CHAPTER 13

SWAT INPUT DATA: .CST

SWAT allows a user to simulate forecast scenarios if desired. The forecast input file contains the statistical data needed to generate daily climate data for the subbasins during the forecast period.

In a forecast simulation, a non-forecast and forecast period are defined. The forecast period begins on the day specified by FCSTDAY and FCSTYR in the master watershed file (file.cio, see Chapter 3) and ends on the last day of the simulation. During the non-forecast period, the parameters used to generate weather are taken from the weather generator file (.wgn, Chapter 12). When the forecast period is simulated, the monthly weather generator parameters for precipitation and temperature are replaced with parameter values stored in the forecast input file (.cst).

The forecast period must be simulated a number of times to obtain a distribution of possible weather scenarios. The user defines the number of model runs made (FCSTCYCLES, file.cio, see Chapter 3). A minimum of 20 cycles is recommended. The only difference between forecast scenarios is the value of the random number seeds used to generate daily weather values.

An unlimited number of forecast regions can be defined in a watershed. The forecast region number assigned to a subbasin in the subbasin input file (.sub, Chapter 5) must correspond to a forecast region number given for a specific dataset in the forecast input file (.cst).

Following is a brief description of the variables in the forecast input file. They are listed in the order they appear within the file.

Variable name	Definition
TITLE	The first line of the .cst file is reserved for user comments. The comments may take up to 80 spaces. The title line is not processed by the model and may be left blank. Optional.
FCST_REGTOT	The total number of forecast regions in the watershed. Data for all the regions is listed in the .cst file. Required if forecast period simulated.
The following input data must be given for each forecast region in the watershed.	
REGION TITLE	Title line for a given forecast region. This line is not used by the model, but makes a convenient location to write the name of the region or any other information the user wishes to record. Optional.
FCST_REG	Forecast region number. This number is used to link forecast data to the desired subbasin(s). Required if forecast period simulated.
FTMPMX(mon)	Average or mean daily maximum air temperature for month in forecast period (ºC). Required if forecast period simulated.

Variable name	Definition
FTMPMN(mon)	Average or mean daily minimum air temperature for month in forecast period (ºC). Required if forecast period simulated.
FTMPSTDMX(mon)	Standard deviation for daily maximum air temperature in month in forecast period (ºC). This parameter quantifies the variability in maximum temperature for each month. Required if forecast period simulated.
FTMPSTDMN(mon)	Standard deviation for daily minimum air temperature in month in forecast period (ºC). This parameter quantifies the variability in minimum temperature for each month. Required if forecast period simulated.
FPCPMM(mon)	Average or mean total monthly precipitation in forecast period (mm H_2O). Required if forecast period simulated.
FPCPSTD(mon)	Standard deviation for daily precipitation in month in forecast period (mm H_2O/day). This parameter quantifies the variability in precipitation for each month. (Note: daily precipitation values of 0 mm are included in the standard deviation calculation). Required if forecast period simulated.
FPCPSKW(mon)	Skew coefficient for daily precipitation in month in forecast period. This parameter quantifies the symmetry of the precipitation distribution about the monthly mean. (Note: daily precipitation values of 0 mm are included in the skew coefficient calculation). Required if forecast period simulated.
FPR_W(1,mon)	Probability of a wet day following a dry day in the month in forecast period. Required if forecast period simulated.
FPR_W(2,mon)	Probability of a wet day following a wet day in the month in forecast period. Required if forecast period simulated.

Variable name	Definition
FPCPD(mon)	Average number of days of precipitation in month in forecast period. Required if forecast period simulated.

The format of the forecast input file is:

Variable name	Line #	Position	Format	F90 Format
TITLE	1	space 1-80	Character	a80
FCSTREGTOT	2	space 1-6	Integer	i6
The remainder of lines repeat for the number of forecast regions defined by FCSTREGTOT.				
REGION TITLE	2 + 1*i*	space 1-80	Character	a80
FCST_REG	2 + 2*i*	space 1-6	Integer	i6
FTMPMX(1)	2 + 3*i*	space 1-6	decimal(xxx.xx)	f6.2
FTMPMX(2)	2 + 3*i*	space 7-12	decimal(xxx.xx)	f6.2
FTMPMX(3)	2 + 3*i*	space 13-18	decimal(xxx.xx)	f6.2
FTMPMX(4)	2 + 3*i*	space 19-24	decimal(xxx.xx)	f6.2
FTMPMX(5)	2 + 3*i*	space 25-30	decimal(xxx.xx)	f6.2
FTMPMX(6)	2 + 3*i*	space 31-36	decimal(xxx.xx)	f6.2
FTMPMX(7)	2 + 3*i*	space 37-42	decimal(xxx.xx)	f6.2
FTMPMX(8)	2 + 3*i*	space 43-48	decimal(xxx.xx)	f6.2
FTMPMX(9)	2 + 3*i*	space 49-54	decimal(xxx.xx)	f6.2
FTMPMX(10)	2 + 3*i*	space 55-60	decimal(xxx.xx)	f6.2
FTMPMX(11)	2 + 3*i*	space 61-66	decimal(xxx.xx)	f6.2
FTMPMX(12)	2 + 3*i*	space 67-72	decimal(xxx.xx)	f6.2
FTMPMN(1)	2 + 4*i*	space 1-6	decimal(xxx.xx)	f6.2
FTMPMN(2)	2 + 4*i*	space 7-12	decimal(xxx.xx)	f6.2
FTMPMN(3)	2 + 4*i*	space 13-18	decimal(xxx.xx)	f6.2
FTMPMN(4)	2 + 4*i*	space 19-24	decimal(xxx.xx)	f6.2
FTMPMN(5)	2 + 4*i*	space 25-30	decimal(xxx.xx)	f6.2
FTMPMN(6)	2 + 4*i*	space 31-36	decimal(xxx.xx)	f6.2
FTMPMN(7)	2 + 4*i*	space 37-42	decimal(xxx.xx)	f6.2
FTMPMN(8)	2 + 4*i*	space 43-48	decimal(xxx.xx)	f6.2
FTMPMN(9)	2 + 4*i*	space 49-54	decimal(xxx.xx)	f6.2
FTMPMN(10)	2 + 4*i*	space 55-60	decimal(xxx.xx)	f6.2
FTMPMN(11)	2 + 4*i*	space 61-66	decimal(xxx.xx)	f6.2

Variable name	Line #	Position	Format	F90 Format
FTMPMN(12)	2 + 4*i*	space 67-72	decimal(xxx.xx)	f6.2
FTMPSTDMX(1)	2 + 5*i*	space 1-6	decimal(xxx.xx)	f6.2
FTMPSTDMX(2)	2 + 5*i*	space 7-12	decimal(xxx.xx)	f6.2
FTMPSTDMX(3)	2 + 5*i*	space 13-18	decimal(xxx.xx)	f6.2
FTMPSTDMX(4)	2 + 5*i*	space 19-24	decimal(xxx.xx)	f6.2
FTMPSTDMX(5)	2 + 5*i*	space 25-30	decimal(xxx.xx)	f6.2
FTMPSTDMX(6)	2 + 5*i*	space 31-36	decimal(xxx.xx)	f6.2
FTMPSTDMX(7)	2 + 5*i*	space 37-42	decimal(xxx.xx)	f6.2
FTMPSTDMX(8)	2 + 5*i*	space 43-48	decimal(xxx.xx)	f6.2
FTMPSTDMX(9)	2 + 5*i*	space 49-54	decimal(xxx.xx)	f6.2
FTMPSTDMX(10)	2 + 5*i*	space 55-60	decimal(xxx.xx)	f6.2
FTMPSTDMX(11)	2 + 5*i*	space 61-66	decimal(xxx.xx)	f6.2
FTMPSTDMX(12)	2 + 5*i*	space 67-72	decimal(xxx.xx)	f6.2
FTMPSTDMN(1)	2 + 6*i*	space 1-6	decimal(xxx.xx)	f6.2
FTMPSTDMN(2)	2 + 6*i*	space 7-12	decimal(xxx.xx)	f6.2
FTMPSTDMN(3)	2 + 6*i*	space 13-18	decimal(xxx.xx)	f6.2
FTMPSTDMN(4)	2 + 6*i*	space 19-24	decimal(xxx.xx)	f6.2
FTMPSTDMN(5)	2 + 6*i*	space 25-30	decimal(xxx.xx)	f6.2
FTMPSTDMN(6)	2 + 6*i*	space 31-36	decimal(xxx.xx)	f6.2
FTMPSTDMN(7)	2 + 6*i*	space 37-42	decimal(xxx.xx)	f6.2
FTMPSTDMN(8)	2 + 6*i*	space 43-48	decimal(xxx.xx)	f6.2
FTMPSTDMN(9)	2 + 6*i*	space 49-54	decimal(xxx.xx)	f6.2
FTMPSTDMN(10)	2 + 6*i*	space 55-60	decimal(xxx.xx)	f6.2
FTMPSTDMN(11)	2 + 6*i*	space 61-66	decimal(xxx.xx)	f6.2
FTMPSTDMN(12)	2 + 6*i*	space 67-72	decimal(xxx.xx)	f6.2
FPCPMM(1)	2 + 7*i*	space 1-6	decimal(xxx.xx)	f6.2
FPCPMM(2)	2 + 7*i*	space 7-12	decimal(xxx.xx)	f6.2
FPCPMM(3)	2 + 7*i*	space 13-18	decimal(xxx.xx)	f6.2
FPCPMM(4)	2 + 7*i*	space 19-24	decimal(xxx.xx)	f6.2
FPCPMM(5)	2 + 7*i*	space 25-30	decimal(xxx.xx)	f6.2
FPCPMM(6)	2 + 7*i*	space 31-36	decimal(xxx.xx)	f6.2
FPCPMM(7)	2 + 7*i*	space 37-42	decimal(xxx.xx)	f6.2
FPCPMM(8)	2 + 7*i*	space 43-48	decimal(xxx.xx)	f6.2
FPCPMM(9)	2 + 7*i*	space 49-54	decimal(xxx.xx)	f6.2
FPCPMM(10)	2 + 7*i*	space 55-60	decimal(xxx.xx)	f6.2

Variable name	Line #	Position	Format	F90 Format
FPCPMM(11)	2 + 7*i*	space 61-66	decimal(xxx.xx)	f6.2
FPCPMM(12)	2 + 7*i*	space 67-72	decimal(xxx.xx)	f6.2
FPCPSTD(1)	2 + 8*i*	space 1-6	decimal(xxx.xx)	f6.2
FPCPSTD(2)	2 + 8*i*	space 7-12	decimal(xxx.xx)	f6.2
FPCPSTD(3)	2 + 8*i*	space 13-18	decimal(xxx.xx)	f6.2
FPCPSTD(4)	2 + 8*i*	space 19-24	decimal(xxx.xx)	f6.2
FPCPSTD(5)	2 + 8*i*	space 25-30	decimal(xxx.xx)	f6.2
FPCPSTD(6)	2 + 8*i*	space 31-36	decimal(xxx.xx)	f6.2
FPCPSTD(7)	2 + 8*i*	space 37-42	decimal(xxx.xx)	f6.2
FPCPSTD(8)	2 + 8*i*	space 43-48	decimal(xxx.xx)	f6.2
FPCPSTD(9)	2 + 8*i*	space 49-54	decimal(xxx.xx)	f6.2
FPCPSTD(10)	2 + 8*i*	space 55-60	decimal(xxx.xx)	f6.2
FPCPSTD(11)	2 + 8*i*	space 61-66	decimal(xxx.xx)	f6.2
FPCPSTD(12)	2 + 8*i*	space 67-72	decimal(xxx.xx)	f6.2
FPCPSKW(1)	2 + 9*i*	space 1-6	decimal(xxx.xx)	f6.2
FPCPSKW(2)	2 + 9*i*	space 7-12	decimal(xxx.xx)	f6.2
FPCPSKW(3)	2 + 9*i*	space 13-18	decimal(xxx.xx)	f6.2
FPCPSKW(4)	2 + 9*i*	space 19-24	decimal(xxx.xx)	f6.2
FPCPSKW(5)	2 + 9*i*	space 25-30	decimal(xxx.xx)	f6.2
FPCPSKW(6)	2 + 9*i*	space 31-36	decimal(xxx.xx)	f6.2
FPCPSKW(7)	2 + 9*i*	space 37-42	decimal(xxx.xx)	f6.2
FPCPSKW(8)	2 + 9*i*	space 43-48	decimal(xxx.xx)	f6.2
FPCPSKW(9)	2 + 9*i*	space 49-54	decimal(xxx.xx)	f6.2
FPCPSKW(10)	2 + 9*i*	space 55-60	decimal(xxx.xx)	f6.2
FPCPSKW(11)	2 + 9*i*	space 61-66	decimal(xxx.xx)	f6.2
FPCPSKW(12)	2 + 9*i*	space 67-72	decimal(xxx.xx)	f6.2
FPR_W(1,1)	2 + 10*i*	space 1-6	decimal(xxx.xx)	f6.2
FPR_W(1,2)	2 + 10*i*	space 7-12	decimal(xxx.xx)	f6.2
FPR_W(1,3)	2 + 10*i*	space 13-18	decimal(xxx.xx)	f6.2
FPR_W(1,4)	2 + 10*i*	space 19-24	decimal(xxx.xx)	f6.2
FPR_W(1,5)	2 + 10*i*	space 25-30	decimal(xxx.xx)	f6.2
FPR_W(1,6)	2 + 10*i*	space 31-36	decimal(xxx.xx)	f6.2
FPR_W(1,7)	2 + 10*i*	space 37-42	decimal(xxx.xx)	f6.2
FPR_W(1,8)	2 + 10*i*	space 43-48	decimal(xxx.xx)	f6.2
FPR_W(1,9)	2 + 10*i*	space 49-54	decimal(xxx.xx)	f6.2

Variable name	Line #	Position	Format	F90 Format
FPR_W(1,10)	2 + 10*i*	space 55-60	decimal(xxx.xx)	f6.2
FPR_W(1,11)	2 + 10*i*	space 61-66	decimal(xxx.xx)	f6.2
FPR_W(1,12)	2 + 10*i*	space 67-72	decimal(xxx.xx)	f6.2
FPR_W(2,1)	2 + 11*i*	space 1-6	decimal(xxx.xx)	f6.2
FPR_W(2,2)	2 + 11*i*	space 7-12	decimal(xxx.xx)	f6.2
FPR_W(2,3)	2 + 11*i*	space 13-18	decimal(xxx.xx)	f6.2
FPR_W(2,4)	2 + 11*i*	space 19-24	decimal(xxx.xx)	f6.2
FPR_W(2,5)	2 + 11*i*	space 25-30	decimal(xxx.xx)	f6.2
FPR_W(2,6)	2 + 11*i*	space 31-36	decimal(xxx.xx)	f6.2
FPR_W(2,7)	2 + 11*i*	space 37-42	decimal(xxx.xx)	f6.2
FPR_W(2,8)	2 + 11*i*	space 43-48	decimal(xxx.xx)	f6.2
FPR_W(2,9)	2 + 11*i*	space 49-54	decimal(xxx.xx)	f6.2
FPR_W(2,10)	2 + 11*i*	space 55-60	decimal(xxx.xx)	f6.2
FPR_W(2,11)	2 + 11*i*	space 61-66	decimal(xxx.xx)	f6.2
FPR_W(2,12)	2 + 11*i*	space 67-72	decimal(xxx.xx)	f6.2
FPCPD(1)	2 + 12*i*	space 1-6	decimal(xxx.xx)	f6.2
FPCPD(2)	2 + 12*i*	space 7-12	decimal(xxx.xx)	f6.2
FPCPD(3)	2 + 12*i*	space 13-18	decimal(xxx.xx)	f6.2
FPCPD(4)	2 + 12*i*	space 19-24	decimal(xxx.xx)	f6.2
FPCPD(5)	2 + 12*i*	space 25-30	decimal(xxx.xx)	f6.2
FPCPD(6)	2 + 12*i*	space 31-36	decimal(xxx.xx)	f6.2
FPCPD(7)	2 + 12*i*	space 37-42	decimal(xxx.xx)	f6.2
FPCPD(8)	2 + 12*i*	space 43-48	decimal(xxx.xx)	f6.2
FPCPD(9)	2 + 12*i*	space 49-54	decimal(xxx.xx)	f6.2
FPCPD(10)	2 + 12*i*	space 55-60	decimal(xxx.xx)	f6.2
FPCPD(11)	2 + 12*i*	space 61-66	decimal(xxx.xx)	f6.2
FPCPD(12)	2 + 12*i*	space 67-72	decimal(xxx.xx)	f6.2