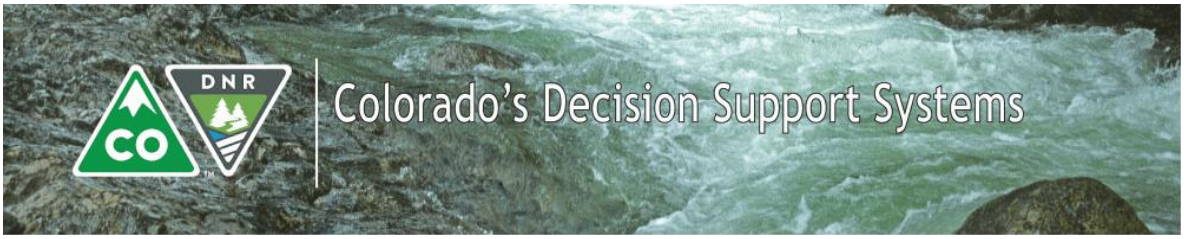


5.0 Output Description

This chapter describes the report options available in StateMod. The following sections are available in this chapter:

5.0 Remarks

There are numerous output files available from the three modules available in StateMod as described below. For scenario management, the files are given the simulation name plus a standard three character suffix as described below. Section 6.0 Model Operation describes the output command and how to obtain each output file. Note that the output command NA indicates the file is generated by a module automatically. Also, unless otherwise noted, all output files are monthly.

#	Module	Output Command	Output File	Contents
1	Base Flow	NA	*.xbi	Base Flow Information at Stream Gage locations
2	Base Flow	NA	*.xbg	Gaged Base Flow Estimates
3	Base Flow		*.xbm	Estimated Gaged and Ungaged Base Flow
4	Base Flow		*.log	Log file
1	Simulate	NA	*.xdd	Direct and Instream Diversion Data Summary
2	Simulate		*.xre	Reservoir Data Summary (total and by account)
3	Simulate		*.xop	Operation Right Summary
4	Simulate		*.xir	Instream Reach Summary
5	Simulate		*.xca	Call Data Summary
6	Simulate	(1)	*.xpl	Plan Data Summary
7	Simulate	(2)	*.xrp	Replacement Reservoir Summary

8	Simulate	(3)	*.xwe	Well Summary
9	Simulate		*.xss	Structure Summary
10	Simulate		*.log	Log file
11	Simulate-Daily	N/A	*.xdy	Direct and Instream Diversion Data Summary
12	Simulate-Daily		*.xry	Reservoir Data Summary (total and by account)
13	Simulate-Daily		*.xwy	Well Summary (if wells are used)
1	Report	-xst	*.xdd	Direct and Instream Diversion Data Summary
2	Report		*.xre	Reservoir Data Summary (total and by account)
3	Report		*.xop	Operation Right Summary
4	Report		*.xir	Instream Reach Summary
5	Report		*.xwe	Well Summary
6	Report	-xnm	*.xnm	Detailed Node Accounting For All Structures By Year
7	Report		*.xna	Detailed Node Accounting Average
8	Report	-xpl	*.xpl	Detailed Plan Accounting Average
9	Report	-xwb	*.xwb	Water Balance
			*.xgw	Ground Water Balance
10	Report	-xwr	*.xwr	Water Right List Sorted by Basin rank
11	Report	-xdg	*.xdg	Direct Diversion, Instream & Gage Graph file
12	Report	-xrg	*.xrg	Reservoir Graph file
13	Report	-xwg	*.xwg	Well Graph file
14	Report	-xdc	*.xdc	Diversion Comparison file
15	Report	-xrc	*.xrc	Reservoir Comparison file
16	Report	-xwc	*.xwc	Well Comparison file
17	Report	-xsc	*.xsc	Stream Flow Gage Comparison file
18	Report	-xcu	*.xcu	CU Summary
			*.xsu	Water Supply Summary
			*.xsh	Shortage Summary
			*.xwd	CU by Water District (first 2 digits of each ID)
19	Report	-xrx	*.xrx	River Data Summary
20	Report	-xsp	*.xsp	Selected Parameter printout
21	Report	-xbn	*.xbn	ASCII Listing of Binary Direct and Instream Flow Diversion File
22	Report	-xbr	*.xbr	Binary file Listing of Reservoirs
23	Report	-xdy	*.xdy	Daily Direct and Instream Diversion Data
24	Report	-xry	*.xry	Daily Reservoir Data (total and by account)
25	Report	-xwy	*.xwy	Daily Well Data

```
26 Report        -xwp   *.xwp   Well to Plan Summary

25 Report         N/A   *.log   Log file

1 Data Check    N/A    *.xcb   Base Flow by River ID
2 Data Check    N/A    *.xcd   Direct Demand by River ID
3 Data Check    N/A    *.xci   Instream Demand by River ID
4 Data Check    N/A    *.xcw   Well Demand by River ID
5 Data Check    N/A    *.xwr   Same as *.xwr from the Report option
6 Data Check    N/A    *.xtb   Tabular summary of Input Formatted
                                for Use in a Standard Report
7 Data Check    N/A    *.xou   List of ID's Formatted for Making ID
                                Specific Data Requests
8 Data Check    N/A    *.log   Log file
```

(1) Plan output is included only when plan data is provided.
(2) Replacement reservoir data is included only when a replacement reservoir operating rule is provided.
(3) Well output is included only when well data is provided and the control switch (iwell) is non zero.

5.1 Base Flow Module Output Files

There are four standard output files from the Base Flow Module; the Base Flow Information File (*.xbi), the Gaged Base Flow Estimate File (*.xbg), the Gaged and Ungaged Base Flow Estimate File (*.xbm), and the Log File (*.log).

5.1.1 Base Flow Information File

The Base Flow Information file (*.xbi) contains information associated with the base flow estimates but in a spreadsheet format for checking. It contains the following data:

#	Column	Description
0	Year	Simulation Year
0	Mon	The first month specified in the control file
0	Days	The number of days in the month
0	River ID	River station ID
1	Gaged Flow	The streamflow provided in the stream flow file (Section 4.14)
2	Import (-)	The total imports (indicated as negative diversion)
3	Divert (+)	The total of diversions upstream of the river ID Provided in the diversion files (Section 4.15, 4.16, and 4.17)which result in a positive adjustment to the gauged flow
4	Return (-)	The total of current and lagged return flows from upstream diversions and well pumping
5	Well Dep (+)	The total of current and lagged stream depletions from wells (not adjusted for returns)
6	Delta Sto (+)	The total of upstream reservoir storage changes from data in the End of Month content file

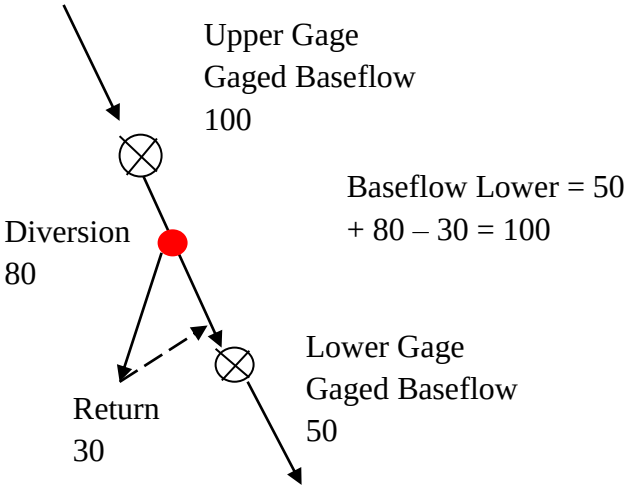
		(Section 4.21) which result in a positive adjustment to the gaged flow
7	Net Evp (+)	The total of upstream net evaporation occurring at upstream reservoirs which result in a positive adjustment to the gaged flow
8	Total Base Flow	The estimated base flow
	w/o(-) Base Flow	The estimated base flow with negative values set to zero

5.1.2 Gaged Base Flow Estimate File

The Gaged Base Flow Estimate file (*.xbg) contains base flow estimates at each gage location provided in the Stream Station input file (Section 4.4). Note, this file is typically used to allow man's impact to be removed from gaged data prior to filling gaps using a technique such as regression. It contains the following data:

Column	Description
Year	Simulation year
ID	River station ID
Oct	Base flow in Oct (the first month specified in the control file (Section 4.2))
Nov - Dec	Same as above for each month of the year
Total	Total annual flow for the year
Repeat	For each River ID and year

For example,



5.1.3 Other Base Flow Files

The Base Flow Estimate for Model Input file (*.xbm) contains gaged and ungaged data in the same format as the gaged base flow estimate file (*.xbg). This file is commonly used as an input file to the Simulate Module.

The Log File (*.log) contains a log of the base flow module's operation. The log file contains important information for the user; it is recommended the user review the log file and understand and/or address

if necessary any warnings after each model execution. Additionally, if the model fails to execute, the log file provides information as to why the model will not execute to completion.

5.2 Simulate Module Output Files

There are seven (7) standard output files from the Simulate Module. In addition if a plan is modeled then a plan output file is provided. Similarly if a replacement reservoir (type 10) operating rule is specified, then a replacement reservoir file is produced. Following is a description of the data provided in each

1. Diversion (Stream) Summary File
2. Reservoir Summary File
3. Well Summary File
4. Structure Summary File
5. Operations Summary File
6. Log File
7. Check File
8. Replacement Reservoir File
9. Plan File

5.2.1 Stream Summary File

The Stream Summary File (*.xdd) describes all stream flow data at all river nodes. For nodes with stream gages, only the columns containing hydrology data described below (Upstream Inflow, Reach Gain, Return Flow, River Inflow, River Outflow) have non zero values. Nodes with reservoirs are similar to stream gage nodes but include the column River Divert, which may be positive if the reservoir diverts or negative if the reservoir releases. Instream reach data is printed for the upstream node and represents the minimum diverted within the reach. For detailed instream flow reach analysis, the file *.xir, provides detailed data for each node within the instream flow reach.

This summary file reflects information on “Available Flow”. Available Flow, as used by StateMod, is the minimum of the stream flow at that point on the river and all downstream locations. It is often quite different than the physical flow at that point on the river. Within StateMod, Available Flow is tracked and adjusted as each water right is operated by priority. However, Available Flow printed to the diversion summary report (*.xdd) is the final value after all water rights have been operated. Therefore, Available Flow is the quantity of water that might be available to a future user at that location who would be the most junior in the system.

In addition, Available Flow is often an indicator on why a structure may be shorted. In general, if the reported Available Flow is greater than zero, then a structure may be shorted only if it is limited by capacity or decree. The Available Flow may not be an indicator of why a structure is shorted if the structure is controlled by an operating rule or if the user has imposed limits on when the model will be allowed to re-operate (see the variable ireopx in the control (*.ctl) file). The control file (*.ctl) variables *icall* and *ccall*, discussed in more detail below, allow a user to evaluate the transient nature of the Available Flow value for an individual water right as it is operated in priority.

The header of the Stream Summary File (*.xdd) describes the structure ID, account and name. In addition, it describes the administration number, on/off switch, owner, and decreed amount for each water right located at this river node. It then contains a time series for the following:

#	Column	Description
General		
0	Str ID	Structure ID
0	Riv ID	River node ID
0	Year	Year of the simulation
0	Mo	Month of the simulation
Demand		
1	Total Demand	Structure Demand provided in the demand files Note if demand data is provided as a consumptive Value total demand is adjusted using a surface Water efficiency
2	CU Demand	Consumptive Demand. Note if a consumptive demand File (*.ddc) is provided this value is printed. If a consumptive demand file is not provided this value is calculated from demand and efficiency data
From River by		
3	Priority	Water Supply from the river by a priority diversion (standard and Operation type 11 diverting structure)
4	Storage	Water Supply from the river by a storage release
5	Other	Water Supply from the river via an exchange, water right transfer or plan
6	Loss	Water Supply lost to the system at the river
From Well		
7	From Well	Water Supply from wells to the structure at this river node.
From Carrier by		
8	Priority	Water Supply from a carrier by a priority diversion (Operation type 3 or 11 destination structure)
9	Other	Water Supply from a carrier by a storage release or exchange (Operation type 2 or 6 destination structure if not diverting)
10	Loss	Water Supply from a carrier lost in transit
Other		
11	Carried Exchange Bypass	Water Supply diverted for carrier purposes. The source will be presented as a From River by Priority, From Carrier by Priority, or From River by Other.
12	From Soil	Water supplied from the soil zone
13	Total Supply	The sum of all water supplies (does not include Carried Water)
Shortage		
14	Total Short	The difference between Total demand and total

		supply
15	CU Short	The difference between the CU demand and CU
Water Use		
16	CU	Consumptive use of the water supply
17	To Soil	Water diverted to the soil zone.
18	To Other	For a diversion this column describes the total return flow (e.g. the amount that will return over all return time periods) For a reservoir this column describes the water diverted to storage. For an administrative or CU reuse plan this column describes water diverted to the plan
19	Loss	Water diverted that is not consumed, to soil or returned. Typically is non zero when the sum of return locations or delays do not equal 100%.
Station In/Out		
20	Upstream Inflow	Inflow from an upstream node to this reach
21	Reach Gain	Inflow from gains to this node as described in stream inflow file (Section 4.14)
22	Return Flow	Inflow from returns to this node. Note this term includes returns from both surface and well supplies in the current time step.
23	Well Depletion	Depletion caused by pumping in prior time steps. Note this term impacts the river inflow (water supply)this month.
24	To_From GWStor	Inflow or outflow to ground water storage. Note this term is positive when ground water storage is required to offset pumping depletions in the current month that cause the river to go negative. This term is negative when stream flow is required to offset water originating from ground water storage in prior months.
Station Balance		
25	River Inflow	The sum of inflows to this node
26	River Divert	The sum of water supplies diverted at this node (does not include From Carrier by Storage or From Carrier by Priority)
27	River by Well	The depletion caused by a well in this month. Note this term is similar to a diversion in the current month.
28	River Outflow	Outflow from this node
29	Avail Flow	Available flow at this river node. This is the amount of water available to a potential user that is the most junior in the basin.
30	Control Location	Location on the river that limits the diversion
31	Control Right	Water Right that limits the diversion (calling right)

5.2.2 Reservoir Summary File

The Reservoir Summary File (*.xre) describes diversion, release, storage and stream flow data at river nodes that contain a reservoir. The header describes the reservoir ID, account and name. In addition, it describes the administration number, on/off switch, owner, and decreed amount for each water right located at this river node. It then contains a time series for the following:

#	Column	Description
General		
0	River ID	River node ID
0	Account	Reservoir account (0 is the total)
0	Year	Year of the simulation
0	Mo	Month of the simulation
1	Initial Storage	Storage at the beginning of month
Water Supply From River by		
2	Priority	Water Supply from the river by a priority diversion standard and Operation type 11 diverting structure)
3	Storage	Water Supply from the river by a storage release
4	Other	Water Supply from the river by an exchange, water Right transfer or plan.
Water Supply From Carrier by		
5	Priority	Water Supply from a carrier by a priority diversion
6	Other	Water Supply from a carrier via a storage release or
7	Total Supply	The sum of all water supplies
Water Use from Storage to		
8	River for Use	Releases for downstream use (Operation type 1 and 2)
9	River for Exc.	Releases for exchange (Operation type 4)
10	Carrier for Use	Releases to a carrier canal (Operation type 3)
11	Total Release	Total of all releases
Other		
12	Evap	Net evaporation
13	Seep and Spill	Seepage and spills
14	EOM Content	End of Month Content
15	Target-0 Stor-n Limit	For the total reservoir (account 0) Target Storage for accounts (account n) their storage limit
16	BOM Decree Limit	The remaining limit to the one fill rule at the beginning of the month
Station Balance		
17	River Inflow	The sum of inflows to this node
18	Total Release	Total release
19	Total Supply	Total reservoir supplies
20	River by Well	The depletion caused by a well in this month.

		Note this term is similar to a diversion in the current month.
21	River Outflow	Outflow from this node

5.2.3 Well Summary File

The Well Summary File (*.xwe) describes the structure data (demand, surface supply, ground supply and shortage), use of water (CU, return and loss) and source of water (river, ground water storage and salvage) for every structure that has a well. The header describes the well ID, account and name. In addition, it describes the administration number, on/off switch, owner, and decreed amount for each ground water right located at this structure. It then contains a time series for the following:

#	Column	Description
General		
0	Structure ID	Well Structure ID
0	River ID	River node ID
0	Year	Year of the simulation
0	Mo	Month of the simulation
Demand		
1	Total Demand	Structure Demand provided in the demand files Note if demand data is provided as a consumptive Value total demand is adjusted using a surface Water efficiency
2	CU Demand	Consumptive Demand. Note if a consumptive demand File (*.ddc) is provided this value is printed. If a consumptive demand file is not provided this value is calculated from demand and efficiency data.
Water Supply		
3	From Well	Water Supply from wells to this structure (e.g. pumping)
4	From SW	Water Supply from other sources (diversions, reservoirs or other Well structures) that are tied to this well structure. Note if this well structure is not tied to a diversion, this column will be zero.
5	From Soil	Water supplied from the soil zone.
6	Total Supply	The sum of all water supplies (does not include carried water
Short		
7	Total Short	The difference between Total demand and total supply.
8	CU Short	The difference between the CU demand and CU
Water Use		
9	CU	Consumptive use of the water supply
10	To Soil	Water diverted to the soil zone.
11	Total Return	Total return flow (note the amount that will return

		over all return time periods)
12	Loss	Water diverted that is not consumed, to soil or Returned. Typically is non zero when the sum Of return locations or delays do not equal 100%.
13	Total Use	Total water use (CU + To Soil + To Return + Loss)
Water Source		
14	From River	Well water supplied by the River in this month.
15	From GWStor	Well water supplied by Ground Water in this month (e.g. lagged depletions).
16	From Salvage	Well water supplied by ET Salvage.
17	From Soil	Well water supplied by the soil zone.
18	Total Source	Total water source (From River + From GWStor + From Salvage + From Soil) node

5.2.4 Structure Summary File

The Structure Summary File (*.xss) is a standard output when the variable efficiency option is used (control variable *ieffmax*=1). The report describes structure data related to area, demand, maximum efficiency surface water use, ground water use, soil storage, consumptive use and returns. It was developed to provide data similar to that provided by StateCU, the State's consumptive use model.

The header describes the structure (diversion or well ID), account and name. In addition, it describes the administration number, on/off switch, owner, and decreed amount for each water right located at this structure. It then contains a time series for the following:

#	Column	Description
General		
0	Structure ID	Structure ID (diversion or well)
0	Year	Year of the simulation
0	Mo	Month of the simulation
Area		
1	Sw Fld	Acres served by surface water and flood irrigation
2	SW Spr	Acres served by surface water and sprinklers
3	GW Fld	Acres served by ground water and flood irrigation
4	GW Spr	Acres served by gronnd water and sprinklers
5	Total	Total Acres
Demand		
6	Total Demand	Structure Demand provided in the demand files Note if demand data is provided as a consumptive value total demand is adjusted using a surface water efficiency
7	CU Demand	Consumptive Demand. Note if a consumptive demand file (*.ddc) is provided this value is printed. If a consumptive demand file is not provided this value is calculated from demand and efficiency data
Max Efficiency		
8	FldEff	Maximum flood efficiency

```
 9   SprEff             Maximum sprinkler efficiency

Surface Water
10   Divert             Water diverted
11   ConEff             Percent Conveyance Efficiency
12   ConLoss            Conveyance loss
13   To CU              Water consumed
14   To Soil            Water diverted to soil
15   Return             Water that will return
16   Loss               Water that is lost to system
17   ActEff             Percent Actual efficiency (To CU + To Soil)/Divert)* 100

Ground Water
18   Pump               Water pumped
19   Capacity           Well capacity
20   To CU              Water consumed
21   To Soil            Water diverted to soil
22   Return             Water that will return
23   Loss               Water that is lost to system
24   ActEff             Percent Actual efficiency (Pump + To Soil)/Divert
                          * 100

Soil Moisture
25   Soil Storage       Volume of water in soil moisture storage

Consumptive Use
26   SW&GW              Consumptive use of surface and ground water
27   Soil               Consumptive use of soil moisture
28   Total              Total CU (sum of SW&GW and Soil)

Return
29   Total Return       Total of all return flows
30   IWR Short          Unmet Irrigation water requirement
```

5.2.5 Operation Summary File

The Operation Summary File (*.xop) provides a matrix of diversion or release activities associated with each operating right.

5.2.6 Log File

The Log File (*.log) contains a log of the simulation operations. The log file contains important information for the user; it is recommended the user review the log file and understand and/or address if necessary any warnings after each model execution. Additionally, if the model fails to execute, the log file provides information as to why the model will not execute to completion.

5.2.7 Check File

The Check File (*.chk) contains a description of key data and detailed warnings (if any). The check file should always be reviewed following a simulation.

5.2.8 Replacement Reservoir File

The Replacement Reservoir File (*.xrp) is a standard output when a Replacement Reservoir (type 10) operating rule is specified. It was developed to provide detailed replacement reservoir operation information. It is particularly useful when more than one replacement reservoir is operational. Note that a release may not equal a diversion if the release is limited to the structures consumptive use. This "Depletion" Vs "Diversion" option is implemented by structure using variable *ireptyp* in the diversion station (*.dds) file.

```
 #      Column           Description
General
 0      Structure ID    Structure ID (diversion or well)
 1      Year            Year of the simulation
 2      Mo              Month of the simulation
 3      Iter            Iteration
 4      Call            Counter to Replace Subroutine per time step
 5      Opr ID          Operational Right ID

 6      Type            Type of Release (Direct or Exchange)
 7      Source ID       Replacement Reservoir
 8      Source Name     Replacement Reservoir Name
 9      Destin. ID      Destination Diversion ID
10      Destin. Name    Destination Diversion Name
11      Release         Reservoir release
12      Tot-Rel         Total Reservoir Release

13      Divert          Water diverted
14      Tot-Div         Total diversion
15      DepAdj          Depletion Adjustment
16      Rel%            Release %
17      Divo            Total diverted by this operating right this time step
18      ishort          Shortage indicator 0=none, 1=yes
```

5.2.9 Plan Summary File

The Plan Summary File (*.xpl) is a standard output when a Plan structure type is used. The report describes structure data related to a plan including its type, ID and Source. In addition it describes any operating rules that may use the plan (Use) or provide water to the plan (Src) and whether or not the operating rule tied to that plan is turned on. Note if a plan source is not turned on, an operating rule that uses that plan as a source has its status reported as "off" and a warning is provided in the log file. The data printed to a plan depends on the type of plan specified; plan types are listed below.

Type 1- Terms and Conditions (T&C)
Type 2 - Well Augmentation
Type 3 - Reuse to a Reservoir
Type 4 - Reuse to a Diversion
Type 7 - Import Plan
Type 8 - Recharge (reservoir or canal seepage
Type 9 - Out-of-Priority Diversion or Storage
Type 10 - Special Well Augmentation
Type 11 - Accounting Plan
Type 12 - Release Limit Plan
Type 13 - Changed Water Right Plan

5.2.9.1 Term and Condition Plan (type 1)

#	Column	Description
General		
0	Plan ID	Plan ID
0	River ID	Plan location on the River network
0	Year	Year of the simulation
0	Mo	Month of the simulation
1	From Exc_Byp	Total amount exchanged/bypass by opr rules with associated T&C Plan
2	Plan Demand	T&C Plan demand at this time step
3	Src 1	Water source 1
..	..	..
..	..	..
22	Src 20	Water source 20
23	Short	Plan shortage
24	Total	Total of all sources

5.2.9.2 Well Augmentation Plan (type 2 and 10)

#	Column	Description
General		
0	Plan ID	Plan ID
0	River ID	Plan location on the River network
0	Year	Year of the simulation
0	Mo	Month of the simulation
1	From Well	Augmentation Well Pumping
2	Plan Demand	Augmentation Plan Demand at this time step Plan Demand is well depletion less return flow from this plans pumping Plan Demand will be zero for Special Aug Plans
3	Src 1	Water source 1
..	..	..
..	..	..
22	Src 20	Water source 20
23	Short	Plan shortage
24	Total	Total of all sources

5.2.9.3 Reservoir Reuse Plan (type 3)

#	Column	Description
General		
0	Plan ID	Plan ID
0	River ID	Plan location on the River network
0	Year	Year of the simulation
0	Mo	Month of the simulation
1	Initial Storage	Initial Reuse Plan storage
2	Supply Total	Reuse Plan Total Supply this time step
3	Use 1	Reuse 1
..	..	..

```
 ..     ..                ..
22      Use 20            Reuse 20
23      Total             Total of all uses
24      Ending Storage    Ending Reuse Plan storage
```

5.2.9.4 Non Reservoir Reuse Plan (type 4)

```
 #      Column            Description
General
 0      Plan ID           Plan ID
 0      River ID          Plan location on the River network
 0      Year              Year of the simulation
 0      Mo                Month of the simulation

 1      Supply Total      Reuse Plan Total Supply this time step
 2      Use 1             Reuse 1
 ..     ..                ..
 ..     ..                ..
21      Use 20            Reuse 20
22      Total             Total of all uses
```

5.2.9.5 Out-of-Priority Plan (type 9)

```
 #      Column            Description
General
 0      Plan ID           Plan ID
 0      River ID          Plan location on the River network
 0      Year              Year of the simulation
 0      Mo                Month of the simulation

 1      Initial Demand    OOP Plan demand at beginning of time step
 2      Demand Total      OOP Plan demand at this time step
 3      Src 1             Water source 1
 ..     ..                ..
 ..     ..                ..
22      Src 20            Water source 20
23      Total             Total of all sources
24      Ending Demand     OOP Plan demand at end of time step
```

5.2.9.6 Accounting Plan (type 11)

```
 #      Column            Description
General
 0      Plan ID           Plan ID
 0      River ID          Plan location on the River network
 0      Year              Year of the simulation
 0      Mo                Month of the simulation

 1      Supply Total      Simulated diversion accounted for in Plan
 2      Use 1             Use 1
 ..     ..                ..
 ..     ..                ..
21      Use 20            Use 20
```

```
22      Total             Total of all uses
```

5.2.9.7 Release Limit Plan (type 12)

```
 #      Column            Description
General
 0      Plan ID           Plan ID
 0      River ID          Plan location on the River network
 0      Year              Year of the simulation
 0      Mo                Month of the simulation

 1      Release Limit     Monthly release limit at beginning of time step
 2      Use 1             Water source 1
 ..     ..                ..
 ..     ..                ..
21      Use 20            Water source 20
22      Total             Total of all sources
```

5.2.9.8 Changed Water Right Plan (type 13)

```
 #      Column            Description
General
 0      Plan ID           Plan ID
 0      River ID          Plan location on the River network
 0      Year              Year of the simulation
 0      Mo                Month of the simulation

 1      Supply Total      Simulated diversion accounted for in Plan
 2      Use 1             Use 1
 ..     ..                ..
 ..     ..                ..
21      Use 20            Use 20
22      Total             Total of all uses
```

5.2.10 Other Simulation Files

The Instream Reach Summary File (*.xir) provides a matrix of total supply for each node associated with an instream flow reach.

The Daily Direct Diversion File (*.xdy) provides the same data as the monthly diversion and instream flow file (*.xdd) but on a daily time step.

The Daily Reservoir Station file (*.xry) provides the same data as the monthly reservoir station file (*.xre) but on a daily time step.

The Daily Well Station file (*.xwy) provides the same data as the monthly well station file (*.xwe) but on a daily time step.

The Plan Summary file (*.xpl) provides a summary of plan data and operational rules associated with a a plan, as discussed for each plan type above.

5.3 Report Module Output Files

There are twenty four (24) output files available from the Report Module as summarized in the table above and described below.

5.3.1 Basin Water Balance

The Basin Water Balance Report (-xwb) provides a description of the inflows, outflows and storage changes. It contains a time series for the following:

#	Column	Description
General		
0	Year	Year
0	Mo	Month
Inflows		
1	Stream Inflow	Total inflow to the river from model boundaries and natural gains
2	Return	Total return flow to the river
3	From/To GWStor	Total inflow or outflow from ground water storage
4	From SoilM	Total from soil moisture
5	From Plan	Total from a non-reservoir reuse plan (type 4) or An accounting plan (type 11) from one of the following 3 operating rules: 1 A Multiple Plan Ownership rule (type 46), 2 A Reuse Plan to a T&C or Augmentation Plan Direct rule (type 48), or 2 A Reuse Plan to a T&C or Augmentation Plan by Exchange rule (type 49)
6	Total Inflow	Total of inflows (Stream Inflow + Return + From/To GW Storage + From SoilM)
Outflows		
7	Divert	Total Diversion (From River by Priority + From River by Storage + From River by Exchange + From Carrier by Storage for operational type 3- Instream Diversions, Diversion to Storage From River by Carrier)
8	From River Well	Total well pumping from the River in this month
9	Well Depletion	Total well depletion from the river from pumping in previous months
10	Res. Evap	Total reservoir evaporation
11	Stream Outflow	Total outflow from the river
12	Reservoir Change	Total reservoir storage change (End of Month Content - Beginning of Month Content)
13	To SoilM	Total to soil moisture
14	SoilM Change	Soil moisture change (End of Month Content - Beginning of Month Content)
15	Total Outflow	Total of outflows (Divert + From River by Well + Well Depletion + Res. Evap + Stream Outflow + Reservoir Change + To SoilM + SoilM Change

Balance		
16	Delta	Difference between inflows and outflows
Other		
17	CU	Total Consumptive Use
18	Loss	Portion of diversions and pumping that are not consumed or do not return to the stream. Calculated to be (Diversion + Pumping) * (100 - sum of returns to river)
19	Pumping	Total well pumping
20	Salvage	Portion of well pumping offset by ET salvage. Calculated to be Well pumping * (100 - sum of depletions to river)

5.3.2 Water Right Report

The Water Right Report (-xwr) provides a sorted list of water rights. It contains the following:

#	Column	Description
1	Rank	Water right rank
2	Type	Water right type code (see footnote)
3	Admin #	Administration number
4	On/Off	On/Off switch (0=off, 1=on)
5	STR ID #1	Primary structure associated with this right
6	Str ID #2	Secondary structure associated with this right (used only when wells are tied to both a well and diversion structure)
7	Amount	Decreed amount (-1 for an operational right)
8	Right Name	Water right name
9	Structure Name	Associated structure name (blank for an operational right)

5.3.3 Additional Output Reports

The Standard Report (-xst) produces four files; the Demand Summary File (*.xdd), the Reservoir Summary File (*.xre), the Instream Reach Summary File (*.xir), the Well Summary File (*.xwe) and the Operation Right Summary File (*.xop). These are the same files produced by the simulate option and are described above.

The Node Accounting Report (-xna) produces two files: the Detailed Node Accounting (*.xnm) file and Summary Node Accounting (*.xna) file. Both provide the same results as the standard report but are sorted by the stream order provided in the river network file (*.rin). The detailed node accounting file provided data for every month of the study period while the summary provides an annual average.

The Diversion Graph Report (-xdg) provides the same data presented in the diversion and stream gage summary report but it is formatted for easy graphing by a spreadsheet or other plotting package (e.g. XMGR for the workstation).

The Reservoir Graph Report (-xrg) provides the same data presented in the reservoir summary report but it is formatted for easy graphing by a spreadsheet or other plotting package (e.g. XMGR for the workstation).

The Well Graph Report (-xwg) provides the same data presented in the well summary report but it is formatted for easy graphing by a spreadsheet or other plotting package (e.g. XMGR for the workstation).

The Diversion Comparison Report (-xdc) compares the total diversion estimated by the model to the gaged record if available in the historic diversion file (*.ddh). Its output file is named *.xdc. If the user specifies –Report as a secondary parameter when executing this option (e.g. –report –xdc – Report) a Diversion Comparison Summary Report (.xdc) is generated for each Reach specified in the Reach Data (*.rch) file.

The Reservoir Comparison Report (-xrc) compares the end of month contents estimated by the model to the gaged record if available in the historic end of month content file (*.eom).

The Well Comparison Report (-xwc) compares the total well pumping estimated by the model to the gaged record if available in the historic well pumping file (*.weh). Its output file is named *.xwc. If the user specifies –Report as a secondary parameter when executing this option (e.g. –report –xwc – Report) a Well Comparison Summary Report (.xwc) is generated for each Reach specified in the Reach Data (*.rch) file.

The Stream Comparison Report (-xsc) compares the total diversion estimated by the model to the gaged record if available in the historic streamflow file (*.xsc). Its output file is named *.xsc. If the user specifies –Report as a secondary parameter when executing this option (e.g. –report –xsc – Report) a Stream Comparison Summary Report (*.xsc) is generated for each Reach specified in the Reach Data (*.rch) file.

The Consumptive Use Water Supply Report (-xcu) provides four output files; *.xcu, *.xsu, *.xsh and *.xwd. The CU summary (*.xcu) presents the total diversion by each structure in a special format required by the CRDSS consumptive use model. The supply summary (*.xsu) presents the total supply to each structure. The shortage summary (*.xsh) presents the shortage associated with each structure. The water district summary (*.xwd) presents the total diversion for each Reach specified in the Reach Data (*.rch) file.

The River Data Summary Report (-xrx) provides a summary of data provided by river node.
The Selected Parameter Report (-xsp) provides a printout of a selected parameter (e.g. Total_Diversion) available to the standard diversion (*.xdd), reservoir (*.xre) and well (*.xwe) output files. It reads the Output Request file (*.out) to determine the type of output (e.g. Diversion, InstreamFlow, StreamGage, Reservoir or Well), parameter (e.g. Total_Diversion) and ID to print. It creates two output files with the same data in a different format; the output formatted into a matrix is named *.xsp while the output formatted into a column is named *.xs2. Note to get a list of parameters for each data type, enter a dummy variable under parameter type (e.g. x) and review the log file.

The Daily Selected Parameter Report (-xds) provides a printout of a selected parameter (e.g. Total_Diversion) available to the standard daily diversion (*.xdy), reservoir (*.xry) and well (*.xwy) output files. It reads the Output Request file (*.out) to determine the type of output (e.g. diversion), parameter (e.g. Total_Diversion) and ID to print. It creates two output files with the same data in a different format; the output formatted into a matrix is named *.xds while the output formatted into a column is named *.xd2. Note to get a list of parameters for each data type (diversion, stream, instream flow, reservoir or well) enter a dummy variable under parameter type (e.g. x) and review the log file. The Well to Plan Summary (-xwp) provides a summary of every well structure and the augmentation plans, if any, associated with a well structure.

The Log File (*.log) contains a log of the report module's operation. The log file contains important information for the user; it is recommended the user review the log file and understand and/or address if necessary any warnings after each model execution.

The control file contains a variable named ichk that is used to obtain detailed results. Section 4.2 provides a description of these detailed report options.

5.4 Data Check Output Files

There are eight (8) standard output files from the Data Check Module

1. Base Flow File (*.xcb)
2. Direct Demand File (*.xcd)
3. Instream Demand File (*.xci)
4. Well Demand File (*.xcw)
5. Water Right List file (.xwr)
6. Output Request File (*.xou)
7. Reach File (*.xrh)
8. Log File (*.log).

The first four files describe the base flow, direct flow demand, instream flow demand and well demand at each river node, respectively. The water right list file is the same as that produced by the Report Module. The Output Request file provides a list of structures which may be used as an input file for data requests by structure. The Reach file provides a list of structure which may be used as an input file for data requests by reach.

The Log File (*.log) contains a log of the data check module's operation. The log file contains important information for the user; it is recommended the user review the log file and understand and/or address if necessary any warnings after each model execution. Additionally, if the model fails to execute, the log file provides information as to why the model will not execute to completion.

5.5 Binary Output Files

StateMod prints a variable number of direct access binary output files, depending on the types of structures and time step (monthly or daily) being simulated. This section describes the contents of the three major structure types (direct diversion, reservoir and wells) for both monthly and daily time steps. Note that the binary files can be accessed using TSTool; see the TSTool documentation available on the CDSS website (cdss.state.co.us) for more information.

5.5.1 Monthly Binary Direct Diversion File

StateMod prints a monthly direct access binary diversion binary file (*.b43) that describes water use at each river node. The record length is 160 bytes. A typical read statement is as follows:

Irecs = ((iy-iystr0)*12 + (im-1))*numsta + is + numtop

Read(43,rec=irecs) (dat(i), i=1,ndiv)

Where:

Irecs	= the binary record to read
iy	= the year of interest
iystr0	= the starting year
im	= the month of interest
numsta	= the total number of stream nodes
is	= the stream node of interest
numtop	= the total number of header cards (numsta+numdiv+numifr+numres+numrun+numdivw+5+3*maxparm+2)
dat(i)	= the data read
ndiv	= the number of diversion data elements (maxparm)

Row-data	Variable	Description
1-1	CodeName	Program Name
1-2	ver	Program version
1-3	Vdate	Program version date

Row-data	Variable	Description
2-1	iystr0	Beginning year of simulation
2-2	iyend0	Ending year of simulation

Row-data	Variable	Description
3-1	numsta	number of river nodes
3-2	numdiv	number of diversions
3-3	numifr	number of instream flows
3-4	numres	number of reservoirs
3-5	numown	number of reservoir owners (active and inactive)
3-6	nrsact	number of active reservoirs
3-7	numrun	number of base flows
3-8	numdivw	number of well structures (D&W and Well

		only)
3-9	numdxw	number of well only structures
3-10	maxparm	number of parameters for a diversion, reservoir and well
3-11	ndivO	number of data elements in the *.b43 output file
3-12	nres0	number of data elements in the *.b44 output file
3-13	nwelO	number of data elements in the *.b45 **output file**

Row-data	**Variable**	**Description**
4-1	xmonam(1-14)	Month corresponding to the year type e.g. xmonam(1) = Jan for a calendar yr. xmonam(1) = 10 for a water year, etc.

Row-data	**Variable**	**Description**
5-1	mthday(1-12)	Days per month (e.g. if xmonam(6) = June mthday(6)=30 if xmonam(6) = March mthday(6) = 31

Row-data	**Variable**	**Description**
6-1	j	Counter
6-2	cstaid(j)	Station ID
6-3	stanam(I,j), I=1,6)	Station Name

Repeat for j=1, numsta (number of river nodes)

Row-data	**Variable**	**Description**
7-1	j	Counter
7-2	cdivid(j)	Diversion ID
7-3	divnam(I,j), I=1,6)	Diversion Name
7-4	idvsta(i)	River Node

Repeat for j=1, numdiv (number of diversions)

Row-data	**Variable**	**Description**
8-1	j	Counter
8-2	cifrid(j)	Instream flow ID
8-3	xfrnam(I,j), I=1,6)	Instream flow Name
8-4	ifrsta(i)	River Node

Repeat for j=1, numifr (number of instream flows)

Row-data	**Variable**	**Description**
9-1	j	Counter
9-2	cresid(j)	Reservoir ID
9-3	resnam(I,j), I=1,6)	Reservoir Name
9-4	irssta(i)	River Node
9-5	iressw(i)	On (1) / Off(0) Code
9-6	nowner(i)	# of owners

Repeat for j=1, numres+1 (number of reservoirs)

Row-data	Variable	Description
10-1	j	Counter
10-2	crunid(j)	Base Flow ID
10-3	runnam(I,j), I=1,6)	Base Flow Name
10-4	irusta(i)	River Node

Repeat for j=1, numrun (number of base flows)

Row-data	Variable	Description
11-1	j	Counter
11-2	cdividw(j)	Well ID
11-3	divnamw(I,j), I=1,6)	Well Name
11-4	idvstw(i)	River Node

Repeat for j=1, numdivw (number of wells)

Row-data	Variable	Description
12-1	j	Counter
12-2	paramD(j)	Diversion Parameter

Repeat for j=1, maxparm (number of parameters)

Row-data	Variable	Description
13-1	j	Counter
13-2	paramR(j)	Reservoir Parameter

Repeat for j=1, maxparm (number of parameters)

Row-data	Variable	Description
14-1	j	Counter
14-2	paramW(j)	Well Parameter

Repeat for j=1, maxparm (number of parameters)

Row-data	Variable	Description
15-1	unit(1-nx)	Units for each data type in a file Where nx is ndivO for *.b43, ndivR for *.b44, and ndivW for *.b42

Row-data	Variable	Description
16-1	dat(1)	Total Demand (Total_Demand)
16-2	dat(2)	CU Demand (CU_Demand)
16-3	dat(3)	Priority Diversion (From_River_By_Priority)
16-4	dat(4)	Storage Diversion (From_River_By_Storage)
16-5	dat(5)	Exchange Diversion (From_River_By_Exchange)
16-6	dat(6)	River Loss (From_River_Loss)
16-7	dat(7)	From Well (From_River_By_Well)
16-8	dat(8)	Carrier by Priority (From_Carrier_By_Priority)
16-9	dat(9)	Carrier by Exchange (From_Carrier_By_Storage)
16-10	dat(10)	Carried Water (Carried_Water)

16-11	dat(11)	Carried Loss (Carried_Loss)
16-12	dat(12)	From Soil (From_Soil)
16-13	dat(13)	Total Supply (Total_Supply)
16-14	dat(14)	Total Short (Total_Short)
16-15	dat(15)	CU Short (CU_Short)
16-16	dat(16)	CU (Consumptive_Use)
16-17	dat(17)	To Soil (To_Soil)
16-18	dat(18)	Total Return (Total_Return)
16-19	dat(19)	Loss (Loss)
16-20	dat(20)	Upstream Inflow (Upstream_Inflow)
16-21	dat(21)	Reach Gain (Reach_Gain)
16-22	dat(22)	Return Flow (Return_Flow)
16-23	dat(23)	Well Depletion (Well_Depletion)
16-24	dat(24)	To_From GWStor (To_From_GW_Storage)
16-25	dat(25)	River Inflow (River_Inflow)
16-26	dat(26)	River Divert (River_Divert)
16-27	dat(27)	River by Well (River_By_Well)
16-28	dat(28)	River Outflow (River_Outflow)
16-29	dat(29)	Available Flow (Available_Flow)
16-30	dat(30)	Diversion by an instream Flow (Divert_For_Instream_Flow)
16-31	dat(31)	Diversion to Power (Divert_For_Power)
16-32	dat(32)	Diversion from Carrier by Storage (Diversion_From_Carrier)

Field 16-33 is a placeholder that currently contains the same data as field 16-19 (loss)

16-34	dat(34)	Released from plan. (This includes 1. Water diverted into then released from a plan and 2. Water released from a plan to a carrier that returns water to the river)
16-35	dat(35)	Structure type see table below

Structure Type Codes

Code (na)	Structure Type
< 0	Baseflow node[1]
< 10,001	Baseflow node only[1]
0	Well Only
1-5,000	Diversion
5,001 - 7,500	Instream Flow
7,501 - 10,000	Reservoir

[1]Note a code of 1 indicates a diversion, a code of -1 indicates a diversion with at baseflow, a code of –10001 indicates a baseflow node only.

16-36	dat(36)	Number of structures at this node
16-37	dat(37)	Calling river node (-1 means NA)
16-38	dat(38)	Calling right amount (-1 means NA)

Repeat for every river node numsta
Repeat for every month of simulation

5.5.2 Monthly Binary Reservoir File

StateMod prints a direct access binary reservoir file (*.b44) that describes water supply and use for each reservoir and account. As with other reservoir outputs, there are binary outputs for the reservoir as a whole (Account 0) and for the individual reservoir accounts (Account 1, 2, 3, etc). The record length is 160 bytes. Note a typical read statement is as follows:

Irecs = ((iy-iystr0)*12 + (im-1))*nrsactx + ir1 + numtop

Read(44,rec=irecs) (dat(i), i=1,nres)

Where:

Irecs	= the binary record to read
iy	= the year of interest
iystr0	= the starting year
im	= the month of interest
nrsactx	= the total number of active reservoirs (nract) and total number of active nd inactive accounts (numown) (i.e. nrsactx = nrsact + numown)
ir1	= the reservoir account of interest (the first account is always the reservoir total)
numtop	= the total number of header cards (See 7.21.1)
dat(i)	= the data read
nres	= the number of reservoir data elements (29)

Fields 1-15 are exactly the same as the Binary Direct Diversion file.

Row-data	Variable	Description
16-1	dat(1)	Initial Storage (Initial_Storage)
16-2	dat(2)	Priority Diversion (River_Priority)
16-3	dat(3)	Storage Diversion (River_Storage)
16-4	dat(4)	Exchange Diversion (River_Exchange)
16-5	dat(5)	River Loss (River_Loss)
16-6	dat(6)	Carrier by Priority (Carrier_Priority)
16-7	dat(7)	Carrier by Sto_Exc (Carrier_Storage)
16-8	dat(8)	Carrier Loss (Carrier_Loss)
16-9	dat(9)	Total Supply (Total_Supply)
16-10	dat(10)	Storage Use (Storage_Use)
16-11	dat(11)	Storage Exchange (Storage_Exchange)
16-12	dat(12)	Carrier Use (Carrier_Use)
16-13	dat(13)	Total Reservoir Release (Total_Release)
16-14	dat(14)	Reservoir Evaporation (Evap)
16-15	dat(15)	Seepage and Spill (Seep_Spill)
16-16	dat(15)	Simulated EOM Contents (Sim_EOM)
16-17	dat(17)	EOM Target Limit (Target_Limit)
16-18	dat(18)	One Fill Limit (Fill_Limit)
16-19	dat(19)	River Inflow (River_Inflow)
16-20	dat(20)	Total Reservoir Release (Total_Release)
16-21	dat(21)	Total Reservoir Supply (Total_Supply)
16-22	dat(22)	River by Well (River_By_Well)
16-23	dat(23)	River Outflow (River_Outflow)
16-24	dat(24)	Reservoir Carry (Reservoir_Carry)

16-25	dat(25)	Reservoir Loss (Reservoir_Loss)
16-26	dat(26)	Reservoir Seepage (Reservoir_Seep)
16-27	dat(27)	Reservoir account number Note 0 = total(ridr)
16-28	dat(28)	Number of accounts for this reservoir (acc)
16-29	dat(29)	Reservoir (rnr)

Repeat for every reservoir account
Repeat for every reservoir
Repeat for every month of simulation

5.5.3 Monthly Binary Well File

StateMod prints a direct access binary well file (*.b42) that describes water supply and use for each well structure. The record length is 92 bytes. Note a typical read statement is as follows:

Irecs = ((iy-iystr0)*12 + (im-1))*numdivw + nw + numtop

Read(42,rec=irecs) (dat(i), I=1,ndivw)

Where:

Irecs	= the binary record to read
iy	= the year of interest
iystr0	= the starting year
im	= the month of interest
numdivw	= the total number of wells
nw	= the well of interest
numtop	= the total number of header cards
dat(i)	= the data read
ndivw	= the number of well data elements (18)

Fields 1-14 are exactly the same as the Binary Direct Diversion file.

Row-data	**Variable**	**Description**
15-1	dat(1)	Total Demand (Total_Demand)
15-2	dat(2)	Consumptive Use Demand (CU_Demand)
15-3	dat(3)	From Well (From_Well)
15-4	dat(4)	From Surface Water (From_SW)
15-5	dat(5)	From Soil Moisture (From_Soil)
15-6	dat(6)	Total Supply (Total_Supply)
15-7	dat(7)	Total Shortage (Total_Short)
15-8	dat(8)	Consumptive Use Short (CU_Short)
15-9	dat(9)	Total Consumptive Use (Total_CU)
15-10	dat(10)	To Soil Moisture (To_Soil)
15-11	dat(11)	Total Return (Total_Return)
15-12	dat(12)	Loss (Loss)
15-13	dat(13)	Total Use (Total_Use)
15-14	dat(14)	From River (From_River)
15-15	dat(15)	To or From Ground Water Storage

```
                                    (To_From_GW_Storage)
15-16         dat(16)               From Salvage (From_Salvage)
15-17         dat(17)               From Soil Moisture (From_Soil)
15-18         dat(18)               Total Supply (Total_Supply)

Repeat for every well
Repeat for every month of simulation
```

5.5.4 Daily Binary Direct Diversion File

StateMod prints a daily direct access binary diversion binary file (*.b49) that describes water use at each river node and day. The record length is 160 bytes. Note a typical read statement is as follows:

Irecs = ((iy-iystr0)*12 + (im-1))*numsta*31 + is + numtop

Read(49,rec=irecs) (dat(i), i=1,ndiv)

Where:

All terms are the same as defined for the Monthly Direct Diversion File

5.5.5 Daily Binary Reservoir File

StateMod prints a daily direct access binary reservoir file (*.b50) that describes water use at each reservoir and account by day. The record length is 160 bytes. Note a typical read statement is as follows:

Irecs = ((iy-iystr0)*12 + (im-1))*nrsactx + ir1 + numtop

Read(50,rec=irecs) (dat(i), i=1,nres)

Where:

All terms are the same as defined for the Monthly Direct Diversion File

5.5.6 Daily Binary Well File

StateMod prints a daily well file (*.b65) that describes water use for each well structure. The record length is 92 bytes. Note a typical read statement is as follows:

Irecs = ((iy-iystr0)*12 + (im-1))*numdivw*31 + nw + numtop

Read(65,rec=irecs) (dat(i), I=1,ndivw)

Where:

All terms are the same as defined for the Monthly Direct Diversion File

5.6 Additional Reporting Options

StateMod also has the capability of providing more detailed information in specific output files. The following sections describe this additional functionality and how to implement the request for specific output information.

5.6.1 Reach Reporting

Selected State Model reports have the capability to summarize results by stream reach including the diversion comparison (*.xdc), the stream comparison (*.xsc), the reservoir comparison (*.xrc), and the well comparison (*.xwc). In addition a water budget by reach is automatically generated whenever a water budget (*.xwb) is generated. To facilitate reach processing the following are noted:

- As defined herein, a stream reach is simply an aggregation of structures located within a geographic region of the network.
- As described in section 4.53 the preliminary Reach Data file contains two components; Reach Data and Node Data. Reach data is used to define how one stream reach is connected to another. Node data is used to assign a stream (river) node to a stream reach.
- To eliminate the need to build a Reach Data file, a preliminary one (*.xrh) is generated by the check option (-check) for every structure in the system when a river gage (*.rig) file is provided (see Section 4.4.1). If a river gage (*.rig) file is not provided the Check option assigns one to define preliminary stream reaches. If one is not provided no reach data is generated.
- The default name for the preliminary file created by the check option is *.xrh. This preliminary file is commonly revised in an editor to reassign the Reach Data connectivity. In addition sub reaches may be defined to represent structures not bounded by a stream gage. After editing, the Reach Data file is typically renamed to *.rch to avoid it being overwritten every time a new check run is made.

5.6.2 Detailed Call Data

The State Model has the ability to print detailed call data for a diversion, reservoir or instream flow by setting the control file (*.ctl) call variable (***icall***) = 1 and the call right variable (***ccall***) to the water right of interest. The following are noted:

- Detailed call output is limited to a diversion, reservoir or instream flow right (i.e. operating rules and wells are not currently supported).
- Results are printed to the *.log file for each iteration. Note that the call can change during a time step if new water (e.g. reservoir releases and non-downstream return flow) become available. Therefore results are printed for every iteration of every time step and the volume of output can be quite large.
- Although the output is limited to when a decree is operating, the volume of water reported as diverted in the detailed output is for the entire structure, not just the right.

5.6.3 Call (Control) Reporting

StateMod allocates water based on available supply, demand, water rights and capacity using the prior appropriation doctrine (first in time, first in right). Therefore it never has the need to "call out" a structure because a structure only diverts if it is in priority, supply is available and it has capacity. However StateMod does report a control location and control right that, in many but not all cases, occurs where a structure has historically set a call on the river. This information can be a useful for calibration. The approach used by StateMod to identify a controlling (call) location and right is as follows:

- If a structure is shorted because of available supply, then the "control location" where a downstream water supply limit occurs is identified. If there is a structure (diversion, instream flow, and reservoir) at the "control location", the "control structure" is identified.

- If a "control structure" does not exist at the "control location" because of natural stream losses, etc. StateMod reports the control structure as "NA".

- If a "control structure" has been identified the "control right" is calculated based on the amount diverted at the "control structure" and the prior appropriation requirement that its senior decrees diverts water before its junior decrees. For example, if the control structure is diverting 100 cfs and it has two rights; one senior for 60 cfs and one junior for 200 cfs then the junior is the controlling right (because the senior is fully satisfied).

- If a "control structure" does not exist, StateMod records the control right as –1 (for not applicable).

- More than one "control structure" and "control right" can occur in a given time step.

- As defined herein, the "control structure" may not necessarily be water short, it is simply the structure that limits an upstream structure from diverting its full water right.

- If a structure benefits from new (non-native) water resulting from a reservoir release or non-downstream return flows then StateMod recalculates the "control location" and "control right" accordingly.

- If the water supply limit ("control location") occurs at the diverting structure itself, it is by definition not a "control location". In such a case StateMod reports the "control location" as "Hgate_Limit" (head gate limit) and the call right as –1.

- If there is no "control location" but a structure is shorted, StateMod reports the call structure as "Cap/Wr_Limit" (capacity or water right limit) and the "control right" as –1.

- Control (call) reporting is currently operational for direct, instream and reservoir rights. Future enhancements may address a call associated with an operational rule.

- The “control location” and “control right” are reported for every structure and time step in the structure summary file (*.xdd). In addition, unique controls (independent of who they are impacting) are reported to the call (control) output file (*.xca).

- If the standard StateMod naming convention is followed and the identifier used at a stream node is the same identifier used for a structure then the “control location” reported in the diversion summary file (*.xdd) is the same as the “control structure”. If the standard naming convention is not followed then the call structure can be identified as the structure located at the control location.