Appendix IV. User's Manual for the Pee Dee River and Atlantic Intracoastal Waterway Salinity Intrusion Model Decision Support System (Version 2)

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1. INTRODUCTION

This document describes how to install and operate the **P**ee Dee **R**iver and Atlantic **I**ntracoastal Waterway **S**alinity Intrusion **M**odel-Version **2** (PRISM-2). The PRISM-2 is a decision support system (DSS) built around a suite of empirical hydrologic models of the study area (fig. A1). Hydrologic behaviors in the study area have been measured at a number of streamgaging stations operated by the U.S. Geological Survey (USGS) since the mid-1980s.

Figure A1. Study area showing U.S. Geological Survey stream gaging station locations in South Carolina where flow, water level, and specific conductance were measured.

2. INSTALLATION

1. Create a folder called “PRISM2” at the top level of your C: drive.
2. Extract all files from the distributed PRISM2-yyyymmdd.zip[1] file. The WinZip™ file contains the following application files:

[1] yyyymmdd is the version date of the PRISM2 application to be installed.

- PRISM2-yyyymmdd.xls—a Microsoft Excel™ (Excel) spreadsheet application,
- 18 files with an ".enn" extension—these are the artificial neural network (ANN) files,
- NNCALC32.xll—a custom Excel add-in used to execute the *.enn files,
- PRISM2UserGuide-yyyymmdd.doc—the Microsoft Word™ file that you are reading right now, and
- ReadMe.txt—a text file with these installation instructions.

3. Open your copy of Microsoft Excel™ for Office 2000™ (Excel). The version of Excel must be 2000 or newer. Ensure that the standard Excel Add-Ins listed below are installed and checked "available."

Analysis Toolpak
Analysis Toolpak – VBA

Add-Ins are accessed from Excel's Tools menu. If any are missing, it may be necessary to install them from your Microsoft Office CD-ROM.

4. Set the macro security level of Excel to either medium or low using Tools > Macro > Security. PRISM-2 uses VBA macros for a variety of purposes and must be able to execute them to operate correctly.
5. Install the NNCALC32 custom Excel add-in that resides in the NNCALC folder described in Step 2. This may be accomplished by clicking on Tools > Add-Ins > Browse, then browsing to the PRISM2 folder you created, clicking on the NNCALC32 icon, then clicking OK.
6. Open the PRISM2-yyyymmdd.xls Excel spreadsheet application. When Excel asks if you want to run macros, click "Enable Macros"; otherwise, PRISM-2 will not operate correctly.

Select the "Run" worksheet (fig. A2). "Run" is the graphical user interface (GUI) component that allows the user to set up and run simulations. At the top of "Run" is a text box labeled "Where model files are located." The model files are the *.enn files. Type in the fully qualified path name of the folder set up in Step 1 above, and save the Excel application using File > Save for the set up changes to be permanent.

At lower right in the "Run" worksheet are a number of columns with headers containing specific conductance (SC). If many of the SC-related fields show numerical values and not "?" or an Excel or NNCALC32 error code, the application is properly configured and ready to use. If all of the SC-related fields show "?" or an error code, exit Excel™ and reload Excel and the PRISM application.

An error code indicates that an ANN cannot execute because either the NNCALC32 add-in is not installed per Step 5 or NNCALC32 cannot find *.enn files because the folder path name in the "Where model files are located" text box is incorrect.

If you cannot get PRISM-2 to operate, re-check the configuration items in Steps 3–6 above.

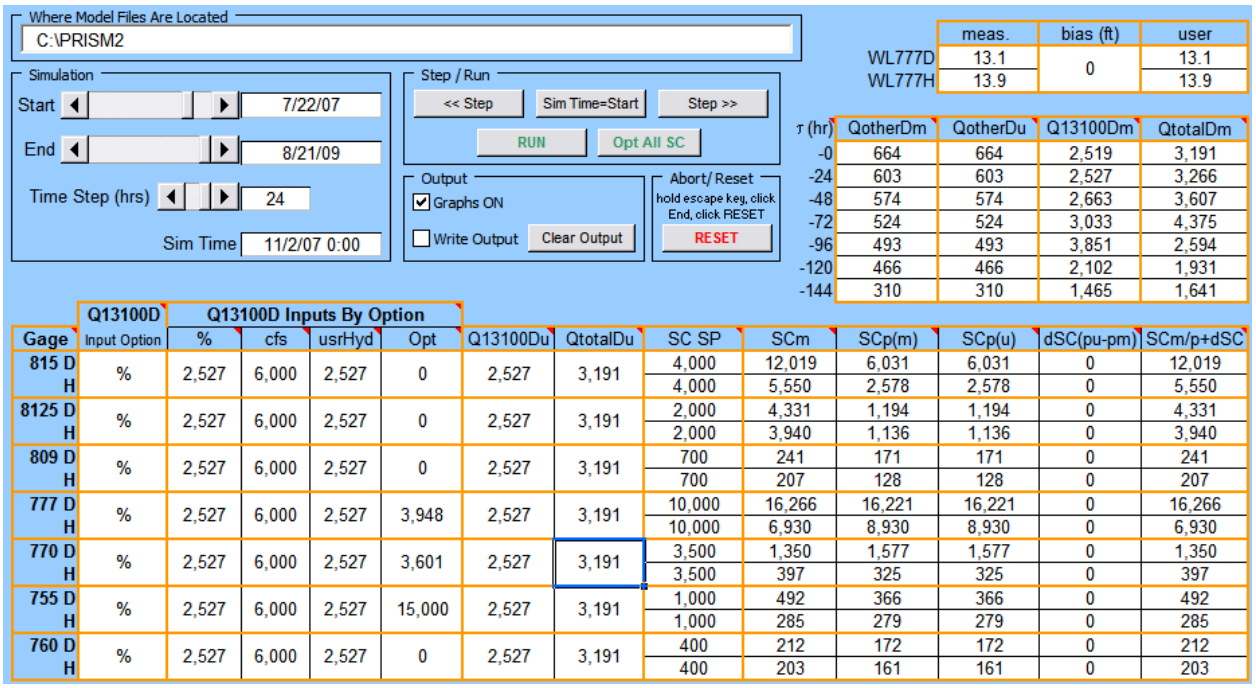


Figure A2. The "Run" worksheet, a component of **P**ee Dee **R**iver and Atlantic **I**ntracoastal Waterway **S**alinity Intrusion **M**odel (Version **2**) graphical user interface.

3. REMOVAL

Delete the folder created to hold the PRISM-2 files and contents.

4. OPERATION

PRISM-2 is opened like any standard Excel workbook. Simply open the PRISM2-yyyymmdd.xls file, and you begin. PRISM2 and its GUI includes a number of worksheets that are described in detail in the following sections.

4.1. Variable Descriptions, Nomenclature, and "ReleaseNotes" Worksheet

PRISM-2 refers to many input and output variables, usually in the form of column headers (fig. A3). Moving the cursor over a header marked with a red caret immediately above and to the right of the header will provide a description of the header variable.

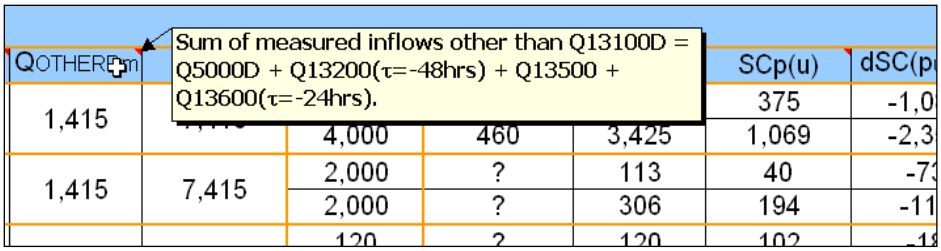


Figure A3. Description of the variable QOTHERDm on the "Run" worksheet.

Descriptions of variables are provided in the "ReleaseNotes" worksheet. This worksheet also describes the development history of PRISM-2 and any new features or changes.

Some of the prefixes, suffixes, and other modifiers that are used in variable names include

- "D," used as a suffix to indicate that a variable is a "daily" or 24-hour average;
- "d," used as a prefix to indicate that a variable is the difference between the values of two variables;
- "p," used to indicate that the variable is a model prediction;
- "m," used to indicate that the value of a variable is either
  - an actual measurement or
  - a model prediction made using an actual measured flow (Q) at station 02131000 (Q131000) as an input value;
- "u," used to indicate that the value of a variable is either
  - a user-set or optimizer-set Q131000 value or
  - a model prediction made using a user-set or optimizer-set Q131000 input value.

4.2. "Info" Worksheet

The "Info" worksheet is automatically displayed when PRISM-2 is first loaded (fig. A4). It contains the program's version date and the contact information of its developers.

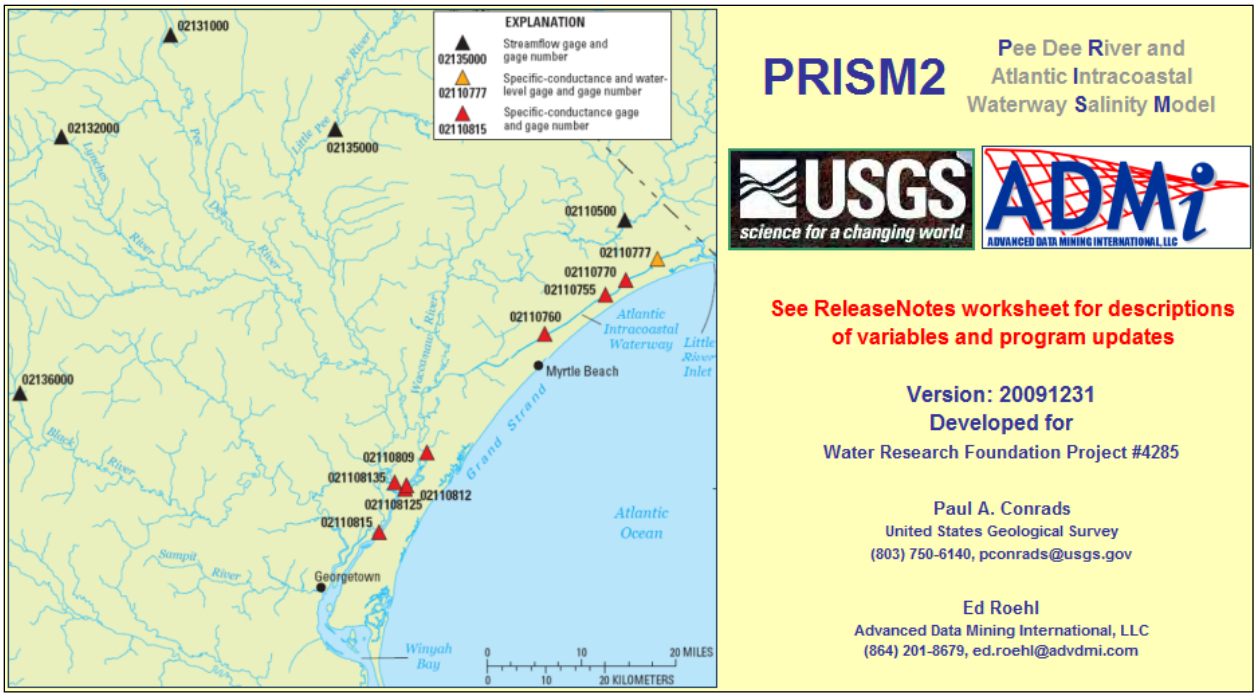


Figure A4. The "Info" worksheet.

4.3. "Run" Worksheet

The "Run" worksheet (fig. A2) is the GUI component that allows the user to set up and run simulations. At the top of "Run" is a text box labeled "Where model files are located." The textbox is used to configure PRISM-2 when it is first installed on a user's computer; it is described further in section 2. As shown in figure A5, start and end dates for simulations can be set by using the controls at the upper left. The end date must be more recent than the start date. The "Time Step" can be set to either 1 hour or 24 hours. PRISM2 simultaneously calculates both daily average and hourly SC. The "Sim Time" text box indicates the time stamp that is providing the current input values to PRISM-2's models.

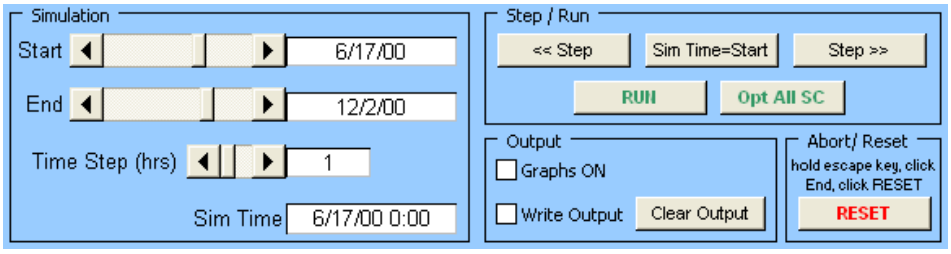


Figure A5. Simulation controls on "Run" worksheet.

In the “Step / Run” controls at the upper right in figure A5, “<<Step” and “Step>>,” move the current time stamp backward or forward one time step. “Sim Time=Start” sets the current time stamp to the simulation “Start” date. “RUN” will start and run a simulation between the dates indicated by the simulation “Start” and “End” dates. “Opt All SC,” for the current time stamp, will run the optimizer for those gages designated by their “Q13100D Input Option” (fig. A2).

On a separate worksheet for each gage, PRISM-2 provides detailed numerical and streaming graphical information that can be observed during simulations or when incrementally stepping through time. This allows the user to examine specific periods and behaviors of interest in detail. PRISM-2 also will write input and output data to the “Output” worksheet. Because of the added computational load, simulations are slowed when streaming graphics and simulation output are generated2. The “Graphs ON” and “Write Output” check boxes of the “Output” controls at lower center right in figure A5 allow the user to toggle the streaming graphics on or off. The “Clear Output” button erases all data in the “Output” worksheet to allow data from a new simulation to be recorded.

A simulation may be stopped at any time during a run by holding down the “Esc” key, after which a pop-up window will appear like that shown in figure A6. Click on the “End” button to stop the simulation, then click the “Reset” button shown at lower right in figure A5. The “Reset” button activates Excel’s™ automatic calculation feature (autocalc). Because the model programmatically manipulates autocalc for performance reasons, aborting a simulation can sometimes leave the model in a state where autocalc is not activated. This is remedied by clicking the “Reset” button.

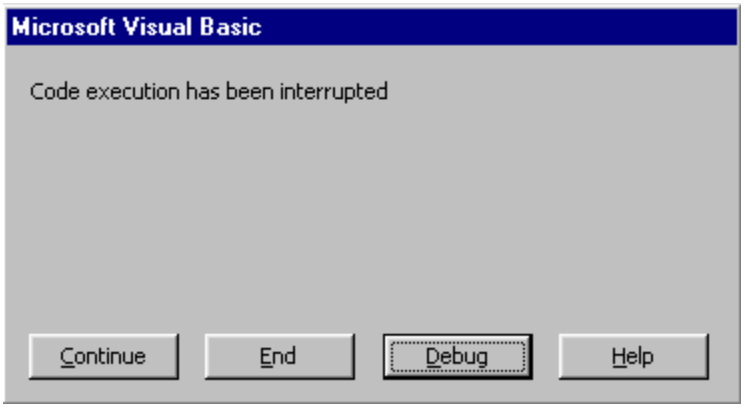


Figure A6. Pop-up window that appears when a simulation is interrupted using the “Esc” key.

[2] The original PRISM was developed in EXCEL™ 2000. It was ported to EXCEL™ 2007 for PRISM-2, where it was found to run very, very slowly. It was learned that in EXCEL™ 2007 macros and chart refreshing execute an order of magnitude more slowly than in previous versions (see *http://www.add-ins.com/Excel%202003%20versus%202007.htm*); therefore, PRISM2 EXCEL™ is also an EXCEL™ 2000 application. It will run in EXCEL™ 2007 but with greatly diminished execution speed.

Figure A7 shows that there are a number of input options for the models of each gage. By column from left to right, they are

- “Gage”: denotes the gage options, setpoints, measurements, and predictions in the rows to the right in the “Run” worksheet. The "D” (daily average value) and the "H” (hourly value) label the “SC SP,” “SCm,” “SCp(m),” “SCp(u),” “dSC(pu-pm),” and “SCm/p+dSC” fields.
- “Q13100D Input Option”: Options listed below are shown above slider bar. Only “%” is shown in figure A7:
  - “%”: percent of historical flow,
  - “cfs”: fixed flow rate in units of cubic feet per second,
  - “usrHyd”: uses the user-defined hydrograph pasted into the UserQ13100D worksheet by the user,
  - “LimitD”: the optimizer is engaged when the daily average SC at the gage exceeds the SC setpoint set on the “SPs” worksheet (see section 4.4),
  - “LimitH”: the optimizer is engaged when the hourly SC at the gage exceeds the SC setpoint set on the “SPs” worksheet ,
  - “OptD”: the optimizer is engaged continuously to hold daily average SC at the gage to the SC setpoint set on the “SPs” worksheet, and
  - “OptH”: the optimizer is engaged continuously to hold daily average SC at the gage to the SC setpoint set on the “SPs” worksheet.
- “Q13100D Inputs By Option”: the potential user-set Q13100D values input to each gage’s model pair. The actual value used depends on the “Q13100D Input Option” setting.
  - “%”: shows the “%” setpoint value set on the “SPs” worksheet.
  - “cfs”: shows the “cfs” setpoint value set on the “SPs” worksheet.
  - “usrHyd”: shows the value given for the current time stamp in the user-defined hydrograph on the UserQ13100D worksheet.
  - “Opt”: shows the value computed by the optimizer to meet the SC Setpoint set on the “SPs” worksheet.
- Q13100Du: the input value used according to the “Q13100D Input Option” setting.
- QTOTDu: total inflow = Q13100Du(τ=24 hrs) + QOTHERm.
- “SC SP”: Daily and hourly SC setpoints as set on the “SPs” worksheet. The setpoint used is per the Q13100D Input Option.
- “SCm”: measured daily and hourly SC.
- “SCp(m)”: predicted daily and hourly SC using the measured Q13100D for input.
- “SCp(u)”: predicted daily and hourly SC using the Q13100Du for input.
- “dSC(pu-pm)”: =SCp(u) - SCp(m).
- “SCm/p+dSC”: =SCm + dSC(pu-pm) if SCm is not missing, else = SCp(m) + dSC(pu-pm) .

	Q13100D	Q13100D Inputs By Option											
Gage	Input Option	%	cfs	usrHyd	Opt	Q13100Du	QtotalDu	SC SP	SCm	SCp(m)	SCp(u)	dSC(pu-pm)	SCm/p+dSC
815 D	OptH	2,527	6,000	2,527	0	0	725	4,000	12,019	6,031	25,217	19,186	31,205
H								4,000	5,550	2,578	18,662	16,084	21,634
8125 D	%	2,527	6,000	2,527	0	2,527	3,252	2,000	4,331	1,194	1,128	-66	4,266
H								2,000	3,940	1,136	1,078	-57	3,883
809 D	%	2,527	6,000	2,527	0	2,527	3,252	700	241	171	170	-2	240
H								700	207	128	128	0	207
777 D	%	2,527	6,000	2,527	3,948	2,527	3,252	10,000	16,266	16,221	16,095	-127	16,139
H								10,000	6,930	8,930	8,784	-146	6,784
770 D	%	2,527	6,000	2,527	3,601	2,527	3,252	3,500	1,350	1,577	1,552	-25	1,325
H								3,500	397	325	324	-2	395
755 D	%	2,527	6,000	2,527	15,000	2,527	3,252	1,000	492	366	359	-7	485
H								1,000	285	279	277	-2	283
760 D	%	2,527	6,000	2,527	0	2,527	3,252	400	212	172	170	-2	211
H								400	203	161	160	-1	202

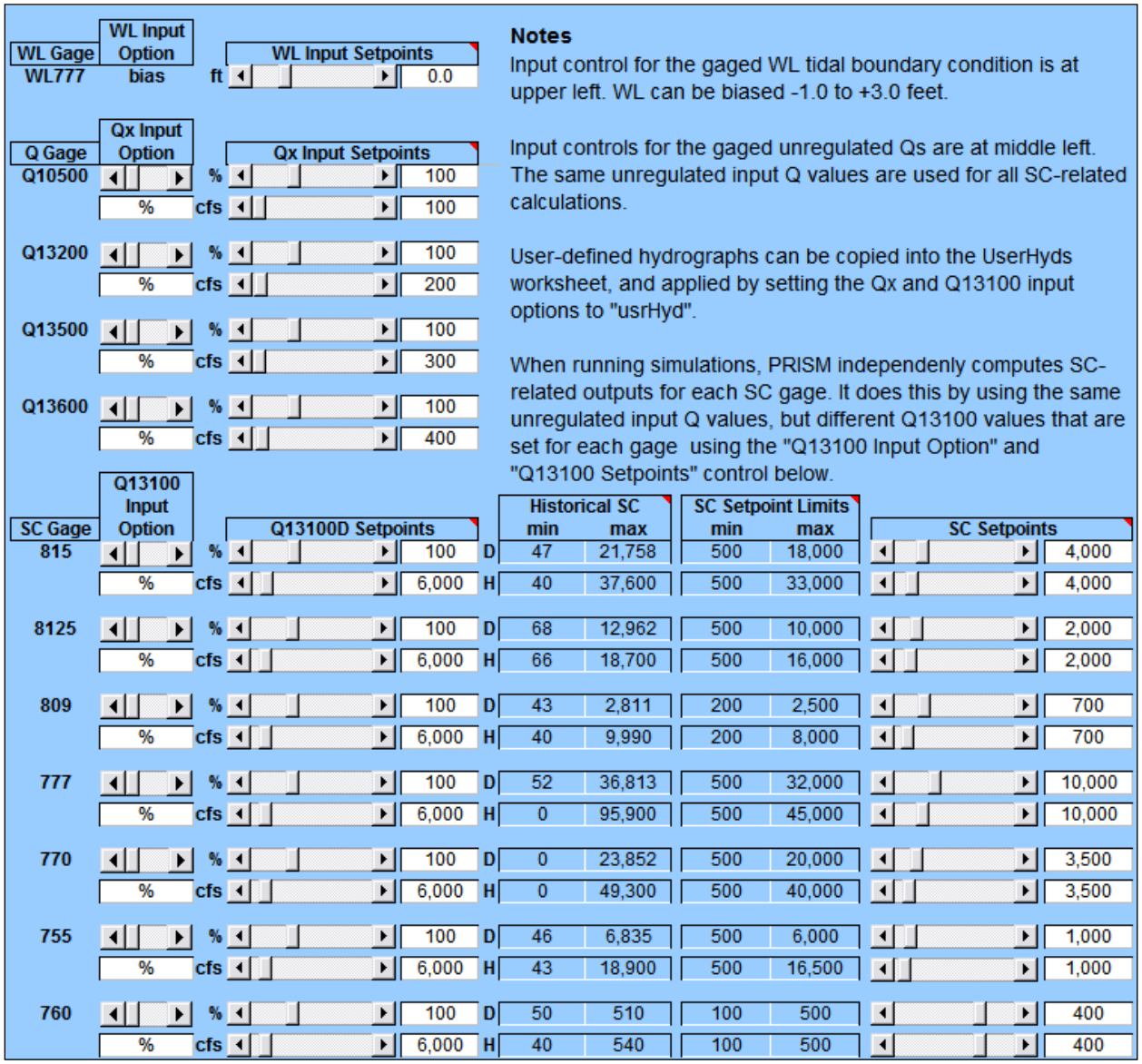
Figure A7. Input options and values for each gage.

4.4. "Setpoints" Worksheet

Figure A8 shows the the "Setpoints" worksheet, which is the component of PRISM-2's GUI that allows the user to set water level (WL), Q, and SC setpoints. The "WL Gage" control shown at top simply provides biasing of the historical WL upwards or downwards in increments of tenths of a foot. Using the "Qx Input Option," the "Q Gage" unregulated Qs can be set to a percentage of their historical flow (Qx Input Option = "%"), a constant Q (Qx Input Option = "cfs"), or made to use a user-defined hydrograph pasted into the "UserHyds" worksheet (Qx Input Option = "usrHyd").

In the lower portion of figure A8, the user controls for modulating the regulated flow Q13100 are shown. The choice of the Q or SC setpoint used for each gage is made using the "Q13100 Input Option." Under "Q13100D Setpoints" are controls that allow the constant and percent valued (Q13100 Input Option = "cfs" and "%") setpoints to be set for each gage; these controls are similar to those for the unregulated flow. The user can also select that a user-defined hydrograph, pasted into the "UserHyds" worksheet (Q13100 Input Option = "usrHyd"), be used.

At right are the controls for setting the SC Daily (D) and Hourly (H) setpoints (Q13100 Input Option = "LimitD," "LimitH," "OptD," and "OptH"). These options engage a numerical optimizer that automatically calculates, for the given gage, the value of Q13100D needed to meet the specified SC setpoint. Using options "LimitD" or "LimitH" will engage the optimizer only when the daily or hourly SCm/p+dSC exceeds the specified setpoint. Using options "OptD" or "OptH" engages the optimizer continuously. The historical daily and hourly maximum and minimum SCs are provided for reference. Maximum and minimum allowed SC setpoints, which are constraints on the optimizer derived from the historical daily and hourly maximum and minimum SCs, are also given. A "hard-coded" optimizer constraint is that Q13100D is limited to a maximum of 15,000 cfs.



WL Gage	WL Input Option	WL Input Setpoints	
WL777	bias	ft	0.0

Notes

Input control for the gaged WL tidal boundary condition is at upper left. WL can be biased -1.0 to +3.0 feet.

Input controls for the gaged unregulated Qs are at middle left. The same unregulated input Q values are used for all SC-related calculations.

User-defined hydrographs can be copied into the UserHyds worksheet, and applied by setting the Qx and Q13100 input options to "usrHyd".

When running simulations, PRISM independenly computes SC-related outputs for each SC gage. It does this by using the same unregulated input Q values, but different Q13100 values that are set for each gage using the "Q13100 Input Option" and "Q13100 Setpoints" control below.

Q Gage	Qx Input Option	Qx Input Setpoints	
Q10500	%	%	100
	%	cfs	100
Q13200	%	%	100
	%	cfs	200
Q13500	%	%	100
	%	cfs	300
Q13600	%	%	100
	%	cfs	400

SC Gage	Q13100 Input Option	Q13100D Setpoints			Historical SC min	Historical SC max	SC Setpoint Limits min	SC Setpoint Limits max	SC Setpoints
815	%	%	100	D	47	21,758	500	18,000	4,000
	%	cfs	6,000	H	40	37,600	500	33,000	4,000
8125	%	%	100	D	68	12,962	500	10,000	2,000
	%	cfs	6,000	H	66	18,700	500	16,000	2,000
809	%	%	100	D	43	2,811	200	2,500	700
	%	cfs	6,000	H	40	9,990	200	8,000	700
777	%	%	100	D	52	36,813	500	32,000	10,000
	%	cfs	6,000	H	0	95,900	500	45,000	10,000
770	%	%	100	D	0	23,852	500	20,000	3,500
	%	cfs	6,000	H	0	49,300	500	40,000	3,500
755	%	%	100	D	46	6,835	500	6,000	1,000
	%	cfs	6,000	H	43	18,900	500	16,500	1,000
760	%	%	100	D	50	510	100	500	400
	%	cfs	6,000	H	40	540	100	500	400

Figure A8. "Setpoints" worksheet showing headings of the controls and parameters.

4.5. "Database," "Database2," and "Output" Worksheets

The "Database" and "Database2" worksheets contain the time-series data used by PRISM-2 to run simulations (fig. A9). These data are described in table A1 and are derived from the raw field measurements. They are augmented by calculated variables whose values are calculated by PRISM's computer code. It is best that the user not alter data in the "Database" worksheet.

DATETIME	I	IQ10500Dm	Q13100Dm	IQ13200Dm	IQ13500Dm	IQ13600Dm	FWL777Hm	FWL777Dm	WL777_RANNm	WL777_RANN_F25m	IFXWL777Hm	IFXWL777Dm	DIRHm
7/11/95 12:00	2	1517.51	18329.54	552.57	5589.35	1683.94	10.94	?	?	?	?	?	300
7/11/95 13:00	3	1515.97	18330.77	551.89	5581.94	1689.08	10.53	?	?	?	?	?	190
7/11/95 14:00	4	1514.43	18330.15	551.31	5574.18	1694.22	10.43	?	?	?	?	?	160
7/11/95 15:00	5	1512.89	18326.77	550.83	5566.34	1699.32	11.85	?	?	?	?	?	308.0826416
7/11/95 16:00	6	1511.35	18321.23	550.44	5558.34	1704.4	13.45	?	?	?	?	?	270.7998047
7/11/95 17:00	7	1509.82	18313.54	550.12	5550.74	1709.48	14.68	?	?	?	?	?	208.8908844
7/11/95 18:00	8	1508.28	18303.69	549.87	5543.57	1714.52	15.7	?	?	?	?	?	135.0717621
7/11/95 19:00	9	1506.74	18291.69	549.68	5536.15	1719.57	16.440001	?	?	?	?	?	354.572052
7/11/95 20:00	10	1505.23	18277.23	549.53	5529.17	1724.65	16.5	?	?	?	?	?	325.8237915
7/11/95 21:00	11	1503.75	18260	549.43	5522.34	1729.72	15.41	?	?	?	?	?	?
7/11/95 22:00	12	1502.31	18240.62	549.36	5515.78	1734.8	14.33	?	?	?	?	?	10
7/11/95 23:00	13	1500.89	18218.77	549.32	5509.72	1739.85	13.21	?	?	?	?	?	10
7/12/95 0:00	14	1499.51	18194.46	549.3	5504.09	1744.92	12.04	?	?	?	?	?	170
7/12/95 1:00	15	1498.15	18168	549.28	5498.8	1750	11.22	?	?	?	?	?	30
7/12/95 2:00	16	1496.83	18139.69	549.25	5493.75	1755.05	10.77	?	?	?	?	?	60
7/12/95 3:00	17	1495.51	18108.92	549.19	5489.29	1760.06	10.81	?	?	?	?	?	180
7/12/95 4:00	18	1494.22	18076.31	549.1	5484.98	1765.08	12.08	?	?	?	?	?	10
7/12/95 5:00	19	1492.98	18041.54	548.97	5480.92	1770.09	13.54	?	?	?	?	?	310
7/12/95 6:00	20	1491.82	18004.62	548.79	5476.55	1775.11	14.64	?	?	?	?	?	10
7/12/95 7:00	21	1490.71	17965.23	548.55	5471.94	1780.09	15.38	?	?	?	?	?	330
7/12/95 8:00	22	1489.66	17923.38	548.26	5467.69	1785.02	15.73	?	?	?	?	?	225
7/12/95 9:00	23	1488.65	17879.08	547.88	5463.14	1789.85	15.06	?	?	?	?	?	90
7/12/95 10:00	24	1487.66	17832.62	547.43	5458.28	1794.65	14.01	?	?	?	?	?	330

Figure A9. Example of measured data from the “Database” worksheet.

Table A1. Descriptions of variables written to the “Output” worksheet during simulations.

PRISM Output Var	Description
DATETIME	time stamp
ROW	Database worksheet for identifier
IQ10500Dm	(I)nterpolated (m)easured (D)aily average Q5000 (cfs)
Q13100Dm	(I)nterpolated (m)easured (D)aily average Q131000 (cfs)
IQ13200Dm	(I)nterpolated (m)easured (D)aily average Q132000 (cfs)
IQ13500Dm	(I)nterpolated (m)easured (D)aily average Q135000 (cfs)
IQ13600Dm	(I)nterpolated (m)easured (D)aily average Q136000 (cfs)
QotherDm	Sum of measured inflows other than Q13100D = Q5000D + Q13200(τ=-48hrs) + Q13500 + Q13600(τ=-24hrs)
QtotalDm	Q13100Dm(τ=24hrs) + QotherDm
FWL777Hm	(F)illed (m)easured (H)ourly water level at gage 02110777
FWL777Dm	(F)illed (m)easured (D)aily water level at gage 02110777
IFXWL777Hm	(I)nterpolated (F)illed (m)easured (H)ourly 12.4-hour water level max range at gage 02110777
IFXWL777Dm	24-hour moving window averaged IFXWL777Hm
DIRH	hourly wind direction (deg)
DIRD	24hr MWA wind direction (deg)
InpOptionXXXX	QxxxxxDu input option for gage XXXX set on Setpoints worksheet
SCXXXXDm	(D)aily (m)easured SC for gage XXXX. "CC" indicated twice corrected
SCXXXXDp(m)	(D)aily predicted SC for gage XXXX using input Q13100Dm
SCXXXXDp(u)	(D)aily predicted SC for gage XXXX using input Q13100Du
dSCXXXXD(pu-pm)	SCXXXXDp(u) - SCXXXXDp(m)
SCXXXXDm/p+dSC	SCXXXXDm + dSCXXXXD(pu-pm) if SCXXXXDm is not missing, else = SCXXXXDp(m) + dSCXXXXD(pu-pm)
SCXXXXHm	(H)ourly (m)easured SC for gage XXXX". CC" indicated twice corrected
SCXXXXHp(m)	(H)ourly predicted SC for gage XXXX using input Q13100Dm
SCXXXXHp(u)	(H)ourly predicted SC for gage XXXX using input Q13100Du
dSCXXXXH(pu-pm)	SCXXXXHp(u) - SCXXXXHp(m)
SCXXXXHm/p+dSC	SCXXXXHm + dSCXXXXH(pu-pm) if SCXXXXHm is not missing, else = SCXXXXHp(m) + dSCXXXXH(pu-pm)

The “Output” worksheet contains a record of key variables for a particular simulation run (fig. A10). The “Write Output” check box on the “Run” worksheet (fig. A2) must be checked for output to be written. The variables written to the “Output” worksheet are explained in table A1. The user can copy output values into another Excel workbook for further analysis.

DATETIME	ROW	DIRDm	WL bias	FWL777Hm	FWL777Hu	FWL777Dm	FWL777Du	IFXWL777Hm	IFXWL777Dm	InpOption Q10500	IQ10500Dm	IQ10500Du
7/22/07 0:00	39914	127	0	14	14	12.89	12.89	3.08	3.76	%	29	29
7/22/07 1:00	39915	127	0	14.48	14.48	12.91	12.91	2.99	3.75	%	29	29
7/22/07 2:00	39916	129	0	14.58	14.58	12.93	12.93	2.91	3.73	%	29	29
7/22/07 3:00	39917	129	0	14.03	14.03	12.94	12.94	2.97	3.72	%	29	29
7/22/07 4:00	39918	129	0	13.24	13.24	12.96	12.96	3.03	3.7	%	29	29
7/22/07 5:00	39919	129	0	12.48	12.48	12.98	12.98	3.09	3.68	%	29	29
7/22/07 6:00	39920	129	0	11.67	11.67	12.99	12.99	3.15	3.66	%	29	29
7/22/07 7:00	39921	116	0	11.21	11.21	13.01	13.01	3.21	3.64	%	28	28
7/22/07 8:00	39922	109	0	11.19	11.19	13.02	13.02	3.28	3.61	%	28	28
7/22/07 9:00	39923	104	0	11.81	11.81	13.03	13.03	3.34	3.59	%	28	28
7/22/07 10:00	39924	99	0	12.48	12.48	13.04	13.04	3.4	3.57	%	28	28
7/22/07 11:00	39925	97	0	13.24	13.24	13.05	13.05	3.46	3.54	%	28	28
7/22/07 12:00	39926	92	0	13.9	13.9	13.06	13.06	3.52	3.52	%	28	28
7/22/07 13:00	39927	79	0	14.47	14.47	13.06	13.06	3.58	3.49	%	28	28

Figure A10. Example output from the “Output” worksheet.

4.6. “Graphs” Worksheet

PRISM-2 provides streaming numerical and graphical output for each gage on the “Graphs” worksheet (fig. A11), which can be observed during simulations or when incrementally stepping through time. This allows the user to examine specific periods and behaviors of interest. Some of the functionality of the “Graphs” worksheet is also found on the “Run” worksheet. At top left are the “<<Step” “Step>>,” “Sim Time=Start,” “Run,” and “Reset” buttons, which are described in section 4.3. Below the buttons is a streaming table listing the Q-related input options, and measured and input values of the Qs. At top center and right are streaming graphs indicating the input wind direction (DIR), WL, and Qs.

Scrolling down will reveal data and graphs that are specific to each modeled SC signal. For each gage there is a short streaming table listing the selected user Q13100D input option, the Q13100D values for each option, and the value of the user-controlled QOTHER. The table also lists the control setpoint for the Q13100D optimization option, and measured and predicted values of hourly and daily SC. The “Opt SCXXXXD” and “Opt SCXXXXH” buttons are similar to the “Opt All SC” button on the “Run” worksheet and will, for the current time stamp, run the optimizer for the gage according to the “Q13100D Input Option” settings on the “Setpoints” worksheet. The leftmost graph for each gage shows the daily and hourly measured and predicted SCs. The graph on the right shows the measured and input Q13100D and QOTHER. The graphed parameters are described in table A1 above.

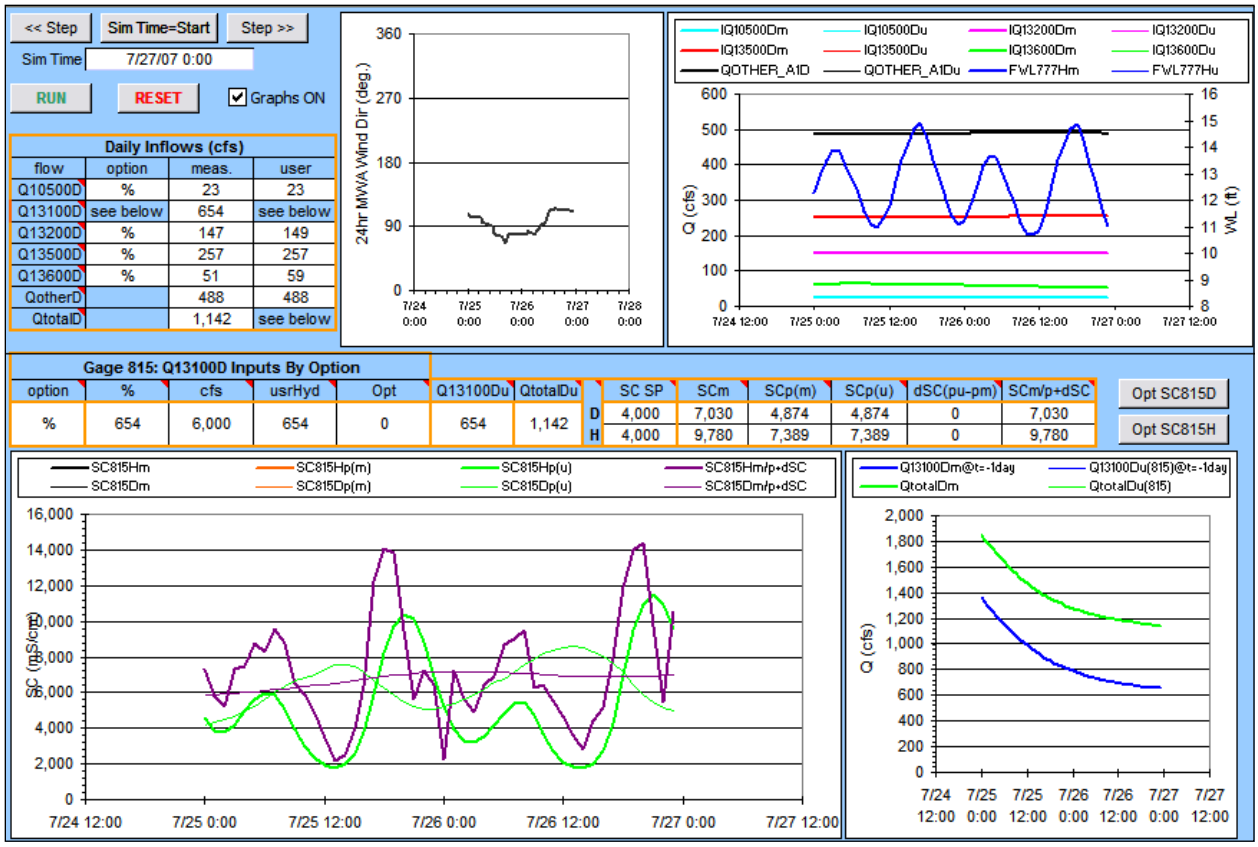


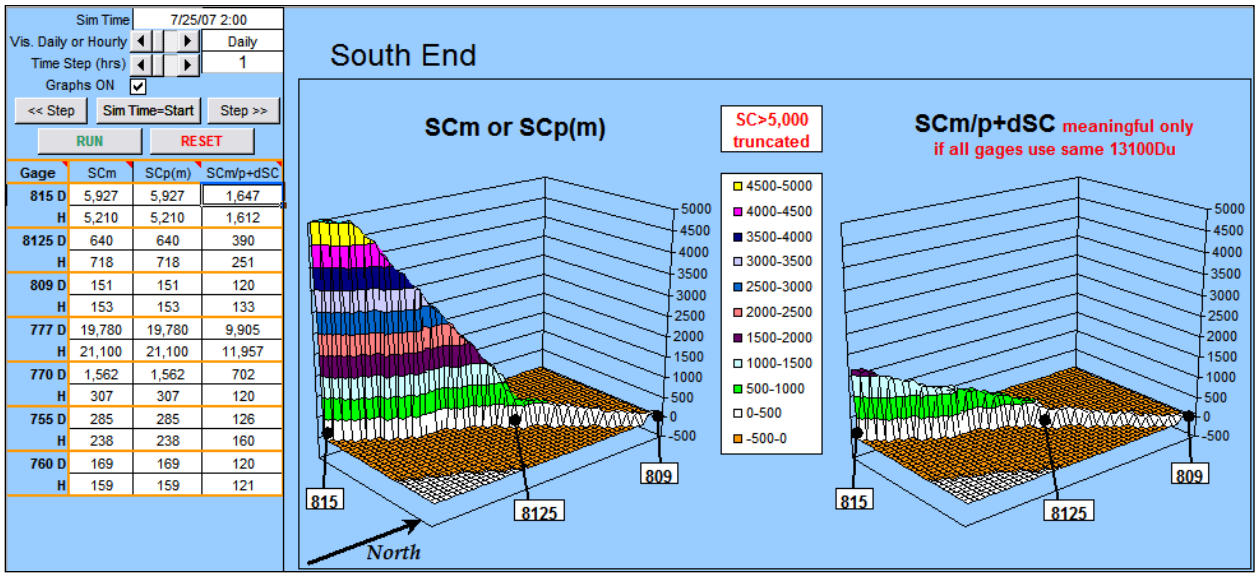
Figure A11. “Graphs” worksheet.

4.7. “3DVis” Worksheet

PRISM-2’s “3DVis” worksheet provides graphical SC profiles at the South and North Ends of the Waccamaw River and Atlantic Intracoastal Waterway study area (fig. A12). It is designed to visualize periods of special interest, selectable using the “Start” and “End” date controls and initialized using the “Sim Time=Start” button on the “Run” worksheet. On the left side of the 3DVis worksheet are data and the controls for operating the 3DVis worksheet. The data are a subset of that on the “Run” worksheet and are provided for reference while using the 3DVis worksheet. The “Vis. Daily or Hourly” control is used to select either daily or hourly SC for visualization. The “<<Step,” “Step>>,” “RUN,” “Sim Time=Start,” “RESET,” “Time Step (hrs),” and “Graphs ON” buttons and controls are the same as those used in the “Run” worksheet and are described in section 4.3. Animations can be started using the “Run” button if the “Graphs ON” check box is checked in the “Run” worksheet.

Figures A12 and A13 show that two plots are created for each of the South and North Ends of the study area. The left plots show the SC profile representing the actual historical data (when available), and the right plots show the profile predicted by the gage model pairs using the user-specified Q13100Du. Note that the predicted profiles are meaningful only if the models are

set to use exactly the same input Q13100Du. For example, the plots shown in figures A12 and A13 were created using all models with settings “Q13100Du Input Option” = “%” on the “Run” worksheet and “Q13100D” “%” setpoints on the “SPs” worksheet = 80 (%).



Gage	SCm	SCp(m)	SCm/p+dSC
815 D	5,927	5,927	1,647
H	5,210	5,210	1,612
8125 D	640	640	390
H	718	718	251
809 D	151	151	120
H	153	153	133
777 D	19,780	19,780	9,905
H	21,100	21,100	11,957
770 D	1,562	1,562	702
H	307	307	120
755 D	285	285	126
H	238	238	160
760 D	169	169	120
H	159	159	121

Figure A12. The “ 3DVis” worksheet showing specific conductance at the South End of the Waccamaw River and Atlantic Intracoastal Waterway study area, South Carolina. Note shortened gage numbers and locations. Here, the Q13100Du setting is 300 percent of the historical value.

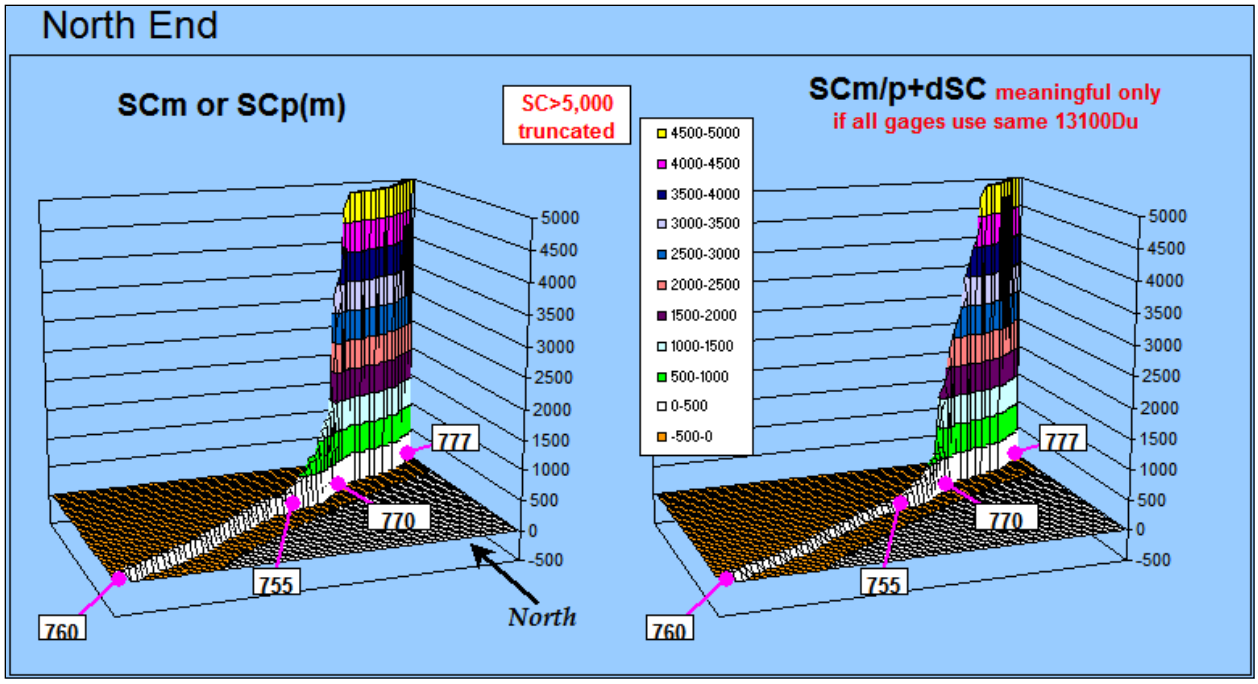


Figure A13. The "3DVis" worksheet showing specific conductance at the North End of the Waccamaw and Atlantic Intracoastal Waterway study area, South Carolina. Note shortened gage numbers and locations. Here, the Q13100Du setting is 300 percent of the historical value.

5. TECHNICAL ASSISTANCE

Please contact Paul Conrads of the USGS at (803) 750-6140, pconrads@usgs.gov, if you have problems with this model.