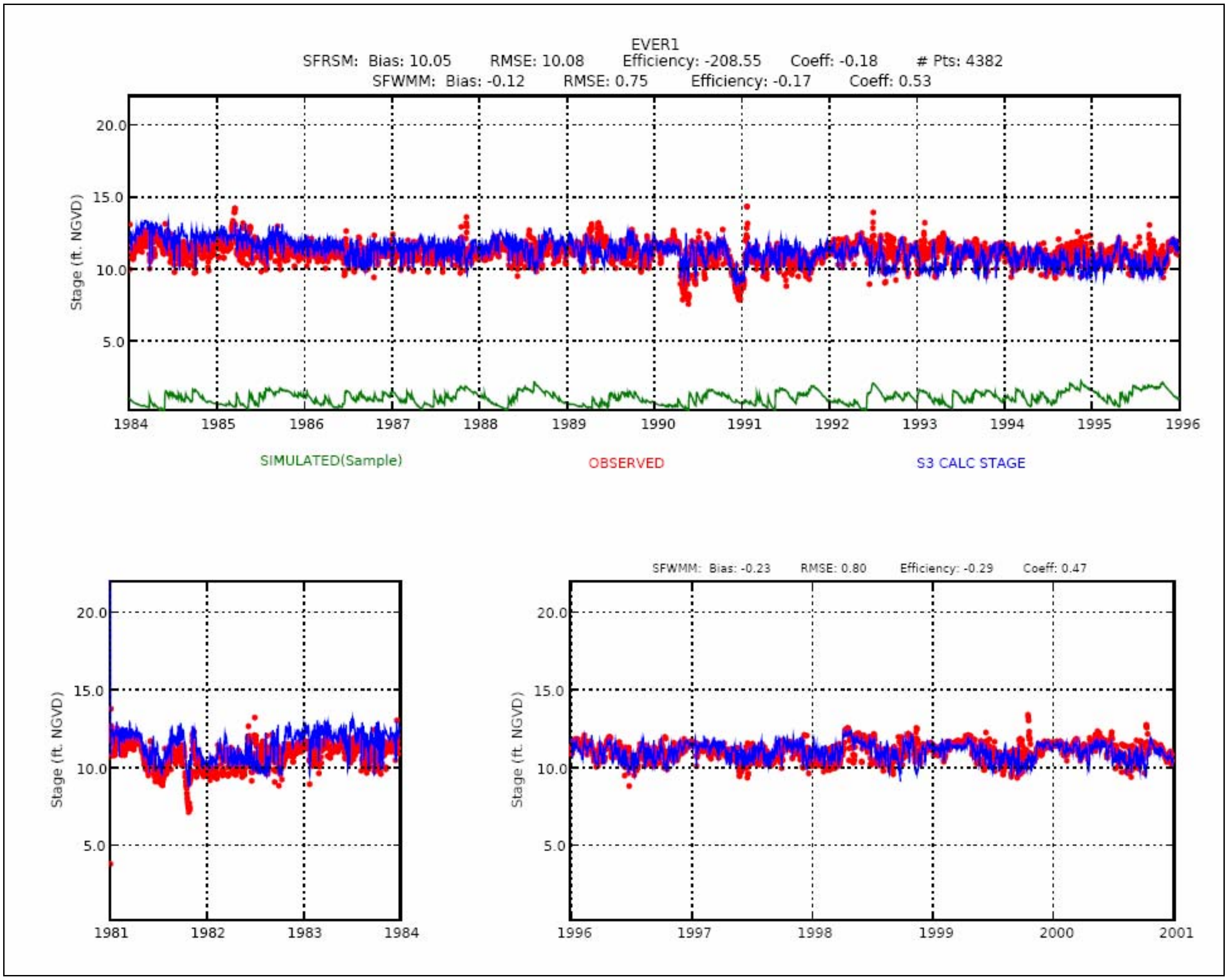


Figure 72: Output from the Verification Tool

13.6 Inundation Report

The *Inundation Report* feature is a Python tool that produces two graphs: 1) Ponding Stage Hydrograph 2) Stage Distribution Curve. The distribution curve shows the percent of time depth exceeds the ground elevation and an optional offset line. This tool uses three input files:

NetCDF FILE: expected to contain Topography and ComputedHead to calculate PondDepth

Cell ID CSV FILE:

Cell ID, Landuse, Index, Eval Area, Offset

```
Area1, 1, 1, 512, 1,-0.65
Area1, 1, , 512, 1, -0.65
```

LANDUSE CSV FILE:

```
LUCode, PDLD#, LU, Hydroperiod Range(mths), Seasonal Wet Level(ft), Seasonal Dry Level(ft), Temp
410,4.1, Cypress Swamp, 6 - 8,1.5,-1.5, junk
420,4.2, Hardwood Swamp, 8 - 10, 2, -1, junk
```

An options menu provides a method to:

- Specify a start/end date
- Specify a daily or a weekly time period
- Set date ranges for wet year, avg year and dry year

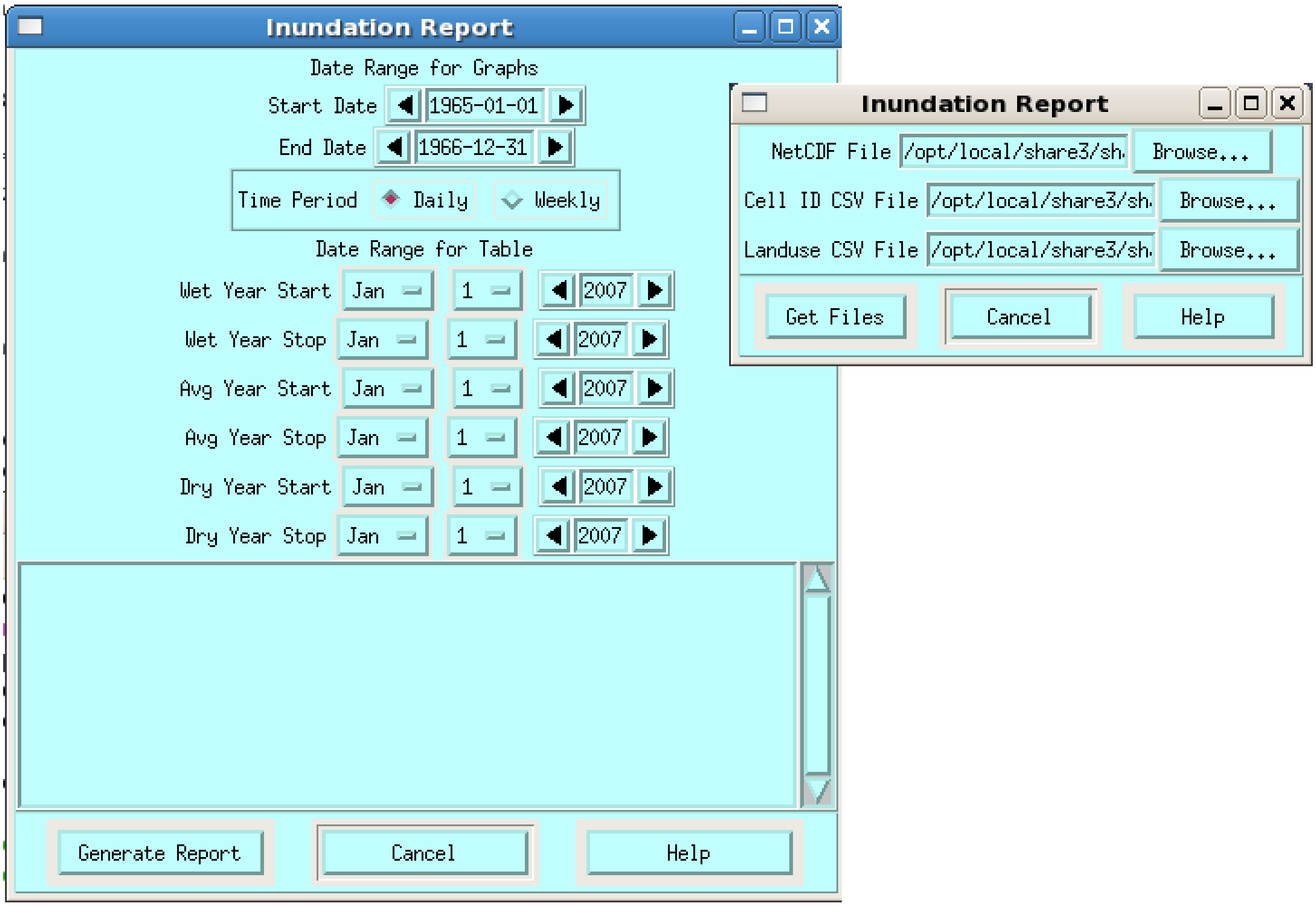


Figure 73: Inundation Report Tool Options Menu

- ▶ Select to view the file: /opt/local/share3/share/samples/inundation_report/calib.nc, Multi_obs_cells_sample.csv, and landuse_v2_3b.csv
- ▶ Specify a start/end date
- ▶ Select a Daily time period
- ▶ Accept the default date ranges
- ▶ Click the Generate button to create the inundation report

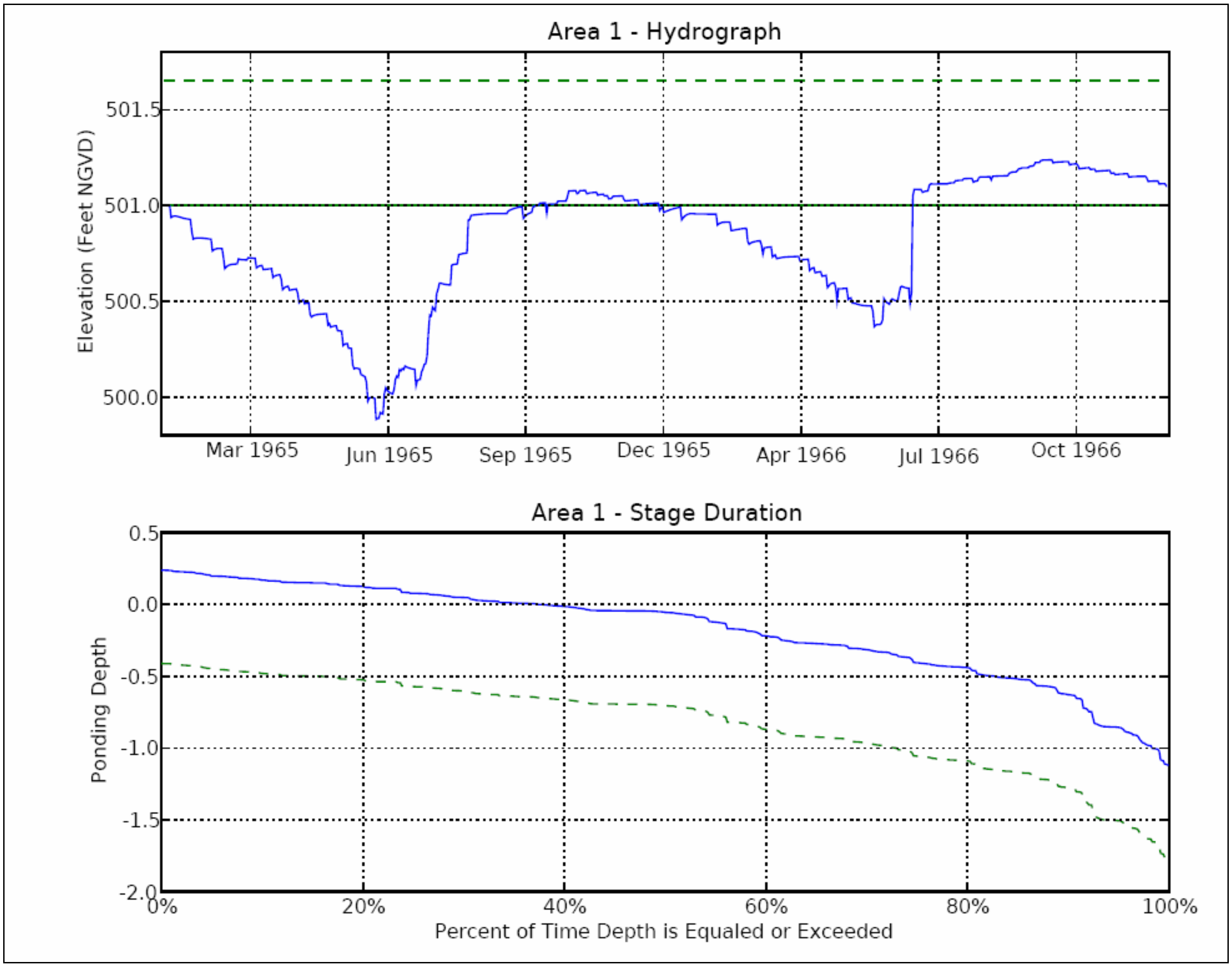


Figure 74: Output from the Inundation Report Tool

13.7 Levee Seepage Report

The *Levee Seepage Report* feature is a Python tool that generates flow graphs showing seepage across a levee. Three graphs are produced for each levee: marsh-to-drycell, marsh-to-segment, drycell-to-segment. A report can also be produced showing daily, monthly or annual summarization of the data.

As input this tool function against DSS or wbbudget NC files, and it requires a corresponding levee-seepage XML file from the model run. Optionally it can accept one or more than one XML files.

Required Data files

- wbbudgetpackage NC or DSS file
- XML file: levee-seepage.xml

➲ `Sample output form this example can be found in this location: /opt/local/share3/share/samples/leveeseepage_report/levee_seepage.pdf`

Examples of the XML files can be found in Appendix G.

An options menu provides a method to select the input files, specify a start/end date. The tool acquires the levees and produces a list of seepage locations to choose from.

- Select to use the files: /opt/local/share3/share/samples/leveeseepage_report/wbbudget.nc and single-seep.xml
- Accept the default start date
- Select one or several seepage(s) across a levee.
- Indicate if you want a CSV report
- Indicate if
- Click the generate button to create the Levee Seepage report.

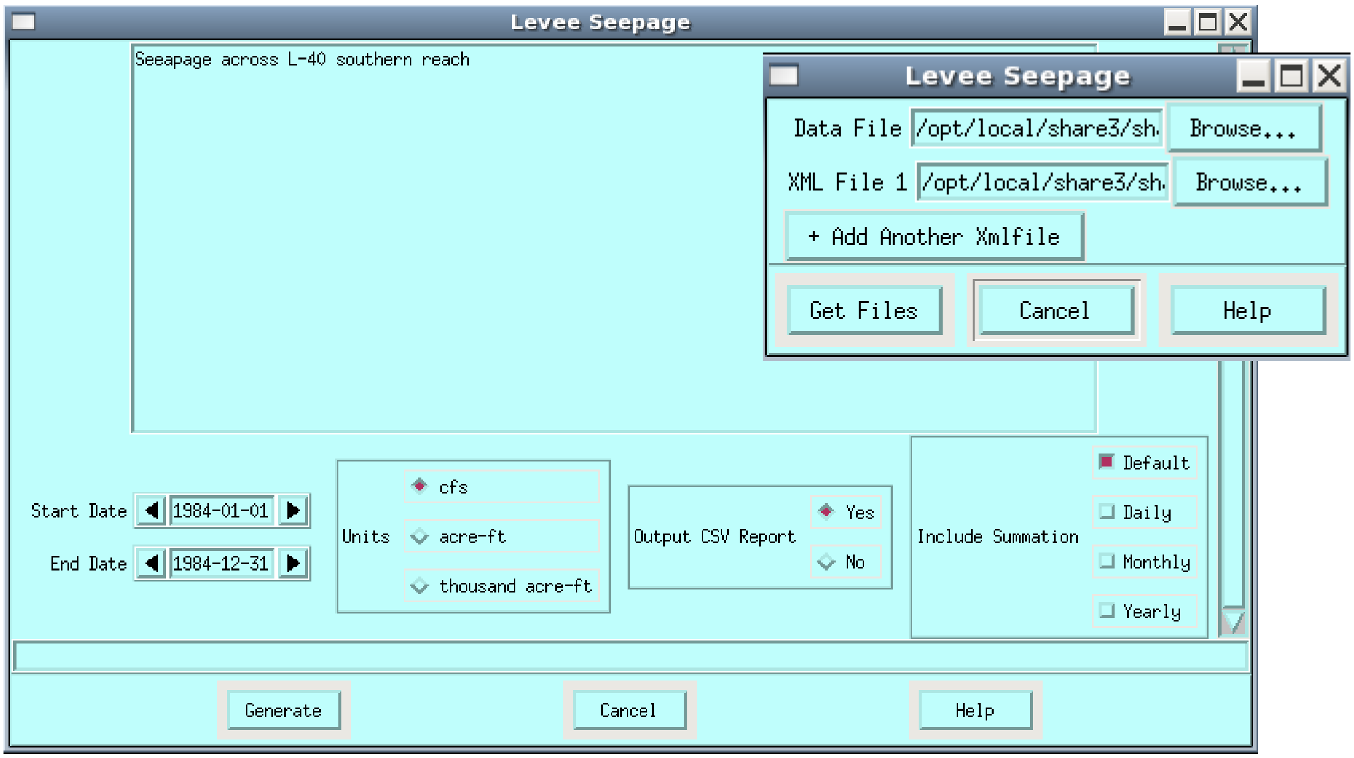


Figure 75: Levee Seepage Report Options Menu

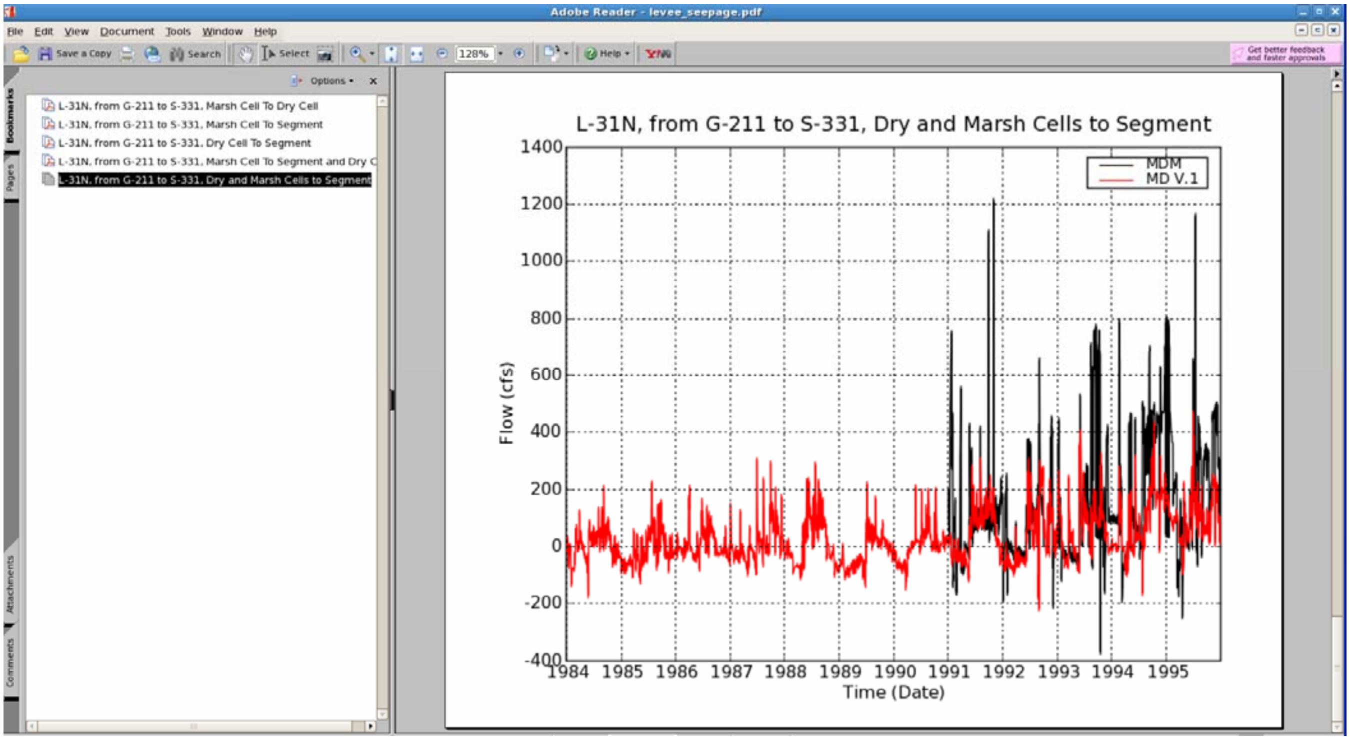


Figure 76: Output from the Levee Seepage Report Tool

Chapter 14

Performance Measure Graphics

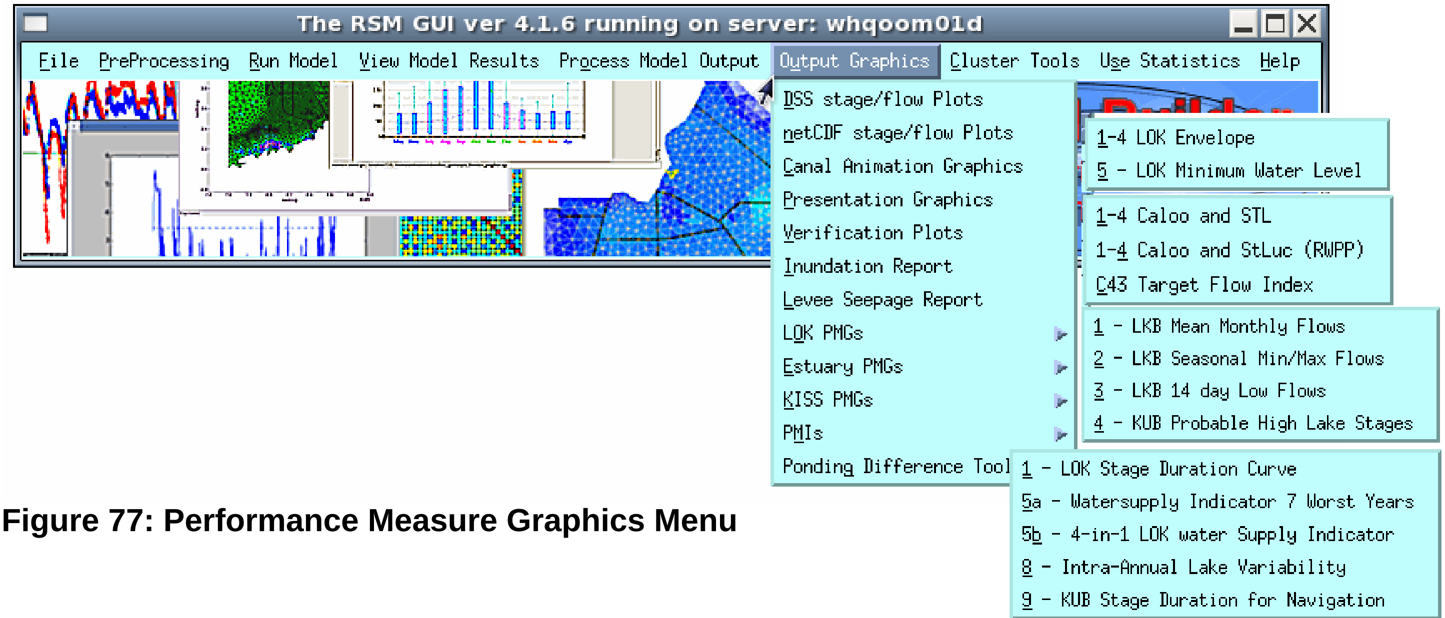


Figure 77: Performance Measure Graphics Menu

The RSM GUI offers a variety of Performance Measure Graphic (PMG) and Performance Measure Indicator (PMI) options. These tools have been designed to meet the needs for the Northern Everglades Project but they may be applied and adopted to fit other projects.

➲ Some of the PMG and PMI tools use SOURCE FILES as input. These are ASCII text files designed to contain references to data files, titles and other formatting information that help control the specific application being run. Source files are carried over from previous usage on the SFWMM model performance measure graphics. The HELP button on each RSM GUI tools that use source files contains a reference where a sample source file can be found. Where it is helpful, these instructions reference how to create each source file.

Source File

An example source file can be found in Appendix F. The file species the location for each dataset, text for the legend, text for the main title, and other formatting controls used by the XMGRACE application used to produce the graphics.

14.1 LOK PMG's

The *LOK PMG's* menu includes a list of tools to produce Lake Okeechobee Performance Measure Graphics for the Northern Everglades Project.

14.1.1 LOK Envelope PMG

This tool generates 4 PMG's: LOK Envelope (Above, Below, Extreme High, Extreme Low). Output is generated in PDF format. The command line option to run this tool outputs files into a Lok sub-directory from where the tool is run. Output files are given default names:

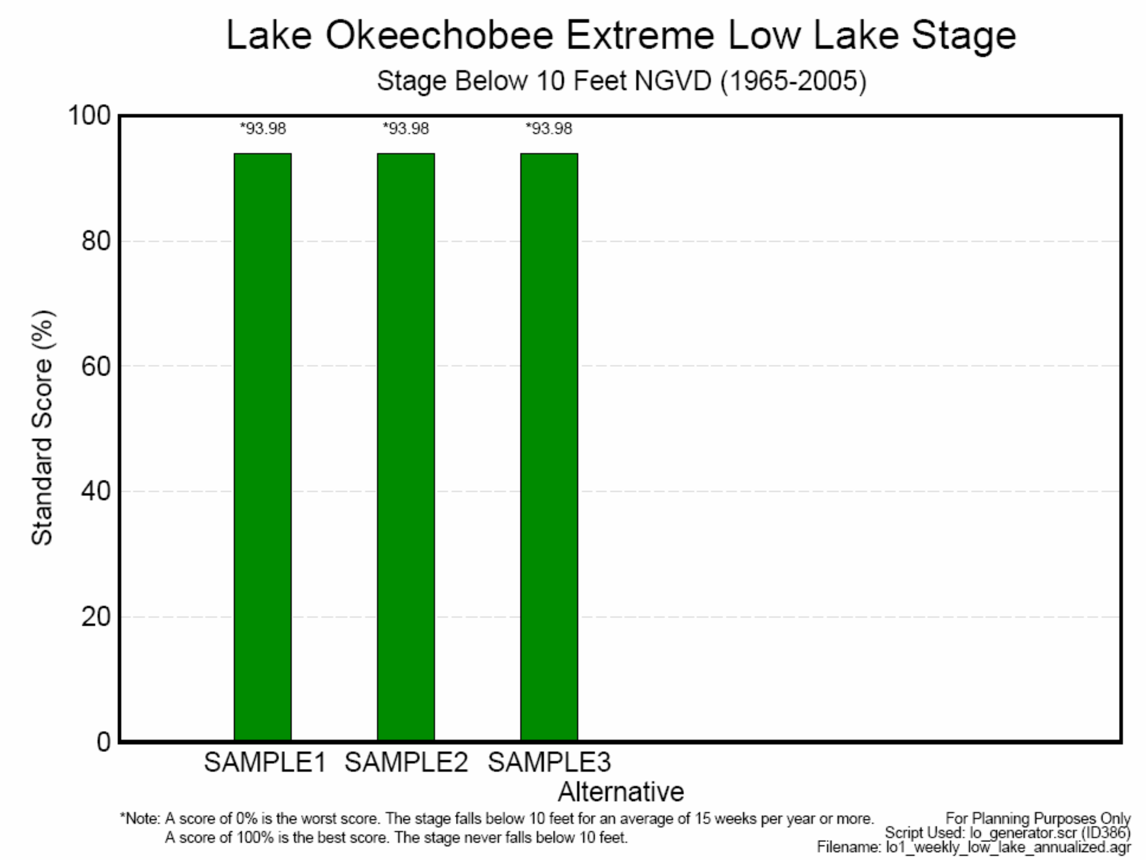


Figure 78: lo1_weekly_low_lake_annualized.pdf

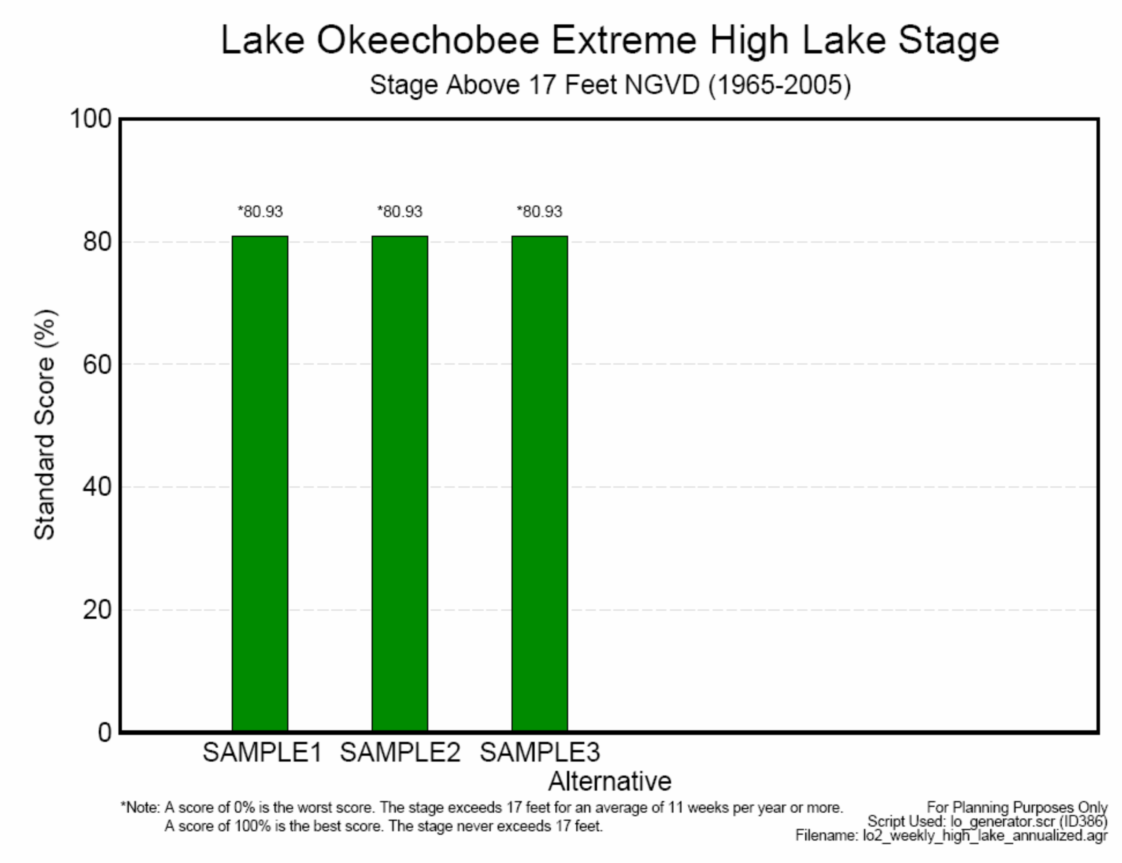


Figure 79: lo2_weekly_high_lake_annualized.pdf

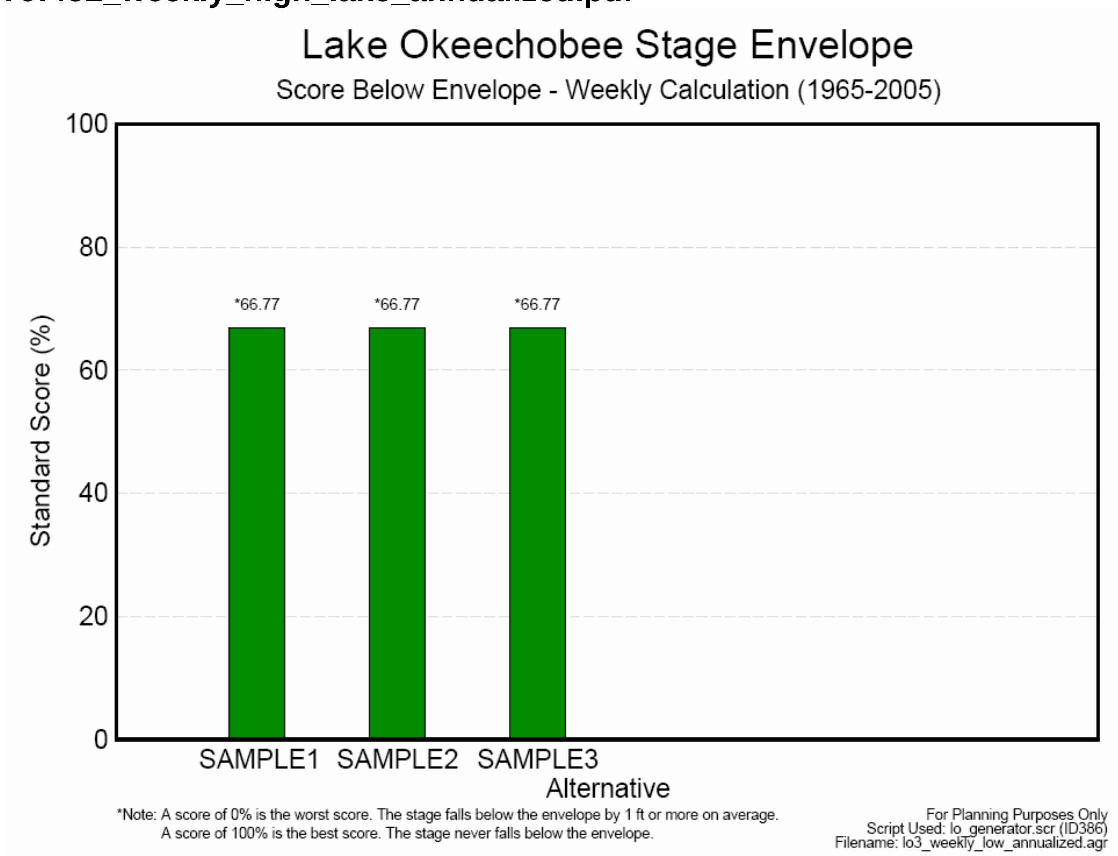


Figure 80: lo3_weekly_low_annualized.pdf

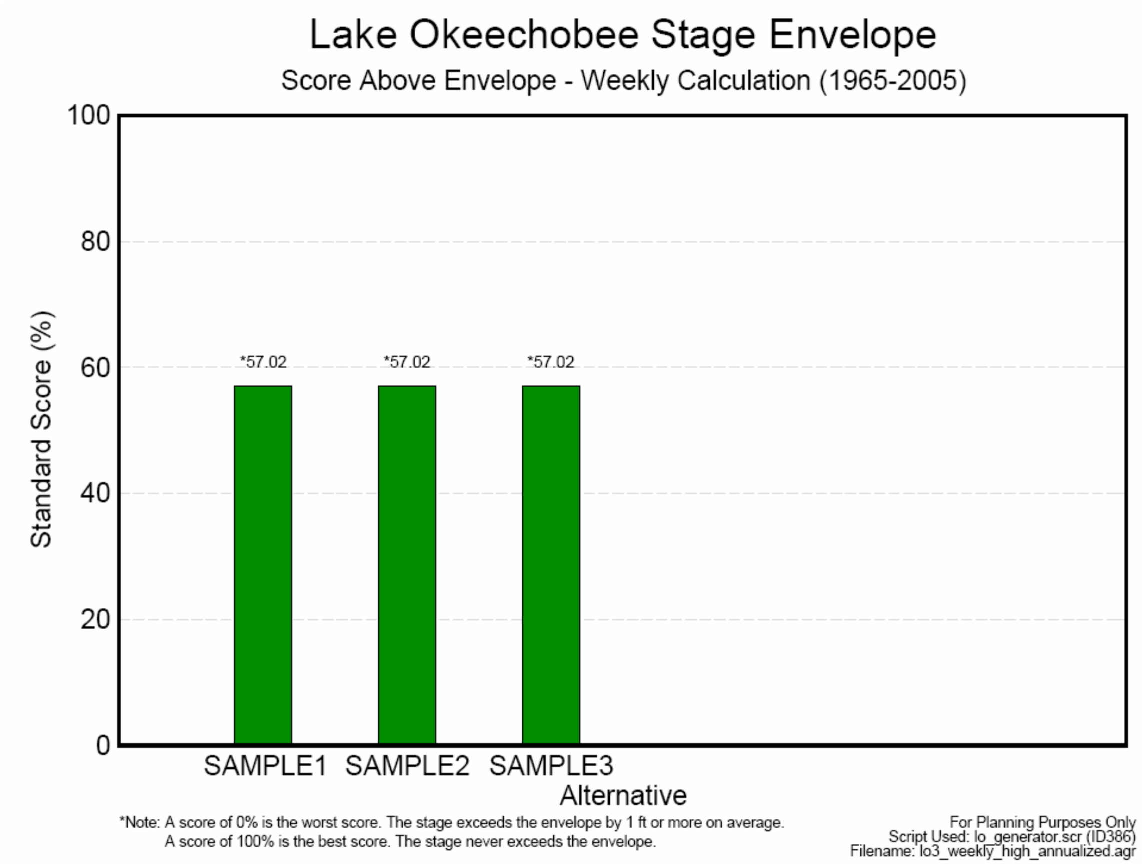


Figure 81: lo3_weekly_high_lake_annualized.pdf

<u>Command Line:</u>

- source the source_pmg1.txt source file.
- execute: /opt/local/share3/bin/run_lo_generator.scr
- Output: stored in Lok sub-directory

<u>TOOLBAR:</u>

- From RSMTOOLBAR select menu choice OUTPUT GRAPHICS>>LOK PMGs>>1-4 LOK Envelope
- Provide location of source_file
- Output: 4 PDF files are displayed on screen.

<u>Sample Files:</u>

/opt/local/share3/share/samples/pmg_input/source_pmg1.txt

14.1.2 LOK Minimum Water Level

This tool generates 1 PMG: LOK Minimum Water Level. Output is generated in PDF format. The command line option to run this tool outputs files into a Lok sub-directory from where the tool is run. The output file is given a default name:

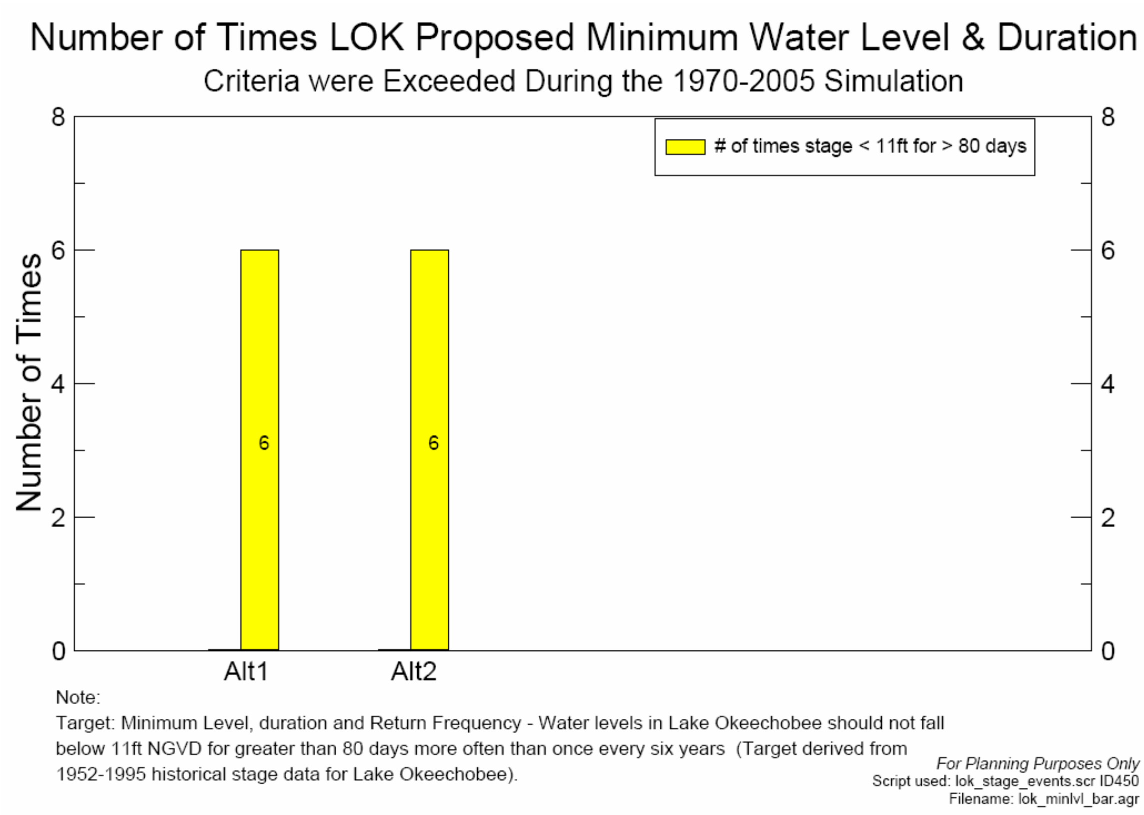


Figure 82: lok_minlvl_bar.pdf

<u>Command Line:</u>

- source the source_pmg5.txt source file.
- execute: /opt/local/share3/bin/run_lo_stg_events_rsm.scr
- Output: stored in Lok sub-directory

*lok_floodprot_bar.pdf is also output as part of this PMG

<u>TOOLBAR:</u>

- From RSMTOOLBAR select menu choice OUTPUT GRAPHICS>>LOK PMGs>>5 LOK Minimum Water Level
- Provide location of source_file
- Output: 1 PDF file is displayed on screen

*lok_floodprot_bar.pdf is also output as part of this PMG

<u>Sample Files:</u>

/opt/local/share3/share/samples/pmg_input/source_pmg5.txt

14.2 Estuary PMG's

The Estuary PMG's menu includes a list of tools to produce St. Lucie and Caloosahatchee Estuary Performance Measure Graphics for the Northern Everglades Project.

14.2.1 Caloo and STL

This tool generates 4 PMG's: High Discharge and Salinity Envelope Criteria for St. Lucie Estuary and Caloosahatchee Estuary. Output is generated in PDF format. The command line option to run this tool outputs files into a Estuary sub-directory from where the tool is run. The output files are given a default names:

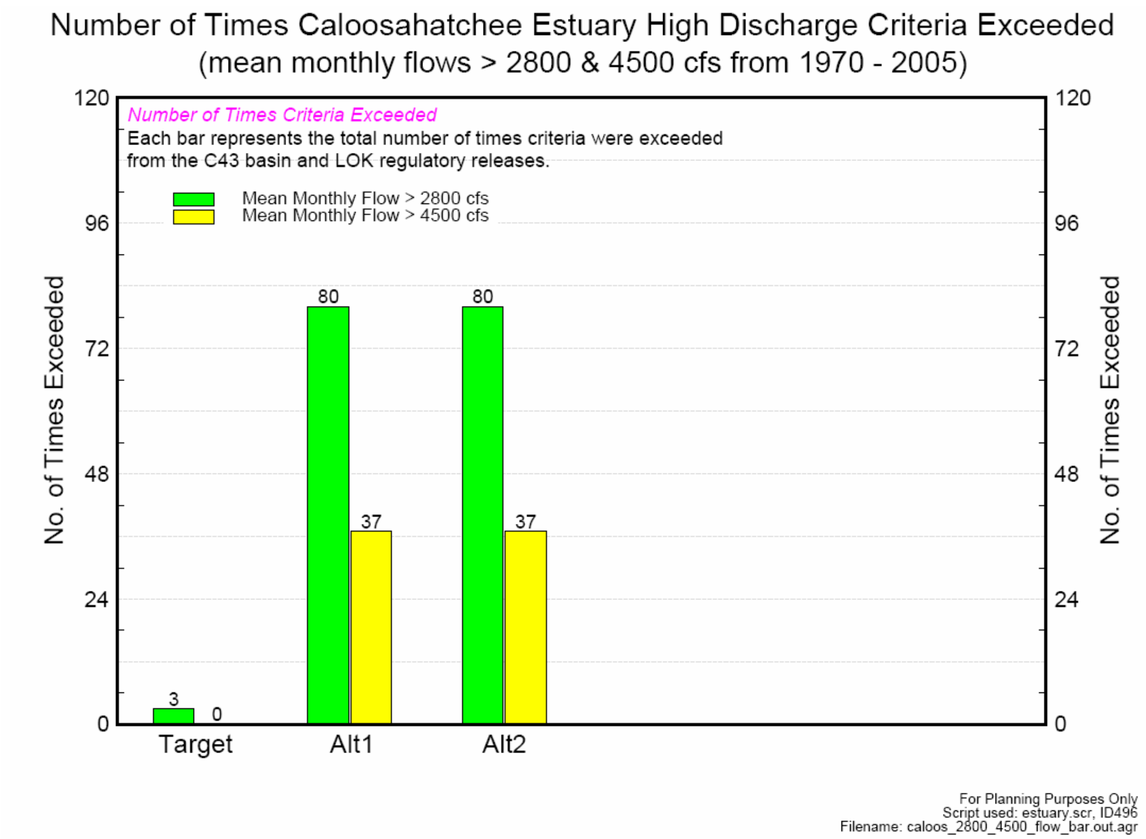


Figure 83: caloos_2800_4500_flow_bar.pdf

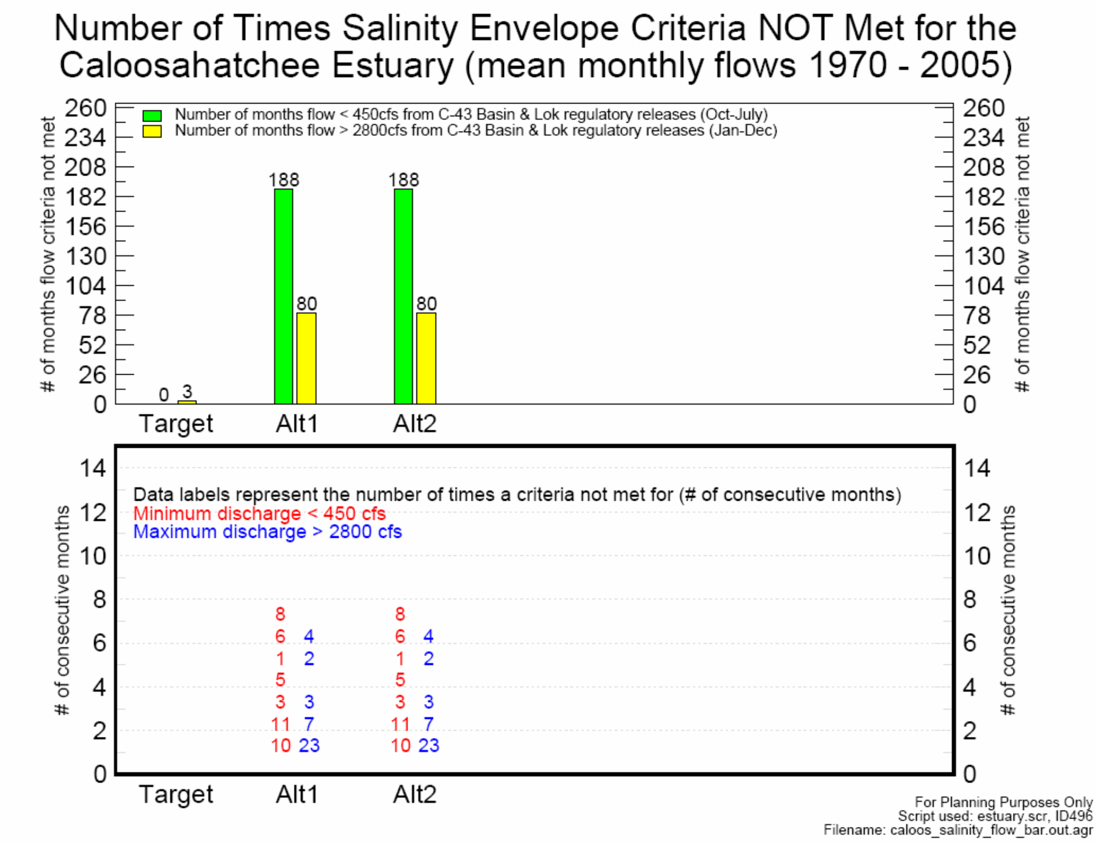


Figure 84: caloos_salinity_flow_bar.pdf

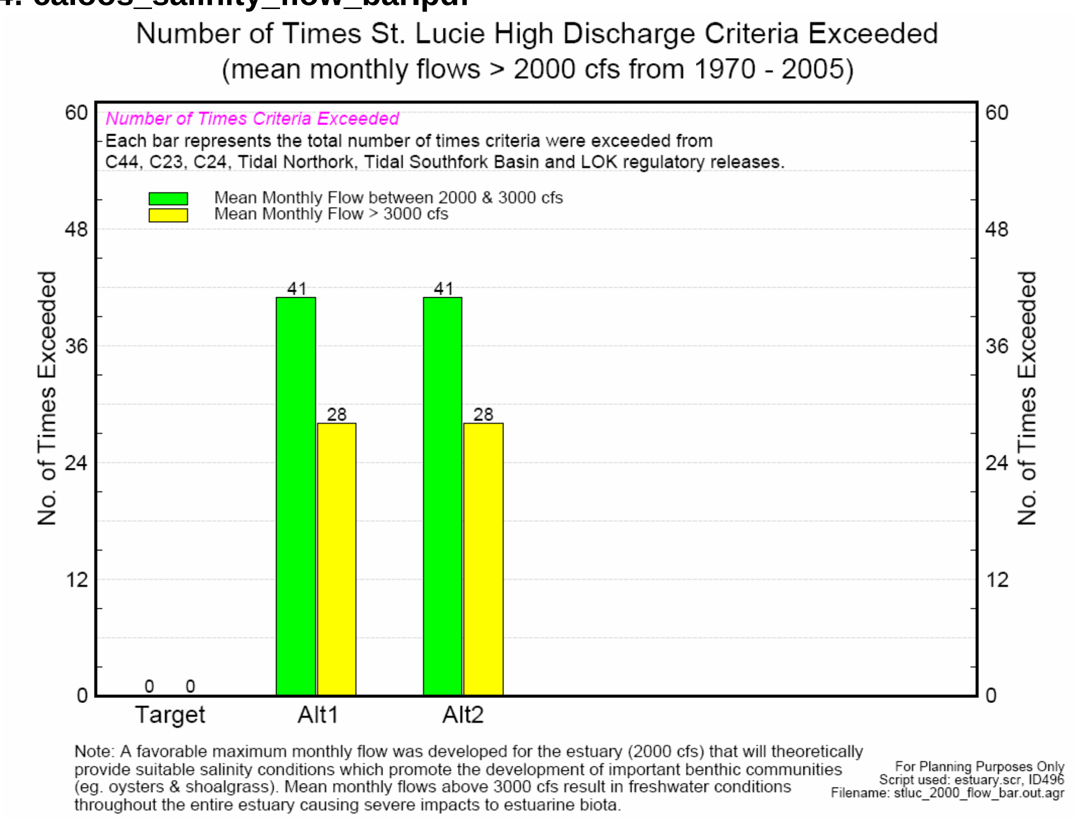


Figure 85: stluc_2000_flow_bar.pdf

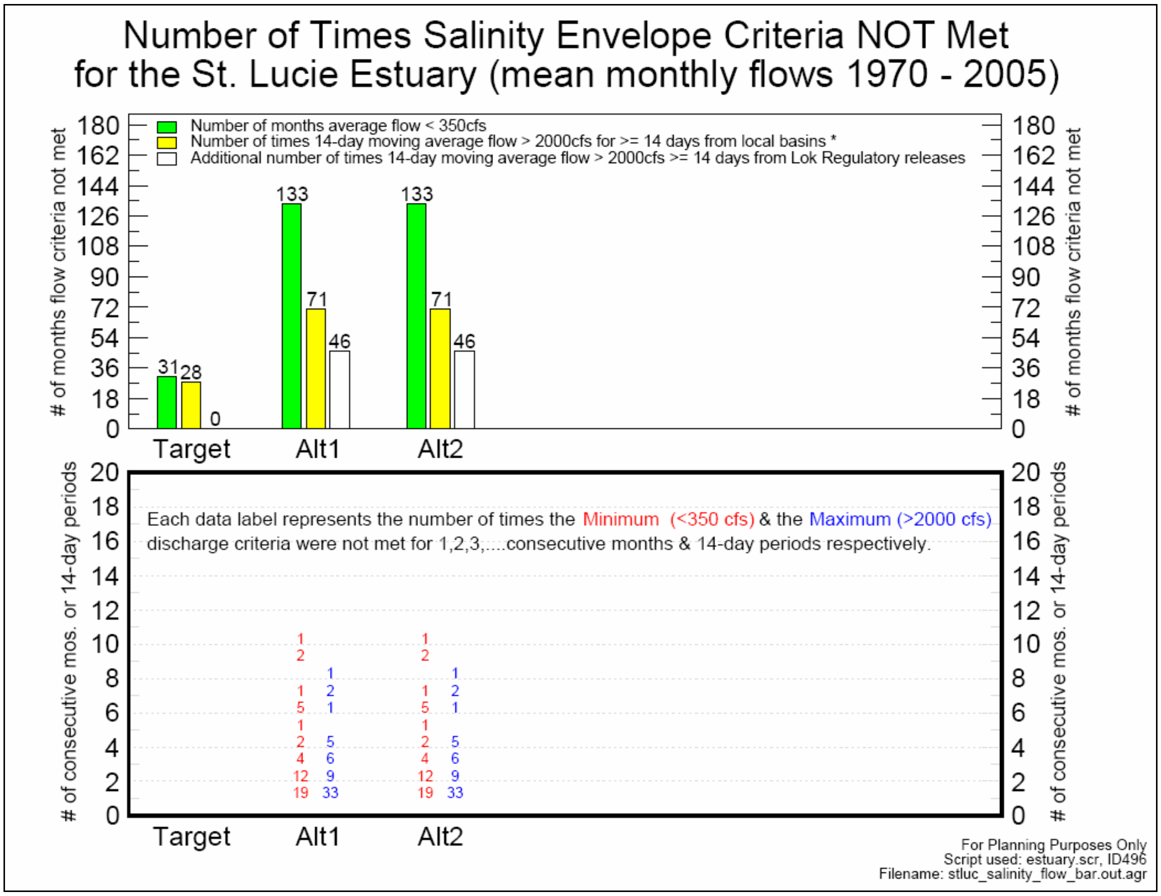


Figure 86: stluc_salinity_flow_bar.pdf

Command Line:

- source the source_pmg6.txt source file.
- execute: /opt/local/share3/bin/run_estuary_rsm.scr
- Output: stored in Estuary sub-directory

TOOLBAR:

- From RSMTOOLBAR select menu choice OUTPUT GRAPHICS>>Estuary PMGs>>1-4 Caloo and STL
- Provide location of source_file
- Output: 4 PDF's are displayed on screen.

Sample Files:

/opt/local/share3/samples/pmg_input/source_pmg6.txt

14.2.2 Caloo and STL (NERSM rivers)

This tool is a modification from the original Caloo STL PMG tool. The target values have been changed for STL High Discharge Criteria(21 & 6), the minimum <350cfs has been deleted from the STL Salinity graph and the STL Salinity graph reflects mean monthly values instead of a 14-day moving average. This tool generates 4 PMG's: High Discharge and Salinity Envelope Criteria for St. Lucie Estuary and Caloosahatchee Estuary. Output is generated in PDF format. The command line option to run this tool outputs files onto the screen where they can be saved to any location by the user. The output files are given default names but they can be changed as they are being saved by the user:

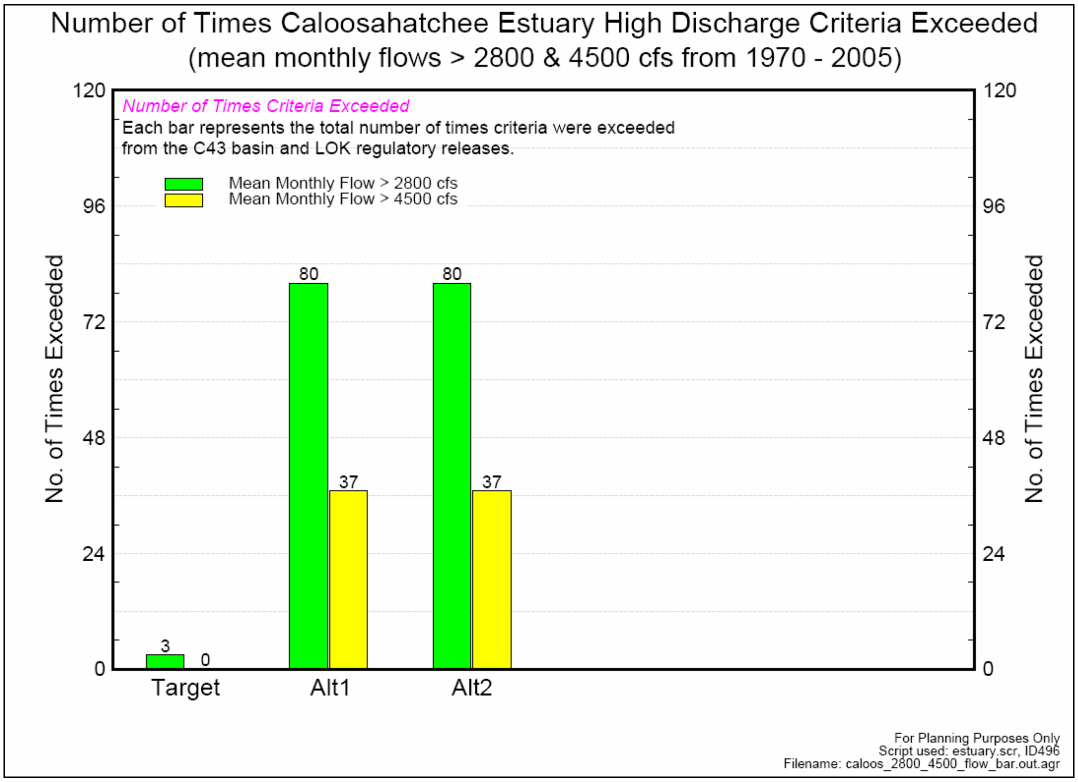


Figure 87: caloos_nersm_2800_4500_flow_bar.pdf

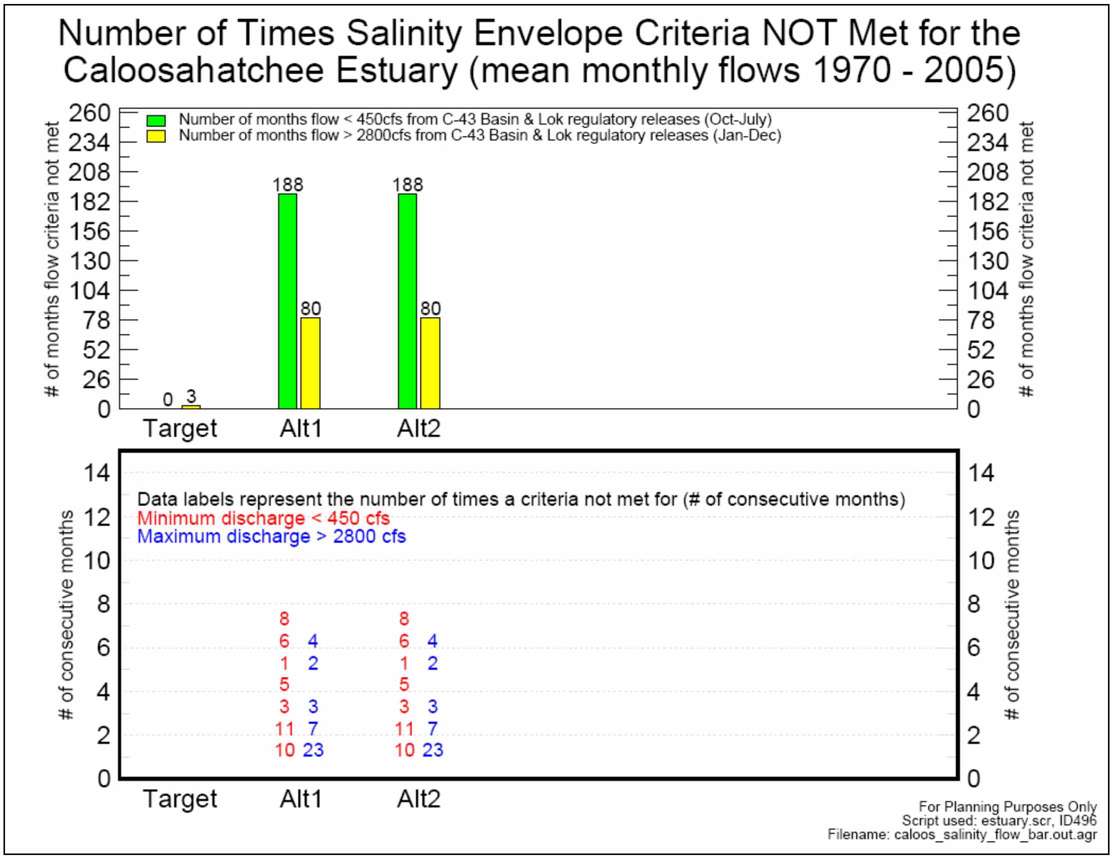


Figure 88: caloos_nersm_salinity_flow_bar.pdf

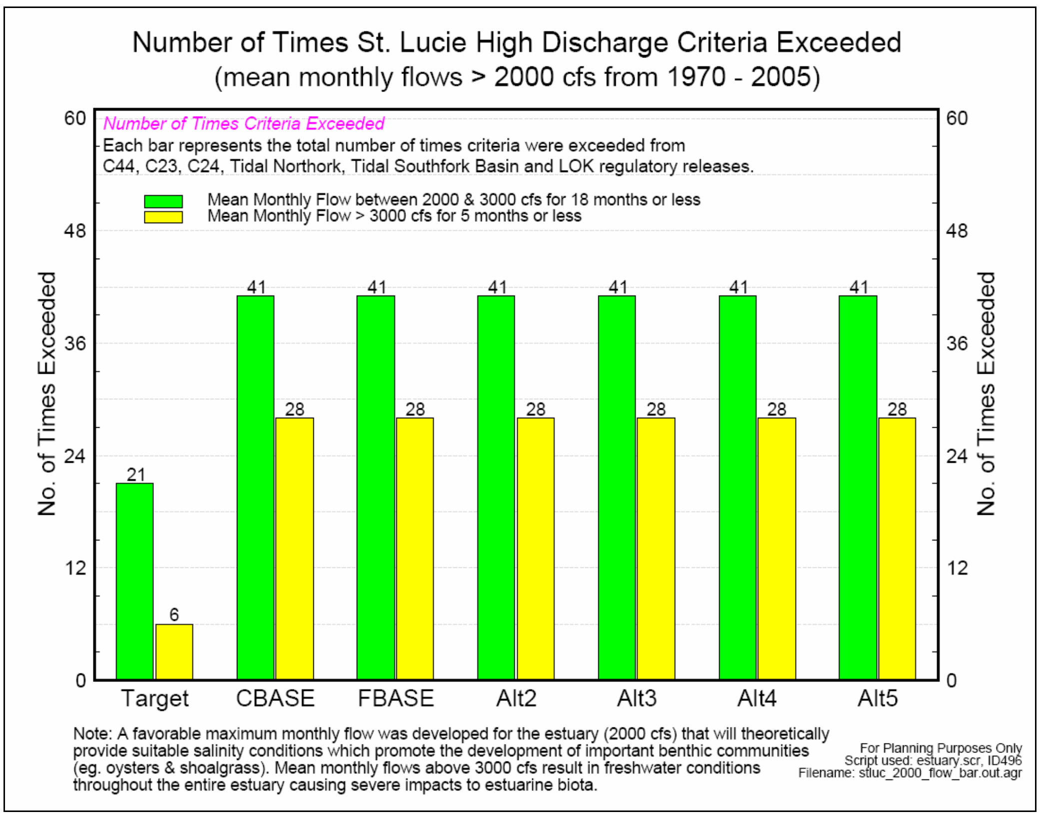


Figure 89: stluc_nersm_2000_flow_bar.pdf

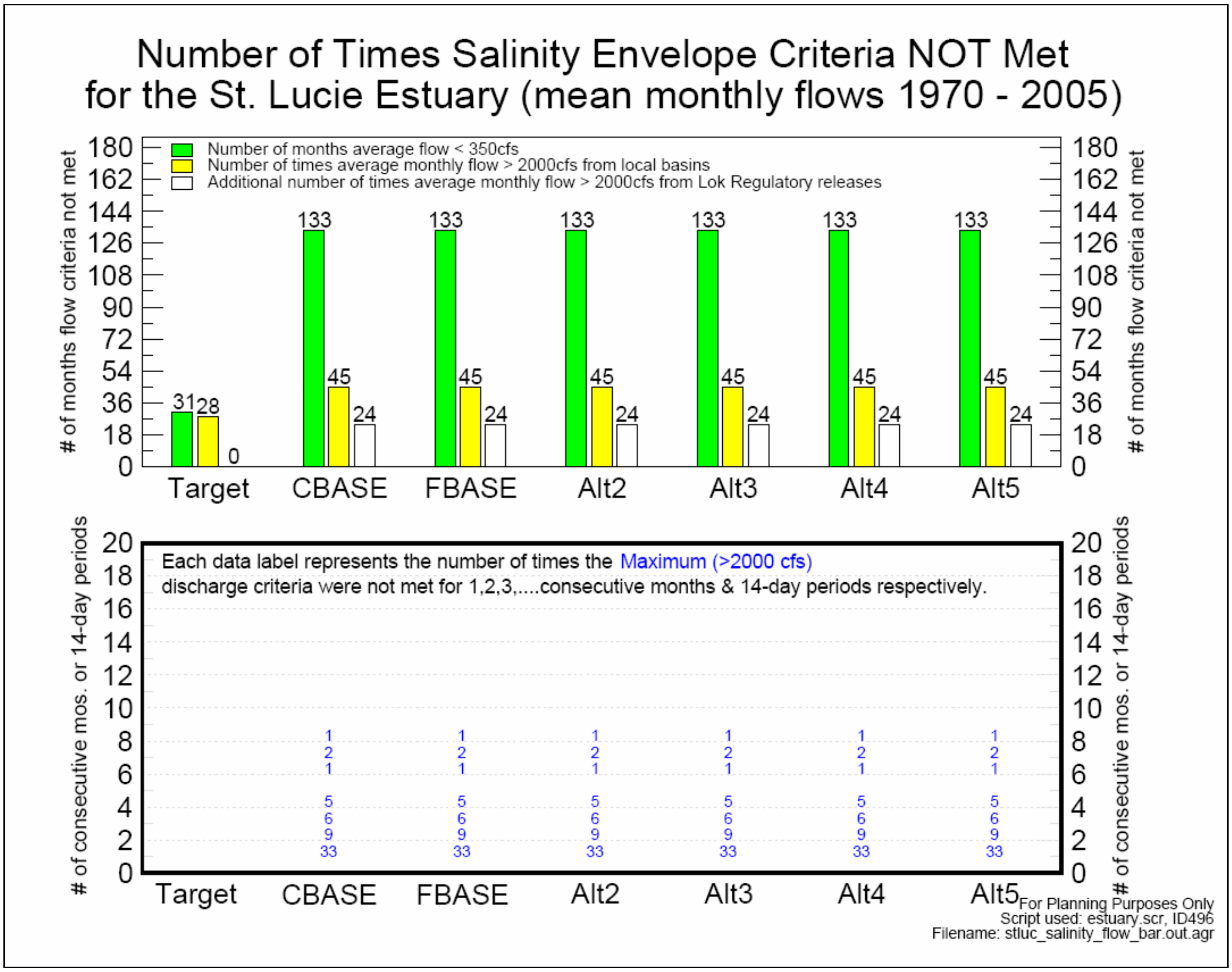


Figure 90: stluc_nersm_salinity_flow_bar.pdf

Command Line:

- execute: /opt/local/share3/bin/PMG-CALOOSTL-NERSM [yourcontrolfile.ctl]
- Output: displayed on screen

TOOLBAR:

- From RSMTOOLBAR select menu choice OUTPUT GRAPHICS>>Estuary PMGs>>1-4 Caloo and STL (NERSM rivers)
- Provide location of source_file
- Output: 4 PDF's are displayed on screen.

Sample Files:

/opt/local/share3/samples/pmg_input/source_pmg6.txt

14.2.3 C43 Target Flow Index

This tool generates one graphic that compares a pre-selected target flow against alternative flows. Output is generated in PDF format. There is no command line option to run this tool as of yet.

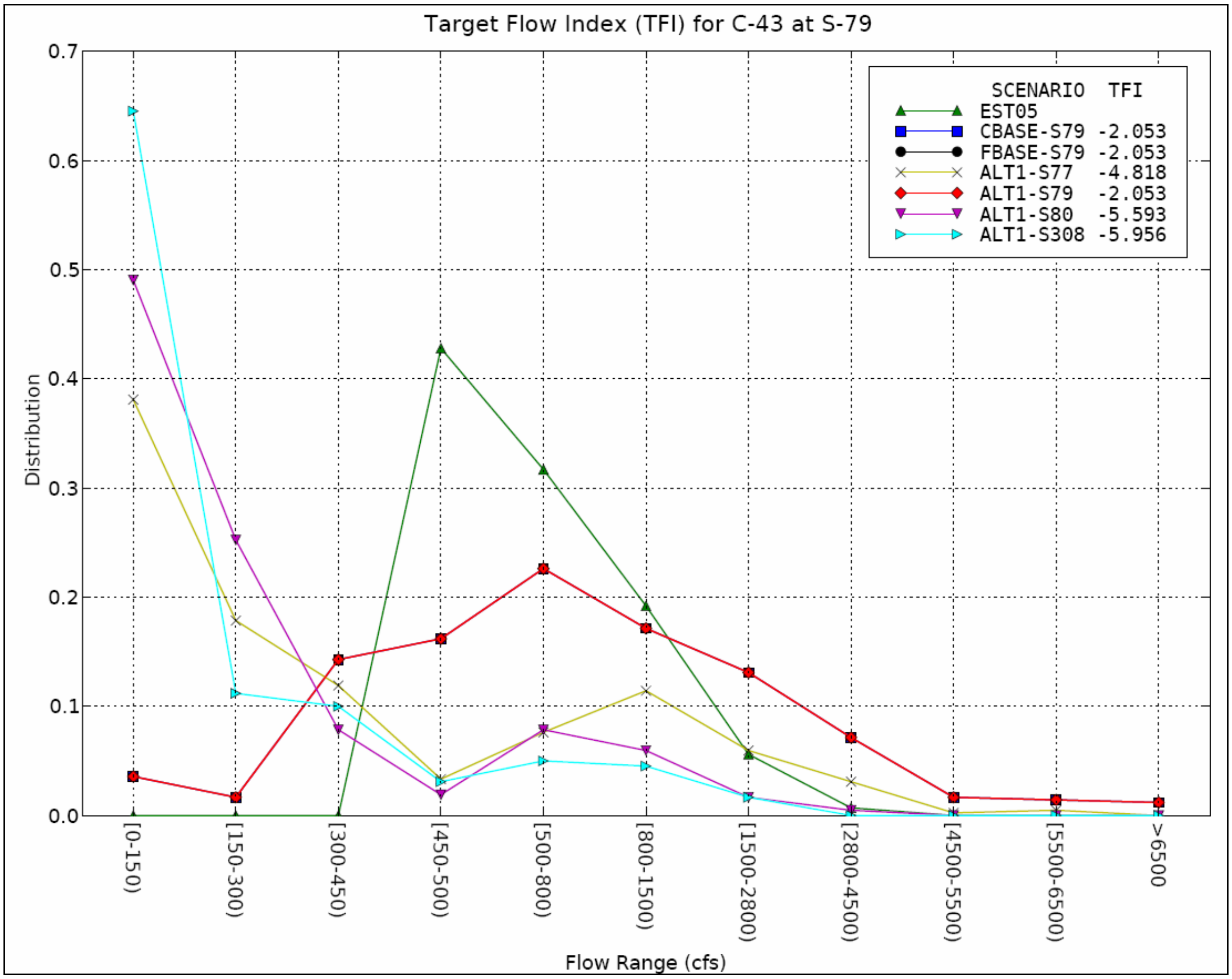


Figure 91: C43 Target Flow Index PMG

Command Line:

- execute: /opt/local/share3/bin/PMG_TFI [yourcontrolfile.ctl]
- Output: displayed on screen

TOOLBAR:

- From RSMTOOLBAR select menu choice OUTPUT GRAPHICS>>Estuary PMGs>> >>C43 Target Flow Index
- Provide location of control_file
- Output: 1 PDF is displayed on screen.

Sample Files:

/opt/local/share3/samples/pmg_input/source_tfi.ctl

14.3 KISS PMG's

The *KISS PMG's* menu includes a list of tools to produce Kissimmee River Performance Measure Graphics for the Northern Everglades Project.

14.3.1 LKB Mean Monthly Flows

This tool generates one PMG: LKB Mean Monthly Flows. Output is generated in PDF format. Output is generated to the screen and can be saved to any specified location.

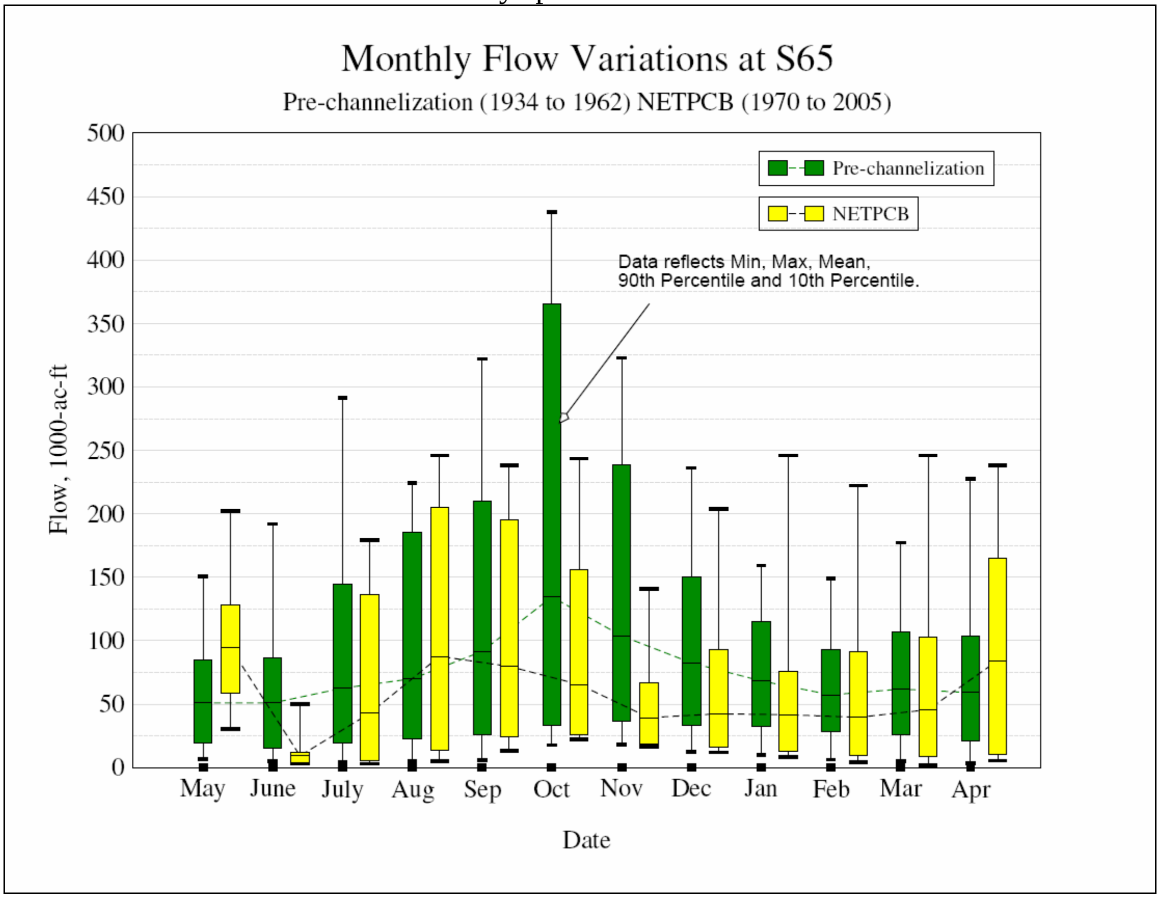


Figure 92: kiss-pmg1.pdf LKB Mean Monthly Flows

Command Line:

- execute: on whqoom01d
- /opt/loca/share3/bin/kiss-pmg1 [control file name]

TOOLBAR:

- From RSMTOOLBAR select menu choice OUTPUT GRAPHICS>>KISS PMGs>>1 LKB Mean Monthly Flows
- Provide location of control_file
- Output: PDF is displayed on screen along with the XMGRACE (.agr) file used to generate the graphic.

Sample Files:

/opt/local/share3/samples/pmg_input/kiss-pmg1.ctl

14.3.2 LKB Seasonal Min/Max Flows

This tool generates 4 PMG's: LKB Seasonal Min and Seasonal Max Flows for S-65 and S-65E. Output is generated into one indexed PDF file. Output is generated to the screen and can be saved to any specified location.

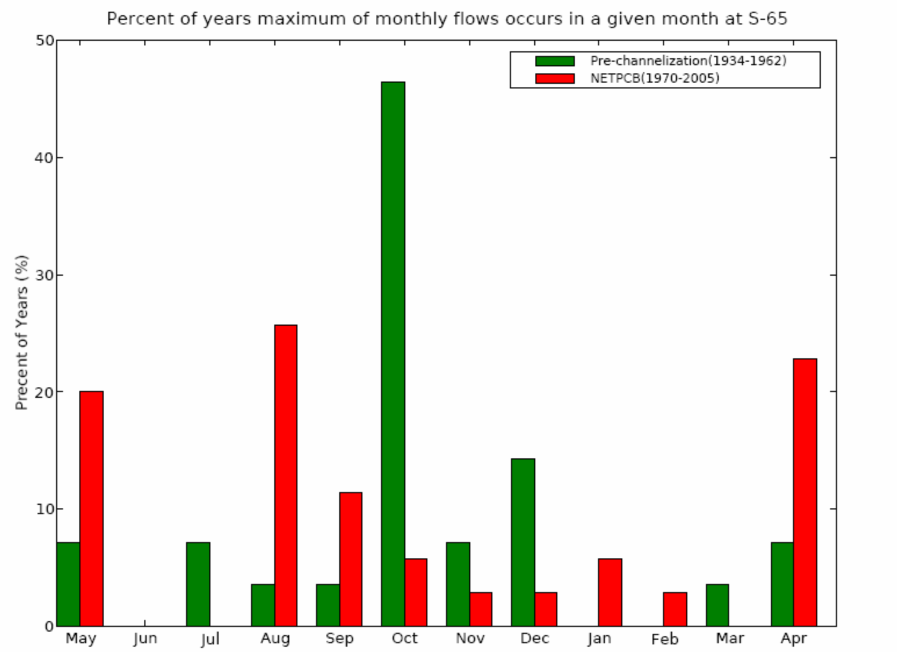


Figure 93: kiss-pmg2.pdf maximum monthly flows at S-65

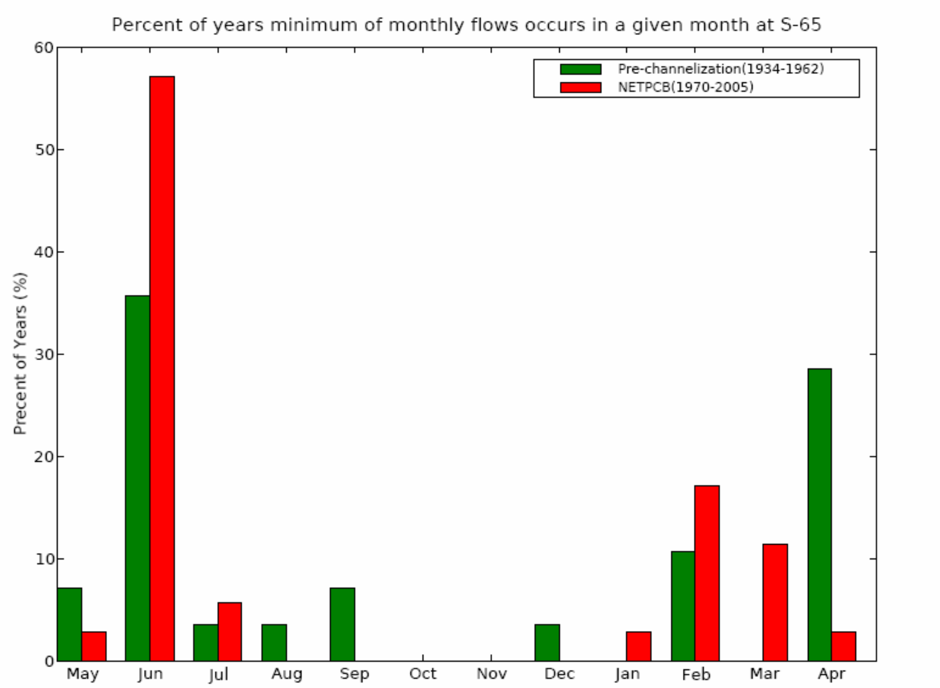


Figure 94: kiss-pmg2.pdf minimum monthly flows at S-65

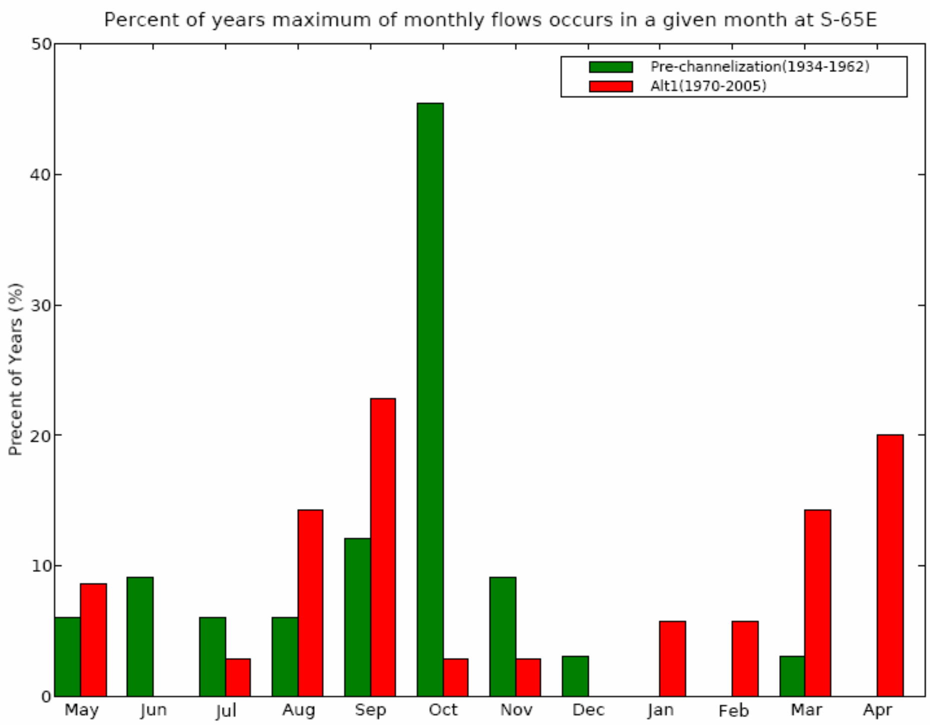


Figure 95: kiss-pmg2.pdf maximum monthly flows at S-65E

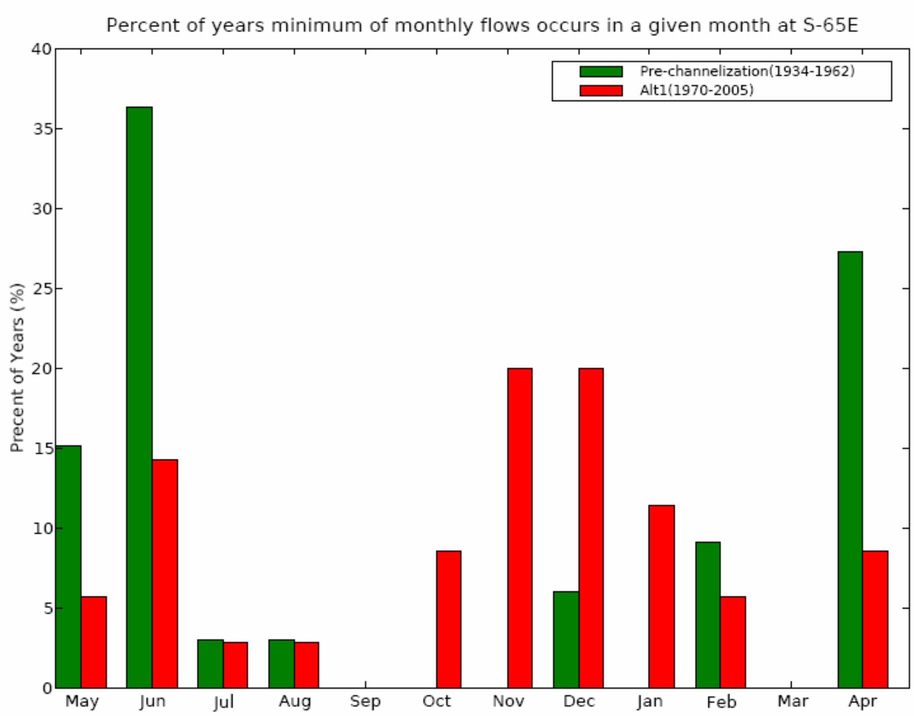


Figure 96: kiss-pmg2.pdf minimum monthly flow at S-65E

Command Line:

- execute: from whqoom01d
- /opt/local/share3/bin/kiss-pmg2 [control file name]

TOOLBAR:

- From RSMTOOLBAR select menu choice OUTPUT GRAPHICS>>KISS PMGs>>2 LKB Seasonal Min/Max Flows
- Provide location of control_file
- Output: PDF is displayed on screen along with ASCII files containing data used to generate the graphs.

Sample Files:
/opt/local/share3/samples/pmg_input/kiss-pmg2.ctl

14.3.3 LKB 14 Day Low Flows

This tool generates 2 PMG: LKB 14 Day Low Flows for S-65 and S-65E. Output is generated into one indexed PDF file. Output is generated to the screen and can be saved to any specified location.

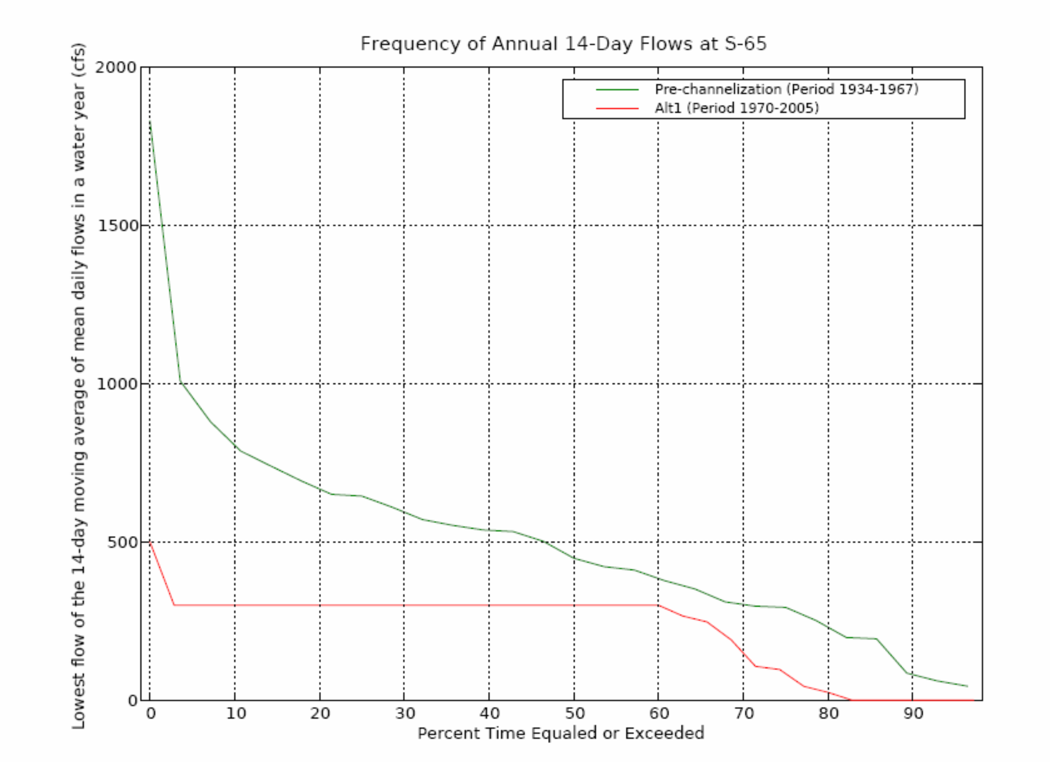


Figure 97: kiss-pmg3.pdf Flows at S-65

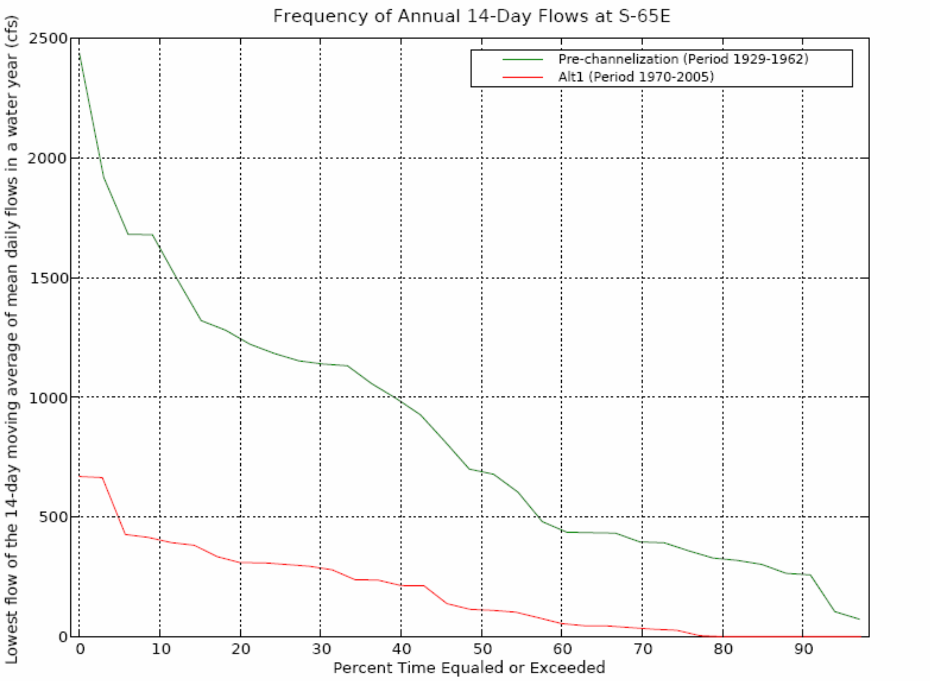


Figure 98: kiss-pmg3.pdf Flows at S-65E

Command Line:

- execute: from whqoom01d
- /opt/local/share3/bin/kiss-pmg3 [control file name]

TOOLBAR:

- From RSMTOOLBAR select menu choice OUTPUT GRAPHICS>>KISS PMGs>>3 LKB 14 Day Low Flows
- Provide location of control_file
- Output: PDF is displayed on screen along with ASCII files containing data used to generate the graphs.

Sample Files:

/opt/local/share3/share/samples/pmg_input/kiss-pmg3.ctl

14.3.4 KUB Probable High Lake Stages

This GUI tool generates 1 PMG and 3 HTML tables: KUB probable High Lake Stages, Duration Above High Pool Stage, High Stage Summary, and Peak Annual Stage. Users can specify the date range for running this tool. Output is generated in PDF format and HTML. Output is generated to the screen and can be saved to any specified location.

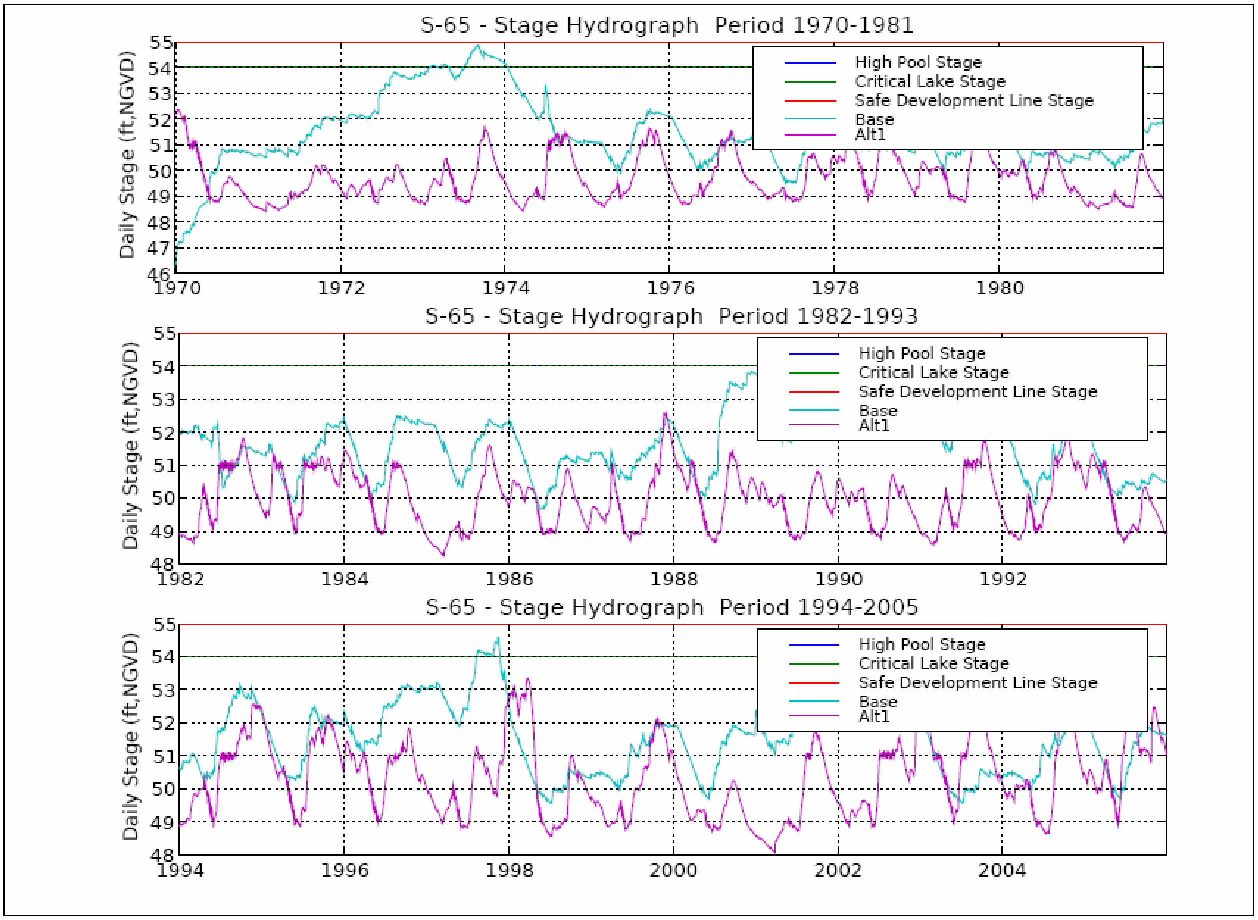


Figure 99: kiss-pmg4.pdf

Performance Graphic 7 Table 1

S-65 HW Stage
Period 1970-2005

Duration that stage is above the High Pool Stage, Critical Lake Stage and Safe Development Line Stage						
Calendar Year	Base (days)			Alt1 (days)		
	HPS	CLS	SDL	HPS	CLS	SDL
1970	0	0	0	0	0	0
1971	0	0	0	0	0	0
1972	0	0	0	0	0	0
1973	247	247	0	0	0	0
1974	10	10	0	0	0	0
1975	0	0	0	0	0	0
1976	0	0	0	0	0	0
1977	0	0	0	0	0	0
1978	0	0	0	0	0	0
1979	0	0	0	0	0	0
1980	0	0	0	0	0	0
1981	0	0	0	0	0	0
1982	0	0	0	0	0	0
1983	0	0	0	0	0	0
1984	0	0	0	0	0	0
1985	0	0	0	0	0	0
1986	0	0	0	0	0	0
1987	0	0	0	0	0	0
<partial view>						
1994	0	0	0	0	0	0
1995	0	0	0	0	0	0
1996	0	0	0	0	0	0
1997	106	106	0	0	0	0
1998	0	0	0	0	0	0
1999	0	0	0	0	0	0
2000	0	0	0	0	0	0
2001	0	0	0	0	0	0
2002	106	106	0	0	0	0
2003	0	0	0	10	10	0
2004	0	0	0	0	0	0
2005	0	0	0	0	0	0
Number of years that the total annual duration above the HPS, CLS, SDL stage is greater than the Base conditions				1	1	0

Performance Graphic 7 Table 2

Probable High Lake Stages Summary - S-65	
Location	Alt1
Number of years that peak annual stage is higher than the Base peak annual stage AND higher than the High Pool Stage	1
Number of years that the total annual duration above the High Pool Stage is greater than Base conditions	1
Number of years that the total annual duration above the Critical Lake Stage is greater than Base conditions	1
Number of years that the total annual duration above the Safe Development Line Stage is greater than Base conditions	0

Performance Graphic 7 Table 3

Peak Annual Stage Summary Table			
Calendar Year	High Pool Stage (ft)	Base (ft)	Alt1 (ft)
1970	54.0	50.8	52.3
1971	54.0	52.1	50.2
1972	54.0	53.8	50.2
1973	54.0	54.9	51.7
1974	54.0	54.2	51.5
1975	54.0	52.4	51.6
1976	54.0	52.1	51.6
1977	54.0	51.8	50.7
1978	54.0	52.7	51.5
1979	54.0	52.0	52.6
1980	54.0	51.8	50.8
1981	54.0	52.0	50.7
1982	54.0	52.2	51.8
[illegible]	[illegible]	[illegible]	[illegible]
<partial view>			
[illegible]	[illegible]	[illegible]	[illegible]
1997	54.0	54.6	52.8
1998	54.0	52.6	53.3
1999	54.0	52.0	52.1
2000	54.0	51.9	51.0
2001	54.0	53.2	51.8
2002	54.0	54.6	52.9
2003	54.0	52.6	54.1
2004	54.0	52.0	53.8
2005	54.0	51.9	52.5
Percent of years that the peak annual stage is above the High Pool Stage AND above the peak annual stage for the Base conditions			2.78

Figure 100: kiss-pmg4.html

Command Line:

- execute: from whqoom01d
- /opt/local/share3/bin/kiss-pmg4 [control file name]

TOOLBAR:

- From RSMTOOLBAR select menu choice OUTPUT GRAPHICS>>KISS PMGs>>4 KUB Probable High Lake Stages
- Provide location of control_file
- Output: 1 PDF is displayed on screen along with a browser window displaying 3 tables.

Sample Files:

/opt/local/hsare3/share/samples/pmg_input/kiss-pmg4.ctl

14.4 PMI's

The PMI's menu includes a list of tools to produce Performance Measure indicators for the Northern Everglades Project.

14.4.1 LOK Stage Duration Curve

This tool generates 1 PMG: LOK Stage Duration Curve. Output is generated in PDF format. Output is generated to the screen and can be saved to any specified location.

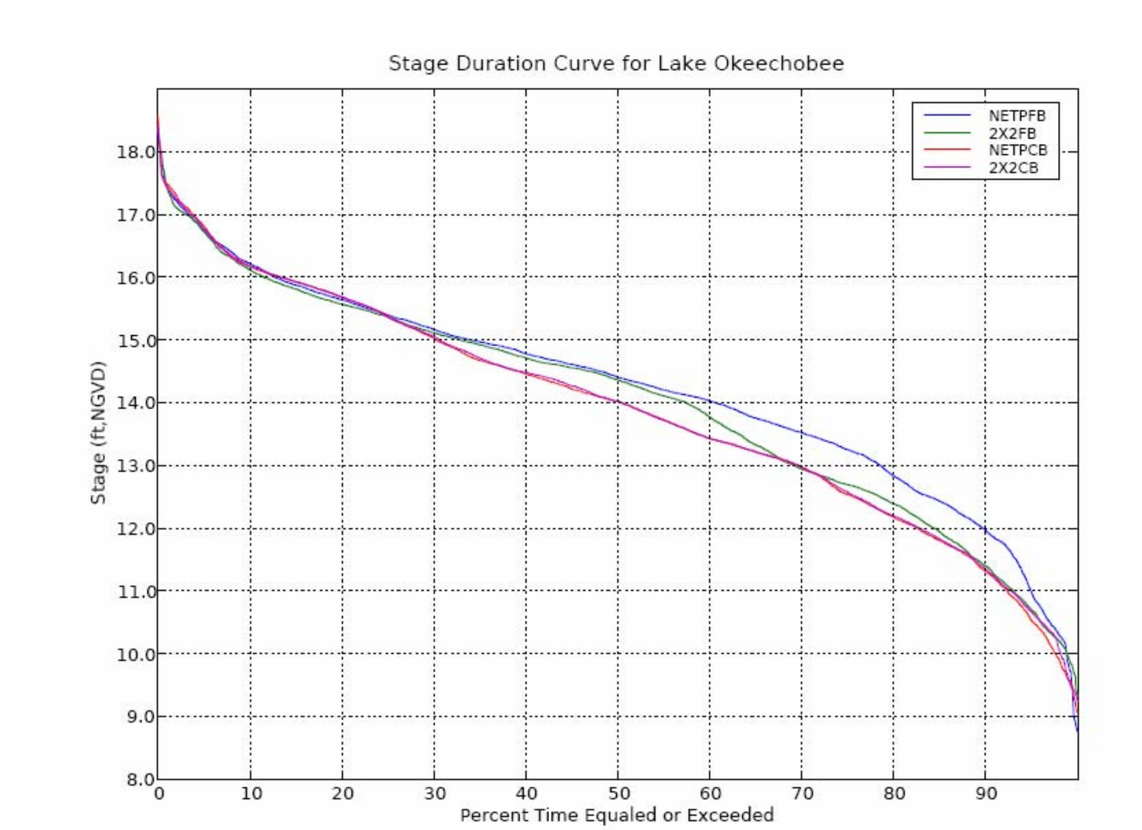


Figure 101: pmi1.pdf

<u>Command Line:</u>

- execute: from whqoom01d
- /opt/local/share3/bin/pmi-1 [control file name]

<u>TOOLBAR:</u>

- From RSMTOOLBAR select menu choice OUTPUT GRAPHICS>>LOK PMIs>>2 LOK Stage Duration Curve
- Provide location of control_file
- Output: 1 PDF file is displayed on screen.

<u>Sample Files:</u>

/opt/local/share3/share/samples/pmg_input/pmg_pmi/pmi1.ctl

14.4.2 Water Supply Indicator 7 Worst Years

This tool generates 1 PMG: Water Supply Indicator 7 Worst Years. The command line option to run this tool outputs files into a Wsupply sub-directory from where the tool is run. The output file is given a default name:

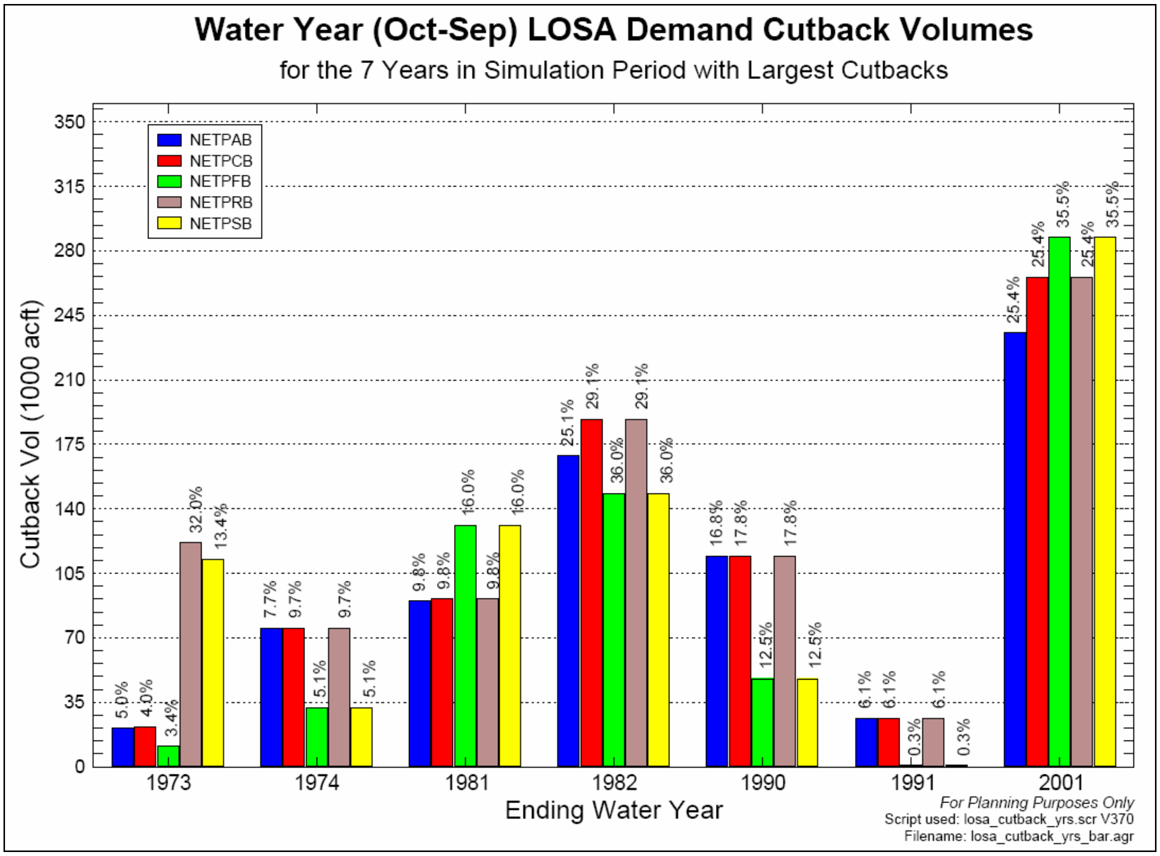


Figure 102: losa_cutback_yrs_bar.pdf

Command Line:

- source the source_pmi5a.txt source file.
- execute: /opt/local/share3/bin/run_losa_cutback_yrs.scr
- Output: stored in Wsupply sub-directory

TOOLBAR:

- From RSMTOOLBAR select menu choice OUTPUT GRAPHICS>>PMI's>>5a Watersupply indicator
- Provide location of source_file
- Output: 1 PDF file is displayed on screen.

Sample Files:

/opt/local/share3/share/samples/pmg_input/source_pmi5a.txt

NOTE: The only change necessary to make in the source file for this PMI is the line indicating the location of the data.txt file. The data.txt file contains the data for creating the graph. See a sample data.txt file at: /opt/local/share3/share/samples/pmg_input/data/pmi5a.txt

14.4.3 4-1in-1 LOK Water Supply Indicator

This tool generates 1 PMG: Water Supply Indicator 7 Worst Years. The command line option to run this tool outputs files into a Wsupply sub-directory from where the tool is run. The output file is given a default name:

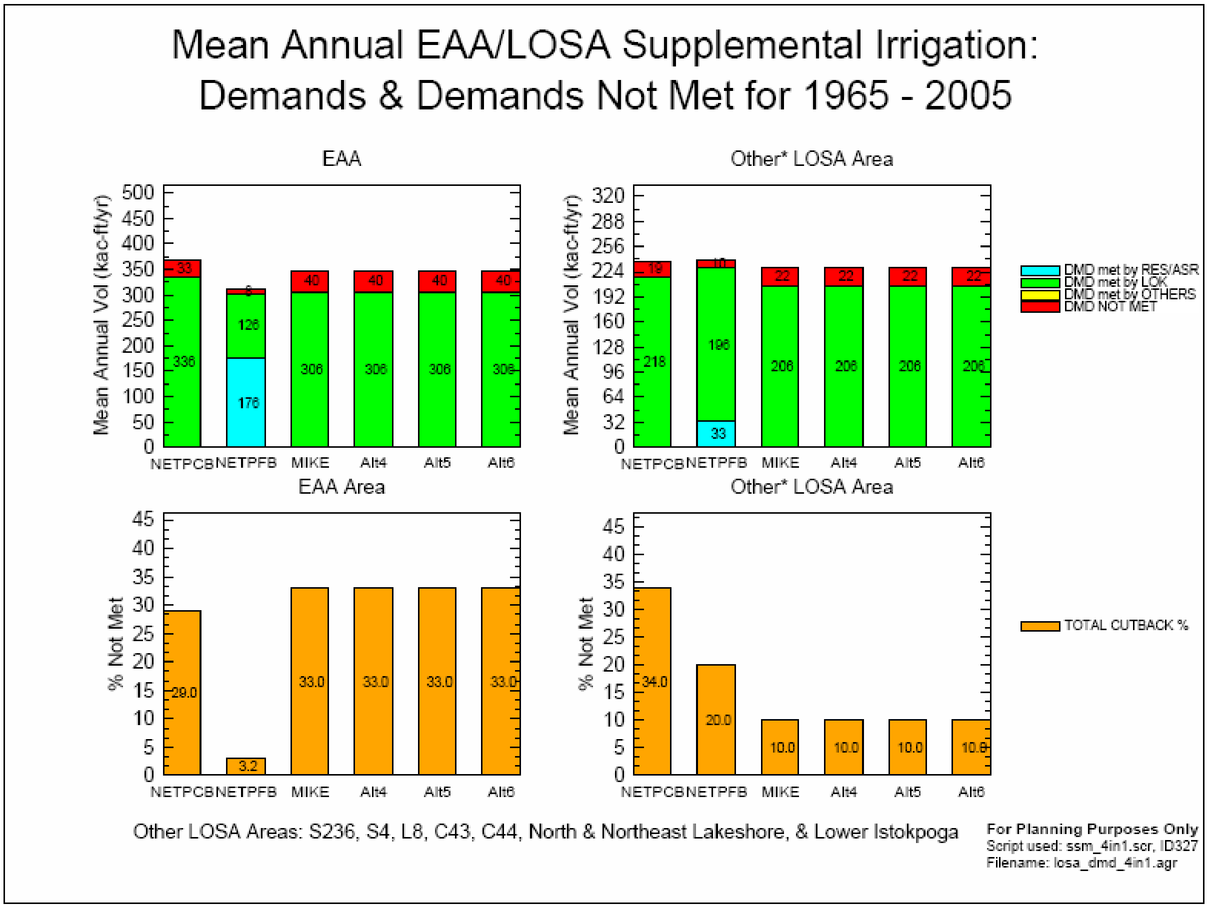


Figure 103: losa_dmd_4in1.pdf

Command Line:

- source the source_pmi5b.txt source file.
- execute: /opt/local/share3/bin/run_4in1_data_rsm.scr
- Output: stored in Wsupply sub-directory

TOOLBAR:

- From RSMTOOLBAR select menu choice OUTPUT GRAPHICS>>PMI's>>5b 4-in-1 LOK Water Supply Indicator
- Provide location of source_file
- Output: 1 PDF file is displayed on screen.

Sample Files:

/opt/local/share3/share/samples/pmg_input/source_pmi5b.txt

NOTE: The only change necessary to make in the source file for this PMI is the line indicating the location of the data.txt file. The data.txt file contains the data for creating the graph. See a sample data.txt file at: /opt/local/share3/share/samples/pmg_input/data/pmi5b.txt

14.4.4 Intra-Annual Lake Variability

This tool generates 1 HTML table: Intra-annual lake Variability. Output is generated in HTML format. Output is generated to the screen, is displayed in a browser and can be saved to any specified location.

Summary of Intra-annual and Inter-annual Lake Stages

		Evaluation Locations	
Alternative		**S-65**	**S-57**
Alt1	Period of Record (Water Years)	1970-2005	1970-2005
	Average intra-annual lake stage variation (ft)	2.3	1.4
	Maximum inter-annual lake stage variation (ft)	5.0	2.3
Alt2	Period of Record (Water Years)	1970-2005	1970-2005
	Average intra-annual lake stage variation (ft)	2.3	1.4
	Maximum inter-annual lake stage variation (ft)	5.0	2.3

Figure 104: pmi8.html

Command Line:

- execute: from whqoom01d
- /opt/local/share3/bin/pmi-8 [control file name]

TOOLBAR:

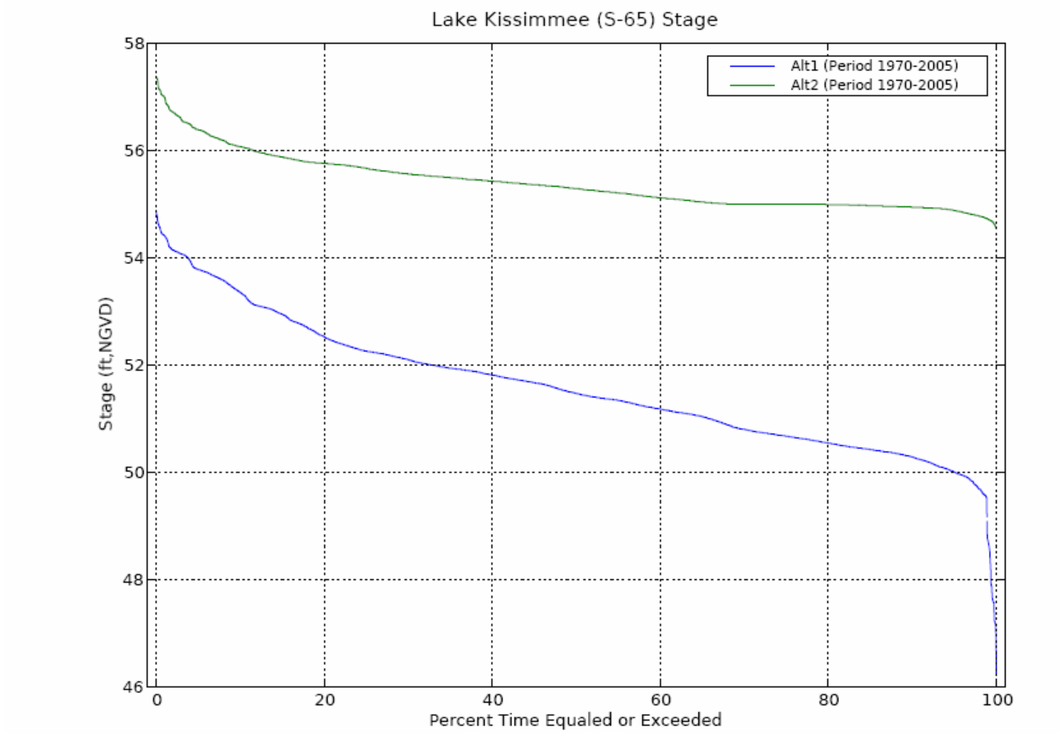
- From RSMTOOLBAR select menu choice OUTPUT GRAPHICS>>PMI's>>8 Intra-annual Lake Variability
- Provide location of control_file
- Output: 1 HTML file is displayed on screen.

Sample Files:

/opt/local/share3/share/samples/pmg_input/pmi8.ctl

14.4.5 KUB Stage Duration for Navigation

This tool generates 2 PMG's: Stage Duration Curve for Navigation and Navigation Depth Less Than 3 Feet. Output is generated to the screen and can be saved to any specified location.



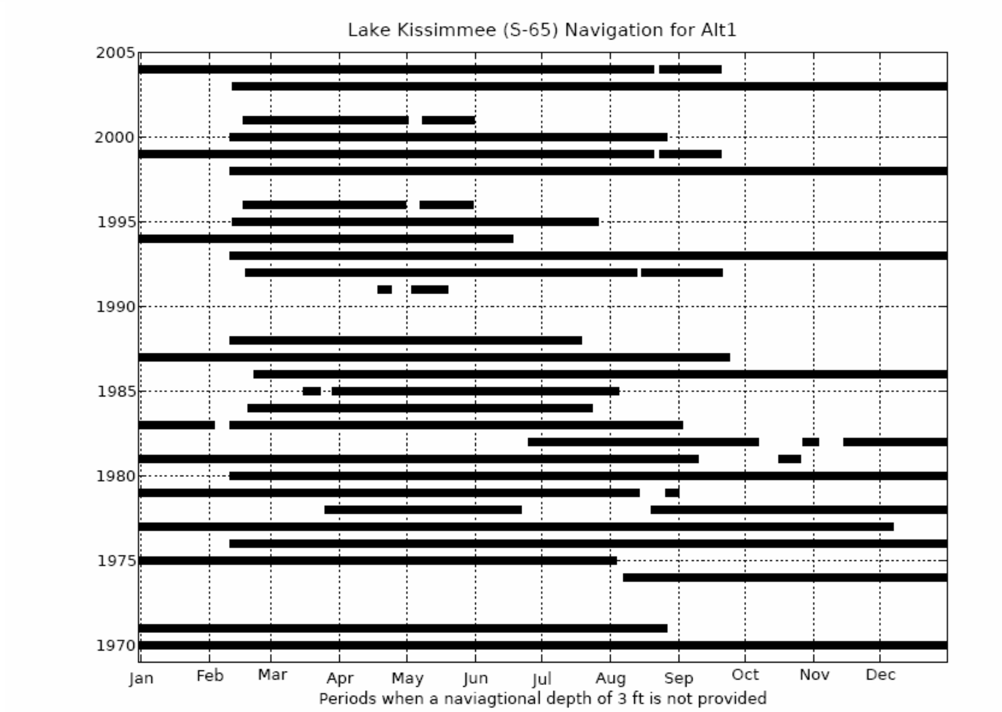


Figure 105: pmi9.pdf

Command Line:

- execute: from whqoom01d
- /opt/local/share3/bin/pmi-9 [control file name]

TOOLBAR:

- From RSMTOOLBAR select menu choice OUTPUT GRAPHICS>>PMI's>>9 KUB Stage Duration for Navigation
- Provide location of control_file
- Output: 1 PDF file is displayed on screen along with the data files used to produce the graphs.

Sample Files:

/opt/local/share3/share/samples/pmg_input/pmi9.ctl

Chapter 15

Cluster Tools Menu

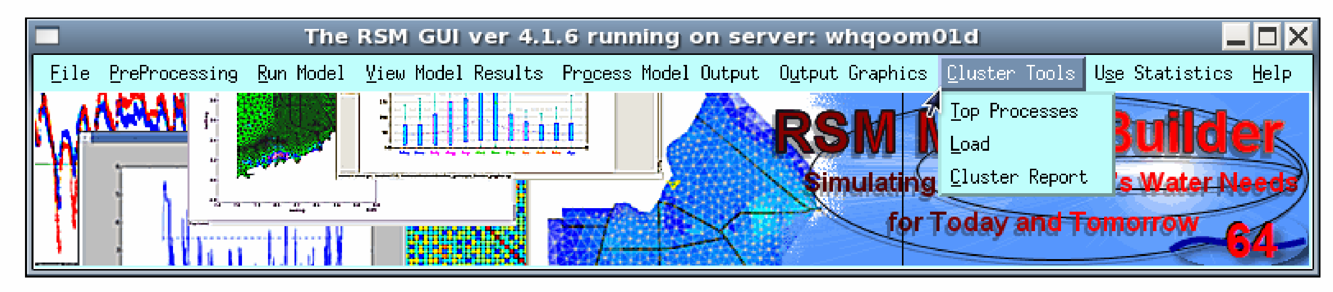


Figure 106: Cluster Tools Menu

15.1 Top Processes

The *Top Processes* feature is a Linux System Call to the "top" command. Top displays list of the top 10 processes utilizing the CPU on the computer on which the RSM GUI is currently being run from. An HSE process represents an executing RSM model run.

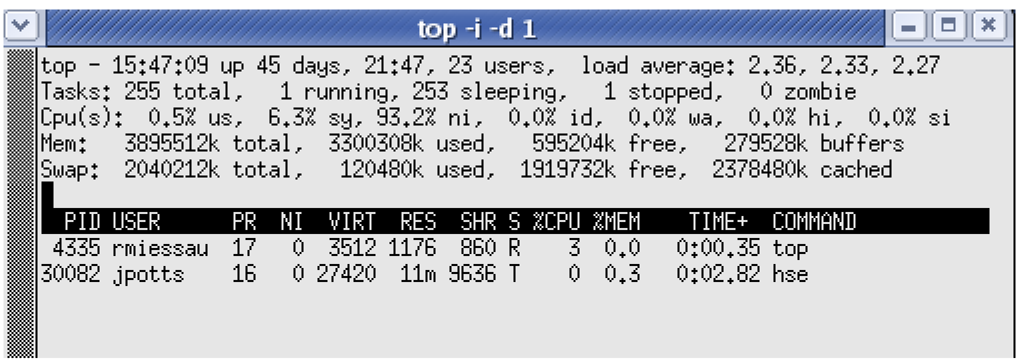


Figure 107: Display produced by the "Top" Command

15.2 Load

The *Load* feature is a Linux System Call to the "load" command. Load displays a moving bar graph representing the CPU load on the server on which the RSM GUI is currently being run from.

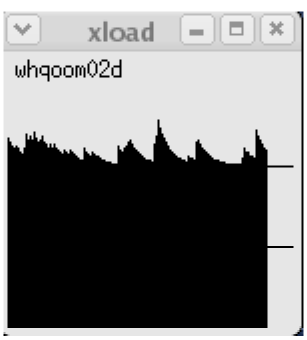


Figure 108: Display produced by the "Load" Command

15.3 Cluster Report

The *Cluster Report* feature is a browser link to Ganglia. Ganglia is a scalable distributed monitoring system for high-performance computing systems such as clusters and Grids.
http://ganglia.sourceforge.net/

Chapter 16

HELP Menu

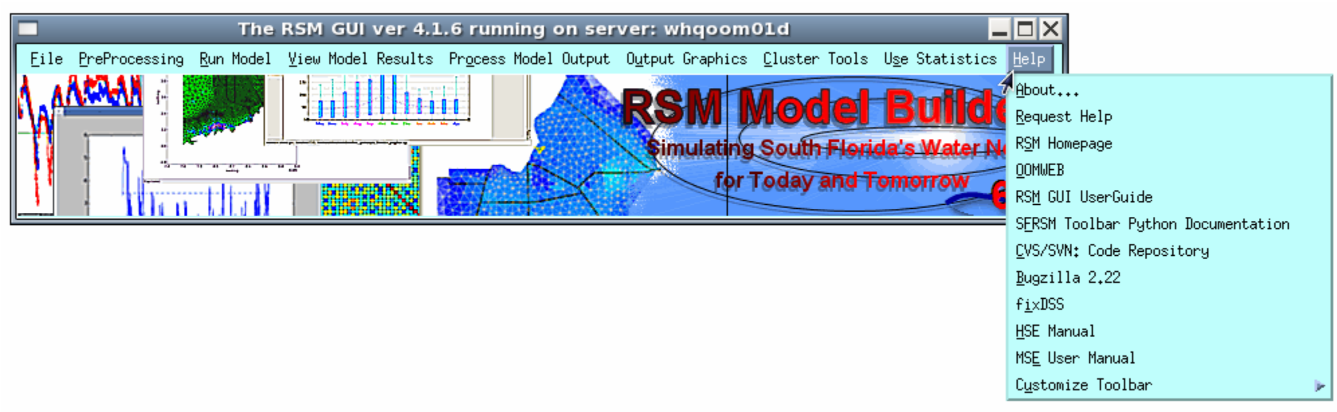
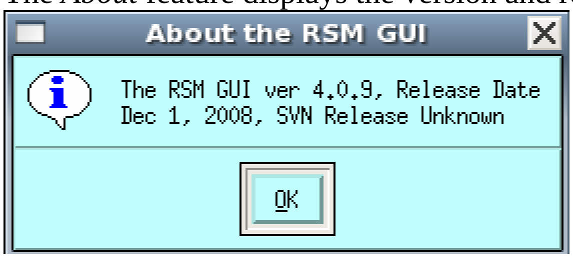


Figure 109: Help Menu

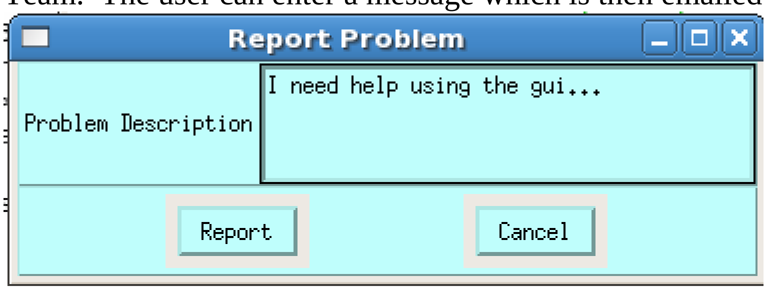
16.1 About…

The *About* feature displays the version and release date of the RSM GUI.



16.2 Request Help

The Request *Help* feature provides a means to report problems directly to the RSM GUI Development Team. The user can enter a message which is then emailed to the development team.



16.3 RSM Homepage

The RSM Homepage feature is a link to the RSM Homepage. Information regarding the RSM development, RSM implementations and the RSM GUI is posted to the RSM Homepage.

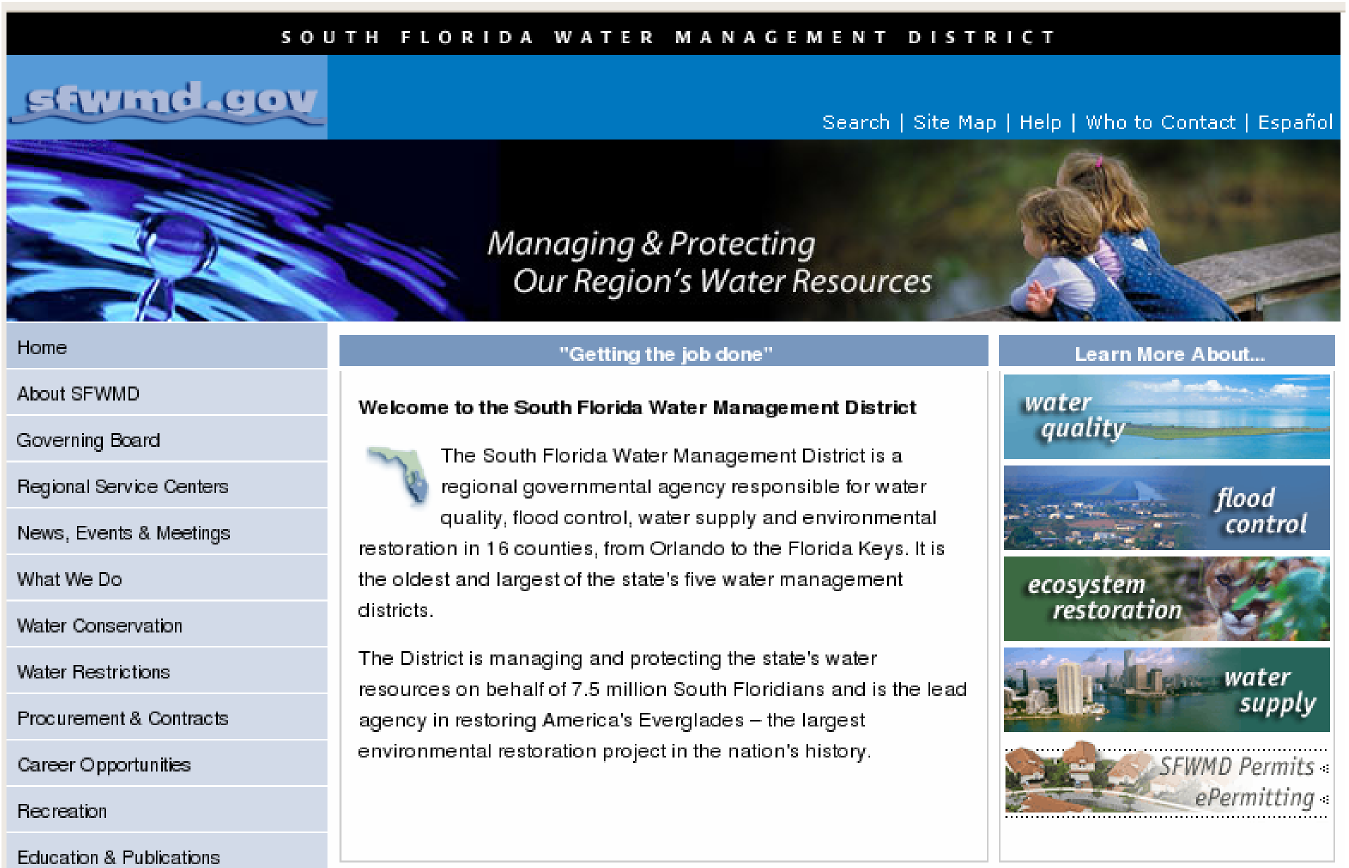
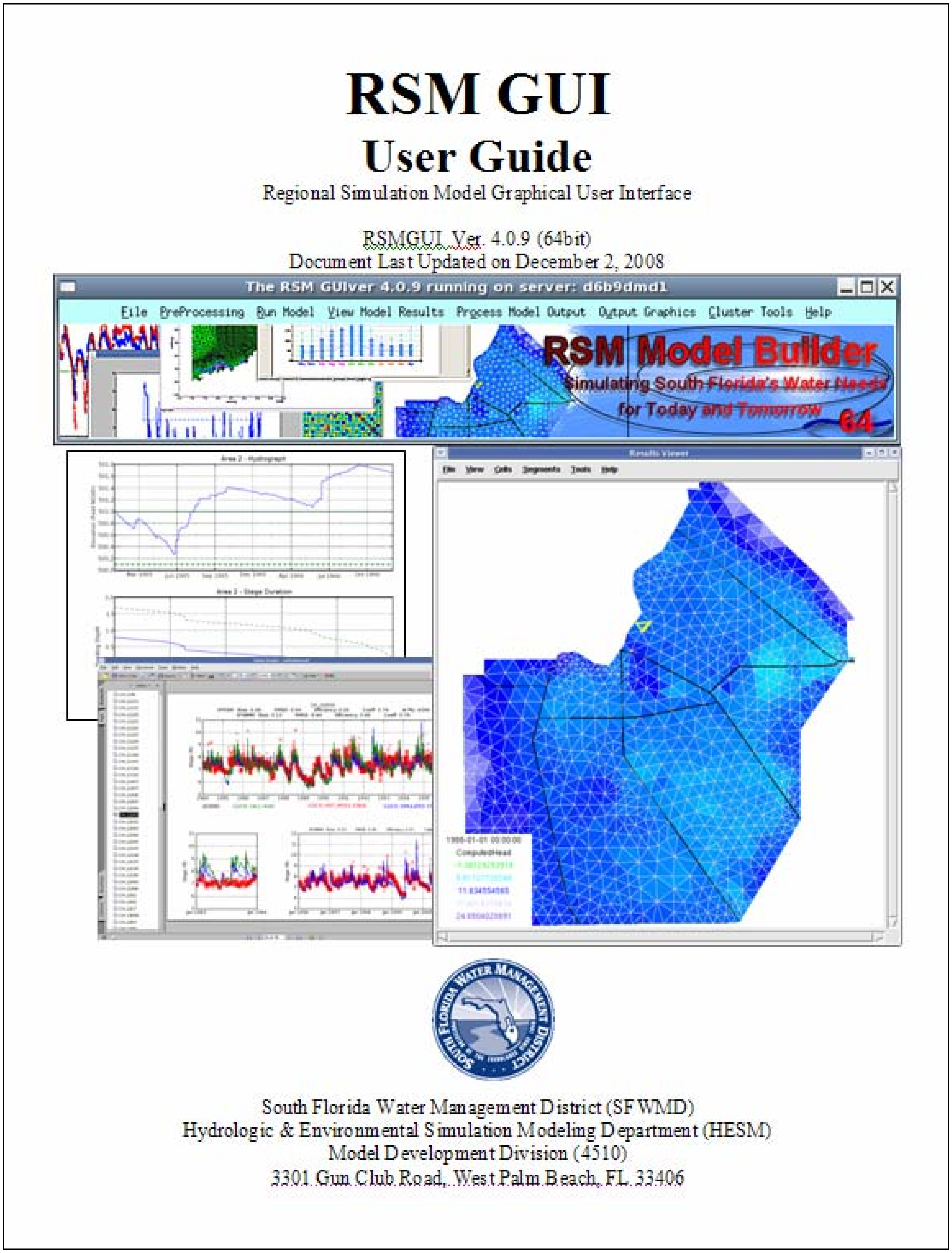


Figure 110: RSM Homepage

16.4 RSM GUI UserGuide

The *RSM GUI UserGuide* feature is a link to the current RSM GUI Users Guide. It is a PDF document containing instructions on the use of every tool in the RSM GUI.

16.5 SFRSM Toolbar Python Documentation



RSM GUI
User Guide
Regional Simulation Model Graphical User Interface

RSMGUI Ver. 4.0.9 (64bit)
Document Last Updated on December 2, 2008

South Florida Water Management District (SFWMD)
Hydrologic & Environmental Simulation Modeling Department (HESM)
Model Development Division (4510)
3301 Gun Club Road, West Palm Beach, FL 33406

16.6 CVS/SVN Code Repository

The *CVS/SVN* feature is a browser link to SVN Subversion. SVN is a software version control system. The RSM SVN repository contains the versioned RSM HSE model code and RSM GUI code.
http://subversion.tigris.org/

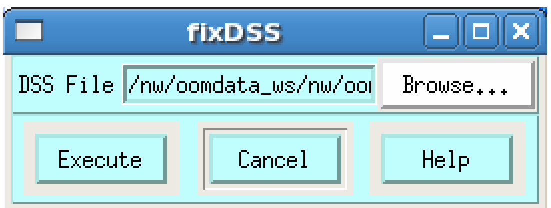
16.7 Bugzilla 2.22

The *Bugzilla 2.22* feature is a link to the browser based Bugzilla work task management system. Bugzilla is used to track all RSM tasks and projects.

16.8 fixDSS

The *fixDSS* feature is a Python tool that reads in an RSM DSS file and generates a duplicate file with corrected time/date stamps. In earlier version of the RSM (prior to 1.1.1) the DSS output files periodically contained a data format that was not readable by Python 2.4. This tool has been included as a precaution in case older files are still in use.

`If a tool encounters an error when reading a DSS file and generates an error message referring to “zrt” or “not a regular timeseries” then fxDSS is needed to correct the problem.`



16.9 Customize Toolbar

The *Customize Toolbar* feature is an option to select customized views of the RSM GUI Toolbar. The options and dropdown menus offered on the RSM GUI are driven by an XML. The Default XML is what most users will use when the run the RSM GUI. Advanced users may prefer to select from a list of customized views or they may choose to create their own XML. This feature will be further developed and automated in future versions of the RSM GUI.

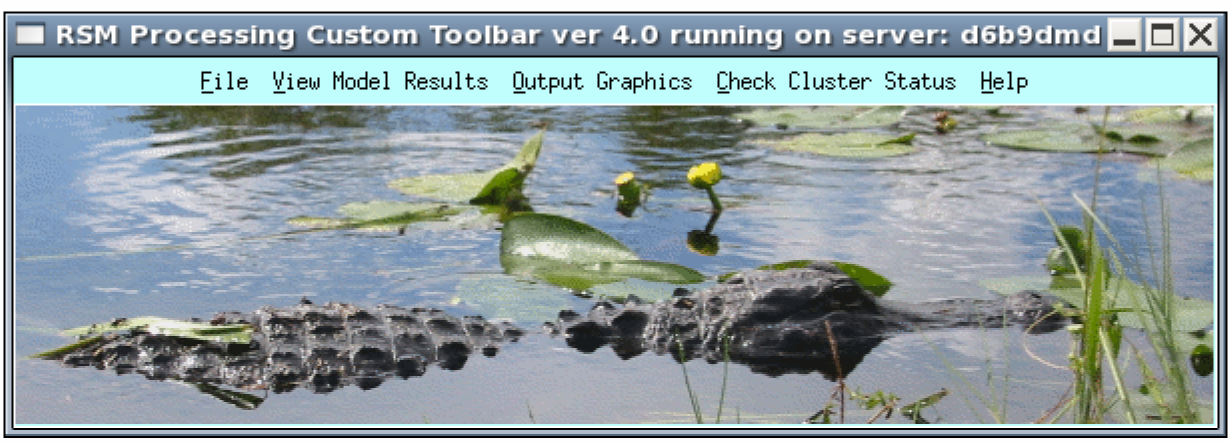


Figure 111: RSM GUI Customized Toolbar

Appendix A - Definitions, Abbreviations and Acronyms

Definitions

Term	Definition
calibration XML	The main XML used to configure an RSM scenario.
model run XML	The main XML used to configure an RSM scenario.
configuration XML	The main XML used to configure an RSM scenario.
Citrix	Commercial computer application access platform.
GMS	Environmental Modeling Systems Inc. groundwater modeling and mesh creation software
Linux	Open source, UNIX like operating system.
geodatabase	a database designed to store query, and manipulate geographic information and spatial data.
DSS	HEC Data Storage System file format used for storing time series data
polygon	A finite number of sequential line segments which begin and end at the same, point forming a closed planar path.

Abbreviations & Acronyms

Abbreviation	Meaning
ESRI	Environmental Systems Research Institute
ET	Evapotranspiration
GIS	Geographic Information System
GUI	Graphical User Interface
HESM	Hydrologic and Environmental Simulation Modeling
HIS	Habitat Suitability Index
HPM	Hydrologic Processing Module in the RSM
HSE	Hydrologic Simulation Engine in the RSM
HTML	Hypertext Markup Language
IR	Indicator Region
KISS	Kissimmee
KUB	Kissimmee Upper Basin
LKB	Lake Kissimmee Basin
LOK	Lake Okeechobee
MFL	Minimum Flows and Levels
MSE	Management Simulation Engine in the RSM
netCDF	Network Common Data Format
NSRSM	Natural Systems Regional Simulation Model
PMG	Performance Measure Graphic
PMI	Performance Measure Indicator
PMViewer	Performance Measure Graphics Viewer
PWS	Public Water Supply
RSM	Regional Simulation Model
SFWMD	South Florida Water Management District

STA	Stormwater Treatment Area
SWMM	South Florida Water Management Model
XML	Extensible Markup Language

Appendix B – RSM Template Geodatabase Report

Geodatabase Reporting Tool

Date Of Report	**6/8/2005 4:47:17 PM**
Generated By	**jsulliva (on 7J0YF61)**
Geodatabase Type	**Personal [Version 1.3.0 (Previous Release)]**
Database	**\\dcluster1\oom\sfrsm\data\gis\network\sumit\sfrsm_gis_v4_copy.mdb**

Geodatabase Report Contents

Geodatabase Summary

FeatureDataset	Object Name (Alias)	Type	Geometry	Subtypes
sfrsm_gis (S)	broward_subset (broward_subset) (C)	Simple Feature	Polyline	None
	canal_has_mse_unit	RelationshipClass	canal->mse_unit	
	canal (canal) (C)	Complex Edge	Polyline	Canal Water Mover
	mesh_bnd (mesh_bnd) (C)	Simple Feature	Polygon	None
	mesh_framework (mesh_framework) (C)	Simple Edge	Polyline	None
	mesh_node (mesh_node) (C)	Simple Junction	Point	None
	mesh_pnt (mesh_pnt) (C)	Simple Feature	Point	None
	mesh (mesh) (C)	Simple Feature	Polygon	None
	sfrsm_gis_Net_Junctions (sfrsm_gis_Net_Junctions) (C)	Simple Junction	Point	None
	sfrsm_gis_Net	GeometricNetwork		
	sfrsm_gis_Net2_Junctions (sfrsm_gis_Net2_Junctions) (C)	Simple Junction	Point	None
	sfrsm_gis_Net2	GeometricNetwork		
	structure_has_culvert_box	RelationshipClass	structure->culvert_box	
	structure_has_culvert_circular	RelationshipClass	structure->culvert_circular	
	structure_has_fixed_weir	RelationshipClass	structure->fixed_weir	
	structure_has_genstruc	RelationshipClass	structure->genstruc	
	structure_has_mse_unit	RelationshipClass	structure->mse_unit	
	structure_has_pump	RelationshipClass	structure->pump	
	structure_has_spillway	RelationshipClass	structure->spillway	
	structure_has_variable_weir	RelationshipClass	structure->variable_weir	
	structure (structure) (C)	Simple Junction	Point	Diversion Structure Inline Structure Junction Block
	watersheds (watersheds) (C)	Simple Feature	Polygon	None
None	culvert_box (culvert_box) (C)	Table	None	None
	culvert_circular (culvert_circular) (C)	Table	None	None
	fixed_weir (fixed_weir) (C)	Table	None	None
	genstruc (genstruc) (C)	Table	None	None
	mse_const (mse_const) (C)	Table	None	None

	mse_dss (mse_dss) (C)	Table	None	None
	mse_inout (mse_inout) (C)	Table	None	None
	mse_node (mse_node) (C)	Table	None	None
	mse_rc (mse_rc) (C)	Table	None	None
	mse_unit (mse_unit) (C)	Table	None	None
	pump (pump) (C)	Table	None	None
	spillway (spillway) (C)	Table	None	None
	variable_weir (variable_weir) (C)	Table	None	None
	boundary	Domain	Coded Value	
	EnabledDomain	Domain	Coded Value	
	rc_domain	Domain	Range	
	vaule	Domain	Coded Value	
	WM_type	Domain	Coded Value	

Geometric Network Summary

Geometric Newtork Name	Role	FeatureClass Name	Links
sfrsm_gis_Net	Simple Junction	sfrsm_gis_Net_Junctions	
		structure	
	Complex Junction	None	
	Simple Edge	None	
	Complex Edge	canal	EJ Rules EE Rules
sfrsm_gis_Net2	Simple Junction	mesh_node	
		sfrsm_gis_Net2_Junctions	
	Complex Junction	None	
	Simple Edge	mesh_framework	EJ Rules EE Rules
	Complex Edge	None	

ObjectClass Information

broward_subset (Simple Feature) (Polyline)

No Subtypes

Field Name	Field Type	Pre	Sc	Len	DV	Domain
OBJECTID	OID	0	0	4		
Shape	Geometry	0	0	0		
FNODE_	Integer	0	0	4		
TNODE_	Integer	0	0	4		
LPOLY_	Integer	0	0	4		
RPOLY_	Integer	0	0	4		
LENGTH	Double	0	0	8		
BRO_CANAL8	Integer	0	0	4		
BRO_CANA_1	Integer	0	0	4		
DIST_CODE	String	0	0	10		
HYDR_COND	Double	0	0	8		
BOT_THICK	Double	0	0	8		
CSLOPE	Double	0	0	8		
MAX_LAYER	Double	0	0	8		
CAN_NAME	String	0	0	15		
BOT_ELEV	Double	0	0	8		
TOP_WIDTH	Double	0	0	8		
BOT_WIDTH	Double	0	0	8		
SIDE_THICK	Double	0	0	8		
STATUS	String	0	0	10		
FUNCTION	String	0	0	5		
OPT_LEV	Double	0	0	8		
ROAD_CROWN	Double	0	0	8		
SIDE_SLOPE	Double	0	0	8		
STRUCTURE	String	0	0	15		
CLASS	String	0	0	1		
LEVEL_	Double	0	0	8		
MAXBOT_THK	Double	0	0	8		

XSEC	String	0	0	16		
TYPE	String	0	0	11		
WATER_BOT	Double	0	0	8		
CANALCODE	Integer	0	0	4		
Shape_Length	Double	0	0	8		

canal (Complex Edge) (Polyline)

Subtype: Canal (Canal_type = 1) [Default]

Field Name	Field Type	Pre	Sc	Len	DV	Domain
OBJECTID	OID	0	0	4		
SHAPE	Geometry	0	0	0		
Name	String	0	0	25		
BOT_WIDTH	Double	0	0	8		
BOT_ELEV	Double	0	0	8		
SIDE_SLOPE	Double	0	0	8		
TYPE	String	0	0	20		
Enabled	Small Integer	0	0	2	1	EnabledDomain
Canal_type	Small Integer	0	0	2	1	
Depth	Double	0	0	8		
Mannings	Double	0	0	8		
segmented	String	0	0	10		
minimum	Integer	0	0	4		
target	Integer	0	0	4		
maximum	Integer	0	0	4		
up_struc	String	0	0	20		
down_struc	String	0	0	20		
reach	Integer	0	0	4		
stagereach	Integer	0	0	4		
SHAPE_Length	Double	0	0	8		
mse_unit	String	0	0	50		
canal_num	Small Integer	0	0	2		

Subtype: Water Mover (Canal_type = 2)

Field Name	Field Type	Pre	Sc	Len	DV	Domain
OBJECTID	OID	0	0	4		
SHAPE	Geometry	0	0	0		
Name	String	0	0	25		
BOT_WIDTH	Double	0	0	8		
BOT_ELEV	Double	0	0	8		
SIDE_SLOPE	Double	0	0	8		
TYPE	String	0	0	20		
Enabled	Small Integer	0	0	2	1	EnabledDomain
Canal_type	Small Integer	0	0	2	1	
Depth	Double	0	0	8		
Mannings	Double	0	0	8		
segmented	String	0	0	10		
minimum	Integer	0	0	4		
target	Integer	0	0	4		
maximum	Integer	0	0	4		
up_struc	String	0	0	20		
down_struc	String	0	0	20		
reach	Integer	0	0	4		
stagereach	Integer	0	0	4		
SHAPE_Length	Double	0	0	8		
mse_unit	String	0	0	50		
canal_num	Small Integer	0	0	2		

mesh_bnd (Simple Feature) (Polygon)

No Subtypes

Field Name	Field Type	Pre	Sc	Len	DV	Domain
OID	OID	0	0	4		
Shape	Geometry	0	0	0		
Id	Small Integer	0	0	2		
Shape_Length	Double	0	0	8		

Shape_Area	Double	0	0	8		

mesh_framework (Simple Edge) (Polyline)

No Subtypes

Field Name	Field Type	Pre	Sc	Len	DV	Domain
OBJECTID_12	OID	0	0	4		
Shape	Geometry	0	0	0		
DENSITY	Double	0	0	8		
LINEID	Double	0	0	8		
DSCRPN	String	0	0	30		
Enabled	Small Integer	0	0	2	1	EnabledDomain
checked	String	0	0	5		
noflow	String	0	0	50		
Shape_Length	Double	0	0	8		
boundary	String	0	0	50		boundary

mesh_node (Simple Junction) (Point)

No Subtypes

Field Name	Field Type	Pre	Sc	Len	DV	Domain
OID	OID	0	0	4		
Shape	Geometry	0	0	0		
Id	Small Integer	0	0	2		
X_coord	Double	0	0	8		
Y_coord	Double	0	0	8		
Z_coord	Double	0	0	8		
Enabled	Small Integer	0	0	2	1	EnabledDomain

mesh_pnt (Simple Feature) (Point)

No Subtypes

Field Name	Field Type	Pre	Sc	Len	DV	Domain
OID	OID	0	0	4		
Shape	Geometry	0	0	0		
Id	Small Integer	0	0	2		
X_coord	Double	0	0	8		
Y_coord	Double	0	0	8		

mesh (Simple Feature) (Polygon)

No Subtypes

Field Name	Field Type	Pre	Sc	Len	DV	Domain
OID	OID	0	0	4		
Shape	Geometry	0	0	0		
Node1	Small Integer	0	0	2		
Node2	Small Integer	0	0	2		
Node3	Small Integer	0	0	2		
lu88_flucs	String	0	0	8		
lu95_flucs	String	0	0	4		
topo	Double	0	0	8		
elev_bot_lyr1	Double	0	0	8		
kh_lyr1	Double	0	0	8		
lu88_beta	String	0	0	10		
lu95_beta	String	0	0	10		
bc_lko	Small Integer	0	0	2		
bc_tide	Small Integer	0	0	2		
Calib_reg	String	0	0	100		
topo2	Double	0	0	8		
cellid	Small Integer	0	0	2		
meshid	String	0	0	20		
water	String	0	0	50		
county	String	0	0	32		
Shape_Length	Double	0	0	8		

Shape_Area	Double	0	0	8		

sfrsm_gis_Net_Junctions (Simple Junction) (Point)

No Subtypes

Field Name	Field Type	Pre	Sc	Len	DV	Domain
OBJECTID	OID	0	0	4		
SHAPE	Geometry	0	0	0		
Enabled	Small Integer	0	0	2	1	EnabledDomain

sfrsm_gis_Net2_Junctions (Simple Junction) (Point)

No Subtypes

Field Name	Field Type	Pre	Sc	Len	DV	Domain
OBJECTID	OID	0	0	4		
SHAPE	Geometry	0	0	0		
Enabled	Small Integer	0	0	2	1	EnabledDomain

structure (Simple Junction) (Point)

Subtype: Inline Structure (Flow = 0)

Field Name	Field Type	Pre	Sc	Len	DV	Domain
OBJECTID	OID	0	0	4		
Shape	Geometry	0	0	0		
AREA	Double	0	0	8		
PERIMETER	Double	0	0	8		
IMFDCSTR_	Integer	0	0	4		
IMFDCSTR_ID	Integer	0	0	4		
NAME	String	0	0	12		
FLOW_TYPE	String	0	0	15		
CONTROL	String	0	0	15		
MATERIAL	String	0	0	25		
PURPOSE	String	0	0	20		
ESTUARY	String	0	0	25		
SOURCE	String	0	0	4		
GPSDEVICE	String	0	0	20		
FIELDSTA	String	0	0	17		
CANAL	String	0	0	30		
SYMBOL	Integer	0	0	4		
SYMBOL500K	Integer	0	0	4		
ANGLE	Small Integer	0	0	2		
VERIFIED	String	0	0	3		
STA	String	0	0	5		
NAME2	String	0	0	12		
FLAG	Small Integer	0	0	2		
TIME_STAMP	String	0	0	30		
WALLMAP	String	0	0	3		
SYMBOLXWEB	Integer	0	0	4		
SYMBOLXWEB500K	Integer	0	0	4		
CRITICAL	String	0	0	4		
ANGLEMAP	Small Integer	0	0	2		
COUNTY	String	0	0	12		
OWNERSHIP	String	0	0	10		
POLYGONID	Integer	0	0	4		
SCALE	Double	0	0	8		
ANGLE_1	Integer	0	0	4		
checked	String	0	0	5	no	
SFWMM_impose	String	0	0	10		
struc_type	String	0	0	40		
type	String	0	0	10		
Enabled	Small Integer	0	0	2	1	EnabledDomain
Flow	Small Integer	0	0	2	0	
WM_type	String	0	0	50		WM_type

Subtype: Diversion Structure (Flow = 1) [Default]

Field Name	Field Type	Pre	Sc	Len	DV	Domain
OBJECTID	OID	0	0	4		
Shape	Geometry	0	0	0		
AREA	Double	0	0	8		
PERIMETER	Double	0	0	8		
IMFDCSTR_	Integer	0	0	4		
IMFDCSTR_ID	Integer	0	0	4		
NAME	String	0	0	12		
FLOW_TYPE	String	0	0	15		
CONTROL	String	0	0	15		
MATERIAL	String	0	0	25		
PURPOSE	String	0	0	20		
ESTUARY	String	0	0	25		
SOURCE	String	0	0	4		
GPSDEVICE	String	0	0	20		
FIELDSTA	String	0	0	17		
CANAL	String	0	0	30		
SYMBOL	Integer	0	0	4		
SYMBOL500K	Integer	0	0	4		
ANGLE	Small Integer	0	0	2		
VERIFIED	String	0	0	3		
STA	String	0	0	5		
NAME2	String	0	0	12		
FLAG	Small Integer	0	0	2		
TIME_STAMP	String	0	0	30		
WALLMAP	String	0	0	3		
SYMBOLXWEB	Integer	0	0	4		
SYMBOLXWEB500K	Integer	0	0	4		
CRITICAL	String	0	0	4		
ANGLEMAP	Small Integer	0	0	2		
COUNTY	String	0	0	12		
OWNERSHIP	String	0	0	10		
POLYGONID	Integer	0	0	4		
SCALE	Double	0	0	8		
ANGLE_1	Integer	0	0	4		
checked	String	0	0	5	no	
SFWMM_impose	String	0	0	10		
struc_type	String	0	0	40		
type	String	0	0	10		
Enabled	Small Integer	0	0	2	1	EnabledDomain
Flow	Small Integer	0	0	2	0	
WM_type	String	0	0	50		WM_type

Subtype: Junction Block (Flow = 2)

Field Name	Field Type	Pre	Sc	Len	DV	Domain
OBJECTID	OID	0	0	4		
Shape	Geometry	0	0	0		
AREA	Double	0	0	8		
PERIMETER	Double	0	0	8		
IMFDCSTR_	Integer	0	0	4		
IMFDCSTR_ID	Integer	0	0	4		
NAME	String	0	0	12		
FLOW_TYPE	String	0	0	15		
CONTROL	String	0	0	15		
MATERIAL	String	0	0	25		
PURPOSE	String	0	0	20		
ESTUARY	String	0	0	25		
SOURCE	String	0	0	4		
GPSDEVICE	String	0	0	20		
FIELDSTA	String	0	0	17		
CANAL	String	0	0	30		
SYMBOL	Integer	0	0	4		
SYMBOL500K	Integer	0	0	4		
ANGLE	Small Integer	0	0	2		
VERIFIED	String	0	0	3		
STA	String	0	0	5		
NAME2	String	0	0	12		

FLAG	Small Integer	0	0	2		
TIME_STAMP	String	0	0	30		
WALLMAP	String	0	0	3		
SYMBOLXWEB	Integer	0	0	4		
SYMBOLXWEB500K	Integer	0	0	4		
CRITICAL	String	0	0	4		
ANGLEMAP	Small Integer	0	0	2		
COUNTY	String	0	0	12		
OWNERSHIP	String	0	0	10		
POLYGONID	Integer	0	0	4		
SCALE	Double	0	0	8		
ANGLE_1	Integer	0	0	4		
checked	String	0	0	5	no	
SFWMM_impose	String	0	0	10		
struc_type	String	0	0	40		
type	String	0	0	10		
Enabled	Small Integer	0	0	2	1	EnabledDomain
Flow	Small Integer	0	0	2	0	
WM_type	String	0	0	50		WM_type

watersheds (Simple Feature) (Polygon)

No Subtypes

Field Name	Field Type	Pre	Sc	Len	DV	Domain
OBJECTID_1	OID	0	0	4		
Shape	Geometry	0	0	0		
OBJECTID	Integer	0	0	4		
Watershed	String	0	0	50		
SHAPE_Leng	Double	0	0	8		
extra	Small Integer	0	0	2		
Shape_Length	Double	0	0	8		
Shape_Area	Double	0	0	8		

culvert_box [Table]

No Subtypes

Field Name	Field Type	Pre	Sc	Len	DV	Domain
OBJECTID	OID	0	0	4		
structure_name	String	0	0	255		
station	String	0	0	255		
unitid	String	0	0	255		
eff_date	Date	0	0	8		
cul_length	Integer	0	0	4		
cul_height	Integer	0	0	4		
cul_width	Integer	0	0	4		
ent_lossco	Integer	0	0	4		
dis_coef	Integer	0	0	4		
cdw	Integer	0	0	4		
cdg	Double	0	0	8		
down_inv_el	Integer	0	0	4		
up_inv_el	Integer	0	0	4		
barrel_num	Integer	0	0	4		
barrel_sha	String	0	0	255		
manning_co	Integer	0	0	4		
con_type	String	0	0	255		
con_num	Integer	0	0	4		
gate_height	Integer	0	0	4		
gate_width	Integer	0	0	4		
hyd_rad	Integer	0	0	4		
area	Integer	0	0	4		
with_flow	Integer	0	0	4		
enabled	Double	0	0	8		

culvert_circular [Table]

No Subtypes

Field Name	Field Type	Pre	Sc	Len	DV	Domain
OBJECTID	OID	0	0	4		
structure_name	String	0	0	255		
dbhyd_sta	String	0	0	255		
unitid	String	0	0	255		
eff_date	Date	0	0	8		
cul_dia	Integer	0	0	4		
cul_length	Integer	0	0	4		
ent_lossco	Double	0	0	8		
dis_coef	Double	0	0	8		
cdw	Double	0	0	8		
cdg	Double	0	0	8		
down_inv_el	Double	0	0	8		
up_inv_el	Double	0	0	8		
barrel_num	Integer	0	0	4		
barrel_sha	String	0	0	255		
manning_co	Double	0	0	8		
con_type	String	0	0	255		
con_num	Integer	0	0	4		
gate_dia	Integer	0	0	4		
gate_height	Integer	0	0	4		
gate_width	Integer	0	0	4		
hyd_rad	Double	0	0	8		
area	Double	0	0	8		
pipeopen	Double	0	0	8		
with_flow	Integer	0	0	4		
enabled	Integer	0	0	4		

fixed_weir [Table]

No Subtypes

Field Name	Field Type	Pre	Sc	Len	DV	Domain
OBJECTID	OID	0	0	4		
structure_name	String	0	0	255		
station	String	0	0	255		
eff_date	Integer	0	0	4		
chan_width	Integer	0	0	4		
crest_el	Double	0	0	8		
crest_length	Double	0	0	8		
crest_width	Double	0	0	8		
notch_dept	Double	0	0	8		
top_width	Double	0	0	8		
dis_coef	Double	0	0	8		
with_flow	Integer	0	0	4		
enabled	Double	0	0	8		
unitid	String	0	0	50		

genstruc [Table]

No Subtypes

Field Name	Field Type	Pre	Sc	Len	DV	Domain
OBJECTID	OID	0	0	4		
unitid	String	0	0	255		
dis_coef	Double	0	0	8		
with_flow	Integer	0	0	4		
enabled	Integer	0	0	4		

mse_const [Table]

No Subtypes

Field Name	Field Type	Pre	Sc	Len	DV	Domain
OBJECTID	OID	0	0	4		
node_name	String	0	0	50		

unit_name	String	0	0	50		
const_supply	Integer	0	0	4		
const_supplyMax	Integer	0	0	4		
const_demand	Integer	0	0	4		
const_open	Integer	0	0	4		
const_close	Integer	0	0	4		
const_twheadLimit	Integer	0	0	4		
const_maintLevel	Integer	0	0	4		
const_localLevel	Integer	0	0	4		
const_fcLevel	Integer	0	0	4		
const_resLevel	Integer	0	0	4		

mse_dss [Table]

No Subtypes

Field Name	Field Type	Pre	Sc	Len	DV	Domain
OBJECTID	OID	0	0	4		
node_name	String	0	0	50		
unit_name	String	0	0	50		
dss_supply	String	0	0	50		
dss_supplyMax	String	0	0	50		
dss_demand	String	0	0	50		
dss_open	String	0	0	50		
dss_close	String	0	0	50		
dss_twheadLimit	String	0	0	50		
dss_maintLevel	String	0	0	50		
dss_localLevel	String	0	0	50		
dss_fcLevel	String	0	0	50		
dss_resLevel	String	0	0	50		

mse_inout [Table]

No Subtypes

Field Name	Field Type	Pre	Sc	Len	DV	Domain
OBJECTID	OID	0	0	4		
unit_name	String	0	0	50		
iostruc_name	String	0	0	50		
type	String	0	0	50		

mse_node [Table]

No Subtypes

Field Name	Field Type	Pre	Sc	Len	DV	Domain
OBJECTID	OID	0	0	4		
NODE_NAME	String	0	0	11		
PURPOSE	String	0	0	11		
LABEL	String	0	0	10		
DESIGN_CAP	Double	0	0	8		
MANAGED	String	0	0	9		
PN_OPEN	String	0	0	33		
PN_CLOSE	String	0	0	33		
wsPriority	Small Integer	0	0	2		
fcPriority	Small Integer	0	0	2		
DEMAND	Small Integer	0	0	2		vaule
SUPPLY	Small Integer	0	0	2		vaule
SUPPLYMAX	Small Integer	0	0	2		vaule
OPEN_	Small Integer	0	0	2		vaule
CLOSE_	Small Integer	0	0	2		vaule
twHeadLimit	Small Integer	0	0	2		

mse_rc [Table]

No Subtypes

Field Name	Field Type	Pre	Sc	Len	DV	Domain

OBJECTID	OID	0	0	4		
node_name	String	0	0	50		
unit_name	String	0	0	50		
rc_supply	Integer	0	0	4		
rc_supplyMax	Integer	0	0	4		
rc_demand	Integer	0	0	4		
rc_open	Integer	0	0	4		
rc_close	Integer	0	0	4		
rc_twheadLimit	Integer	0	0	4		
rc_maintLevel	Integer	0	0	4		
rc_localLevel	Integer	0	0	4		
rc_fcLevel	Integer	0	0	4		
rc_resLevel	Integer	0	0	4		

mse_unit [Table]

No Subtypes

Field Name	Field Type	Pre	Sc	Len	DV	Domain
OBJECTID	OID	0	0	4		
ID	Integer	0	0	4		
UNIT_NAME	String	0	0	11		
MAINT_LEVE	Small Integer	0	0	2		vaule
LOCAL_LEVE	Small Integer	0	0	2		vaule
FC_LEVEL	Small Integer	0	0	2		vaule
RES_LEVEL	Small Integer	0	0	2		vaule

pump [Table]

No Subtypes

Field Name	Field Type	Pre	Sc	Len	DV	Domain
OBJECTID	OID	0	0	4		
structure_name	String	0	0	255		
case_	Integer	0	0	4		
station	String	0	0	255		
unitid	String	0	0	255		
pump_no	Integer	0	0	4		
v_0	Double	0	0	8		
v_0_25	Double	0	0	8		
v_0_5	Double	0	0	8		
v_0_75	Double	0	0	8		
v_1	Double	0	0	8		
v_1_25	Double	0	0	8		
v_1_5	Double	0	0	8		
v_1_75	Double	0	0	8		
v_2	Double	0	0	8		
v_2_25	Double	0	0	8		
v_2_5	Double	0	0	8		
v_2_75	Double	0	0	8		
v_3	Double	0	0	8		
v_3_25	Double	0	0	8		
v_3_5	Double	0	0	8		
v_3_75	Double	0	0	8		
v_4	Double	0	0	8		
v_4_25	Double	0	0	8		
v_4_5	Double	0	0	8		
v_4_75	Double	0	0	8		
v_5	Double	0	0	8		
v_5_25	Double	0	0	8		
v_5_5	Double	0	0	8		
v_5_75	Double	0	0	8		
v_6	Double	0	0	8		
v_6_25	Double	0	0	8		
v_6_5	Double	0	0	8		
v_6_75	Double	0	0	8		
v_7	Double	0	0	8		

v_7_25	Double	0	0	8		
v_7_5	Double	0	0	8		
v_7_75	Double	0	0	8		
v_8	Double	0	0	8		
v_8_25	Double	0	0	8		
v_8_5	Double	0	0	8		
v_8_75	Double	0	0	8		
v_9	Double	0	0	8		
v_9_25	Double	0	0	8		
v_9_5	Double	0	0	8		
v_9_75	Double	0	0	8		
v_10	Double	0	0	8		
v_10_25	Double	0	0	8		
v_10_5	Double	0	0	8		
v_10_75	Double	0	0	8		
v_11	Double	0	0	8		
v_11_25	Double	0	0	8		
v_11_5	Double	0	0	8		
v_11_75	Double	0	0	8		
v_12	Double	0	0	8		
v_12_25	Double	0	0	8		
v_12_5	Double	0	0	8		
v_12_75	Double	0	0	8		
v_13	Double	0	0	8		
v_13_25	Double	0	0	8		
v_13_5	Double	0	0	8		
v_13_75	Double	0	0	8		
v_14	Double	0	0	8		
v_14_25	Double	0	0	8		
v_14_5	Double	0	0	8		
v_14_75	Double	0	0	8		
with_flow	Integer	0	0	4		
enabled	Integer	0	0	4		

spillway [Table]

No Subtypes

Field Name	Field Type	Pre	Sc	Len	DV	Domain
OBJECTID	OID	0	0	4		
structure_name	String	0	0	255		
dbhyd_sta	String	0	0	255		
dis_coef	Integer	0	0	4		
with_flow	Integer	0	0	4		
enabled	Double	0	0	8		
unitid	String	0	0	50		

variable_weir [Table]

No Subtypes

Field Name	Field Type	Pre	Sc	Len	DV	Domain
OBJECTID	OID	0	0	4		
structure_name	String	0	0	255		
station	String	0	0	255		
eff_date	Integer	0	0	4		
mincrest_el	Double	0	0	8		
maxcrest_el	Double	0	0	8		
crest_length	Double	0	0	8		
dis_coef	Integer	0	0	4		
with_flow	Integer	0	0	4		
enabled	Double	0	0	8		
unitid	String	0	0	50		

RelationshipClass Information

Name	**canal_has_mse_unit [Simple]**	
Cardinality	One To Many	
Notification	Both	
Attributed	No	
	Origin ObjectClass	Destination ObjectClass
Name	canal [FeatureClass]	mse_unit [Table]
Key	mse_unit [Origin Primary Key]	UNIT_NAME [Origin Foreign Key]
Labels	mse_unit	canal
Rules	This RelationshipClass has no rules.	

Name	**structure_has_culvert_box [Simple]**	
Cardinality	One To Many	
Notification	None	
Attributed	No	
	Origin ObjectClass	Destination ObjectClass
Name	structure [FeatureClass]	culvert_box [Table]
Key	NAME [Origin Primary Key]	structure_name [Origin Foreign Key]
Labels	culvert_box	structure
Rules	This RelationshipClass has no rules.	

Name	**structure_has_culvert_circular [Simple]**	
Cardinality	One To Many	
Notification	None	
Attributed	No	
	Origin ObjectClass	Destination ObjectClass
Name	structure [FeatureClass]	culvert_circular [Table]
Key	NAME [Origin Primary Key]	structure_name [Origin Foreign Key]
Labels	culvert_circular	structure
Rules	This RelationshipClass has no rules.	

Name	**structure_has_fixed_weir [Simple]**	
Cardinality	One To Many	
Notification	None	
Attributed	No	
	Origin ObjectClass	Destination ObjectClass
Name	structure [FeatureClass]	fixed_weir [Table]
Key	NAME [Origin Primary Key]	structure_name [Origin Foreign Key]
Labels	fixed_weir	structure
Rules	This RelationshipClass has no rules.	

Name	**structure_has_genstruc [Simple]**	
Cardinality	One To Many	
Notification	None	
Attributed	No	
	Origin ObjectClass	Destination ObjectClass
Name	structure [FeatureClass]	genstruc [Table]
Key	NAME [Origin Primary Key]	unitid [Origin Foreign Key]
Labels	genstruc	structure
Rules	This RelationshipClass has no rules.	

Name	**structure_has_mse_unit [Simple]**	
Cardinality	One To One	
Notification	None	
Attributed	No	
	Origin ObjectClass	Destination ObjectClass
Name	structure [FeatureClass]	mse_unit [Table]
Key	NAME [Origin Primary Key]	UNIT_NAME [Origin Foreign Key]
Labels	mse_unit	structure
Rules	This RelationshipClass has no rules.	

Name	**structure_has_pump [Simple]**	
Cardinality	One To Many	
Notification	None	
Attributed	No	
	Origin ObjectClass	Destination ObjectClass
Name	structure [FeatureClass]	pump [Table]
Key	NAME [Origin Primary Key]	structure_name [Origin Foreign Key]
Labels	pump	structure
Rules	This RelationshipClass has no rules.	

Name	**structure_has_spillway [Simple]**	
Cardinality	One To Many	
Notification	None	
Attributed	No	
	Origin ObjectClass	Destination ObjectClass
Name	structure [FeatureClass]	spillway [Table]
Key	NAME [Origin Primary Key]	structure_name [Origin Foreign Key]
Labels	spillway	structure
Rules	This RelationshipClass has no rules.	

Name	**structure_has_variable_weir [Simple]**	
Cardinality	One To Many	
Notification	None	
Attributed	No	
	Origin ObjectClass	Destination ObjectClass
Name	structure [FeatureClass]	variable_weir [Table]
Key	NAME [Origin Primary Key]	structure_name [Origin Foreign Key]
Labels	variable_weir	structure
Rules	This RelationshipClass has no rules.	

Domain Information

boundary

Field Type	String	Merge Policy	Default Value
Domain Type	Coded Value	Split policy	Default Value

Value	Description
ol	Overland Flow
gw	Groundwater Flow
ol/gw	Overland and Groundwater Flow
none	No Boundary Conditions

Domain Assigned To

ObjectClass Type	ObjectClass Name	Subtype	Field
FeatureClass	mesh_framework	None	boundary

EnabledDomain

Field Type	Small Integer	Merge Policy	Default Value
Domain Type	Coded Value	Split policy	Default Value

Value	Description
0	False
1	True

Domain Assigned To

ObjectClass Type	ObjectClass Name	Subtype	Field
FeatureClass	canal	Canal	Enabled
FeatureClass	canal	Water Mover	Enabled
FeatureClass	mesh_framework	None	Enabled
FeatureClass	mesh_node	None	Enabled
FeatureClass	sfrsm_gis_Net_Junctions	None	Enabled
FeatureClass	sfrsm_gis_Net2_Junctions	None	Enabled
FeatureClass	structure	Diversion Structure	Enabled
FeatureClass	structure	Inline Structure	Enabled
FeatureClass	structure	Junction Block	Enabled

rc_domain

Field Type	Integer	Merge Policy	Default Value
Domain Type	Range	Split policy	Default Value

Value	Description
450001	Minimum
455000	Maximum

Domain Assigned To

ObjectClass Type	ObjectClass Name	Subtype	Field
Not Assigned			

vaule

Field Type	Small Integer	Merge Policy	Default Value
Domain Type	Coded Value	Split policy	Default Value

Value	Description
1	RC
2	DSS
3	Constant

Domain Assigned To

ObjectClass Type	ObjectClass Name	Subtype	Field
Table	mse_node	None	CLOSE_
Table	mse_node	None	DEMAND
Table	mse_node	None	OPEN_
Table	mse_node	None	SUPPLY
Table	mse_node	None	SUPPLYMAX
Table	mse_unit	None	FC_LEVEL
Table	mse_unit	None	LOCAL_LEVE
Table	mse_unit	None	MAINT_LEVE
Table	mse_unit	None	RES_LEVEL

WM_type

Field Type	String	Merge Policy	Default Value
Domain Type	Coded Value	Split policy	Default Value

Value	Description
Seg to Seg	Seg to Seg
Structure_Flow	Structure_Flow
Cell to Seg	Cell to Seg

Seg to Cell	Seg to Cell
Cell to Cell	Cell to Cell

Domain Assigned To

ObjectClass Type	ObjectClass Name	Subtype	Field
FeatureClass	structure	Diversion Structure	WM_type
FeatureClass	structure	Inline Structure	WM_type
FeatureClass	structure	Junction Block	WM_type

Spatial Reference Information

sfrsm_gis (FeatureDataset)

Spatial Domain

	Minimum	Maximum	Precision
X	-2450000	6497848.52083333	} 240
Y	-1800000	7147848.52083333	
M	0	21474.83645	100000
Z	0	21474.83645	100000

Projection System

PROJCS["NAD_1983_HARN_StatePlane_Florida_East_FIPS_0901"
PROJECTION["Transverse_Mercator"]
PARAMETER["False_Easting",656166.6666666666]
PARAMETER["False_Northing",0.0]
PARAMETER["Central_Meridian",-81.0]
PARAMETER["Scale_Factor",0.9999411764705882]
PARAMETER["Latitude_Of_Origin",24.33333333333333]
UNIT["Foot_US",0.3048006096012192]]

Geographic Coordinate System

GEOGCS["GCS_North_American_1983_HARN"
DATUM["D_North_American_1983_HARN"
SPHEROID["GRS_1980",6378137.0,298.257222101]]
PRIMEM["Greenwich",0.0]
UNIT["Degree",0.0174532925199433]]

Row/Feature Count Information

Feature Dataset	Dataset (Type)	Subtype/ Band	Count	Extent	SnapShot
sfrsm_gis	broward_subset (FeatureClass)	No Subtypes	186	Xmin 921142.8125 Xmax 945340.125 Ymin 684351.3125 Ymax 725799.6875	
	canal (FeatureClass)	Canal	3526	Xmin 423706.65 Xmax 968212.379166667 Ymin 286805.091666667 Ymax 1109800.58333333	
		Water Mover	61		
	mesh_bnd (FeatureClass)	No Subtypes	1	Xmin 423706.65 Xmax 968212.379166667 Ymin 286805.091666667 Ymax 1109800.58333333	
	mesh_framework (FeatureClass)	No Subtypes	640	Xmin 423706.65 Xmax 968212.379166667 Ymin 286805.091666667 Ymax 1109800.58333333	
	mesh_node (FeatureClass)	No Subtypes	14156	Xmin 423706.65 Xmax 968212.379166667 Ymin 286805.091666667 Ymax 1109800.58333333	
	mesh_pnt (FeatureClass)	No Subtypes	27604	Xmin 426803.2125 Xmax 967354.833333333 Ymin 288603.3375 Ymax 1104674.1625	
	mesh (FeatureClass)	No Subtypes	27604	Xmin 423706.65 Xmax 968212.379166667 Ymin 286805.091666667 Ymax 1109800.58333333	
	sfrsm_gis_Net_Junctions (FeatureClass)	No Subtypes	3509	Xmin 431148.620833333 Xmax 968195.791666667 Ymin 336820.408333333 Ymax 1026906.99166667	

	sfrsm_gis_Net2_Junctions (FeatureClass)	No Subtypes	0	No Spatial Extent
	structure (FeatureClass)	Diversion Structure	81	Xmin 429956.5125 Xmax 964822.708333333 Ymin 347027.541666667 Ymax 1015481.79166667
		Inline Structure	119	
		Junction Block	0	
	watersheds (FeatureClass)	No Subtypes	163	Xmin 237292.9875 Xmax 972362.620833333 Ymin 66166.3166666667 Ymax 1540447.625
None	culvert_box (Table)	No Subtypes	24	No Spatial Extent
	culvert_circular (Table)	No Subtypes	201	No Spatial Extent
	fixed_weir (Table)	No Subtypes	3	No Spatial Extent
	genstruc (Table)	No Subtypes	84	No Spatial Extent
	mse_const (Table)	No Subtypes	211	No Spatial Extent
	mse_dss (Table)	No Subtypes	211	No Spatial Extent
	mse_inout (Table)	No Subtypes	11	No Spatial Extent
	mse_node (Table)	No Subtypes	10	No Spatial Extent
	mse_rc (Table)	No Subtypes	211	No Spatial Extent
	mse_unit (Table)	No Subtypes	11	No Spatial Extent
	pump (Table)	No Subtypes	138	No Spatial Extent
	spillway (Table)	No Subtypes	75	No Spatial Extent
	variable_weir (Table)	No Subtypes	10	No Spatial Extent

Appendix C – Preparing an RSM Scenario

Steps for creating a “new” RSM implementation:

1. Generate a new mesh.
   - Use GMS to generate a new mesh.2dm file.
   - The mesh generation requires a new framework. (Start with SFRSM framework)
   - Test for thin triangles and other mesh criteria.
   - Import GMS mesh.2dm into GIS to get mesh node, point and bnd.

2. Populate mesh with necessary attributes.
   - Use GUI Mesh Intersect tool to “intersect” the mesh with physical model system properties. (Eg, topo, land use, hydraulic conductivity, bottom aquifer elevation, etc…)
   - Generate mesh input files using GUI.

3. Build canal network.
   - Decide which canals will be physically represented in the model.
   - Decide how to segment the canals to best meet the regional modeling and MSE needs. (This needs a fair amount of thought to help limit the need to re-segment later.)
   - Decide which structures will be used in the model.
   - Generate canal input datasets using the GUI where possible.

4. Boundary conditions.
   - Assign levee bc’s to the mesh framework lines and generate input with GUI.
   - Build tide bc file. There is not currently a tool to do this.
   - Build watermover input files. The current tools offer limited help for this.
   - Build canal bc file. This file or files will represent a mix of bc types and is very time consuming.

5. Levee Seepage
   - Build levee seepage files. The tools for this are not yet completed. This is very time consuming.

6. Public Water Supply
   - All PWS wells need to be assigned to their appropriate cell and an xml file needs to be built. I think Dave may have a script to do this.

7. Time Series Data
   - All necessary time series data needs to be gathered and compiled into DSS files.

8. Monitors
   - Build any necessary monitor xml files. (There are no tools to do this.)

9. MSE
   - Assign MSE information to canal segments, canal reaches, and watermovers to assemble MSE water control units.
   - Use the RSM GIS TOOLBAR tool to build the MSE XML.

Appendix D - RSM Input Files

Steps used to create all input files used for run_calib_MDM_v1_4_19
All files can be found on dcluster1 under:
/opt/local/share3/share/samples/run_model/input

lu88_index.xml

- Use the Index tool found under the GIS HSE Network menu
- Select the mesh layer
- Select the lu88_index attribute
- Designate an output directory to write a file called lu_index.xml

bot_lyr1.xml

- Use the Index tool found under the GIS HSE Network menu
- Select the mesh layer
- Select the bot_lyr1 attribute
- Designate an output directory to write a file called bot_lyr1.xml

hyd_con.xml

- Use the Index tool found under the GIS HSE Network menu
- Select the mesh layer
- Select the kn_lyr1 attribute
- Designate an output directory to write a file called hyd_con.xml

topo.xml

- Use the Index tool found under the GIS HSE Network menu
- Select the mesh layer
- Select the topo attribute
- Designate an output directory to write a file called topo.xml

parameter_zones.gms

- Use the Index tool found under the GIS HSE Network menu
- Select the mesh layer
- Select the kzones attribute
- Designate an output directory to write a file called parameter_zones.gms

canal_3_14.map

- Use the Canal File (.map) tool found under the GIS Generate XML menu
- Select the Mesh Feature rsm-geodatabase.mdb/sfrsm_gis/canal
- Designate an output directory to write a file called canal_3_14.map
- Set filter 1 to specify enabled=1 and filter 2 to specify canal_type=1
- Accept all the other default settings and run the tool

canal_index.dat

- Use the Index tool found under the GIS HSE Network menu
- Select the canal layer

- Select the calib attribute
- Designate an output directory to write a file called canal_index.dat

canal_start_head.dat

- Use the Index tool found under GIS HSE Network menu
- Select the canal layer
- Select the BOT_ELEV attribute
- Designate an output directory to write a file called canal_start_head.dat

levee_bc_3_13_2006.xml

- You must first be in ✐EDIT MODE.
- Use the Boundary Condition tool found under GIS Generate XML menu
- Output will be written to \\gisdata2\citirix
- Rename file boundaryconditionreport.xml to levee_bc_3_13_2006.xml

junction_blocks.xml

- Use the HSE Network tool found under the GIS Generate XML menu
- Output will be written to \\gisdata2\citirix
- Rename file network.xml to MDM_junction_blocks040406.xml

Headstage

- Use the headstage tool found under the GIS generate XML menu
- Output will be written to \\gisdata2\citirix
- The file will be named Headstage.txt

mann_prop_3_13-2006.xml

- On the Python Toolbar use the Conveyance tool found under the Pre-Processing menu, Scenario Builder
- Use /nw/oom/sfrsm/workdirs/sfrsm_gui/sample_files/edit_scenario/conveyance.dat as input.

pws_3-13_2006.xml

- On the Python Toolbar use the PWS tool found under the Pre-Processing menu
- Use /nw/oom/sfrsm/workdirs/sfrsm_gui/sample_files/edit_scenario/pws_input.csv as input.

md_canal_bc_floats_ghb_pest03292006a.xml

- Output from Headstage tool

The following DSS files must be obtained for this scenario:

- **all_canal_bc.dss**
- **all_canal_historical.dss**
- **canal_bc.dss**
- **Canal_Stage_Glades1072005a.dss**
- **flow_v5.0_09122003.dss**
- **md_canal_bc.dss**
- **regional_cell_heads.dss**
- **rsm_calibVerif_v1.2.dss**
- **rsm_hourly_to_daily_tidal_65_00_v1.dss**
- **RSM_TIDES-2006.dss**

- **Meas+comp_submodel.dss**

The following binary .BIN files must be obtained for this scenario:
- **ETp_recomputed_tin.bin**
- **rain_v2.0_global.bin**

The GMS .2dm mesh file must be obtained for this scenario:
- **2dm_mesh.2dm**

The following static XML files must be obtained for this scenario:
- **evap_prop_3_13_2006.xml**
- **tide_wallghb_3_16_2006.xml**

The following XML files are being considered for the next phase of tool development but in the mean time must be obtained for this scenario:
- **cellghb_bc_4_10a-2006.xml**
- **levee_bc_3_13_2006.xml**
- **mdm_flow+stage_monitors.xml**
- **MDM_LVspg_PEST-03292006.xml**
- **Watermover_bc_MDM_03142006.xml**

Appendix E – The Calibration XML

Calibration.xml

The RSM utilizes an XML formatted file to configure a scenario. This XML is referred to as the "calibration.xml". First let's examine the main parts of the XML and then we will examine each block a little closer to gain a better understanding on how to configure a scenario.

XML BLOCK	Description
<Entity>	references to external files that will be used construct an RSM scenario
<Control>	control parameters used to construct a scenario such as: timestep, units, beginning data, end date.
<Mesh>	information describing the 2-D irregular triangular mesh
<Network>	information describing the canal network
<Watermovers>	information describing the watermovers (structures) represented in the scenario
<Output>	designations of how the model results will be output

<ENTITY>

The entity block contains references to files that will be used as input to the model. Validation of the XML elements and content accepted by the RSM are dictated by the RSM DTD file. The files are then referenced by the designated name (i.e. &tide_bc) elsewhere in the calibration.xml. Following this logic, each file being referenced can also contain references to other files.

```
<?xml version="1.0" ?>
<!DOCTYPE hse SYSTEM "./hse.dtd" [
<!ENTITY tide_bc     SYSTEM "../input/tide_wallghb_3_16_2006.xml">
<!ENTITY evap_prop  SYSTEM "../input/evap_prop_3_13_2006.xml">
<!ENTITY mann_prop  SYSTEM "../input/mann_prop_3_13_2006.xml">
<!ENTITY pws_bc     SYSTEM "../input/pws_3_13_2006.xml">
<!ENTITY levee_bc   SYSTEM "../input/levee_bc_3_13_2006.xml">
<!ENTITY levee-seep   SYSTEM "../input/MDM_LVSpg_PEST_03292006.xml">
<!ENTITY network_bc   SYSTEM "../input/md_canal_bc_floats_ghb_pest03292006a.xml">
<!ENTITY junction_blocks SYSTEM "../input/MDM_junction_blocks040406.xml">
<!ENTITY struc_ops SYSTEM "../input/Watermover_bc_MDM_03142006.xml">
<!ENTITY bnd_flux SYSTEM "../input/cellghb_bc_4_10a_2006.xml">
<!ENTITY dss_output1   SYSTEM "../input/mdm_flow+stage_monitors.xml">
]>
<hse version="0.1">
```

Files commonly included in the entity block include:

NAME	DESCRIPTION
hse	XML lexicon used to validate acceptable XML input to the model. data type definition (DTD) file
tide_bc	tidal boundary conditions
evap_prop	avapotranspiration properties
mann_prop	mannings coefficient properties
pws_bc	public water supply boundary conditions
levee_bc	levee boundary conditions
levee-seep	levee seepage
network_bc	canal network boundary conditions
junction_blocks	canal network junction blocks
struc_ops	structure operations
bnd_flux	boundary condition flux
dss_output1	dss input file containing flow and stage observations

<CONTROL>

The control block contains control parameters used to define an RSM scenario.

```
<control
 tslen="1"
 tstype="day"
 startdate="01Jan1983"
 starttime="0000"
 enddate="31Dec1995"
 endtime="2359"
 alpha="1.0"
 solver="PETSC"
 petscplot="none"
 method="bcgs"
 units="ENGLISH"
 controllers="off"
 supervisors="off"
 precond="bjacobi">
</control>
```

Elements within the control block

Element	Description
tslen	time stamp length
tstype	time step type
start date	scenario start date
start time	scenario start time
end date	scenario end date
end time	scenario end time
alpha	numeric time weighting factor
solver	PETSC is currently the only sparse solver method available

petscplot	solver monitor
method	sparse solver method used
units	units used in the model
controllers	controllers setting
supervisors	supervisors setting
precond	pre-conditioner setting

<MESH>

The mesh block contains information describing the 2-D irregular triangular mesh. The mesh contains information from several layers that help define the model scenario such as topo, landuse, hydraulic conductivity, transmissivity and storage coefficient.

```
<!-- Mesh Geometry file -->
  <mesh>
   <geometry file="../input/2dm_mesh.2dm" mult="1.0"></geometry>
  &tide_bc;
  &bnd_flux;
  &pws_bc;
  &levee_bc;
   <!-- Starting Head or intial condition - using land surface elevation -->
        <shead>
          <gms file="../input/topo.xml" mult="0.8">
          </gms>
         </shead>
     <!-- Rainfall & ET in GRIDIO -->
   <rain>
     <gridio file="../input/rain_v2.0_global.bin"
        xorig="237027" yorig="286611" mult=".0833" dbintl="1440">
     </gridio>
   </rain>
   <refet>
     <gridio file="../input/ETp_recomputed_tin.bin"
        xorig="237027" yorig="286611" mult=".0833" dbintl="1440">
     </gridio>
   </refet>
   <!-- Top of layer 1 or landsurface -->
   <surface>
         <gms file="../input/topo.xml" mult="1.0"></gms>
   </surface>
   <!-- Bottom of layer 1 -->
   <bottom>
```

```
        <gms file="../input/bot_lyr1.xml" mult="1.0"></gms>
    </bottom>
    &evap_prop;
    &mann_prop;
    <!-- horizontal hydraulic conductivity of layer 1 -->
    <!-- Zone 12 is default -->
        <transmissivity>
        <indexed file="../input/parameter_zones.gms">
         <entry id="1">
           <unconfined_gms_layer layer="1" file="../input/hyd_con.xml"  mult=" 4.8106251E-
05"/>
         </entry>
         <entry id="2">
           <unconfined_gms_layer layer="1" file="../input/hyd_con.xml"  mult=" 7.4167186E-
05"/>
         </entry>
         <entry id="3">
           <unconfined_gms_layer layer="1" file="../input/hyd_con.xml"  mult=" 6.7493859E-
06"/>
         </entry>
         <entry id="4">
           <unconfined_gms_layer layer="1" file="../input/hyd_con.xml"  mult=" 2.2810139E-
05"/>
         </entry>
         <entry id="5">
           <unconfined_gms_layer layer="1" file="../input/hyd_con.xml"  mult=" 9.4342727E-
06"/>
         </entry>
         <entry id="6">
           <unconfined_gms_layer layer="1" file="../input/hyd_con.xml"  mult=" 1.8824841E-
05"/>
         </entry>
         <entry id="7">
           <unconfined_gms_layer layer="1" file="../input/hyd_con.xml"  mult=" 4.9521702E-
05"/>
         </entry>
         <entry id="8">
           <unconfined_gms_layer layer="1" file="../input/hyd_con.xml"  mult=" 2.2289671E-
04"/>
         </entry>
         <entry id="9">
           <unconfined_gms_layer layer="1" file="../input/hyd_con.xml"  mult=" 8.0060304E-
06"/>
         </entry>
         <entry id="10">
           <unconfined_gms_layer layer="1" file="../input/hyd_con.xml"  mult="  3.3059612E-
06"/>
         </entry>
         <entry id="11">
```

```
          <unconfined_gms_layer layer="1" file="../input/hyd_con.xml"  mult="  1.0000000E-
06"/>
         </entry>
         <entry id="12">
         <unconfined_gms_layer layer="1" file="../input/hyd_con.xml"  mult="1.1574E-5"/>
         </entry>
        </indexed>
    </transmissivity>
    <!-- Storage coefficient or specific yield for layer 1 -->
    <!-- Zone 12 is default -->
      <svconverter>
        <indexed file="../input/parameter_zones.gms">
         <entry id="1">
           <constsv sc="   2.0000000E-01"></constsv>
         </entry>
         <entry id="2">
           <constsv sc="   2.0000000E-01"></constsv>
         </entry>
         <entry id="3">
           <constsv sc="   2.0000000E-01"></constsv>
         </entry>
         <entry id="4">
           <constsv sc="   2.0000000E-01"></constsv>
         </entry>
         <entry id="5">
           <constsv sc="   2.0000000E-01"></constsv>
         </entry>
         <entry id="6">
           <constsv sc="   2.0000000E-01"></constsv>
         </entry>
         <entry id="7">
           <constsv sc="   2.0000000E-01"></constsv>
         </entry>
         <entry id="8">
           <constsv sc="   2.0000000E-01"></constsv>
         </entry>
         <entry id="9">
           <constsv sc="   2.0000000E-01"></constsv>
         </entry>
         <entry id="10">
           <constsv sc="   2.0000000E-01"></constsv>
         </entry>
         <entry id="11">
           <constsv sc="   9.5000000E-01"></constsv>
         </entry>
         <entry id="12">
             <constsv sc="   2.0000000E-01"></constsv>
         </entry>
        </indexed>
```

```
  </svconverter>
   </mesh>
```

<NETWORK>

The network block contains information describing the canal network. The canal network contains information pertaining to cross-sectional values, leekage coefficients, flow coefficients boundary conditions and the geometry of the canal network.

```
<!-- Canal Network -->
<network>
<geometry file="../input/canal_3_14.map"> </geometry>
<initial file="../input/canal_start_head.dat"> </initial>
<arcs>
  <indexed file="../input/canal_index_04052006.dat">
    <xsentry id="1">
      <arcflow n="0.06"></arcflow>
      <arcseepage leakage_coeff="0.00001"></arcseepage>
    </xsentry>
    <xsentry id="2">
      <arcflow n="0.06"></arcflow>
      <arcseepage leakage_coeff="0.00001"></arcseepage>
    </xsentry>
    <xsentry id="3">
      <arcflow n="0.04"></arcflow>
      <arcseepage leakage_coeff="0.00001"></arcseepage>
    </xsentry>
    <xsentry id="4">
      <arcflow n="0.06"></arcflow>
      <arcseepage leakage_coeff="0.00001"></arcseepage>
    </xsentry>
    <xsentry id="5">
      <arcflow n="0.06"></arcflow>
      <arcseepage leakage_coeff="0.00001"></arcseepage>
    </xsentry>
    <xsentry id="6">
      <arcflow n="0.06"></arcflow>
      <arcseepage leakage_coeff="0.00001"></arcseepage>
    </xsentry>
    <xsentry id="7">
      <arcflow n="0.06"></arcflow>
      <arcseepage leakage_coeff="0.00001"></arcseepage>
    </xsentry>
    <xsentry id="8">
      <arcflow n="0.06"></arcflow>
      <arcseepage leakage_coeff="0.00001"></arcseepage>
      <arcoverbank bank_height="0.00" bank_coeff="0.05"></arcoverbank>
```

</xsentry>
<xsentry id="9">
<arcflow n="0.06"></arcflow>
<arcseepage leakage_coeff="0.00001"></arcseepage>
<arcoverbank bank_height="0.00" bank_coeff="0.05"></arcoverbank>
</xsentry>
<xsentry id="10">
<arcflow n="0.06"></arcflow>
<arcseepage leakage_coeff="0.00001"></arcseepage>
<arcoverbank bank_height="0.00" bank_coeff="0.05"></arcoverbank>
</xsentry>
<xsentry id="11">
<arcflow n="0.045"></arcflow>
<arcseepage leakage_coeff="0.00001"></arcseepage>
<arcoverbank bank_height="0.00" bank_coeff="0.05"></arcoverbank>
</xsentry>
<xsentry id="12">
<arcflow n="0.045"></arcflow>
<arcseepage leakage_coeff="0.00001"></arcseepage>
<arcoverbank bank_height="0.00" bank_coeff="0.05"></arcoverbank>
</xsentry>
<xsentry id="13">
<arcflow n="0.045"></arcflow>
<arcseepage leakage_coeff="0.00001"></arcseepage>
<arcoverbank bank_height="0.00" bank_coeff="0.05"></arcoverbank>
</xsentry>
<xsentry id="14">
<arcflow n="0.06"></arcflow>
<arcseepage leakage_coeff="0.00001"></arcseepage>
<arcoverbank bank_height="0.00" bank_coeff="0.05"></arcoverbank>
</xsentry>
<xsentry id="15">
<arcflow n="0.06"></arcflow>
<arcseepage leakage_coeff="0.00001"></arcseepage>
</xsentry>
<xsentry id="16">
<arcflow n="0.06"></arcflow>
<arcseepage leakage_coeff="0.00001"></arcseepage>
</xsentry>
<xsentry id="17">
<arcflow n="0.06"></arcflow>
<arcseepage leakage_coeff="0.00001"></arcseepage>
</xsentry>
<xsentry id="18">
<arcflow n="0.06"></arcflow>
<arcseepage leakage_coeff="0.00001"></arcseepage>
</xsentry>
<xsentry id="94">
<arcflow n="0.04"></arcflow>

```
        <arcseepage leakage_coeff="0"></arcseepage>
        <arcoverbank bank_height="20" bank_coeff="0.05"></arcoverbank>
</xsentry>
<xsentry id="96">
            <arcflow n="0.04"></arcflow>
            <arcseepage leakage_coeff="0"></arcseepage>
</xsentry>
<xsentry id="97">
        <arcflow n="0.04"></arcflow>
        <arcseepage leakage_coeff="0"></arcseepage>
</xsentry>
<xsentry id="98">
        <arcflow n="0.04"></arcflow>
        <arcseepage leakage_coeff="0"></arcseepage>
</xsentry>
<xsentry id="99">
        <arcflow n="0.04"></arcflow>
        <arcseepage leakage_coeff="0"></arcseepage>
</xsentry>
<xsentry id="4601">
  <arcflow n=".0300000000" />
  <arcseepage leakage_coeff="0.0" />
</xsentry>
<xsentry id="4202">
  <arcflow n=".0656452397" />
  <arcseepage leakage_coeff=".0017746582" />
</xsentry>
<xsentry id="4502">
  <arcflow n=".0300000000" />
  <arcseepage leakage_coeff=".0017746582" />
</xsentry>
<xsentry id="4602">
  <arcflow n=".0300000000" />
  <arcseepage leakage_coeff=".0017746582" />
</xsentry>
<xsentry id="4702">
  <arcflow n=".1000000000" />
  <arcseepage leakage_coeff=".0017746582" />
</xsentry>
<xsentry id="4103">
  <arcflow n=".1000000000" />
  <arcseepage leakage_coeff="9.185292E-4" />
</xsentry>
<xsentry id="4204">
  <arcflow n=".0656452397" />
  <arcseepage leakage_coeff="7.777518E-5" />
</xsentry>
<xsentry id="4404">
  <arcflow n=".0300000000" />
```

```
  <arcseepage leakage_coeff="7.777518E-5" />
</xsentry>
<xsentry id="4504">
  <arcflow n=".0300000000" />
  <arcseepage leakage_coeff="7.777518E-5" />
</xsentry>
<xsentry id="4704">
  <arcflow n=".1000000000" />
  <arcseepage leakage_coeff="7.777518E-5" />
</xsentry>
<xsentry id="4705">
  <arcflow n=".1000000000" />
  <arcseepage leakage_coeff="5.035207E-4" />
</xsentry>
<xsentry id="4106">
  <arcflow n=".1000000000" />
  <arcseepage leakage_coeff="1.360386E-4" />
</xsentry>
<xsentry id="4206">
  <arcflow n=".0656452397" />
  <arcseepage leakage_coeff="1.360386E-4" />
</xsentry>
<xsentry id="4306">
  <arcflow n=".1000000000" />
  <arcseepage leakage_coeff="1.360386E-4" />
</xsentry>
<xsentry id="4107">
  <arcflow n=".1000000000" />
  <arcseepage leakage_coeff="9.443868E-4" />
</xsentry>
<xsentry id="4207">
  <arcflow n=".0656452397" />
  <arcseepage leakage_coeff="9.443868E-4" />
</xsentry>
<xsentry id="4607">
  <arcflow n=".0300000000" />
  <arcseepage leakage_coeff="9.443868E-4" />
</xsentry>
<xsentry id="4208">
  <arcflow n=".0656452397" />
  <arcseepage leakage_coeff="1.359664E-5" />
</xsentry>
<xsentry id="4308">
  <arcflow n=".1000000000" />
  <arcseepage leakage_coeff="1.359664E-5" />
</xsentry>
<xsentry id="4809">
  <arcflow n=".1000000000" />
  <arcseepage leakage_coeff="1.796430E-5" />
```

```
      </xsentry>
      <xsentry id="4110">
        <arcflow n=".1000000000" />
        <arcseepage leakage_coeff="4.916325E-5" />
      </xsentry>
      <xsentry id="4210">
        <arcflow n=".0656452397" />
        <arcseepage leakage_coeff="4.916325E-5" />
      </xsentry>
      <xsentry id="4511">
        <arcflow n=".0300000000" />
        <arcseepage leakage_coeff="8.299992E-5" />
      </xsentry>
      <xsentry id="4611">
        <arcflow n=".0300000000" />
        <arcseepage leakage_coeff="8.299992E-5" />
      </xsentry>
      <xsentry id="4711">
        <arcflow n=".1000000000" />
        <arcseepage leakage_coeff="8.299992E-5" />
      </xsentry>
      <xsentry id="4811">
        <arcflow n=".1000000000" />
        <arcseepage leakage_coeff="8.299992E-5" />
     </xsentry>
    </indexed>
  </arcs>
 <network_bc>
     &network_bc;
    &junction_blocks;
 </network_bc>
  </network>
```

<WATERMOVERS>

The watermover block contains information describing the structures represented in the scenario. The watermovers contain information pertaining to structure operations and levee seepage.

```
<watermovers>
   &levee-seep;
  &struc_ops;
 </watermovers>
```

<OUTPUT>

The output block contains information describing the output to be generated from the model run. The output information can include information pertaining to global monitors, waterbudgets and flow observations. Output is directed to a specified directory into specified netCDF files.

```
<!-- Model output - we are using NetCDF so that results can be viewed
      using the python post processing GUI -->
  <output>

  <!-- &BC_mon; -->
  &dss_output1;
  <globalmonitor attr="topo">
      <netcdf file="./output/sfrsm_calib_cellghb041006.nc">
      </netcdf>
    </globalmonitor>
    <globalmonitor attr="head">
      <netcdf file="./output/sfrsm_calib_cellghb041006.nc">
      </netcdf>
    </globalmonitor>
    <globalmonitor attr="segmenthead">
     <netcdf file="./output/sfrsm_calib_cellghb041006.nc">
      </netcdf>
    </globalmonitor>
    <globalmonitor attr="olvector" >
      <netcdf file="./output/sfrsm_calib_cellghb041006.nc">
      </netcdf>
    </globalmonitor>
  <!-- <budget file="./output/budget.dat"></budget>
  <budgetpackage file="./output/budgetpackage_3_22_2006.nc"
dbintl="525600"></budgetpackage>
  <psbudgetpackage file="./output/psbudgetpackage_3_22_2006.nc"
dbintl="525600"></psbudgetpackage> -->
     <flowgage section="gw" label="MDM_wBC_GW">
            <nodelist> 1320 1415 1517 1516 1515 1514 1513 1512 1511 1510 1509 1620 1619
</nodelist>
            <dss file="./output/transect_flows.dss" pn="/SFRSM/ENP/GWFLOW//1DAY/CALC/">
</dss></flowgage>
    <flowgage section="ol" label="MDM_wBC_SWF">
            <nodelist> 1320 1415 1517 1516 1515 1514 1513 1512 1511 1510 1509 1620 1619
</nodelist>
          <dss file="./output/transect_flows.dss" pn="/SFRSM/ENP/SWFLOW//1DAY/CALC/">
</dss>  </flowgage>
  </output>

</hse>
```

Appendix F – The PMG SOURCE FILE

```
# This file contains the ENVIRONMENT VARIABLES for the various SFWMM runs
that we want to compare in the
# Performance Measure (PM) Graphics. This file should be updated BEFORE
making a run of the PM graphics.
# When running frmo the command line, "source" this file as the first step.
# When running throught the RSMTOOLBAR you will be prompted for this file to
run the graphics tools.

# All the run variables should be defined/updated (to to six runs). If only
two runs along
# with the base run are desired, the 3rd, 4th, & 5th variable can be
designated as null (" ").
# The legends, xaxis labels should also be set to null.
# Further comments below are to help understand how to edit this file.


###  Title block information, version, etc. included at the bottom of the
graphs  ###

unsetenv SFRSM_VER
unsetenv DISCLAIM
unsetenv RECOVER
  setenv SFRSM_VER "Regional Simulation Model (RSM)"
  setenv DISCLAIM "For Planning Purposes Only"
  setenv RECOVER "N"

###  directory paths  ###
# In this area you will designate the path to the output.dss files for each
run.

unsetenv SFWMM_NSM
unsetenv SFWMM_RUN1
unsetenv SFWMM_RUN2
unsetenv SFWMM_RUN3
unsetenv SFWMM_RUN4
unsetenv SFWMM_RUN5
  setenv SFWMM_NSM  "/opt/local/share3/share/samples/pmg_pmi/data"
  setenv SFWMM_RUN1 "/opt/local/share3/share/samples/pmg_pmi/data"
  setenv SFWMM_RUN2 "/opt/local/share3/share/samples/pmg_pmi/data"
  setenv SFWMM_RUN3 "/opt/local/share3/share/samples/pmg_pmi/data"
  setenv SFWMM_RUN4 "/opt/local/share3/share/samples/pmg_pmi/data"
  setenv SFWMM_RUN5 "/opt/local/share3/share/samples/pmg_pmi/data"
###  legend  ###
# In this area you will designate the names to be used in the legend for
each run.

unsetenv SFWMM_NSM_LEGEND
unsetenv SFWMM_RUN1_LEGEND
unsetenv SFWMM_RUN2_LEGEND
unsetenv SFWMM_RUN3_LEGEND
unsetenv SFWMM_RUN4_LEGEND
unsetenv SFWMM_RUN5_LEGEND
```

```
  setenv SFWMM_NSM_LEGEND  "CBASE"
  setenv SFWMM_RUN1_LEGEND "FBASE"
  setenv SFWMM_RUN2_LEGEND "ALT1"
  setenv SFWMM_RUN3_LEGEND "ALT2"
  setenv SFWMM_RUN4_LEGEND "ALT3"
  setenv SFWMM_RUN5_LEGEND "ALT4"


###  x-axis labels  ###
# In this area you will designate the X-axis labels for each run.


unsetenv SFWMM_NSM_XAXIS
unsetenv SFWMM_RUN1_XAXIS
unsetenv SFWMM_RUN2_XAXIS
unsetenv SFWMM_RUN3_XAXIS
unsetenv SFWMM_RUN4_XAXIS
unsetenv SFWMM_RUN5_XAXIS
  setenv SFWMM_NSM_XAXIS  "BASE"
  setenv SFWMM_RUN1_XAXIS "SAMPLE1"
  setenv SFWMM_RUN2_XAXIS "SAMPLE2"
  setenv SFWMM_RUN3_XAXIS "SAMPLE3"
  setenv SFWMM_RUN4_XAXIS "SAMPLE4"
  setenv SFWMM_RUN5_XAXIS "SAMPLE5"


###  time frame to be graphed  ###
# In this area you will designate the start and end time for the graphic.

unsetenv SFWMM_START_YR
unsetenv SFWMM_START_MONTH
unsetenv SFWMM_START_DAY
unsetenv SFWMM_END_YR
unsetenv SFWMM_END_MONTH
unsetenv SFWMM_END_DAY
  setenv SFWMM_START_YR 1965
  setenv SFWMM_START_MONTH 1
  setenv SFWMM_START_DAY 1
  setenv SFWMM_END_YR 2005
  setenv SFWMM_END_MONTH 12
  setenv SFWMM_END_DAY 31


###  "C" current   OR   "F" future w/o reservoir   OR   "R" future with
reservoir  ###
# In this area you will designate type to be used in processing each run.

unsetenv SFWMM_RUN1_YEAR
unsetenv SFWMM_RUN2_YEAR
unsetenv SFWMM_RUN3_YEAR
unsetenv SFWMM_RUN4_YEAR
unsetenv SFWMM_RUN5_YEAR
  setenv SFWMM_RUN1_YEAR "C"
  setenv SFWMM_RUN2_YEAR "C"
```

```
  setenv SFWMM_RUN3_YEAR "C"
  setenv SFWMM_RUN4_YEAR "C"
  setenv SFWMM_RUN5_YEAR "C"


###  variables pointing to dmdro2x2 files  ###
# In this area you will designate the location of the 2x2 output to be used
in processing each run.

unsetenv SFWMM_DMDRO_FILE1
unsetenv SFWMM_DMDRO_FILE2
unsetenv SFWMM_DMDRO_FILE3
unsetenv SFWMM_DMDRO_FILE4
unsetenv SFWMM_DMDRO_FILE5
  setenv SFWMM_DMDRO_FILE1
"/opt/local/share3/share/samples/pmg_pmi/data/dmdro_v5.0_100306.dss"
  setenv SFWMM_DMDRO_FILE2
"/opt/local/share3/share/samples/pmg_pmi/data/dmdro_v5.0_100306.dss"
  setenv SFWMM_DMDRO_FILE3
"/opt/local/share3/share/samples/pmg_pmi/data/dmdro_v5.0_100306.dss"
  setenv SFWMM_DMDRO_FILE4
"/opt/local/share3/share/samples/pmg_pmi/data/dmdro_v5.0_100306.dss"
  setenv SFWMM_DMDRO_FILE5
"/opt/local/share3/share/samples/pmg_pmi/data/dmdro_v5.0_100306.dss"


###  general variables for most scripts  ###
# This area typically does NOT need to be edited as the paths are standard
for running on the whqoom01d server.

unsetenv GRBATCH_DIR
unsetenv PM_DATA_DIR
unsetenv PM_EXEC_DIR
unsetenv PM_TMP_DIR
unsetenv  HSM_BIN

setenv  PM_TMP_DIR   "/tmp"
setenv  GRBATCH_DIR  "/usr/local/grace/bin"
setenv  HSM_BIN      "/opt/local/share3/share/samples/pmgs/bin"
setenv  PM_DATA_DIR  "/opt/local/share3/share/rsmpost/pmgs/data"
setenv  PM_EXEC_DIR  "/opt/local/share3/share/rsmpost/pmgs/exec"
setenv  SFWMM_VER "5.5"
```

Appendix G – The LeveeSeepage Report Input Files

LeveeSeepage XML

```
<!-- seepage across C-111, from S-18C to S-197 (extrapolated from S-177 to 18C) -->
<leveeSeepage>
 <MarshCellToDryCell MarshCellId="26866" DryCellId="26865" K_md="3.1300000E-
05" wmID="604206" length="5700" />
 <MarshCellToSegment MarshCellId="26866" SegmentId="309554"
K_ms="9.4955613E-03" wmID="604207" length="5700" />
 <DryCellToSegment DryCellId="26865" SegmentId="309554" K_ds="1.0571970E-02"
wmID="604208" length="5700" />
```

```
</leveeSeepage>
<leveeSeepage>
 <MarshCellToDryCell MarshCellId="27041" DryCellId="27040" K_md="3.1300000E-05" wmID="604209" length="5600" />
 <MarshCellToSegment MarshCellId="27041" SegmentId="309554" K_ms="9.4955613E-03" wmID="604210" length="5600" />
 <DryCellToSegment DryCellId="27040" SegmentId="309554" K_ds="1.0571970E-02" wmID="604211" length="5600" />
</leveeSeepage>
<leveeSeepage>
 <MarshCellToDryCell MarshCellId="27151" DryCellId="27150" K_md="3.1300000E-05" wmID="604212" length="6300" />
 <MarshCellToSegment MarshCellId="27151" SegmentId="309553" K_ms="9.4955613E-03" wmID="604213" length="6300" />
 <DryCellToSegment DryCellId="27150" SegmentId="309553" K_ds="1.0571970E-02" wmID="604214" length="6300" />
</leveeSeepage>
<leveeSeepage>
 <MarshCellToDryCell MarshCellId="27232" DryCellId="27231" K_md="3.1300000E-05" wmID="604215" length="6000" />
 <MarshCellToSegment MarshCellId="27232" SegmentId="309555" K_ms="9.4955613E-03" wmID="604216" length="6000" />
 <DryCellToSegment DryCellId="27231" SegmentId="309555" K_ds="1.0571970E-02" wmID="604217" length="6000" />
</leveeSeepage>
<leveeSeepage>
 <MarshCellToDryCell MarshCellId="27301" DryCellId="27300" K_md="3.1300000E-05" wmID="604218" length="5600" />
 <MarshCellToSegment MarshCellId="27301" SegmentId="309558" K_ms="9.4955613E-03" wmID="604219" length="5600" />
 <DryCellToSegment DryCellId="27300" SegmentId="309558" K_ds="1.0571970E-02" wmID="604220" length="5600" />
</leveeSeepage>
<leveeSeepage>
 <MarshCellToDryCell MarshCellId="27362" DryCellId="27361" K_md="3.1300000E-05" wmID="604221" length="6100" />
 <MarshCellToSegment MarshCellId="27362" SegmentId="309558" K_ms="9.4955613E-03" wmID="604222" length="6100" />
 <DryCellToSegment DryCellId="27361" SegmentId="309558" K_ds="1.0571970E-02" wmID="604223" length="6100" />
</leveeSeepage>
<!-- end of input -->
```