
IRWMS

(Integrated Real-time Basin Water Management System)

14 November 2005

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IRWMS Intro window



Integrated Real-time Water Management System

The screenshot displays a user interface for the Integrated Real-time Water Management System. On the left, there is a landscape image of a wide river valley. On the right, a vertical list of five river basins is shown, each with a blue circular icon. The 'Geum River Basin' is highlighted with a red rectangular border. A blue arrow labeled 'NEXT' points from the right side of the list towards the 'Geum River Basin'.

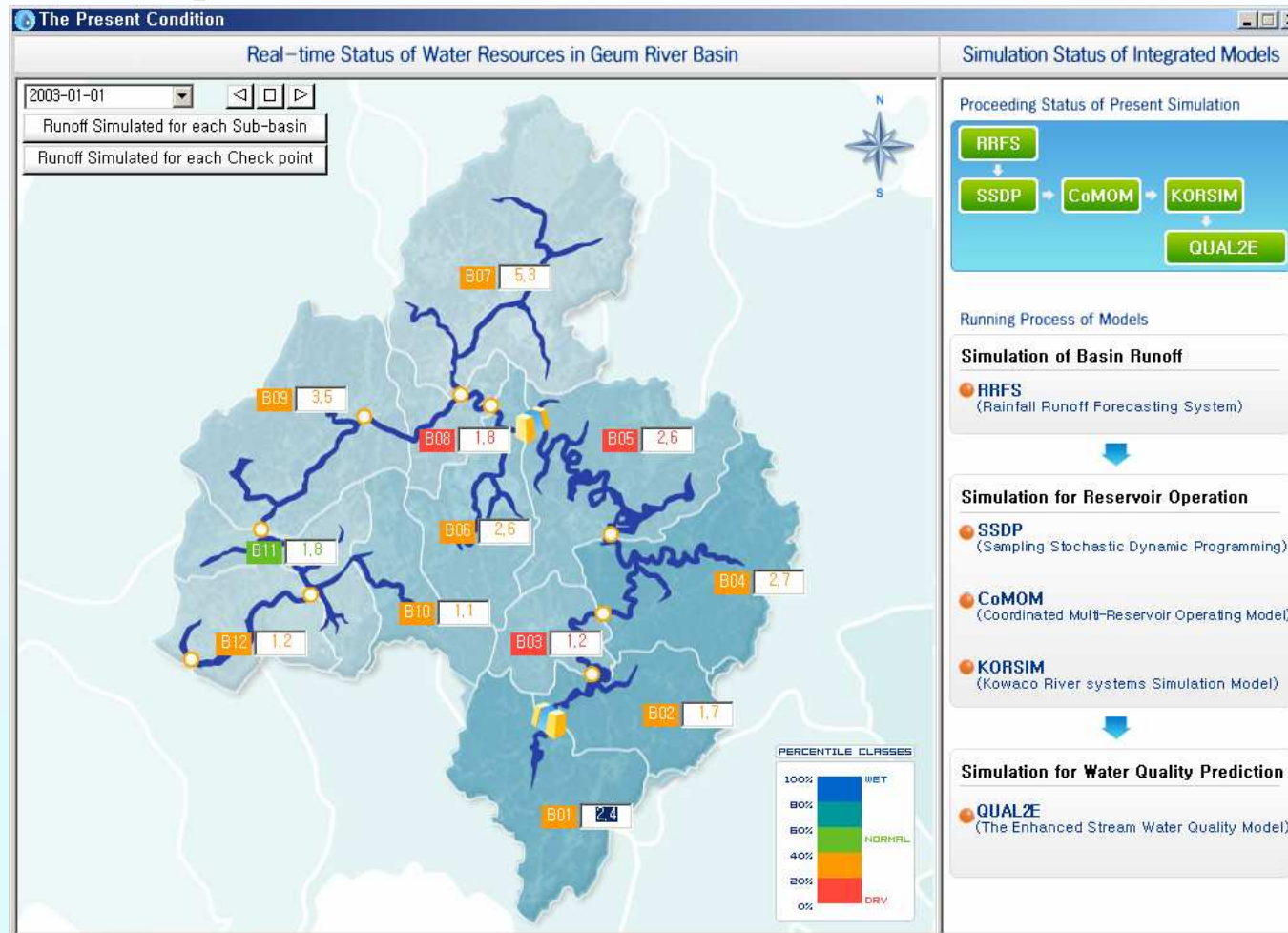
- Han River Basin
- Geum River Basin**
- Nakdong River Basin
- Seomjin River Basin
- Yeongsan River Basin

Korea Water Resources Corporation



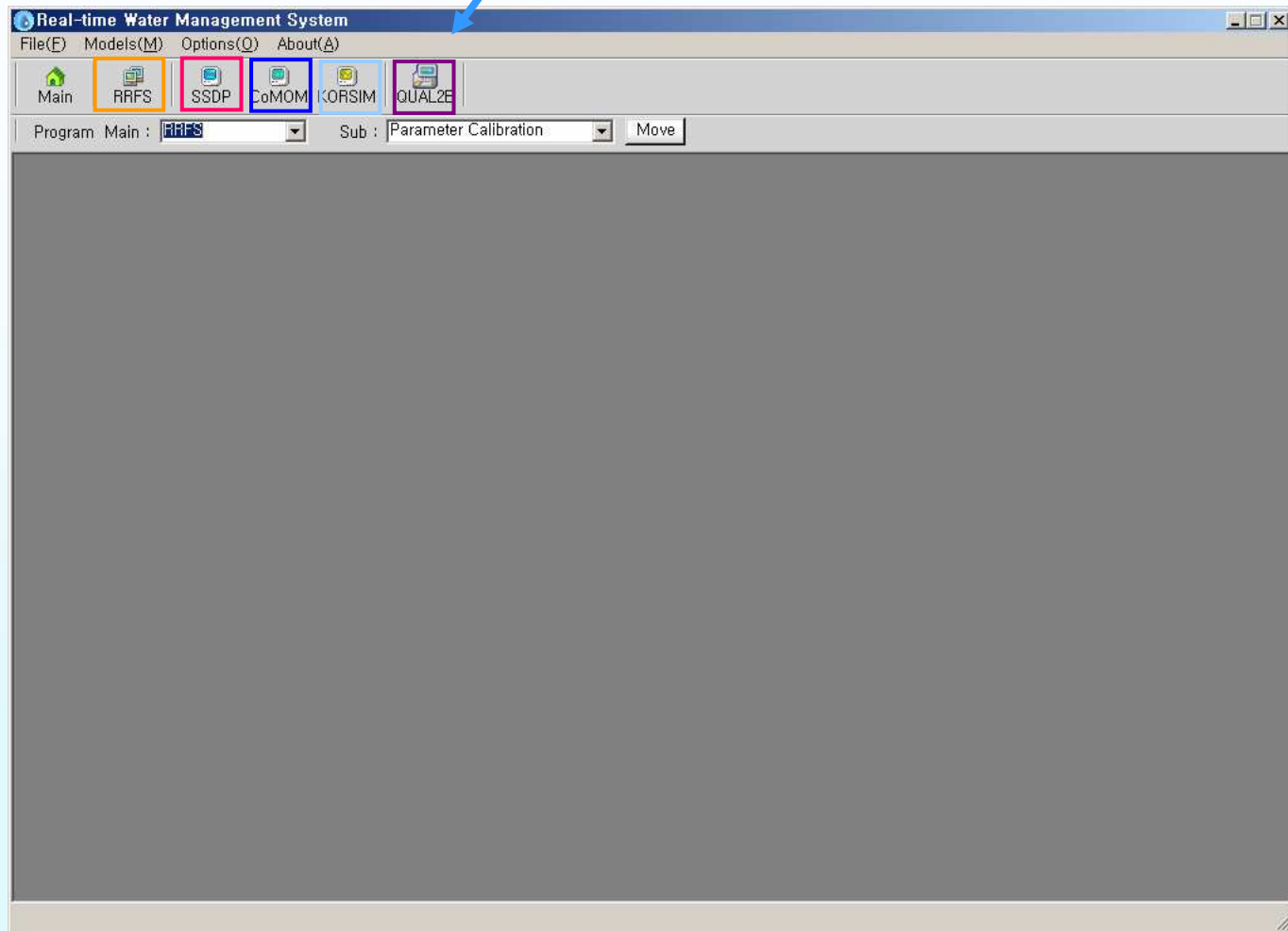
Main Frame

Basin map & Present water resources condition



❁ Operation tools

Each module

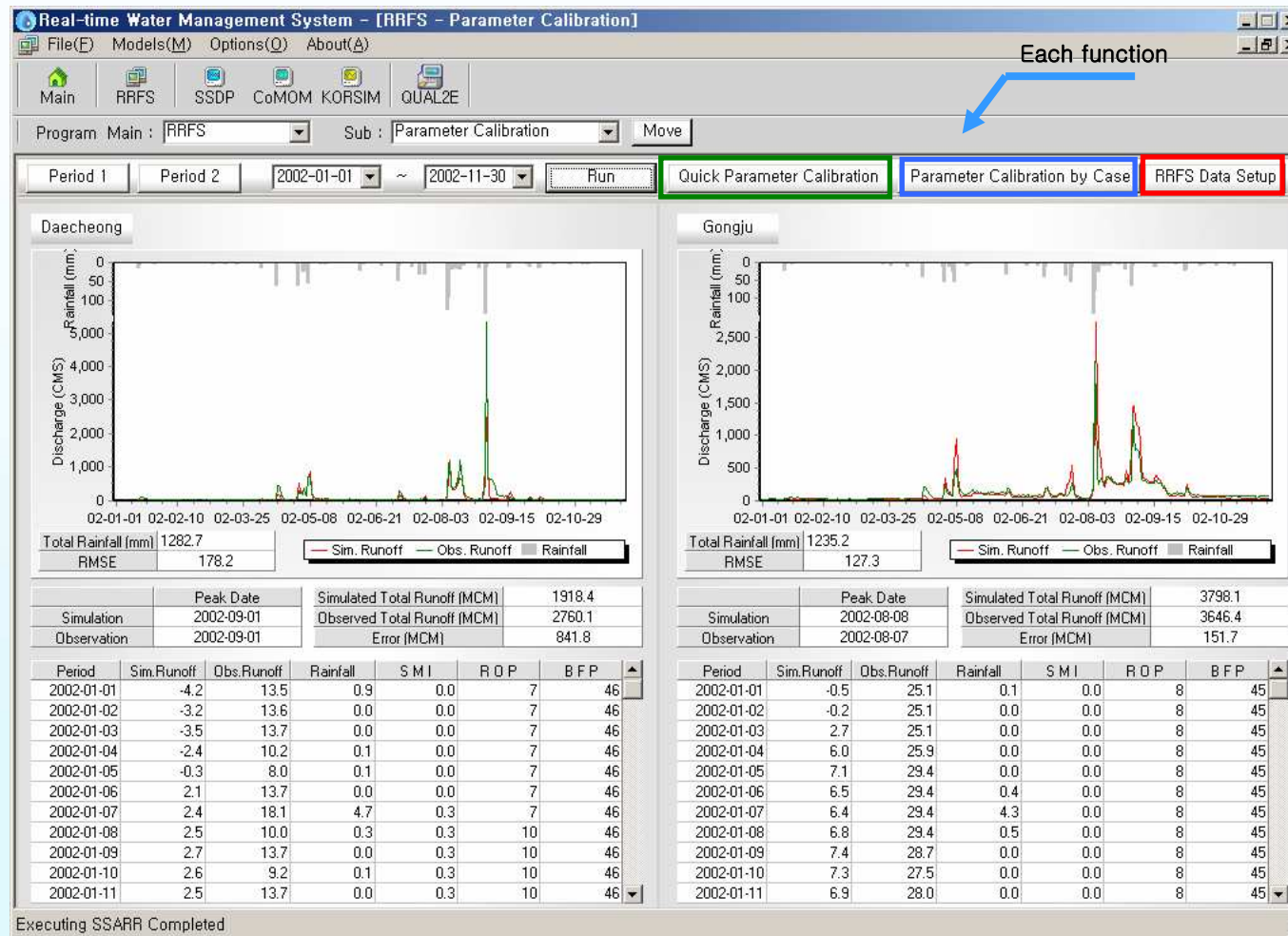


❁ Rainfall Runoff Forecasting System (RRFS)

- Identifying characteristics of water use for municipal, industrial and agricultural purposes
- Deriving hydrologic rainfall-runoff relationship
- Estimating streamflow by sub-basins and major control point
- Integrated management of water quantity and quality



Parameter calibration



Parameter Calibration

Calibration Period: 2002-01-01 ~ 2002-11-30

SMI	0	1	2	3	4	5	10	999						
SMI1	7	18	41	65	83	91	100	100						
SMI2	7	18	41	65	83	91	100	100						
SMI3	8	19	43	68	85	93	100	100						
SMI4	9	21	49	79	91	98	100	100						
BII	0	1	1.5	2	2.5	3	5	100						
BII1	46	17	15	13	12	11	10	10						
BII2	46	17	15	13	12	11	10	10						
BII3	45	16	14	13	12	11	10	10						
BII4	42	15	12	11	10	10	10	10						
SSS	0	0.5	1	1.5	2	2.5	3							
SSS1	0	0.05	0.39	0.89	1.39	1.89	2.39							
SSS2	0	0.05	0.39	0.89	1.39	1.89	2.39							
SSS3	0	0.15	0.57	1.07	1.57	2.07	2.57							
SSS4	0	0.25	0.75	1.25	1.75	2.25	2.75							
TS	0	100	150	200	400	1000	4000	10000						
TS1 (Hr)	13	11	10	9	8	7	6	5						
TS2 (Hr)	10	8	7	6	5	4	3	2						
TS3 (Hr)	10	8	7	6	5	4	3	2						
TS4 (Hr)	10	8	7	6	5	4	3	2						
TSS	0	100	150	200	400	1000	4000	10000						
TSS1 (Hr)	13	11	10	9	8	7	6	5						

		Daejeon	Cheongju												
Dom.&Ind. Use (%)		65.0	65.0												
		B01	B02	B03	B04	B05	B06	B07	B08	B09	B10	B11	B12	B13	B14
Domestic Use (%)		65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Industrial Use (%)		65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Agricultural Use (%)		35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0

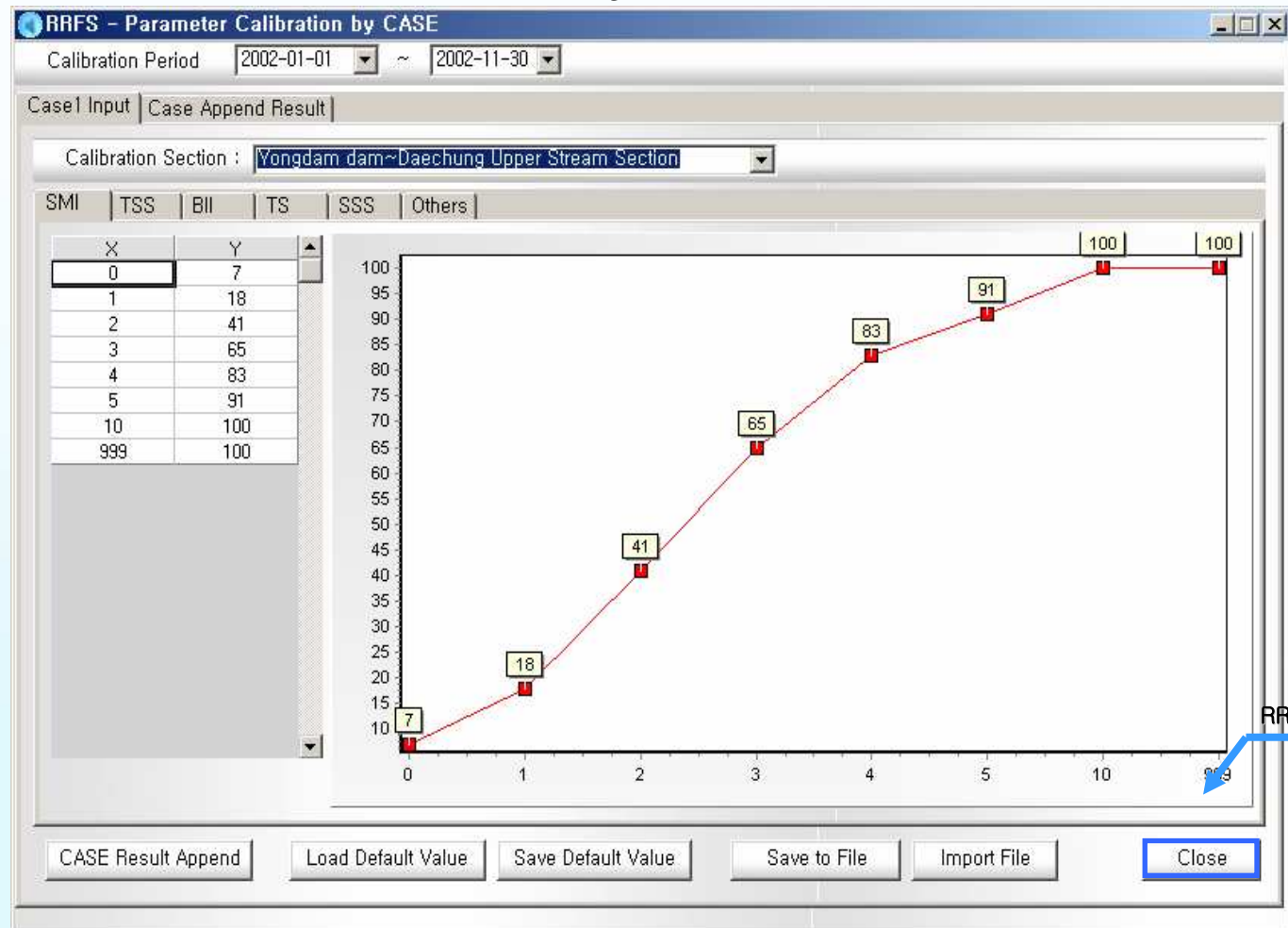
BasinNO	BFTS (Hr)	LZTS (Hr)	BIITS (Hr)	BIIMX (cm/d)	BFLIM (cm/d)	PBLZ (%)
1	170	1700	40	3	0.13	50
2	170	1700	40	3	0.13	50
3	170	1700	40	3	0.13	50
4	150	1500	40	3	0.13	50
5	140	1400	40	3	0.13	50
6	180	1800	40	3	0.13	50
7	190	1900	40	3	0.13	50
8	160	1600	40	3	0.13	50
9	230	2300	40	3	0.13	50
10	150	1500	40	3	0.13	50
11	180	1800	40	3	0.13	50
12	140	1400	40	3	0.13	50
13	150	1500	40	3	0.13	50
14	150	1500	40	3	0.13	50

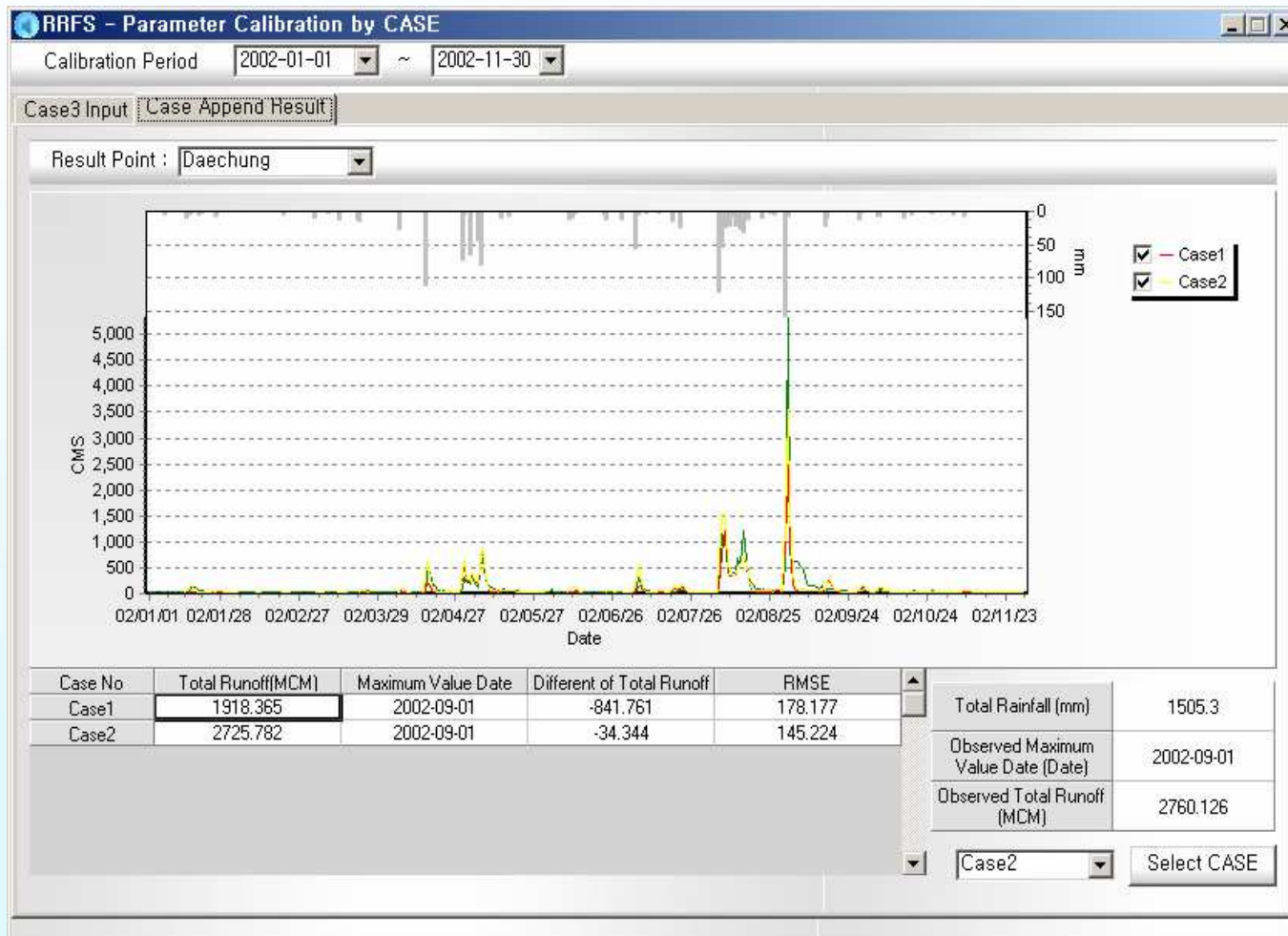
RRFS main



Parameter setup

Parameter calibration by case





RRFS Input data

❁ Rainfall data (Historical Rainfall)

Real-time Water Management System

File(E) Models(M) Options(O) About(A)

Main RRFS SSDP CoMOM KORSIM QUALZE

Program Main : RRFS Sub : Data Setup Move

RRFS Data Setup

Calibration Starting Date : 2002-12-01 Initialization of Data **Revise** in Option Start Scenario : 1983 End Scenario : 2003

Starting Date : 2003-01-01 Generating of Input file

Ending Date : 2003-03-31 Run and Result Analysis

TimeStep : 1 Month 3 Months 6 Months 1 Year Cal

RRFS Log

11:30:22 - Loading RRFS Data Setup Form...
11:30:25 - Loading RRFS Data Setup Form Completed

View of Result
Window Close

Rainfall Domestic Use Agricultural Use Industrial Use Intake Temperature Dam Release

Method : 2000 **Historical Rainfall** Total Value Pattern Value Predicted Rainfall

Date	B01	B02	B03	B04	B05	B06	B07	B08	B09	B10	B11	B12	B13	B14
2003-01-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	4.1
2003-01-02	2.3	2.3	2.7	2.3	4.1	2.6	3.2	3.4	2.8	2.1	2.4	3.6	2.2	7.3
2003-01-03	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0
2003-01-04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2003-01-05	7.1	7.0	7.5	7.1	9.0	7.9	8.3	8.5	17.6	12.9	15.7	10.2	11.6	11.2
2003-01-06	5.6	5.5	5.6	5.6	5.9	6.2	7.5	6.6	10.3	5.7	8.9	8.5	9.6	26.3
2003-01-07	0.6	0.6	0.6	0.5	0.8	0.2	0.5	0.7	0.8	0.5	1.2	1.1	1.2	1.2
2003-01-08	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.8	0.3	0.5	0.2	0.4	1.1

Prediction Rainfall for each Sub-basin : Basin 01

Loading RRFS Data Setup Form Completed



❁ Rainfall data (Total Value)

Real-time Water Management System

File(E) Models(M) Options(O) About(A)

Main RRFS SSDP CoMOM KORSIM QUALZE

Program Main : RRFS Sub : Data Setup Move

RRFS Data Setup

Calibration Starting Date : 2002-12-01 Initialization of Data

Starting Date : 2003-01-01 Generating of Input file

Ending Date : 2003-03-31 Run and Result Analysis

TimeStep : 1 Month 3 Months 6 Months 1 Year Cal

Revise in Option Start Scenario : 1983 End Scenario : 2003

RRFS Log

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11:30:25 - Loading RRFS Data Setup Form Completed

View of Result
Window Close

Rainfall Domestic Use Agricultural Use Industrial Use Intake Temperature Dam Release

Method : 2000 Historical Rainfall **Total Value** Pattern Value Predicted Rainfall

Date	B01	B02	B03	B04	B05	B06	B07	B08	B09	B10	B11	B12	B13	B14
2003-01-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	4.1
2003-01-02	2.3	2.3	2.7	2.3	4.1	0.0	0.0	0.0	0.0	2.1	2.4	3.6	2.2	7.3
2003-01-03	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0
2003-01-04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2003-01-05	7.1	7.0	7.5	7.1	9.0	0.0	0.0	0.0	0.0	12.9	15.7	10.2	11.6	11.2
2003-01-06	5.6	5.5	5.6	5.6	5.9	0.0	0.0	0.0	0.0	5.7	8.9	8.5	9.6	26.3
2003-01-07	0.6	0.6	0.6	0.5	0.8	0.0	0.0	0.0	0.0	0.5	1.2	1.1	1.2	1.2
2003-01-08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.5	0.2	0.4	1.1

Prediction Rainfall for each Sub-basin : Basin 01

Rainfall (mm)

Choice of Rainfall Type

Input Total Rainfall : 100

- Increment Form
- Decrement Form
- Increment & Decrement Form
- Rectangular Form
- Decrement & Increment Form
- Uniformly Increment Form
- Uniformly Decrement Form

Loading RRFS Data Setup Form Completed



Domestic water use

Real-time Water Management System

File(E) Models(M) Options(O) About(A)

Main RRF5 SSSP CoMOM KORSIM QUAL2E

Program Main : RRF5 Sub : Data Setup Move

RRFS Data Setup

Calibration Starting Date : 2002-12-01 Initialization of Data
 Starting Date : 2003-01-01 Generating of Input file
 Ending Date : 2003-03-31 Run and Result Analysis

TimeStep : 1 Month 3 Months 6 Months 1 Year Cal

RRFS ESP Option
 ESP Execute Option Start Scenario : 1983 End Scenario : 2003

RRFS Log
 11:30:22 - Loading RRFS Data Setup Form...
 11:30:25 - Loading RRFS Data Setup Form Completed

View of Result
 Window Close

Rainfall Domestic Use Agricultural Use Industrial Use Intake Temperature Dam Release

Method : 2002 Historical Domestic Use

Date	B01	B02	B03	B04	B05	B06	B07	B08	B09	B10	B11	B12	B13	B14
2003-01-01	0.0	0.0	0.1	0.1	0.1	0.4	1.4	6.8	3.3	0.5	0.5	0.4	0.2	0.2
2003-01-02	0.0	0.0	0.1	0.1	0.1	0.4	1.4	6.8	3.3	0.5	0.5	0.4	0.2	0.2
2003-01-03	0.0	0.0	0.1	0.1	0.1	0.4	1.4	6.8	3.3	0.5	0.5	0.4	0.2	0.2
2003-01-04	0.0	0.0	0.1	0.1	0.1	0.4	1.4	6.8	3.3	0.5	0.5	0.4	0.2	0.2
2003-01-05	0.0	0.0	0.1	0.1	0.1	0.4	1.4	6.8	3.3	0.5	0.5	0.4	0.2	0.2
2003-01-06	0.0	0.0	0.1	0.1	0.1	0.4	1.4	6.8	3.3	0.5	0.5	0.4	0.2	0.2
2003-01-07	0.0	0.0	0.1	0.1	0.1	0.4	1.4	6.8	3.3	0.5	0.5	0.4	0.2	0.2
2003-01-08	0.0	0.0	0.1	0.1	0.1	0.4	1.4	6.8	3.3	0.5	0.5	0.4	0.2	0.2

Predicted Domestic Use for each Sub-basin : Basin 01

Domestic Wtr (CMS)

Date

Loading RRFS Data Setup Form Completed



❁ Agricultural water use

Real-time Water Management System

File(E) Models(M) Options(O) About(A)

Main RRF5 SSSP CoMOM KORSIM QUAL2E

Program Main : RRF5 Sub : Data Setup Move

RRFS Data Setup

Calibration Starting Date : 2002-12-01 Initialization of Data
 Starting Date : 2003-01-01 Generating of Input file
 Ending Date : 2003-03-31 Run and Result Analysis

TimeStep : 1 Month 3 Months 6 Months 1 Year Cal.

RRFS ESP Option
 ESP Execute Option Start Scenario : 1983 End Scenario : 2003

RRFS Log
 11:30:22 - Loading RRFS Data Setup Form...
 11:30:25 - Loading RRFS Data Setup Form Completed

View of Result
 Window Close

Rainfall Domestic Use Agricultural Use Industrial Use Intake Temperature Dam Release

Method : 2002 Historical Agricultural Use

Date	B01	B02	B03	B04	B05	B06	B07	B08	B09	B10	B11	B12	B13	B14
2003-01-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2003-01-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2003-01-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2003-01-04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2003-01-05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2003-01-06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2003-01-07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2003-01-08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Predicted Agricultural Use for each Sub-basin : Basin 01

Agricultural Wtr (CMS)

Date

Loading RRFS Data Setup Form Completed



Industrial water use

Real-time Water Management System

File(E) Models(M) Options(O) About(A)

Main RRFS SSDP CoMOM KORSIM QUALZE

Program Main : RRFS Sub : Data Setup Move

RRFS Data Setup

Calibration Starting Date : 2002-12-01 Initialization of Data

Starting Date : 2003-01-01 Generating of Input file

Ending Date : 2003-03-31 Run and Result Analysis

TimeStep : 1 Month 3 Months 6 Months 1 Year Cal

RRFS ESP Option
 ESP Execute Option Start Scenario : 1983 End Scenario : 2003

RRFS Log
 11:30:22 - Loading RRFS Data Setup Form...
 11:30:25 - Loading RRFS Data Setup Form Completed

View of Result
 Window Close

Rainfall Domestic Use Agricultural Use **Industrial Use** Intake Temperature Dam Release

Method : 2002 Historical Industrial Use

Date	B01	B02	B03	B04	B05	B06	B07	B08	B09	B10	B11	B12	B13	B14
2003-01-01	0.1	0.0	0.1	0.3	0.2	2.1	3.0	0.5	0.8	0.1	0.1	0.1	0.0	0.0
2003-01-02	0.1	0.0	0.1	0.3	0.2	2.1	3.0	0.5	0.8	0.1	0.1	0.1	0.0	0.0
2003-01-03	0.1	0.0	0.1	0.3	0.2	2.1	3.0	0.5	0.8	0.1	0.1	0.1	0.0	0.0
2003-01-04	0.1	0.0	0.1	0.3	0.2	2.1	3.0	0.5	0.8	0.1	0.1	0.1	0.0	0.0
2003-01-05	0.1	0.0	0.1	0.3	0.2	2.1	3.0	0.5	0.8	0.1	0.1	0.1	0.0	0.0
2003-01-06	0.1	0.0	0.1	0.3	0.2	2.1	3.0	0.5	0.8	0.1	0.1	0.1	0.0	0.0
2003-01-07	0.1	0.0	0.1	0.3	0.2	2.1	3.0	0.5	0.8	0.1	0.1	0.1	0.0	0.0
2003-01-08	0.1	0.0	0.1	0.3	0.2	2.1	3.0	0.5	0.8	0.1	0.1	0.1	0.0	0.0

Predicted Industrial Use for each Sub-basin : Basin 01

Industrial Wtr (CMS)

Date

Loading RRFS Data Setup Form Completed



Intake

Real-time Water Management System

File(E) Models(M) Options(O) About(A)

Main RRFs SSDP CoMOM KORSIM QUAL2E

Program Main : RRFs Sub : Data Setup Move

RRFS Data Setup

Calibration Starting Date : 2002-12-01 Initialization of Data
 Starting Date : 2003-01-01 Generating of Input file
 Ending Date : 2003-03-31 Run and Result Analysis

TimeStep : 1 Month 3 Months 6 Months 1 Year Cal

RRFS ESP Option
 ESP Execute Option Start Scenario : 1983 End Scenario : 2003

RRFS Log
 11:30:22 - Loading RRFS Data Setup Form...
 11:30:25 - Loading RRFS Data Setup Form Completed

View of Result
 Window Close

Rainfall Domestic Use Agricultural Use Industrial Use Intake Temperature Dam Release

Method : 2002 Historical Intake

Date	Jeonju	Cheongju, Daejun	Daejun	Seokseong
2003-01-01	1.1	4.2	6.9	0.6
2003-01-02	1.1	4.2	6.9	0.6
2003-01-03	1.1	4.2	6.9	0.6
2003-01-04	1.1	4.2	6.9	0.6
2003-01-05	1.1	4.2	6.9	0.6
2003-01-06	1.1	4.2	6.9	0.6
2003-01-07	1.1	4.2	6.9	0.6
2003-01-08	1.1	4.2	6.9	0.6

Predicted Intake for each Intake Point : Jeonju

Loading RRFS Data Setup Form Completed



Temperature

Real-time Water Management System

File(E) Models(M) Options(O) About(A)

Main RRF5 SSDP CoMOM KORSIM QUAL2E

Program Main : RRF5 Sub : Data Setup Move

RRFS Data Setup

Calibration Starting Date : 2002-12-01 Initialization of Data

Starting Date : 2003-01-01 Generating of Input file

Ending Date : 2003-03-31 Run and Result Analysis

TimeStep : 1 Month 3 Months 6 Months 1 Year Cal

RRFS ESP Option
 ESP Execute Option Start Scenario : 1983 End Scenario : 2003

RRFS Log
 11:30:22 - Loading RRFS Data Setup Form...
 11:30:25 - Loading RRFS Data Setup Form Completed

View of Result
 Window Close

Rainfall Domestic Use Agricultural Use Industrial Use Intake Temperature Dam Release

Method : 2002 Historical Temperature Pattern Value

Date	T3501	T3502	T3503	T3504	T3505	T3506	T3507	T3508
2003-01-01	-2.5	-0.9	-2.7	-2.4	-0.8	-2.1	-0.9	0.3
2003-01-02	-7.5	-5.9	-7.0	-7.2	-5.7	-7.1	-5.5	-3.7
2003-01-03	-4.1	-4.5	-4.9	-5.7	-3.7	-4.8	-4.4	-2.1
2003-01-04	3.8	5.9	4.4	3.7	4.9	3.1	2.0	6.3
2003-01-05	-0.8	0.4	-1.2	-0.7	0.7	0.1	0.0	2.2
2003-01-06	-1.7	-2.1	-3.2	-2.7	-0.2	-1.3	-2.1	0.8
2003-01-07	-1.2	-0.7	-2.5	-2.1	0.0	-1.6	-1.1	1.8
2003-01-08	-5.2	-3.9	-6.3	-5.3	-3.4	-4.9	-3.7	-1.4

Predicted Temperature of each Temperature Observatory : T3501

Loading RRFS Data Setup Form Completed



Dam release

Real-time Water Management System

File(E) Models(M) Options(O) About(A)

Main RRFSSSDP CoMOM KORSIM QUAL2E

Program Main : RRFSSub : Data Setup Move

RRFS Data Setup

Calibration Starting Date : 2002-12-01 Initialization of Data

Starting Date : 2003-01-01 Generating of Input file

Ending Date : 2003-03-31 Run and Result Analysis

TimeStep : 1 Month 3 Months 6 Months 1 Year Cal

RRFS ESP Option

ESP Execute Option Start Scenario : 1983 End Scenario : 2003

RRFS Log

11:30:22 - Loading RRFS Data Setup Form...
11:30:25 - Loading RRFS Data Setup Form Completed

View of Result
Window Close

Rainfall Domestic Use Agricultural Use Industrial Use Intake Temperature Dam Release

Method : 2002 Historical Dam Release Put 0 into All Data

Date	Yongdam	Daecheong
2003-01-01	5.1	6.9
2003-01-02	5.1	6.9
2003-01-03	5.1	7.0
2003-01-04	5.1	8.0
2003-01-05	5.1	5.8
2003-01-06	5.1	7.0
2003-01-07	5.1	7.0
2003-01-08	5.1	7.8

Predicted Dam Release : Yongdam

Dam Release (CMS)

Date

Loading RRFS Data Setup Form Completed



Running & Modification

Modified water demand control unit

Revised Demand Confirmation

RRFS Revised Demand Information

Sub-Basin :

Date	Maximum Supply	Before Cal. (Domestic Use)	Before Cal. (Industrial Use)	Before Cal. (Agricultural)	Case	After Cal. (Domestic Use)	After Cal. (Industrial Use)	After Cal. (Agricultural)
2003-01-01	1.166	0.030	0.060	0.000	1	0.000	0.000	0.000
2003-01-02	2.096	0.030	0.060	0.000	1	0.000	0.000	0.000
2003-01-03	2.258	0.030	0.060	0.000	1	0.000	0.000	0.000
2003-01-04	1.302	0.030	0.060	0.000	1	0.000	0.000	0.000
2003-01-05	3.817	0.030	0.060	0.000	1	0.000	0.000	0.000
2003-01-06	6.890	0.030	0.060	0.000	1	0.000	0.000	0.000
2003-01-07	4.942	0.030	0.060	0.000	1	0.000	0.000	0.000
2003-01-08	2.007	0.030	0.060	0.000	1	0.000	0.000	0.000
2003-01-09	1.573	0.030	0.060	0.000	1	0.000	0.000	0.000
2003-01-10	1.539	0.030	0.060	0.000	1	0.000	0.000	0.000
2003-01-11	1.295	0.030	0.060	0.000	1	0.000	0.000	0.000
2003-01-12	1.252	0.030	0.060	0.000	1	0.000	0.000	0.000
2003-01-13	1.350	0.030	0.060	0.000	1	0.000	0.000	0.000
2003-01-14	1.347	0.030	0.060	0.000	1	0.000	0.000	0.000
2003-01-15	1.211	0.030	0.060	0.000	1	0.000	0.000	0.000
2003-01-16	1.173	0.030	0.060	0.000	1	0.000	0.000	0.000
2003-01-17	1.147	0.030	0.060	0.000	1	0.000	0.000	0.000
2003-01-18	1.121	0.030	0.060	0.000	1	0.000	0.000	0.000
2003-01-19	1.097	0.030	0.060	0.000	1	0.000	0.000	0.000
2003-01-20	1.071	0.030	0.060	0.000	1	0.000	0.000	0.000
2003-01-21	1.047	0.030	0.060	0.000	1	0.000	0.000	0.000
2003-01-22	1.023	0.030	0.060	0.000	1	0.000	0.000	0.000
2003-01-23	1.000	0.030	0.060	0.000	1	0.000	0.000	0.000
2003-01-24	0.978	0.030	0.060	0.000	1	0.000	0.000	0.000
2003-01-25	0.958	0.030	0.060	0.000	1	0.000	0.000	0.000
2003-01-26	0.938	0.030	0.060	0.000	1	0.000	0.000	0.000
2003-01-27	0.920	0.030	0.060	0.000	1	0.000	0.000	0.000

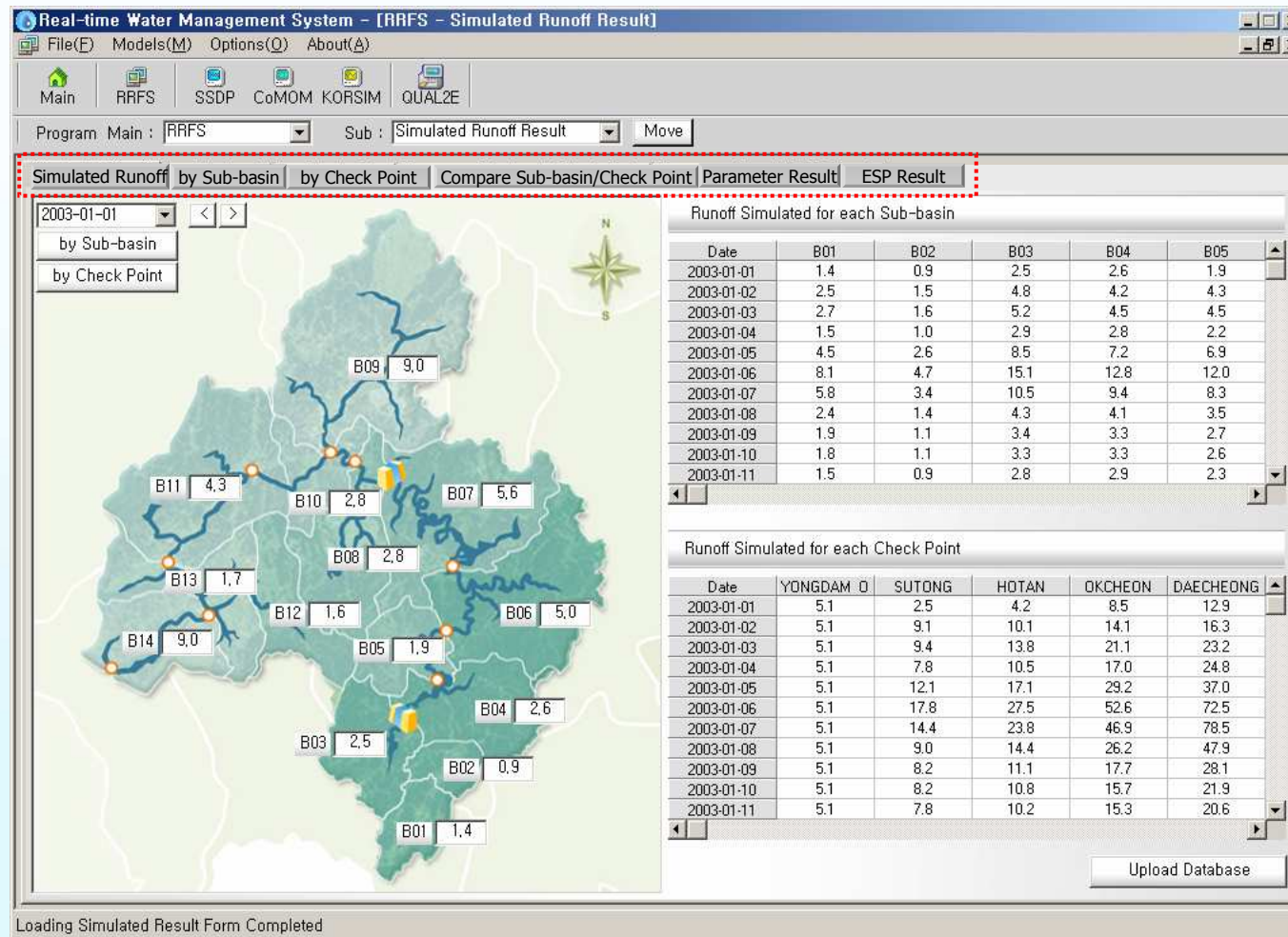
Close

Input data

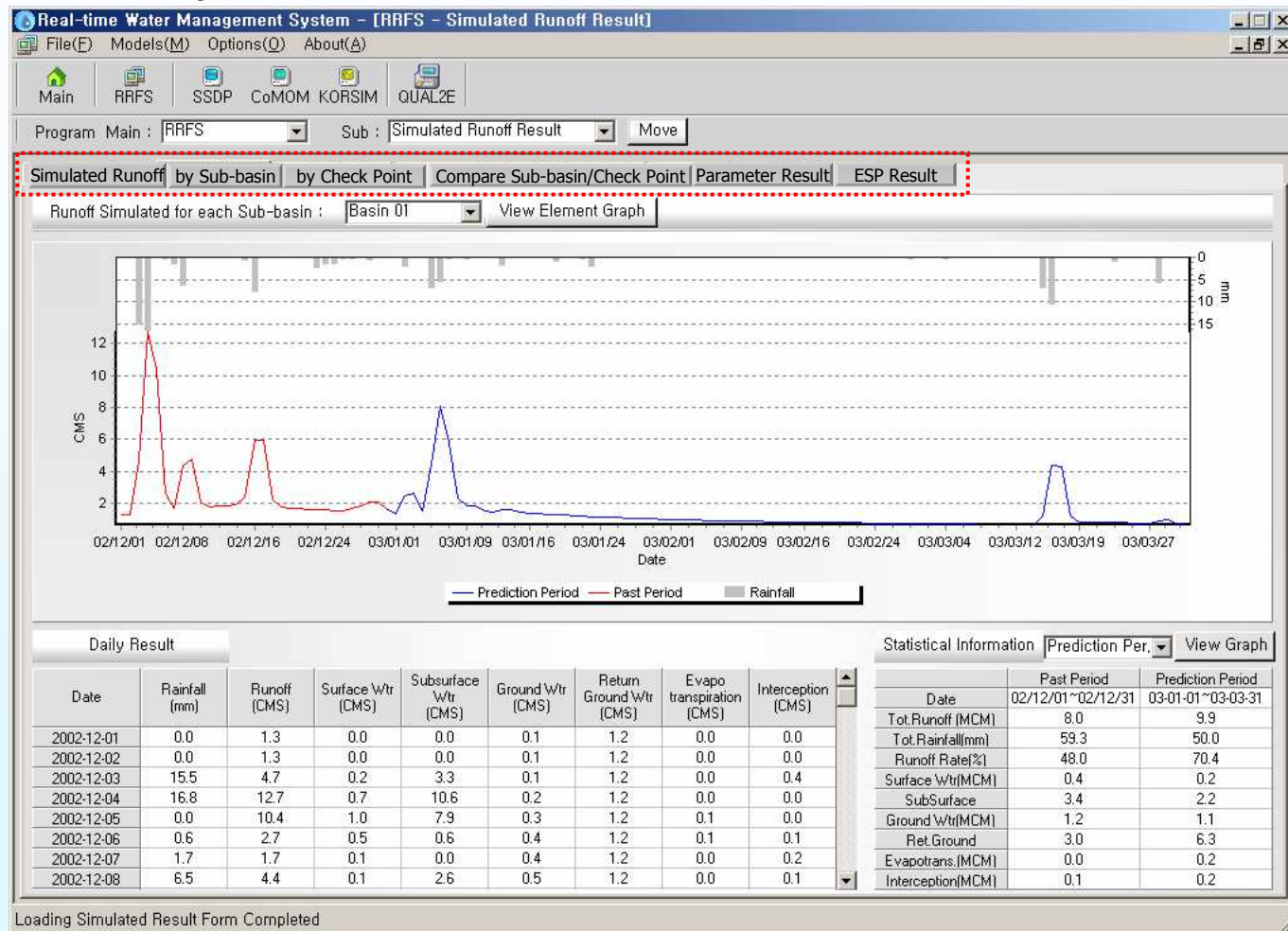


RRFS results

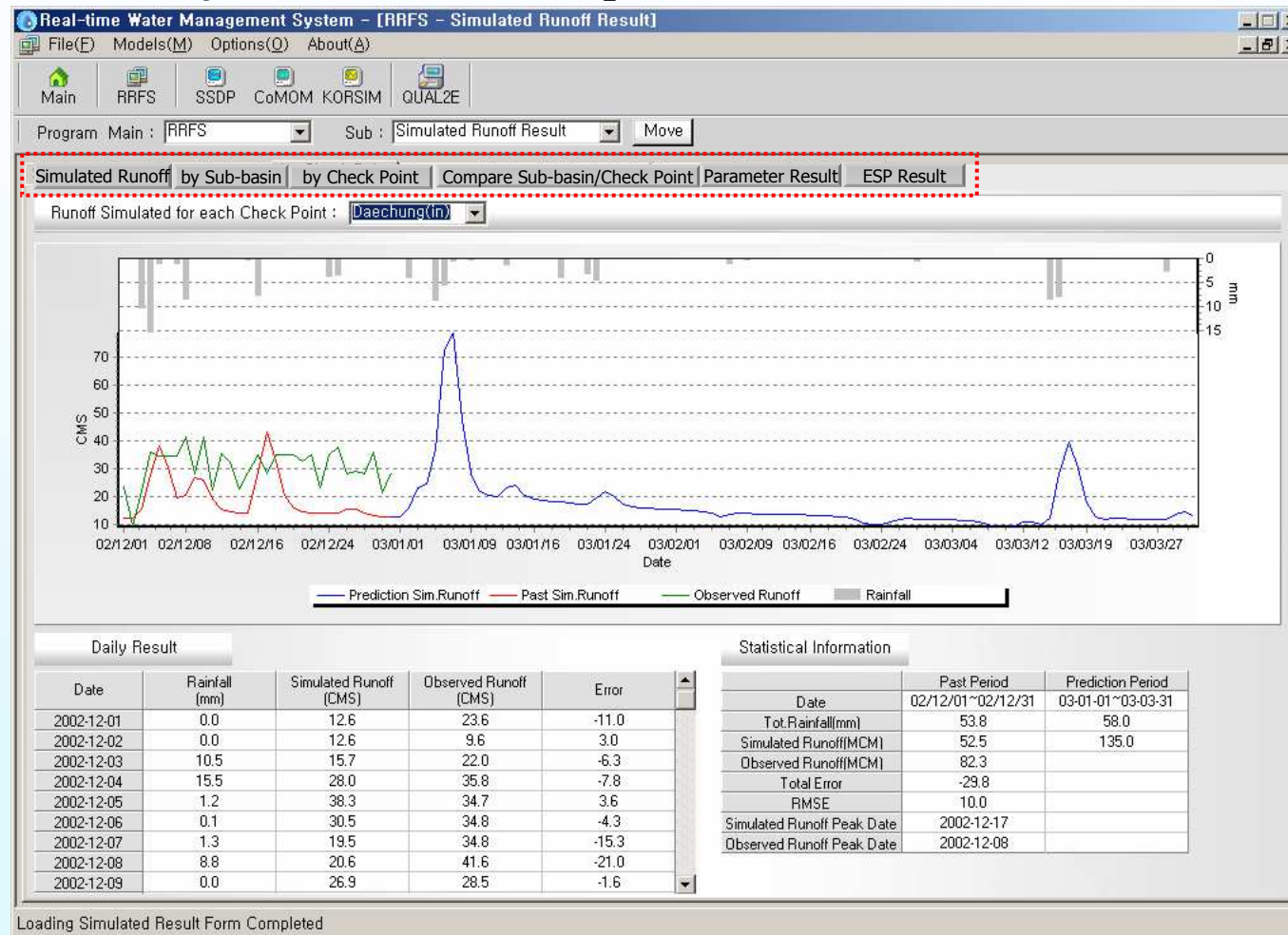
Simulated runoff results



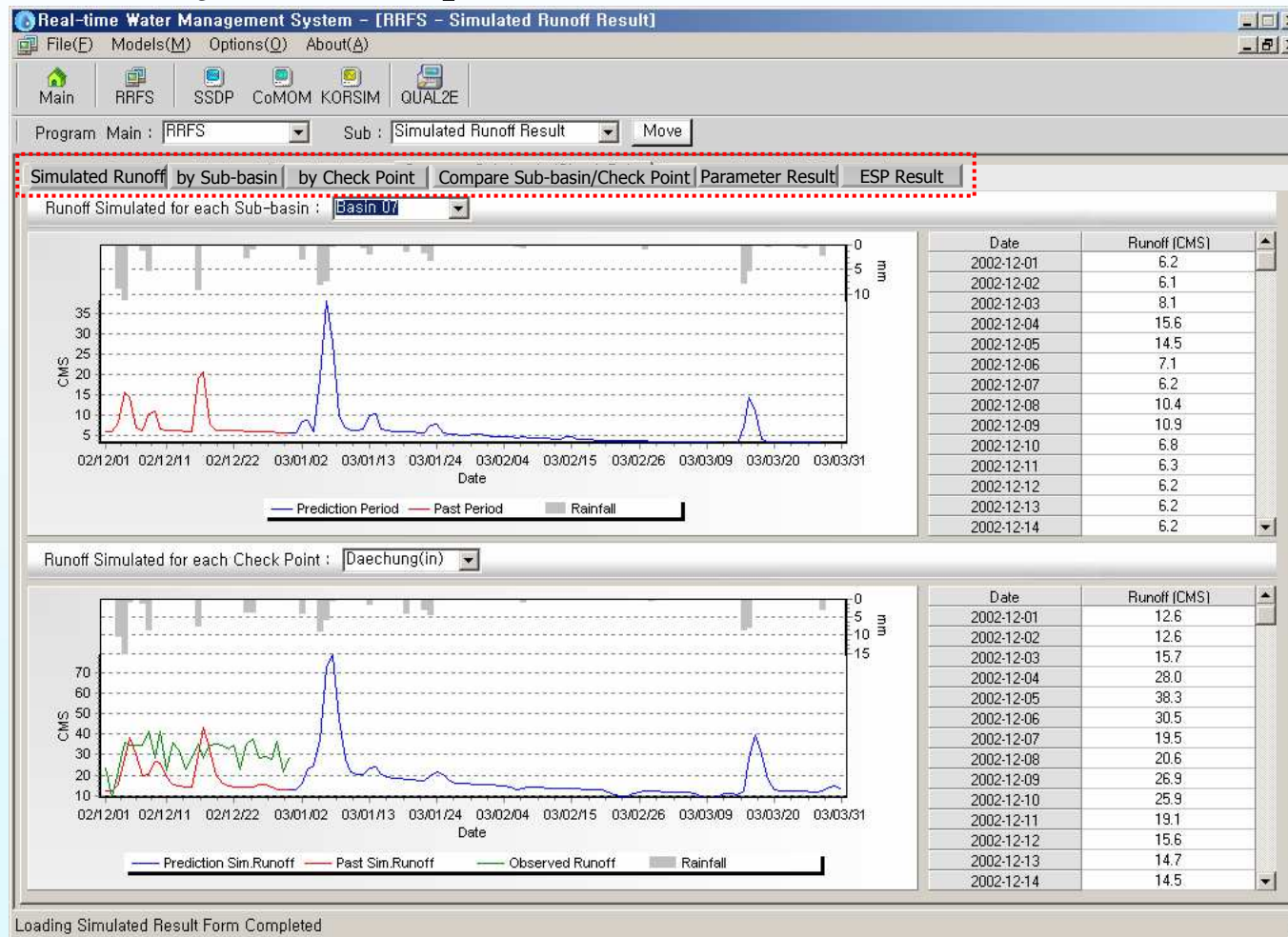
Results by Sub-basin



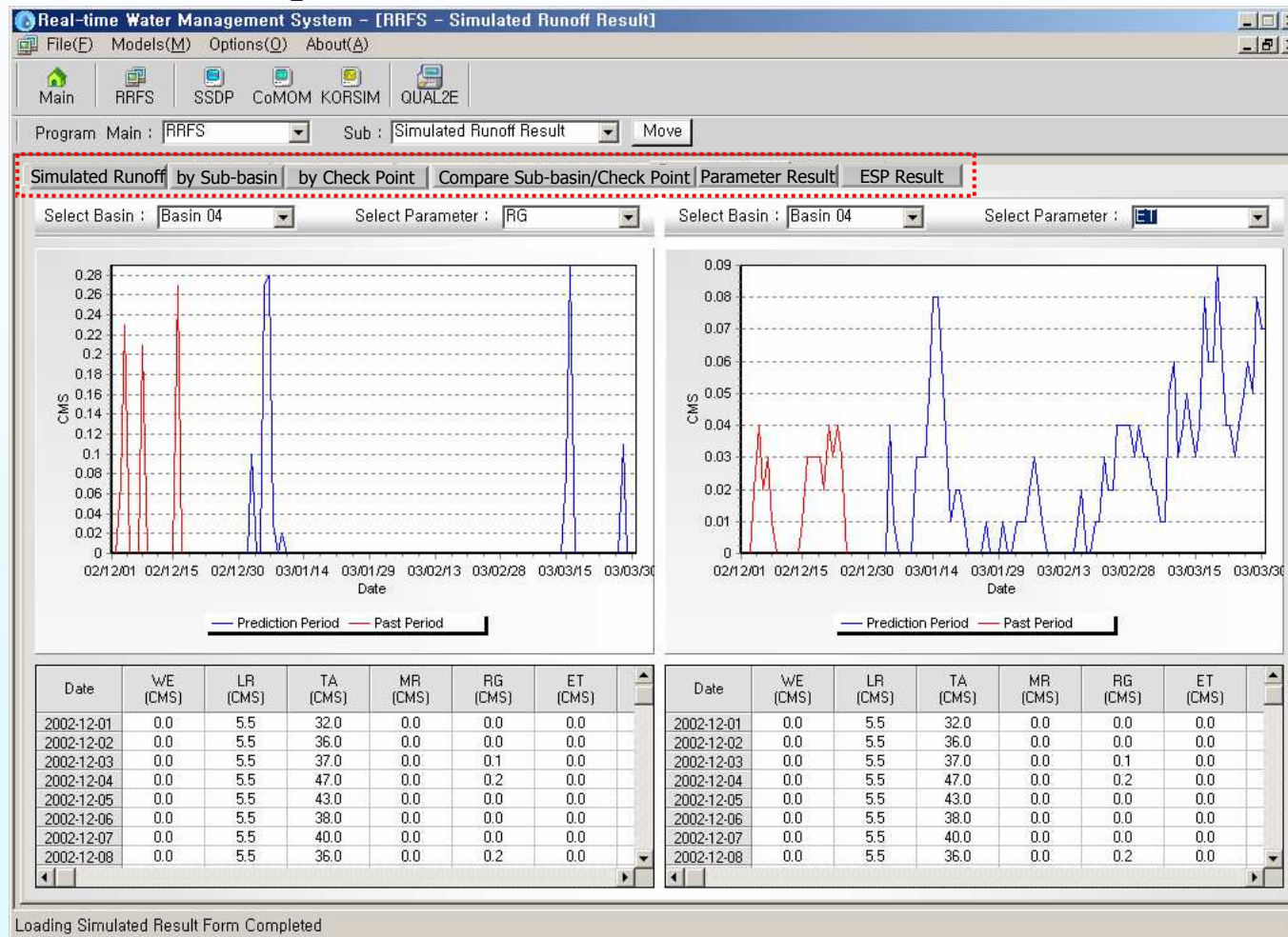
Results by main check point



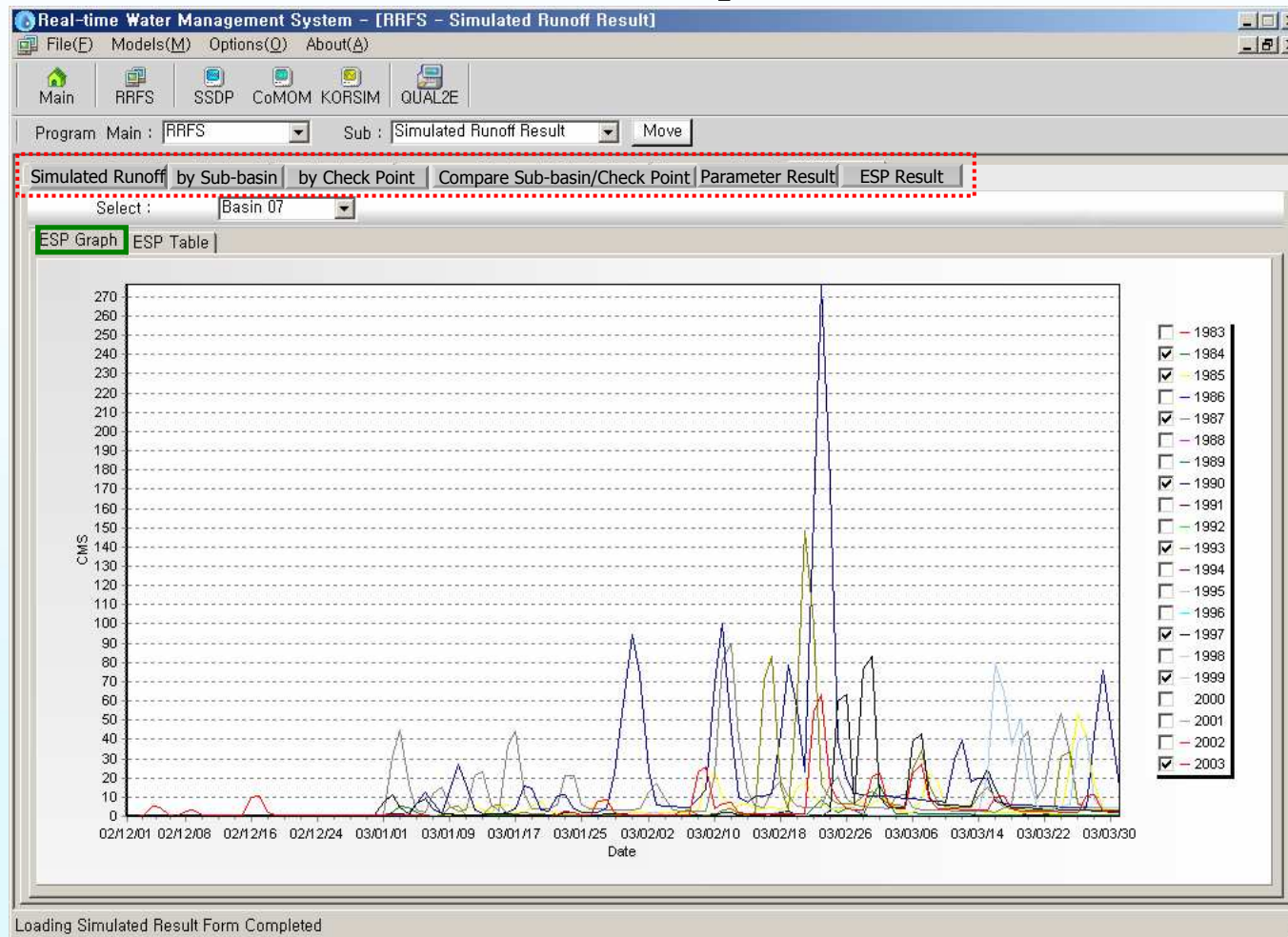
Results by check point and sub-basin



❁ Variation of parameters



❁ Simulated ESP results (Graph)



❁ Simulated ESP results (table)

Real-time Water Management System - [RRFS - Simulated Runoff Result]

File(E) Models(M) Options(O) About(A)

Main RRFS SSDP CoMOM KORSIM QUAL2E

Program Main : RRFS Sub : Simulated Runoff Result Move

Simulated Runoff by Sub-basin by Check Point Compare Sub-basin/Check Point Parameter Result ESP Result

Select : Basin 07

ESP Graph ESP Table

Order	Scenario	Probability	Tot.Rainfall (mm)	Tot.Runoff (MCM)	Surface Wtr (MCM)	Subsurface Wtr (MCM)	Ground Wtr (MCM)	Ret.Ground Wtr (MCM)	Evapotrans. (MCM)	Interception (MCM)
1	1984	0.028	39.8	10.803	0.693	6.268	2.998	0.844	0.124	0.163
2	1988	0.075	46.6	11.464	0.768	6.975	2.914	0.807	0.127	0.191
3	2000	0.123	50.9	21.791	1.436	13.034	5.624	1.698	0.150	0.113
4	2002	0.170	78.3	26.032	1.727	15.757	6.732	1.816	0.212	0.281
5	1992	0.217	73.3	26.774	1.917	17.408	6.122	1.327	0.154	0.204
6	1986	0.264	72.0	34.008	2.432	22.189	7.913	1.474	0.115	0.136
7	1999	0.311	87.6	38.953	3.136	29.254	5.817	0.745	0.111	0.161
8	1994	0.358	75.9	38.954	2.750	25.074	9.528	1.602	0.120	0.131
9	1995	0.406	81.7	39.661	2.774	25.661	9.668	1.559	0.123	0.153
10	2003	0.453	97.0	41.778	2.878	26.779	10.596	1.525	0.200	0.236
11	1998	0.500	80.6	42.044	2.908	26.650	10.501	1.985	0.125	0.140
12	1985	0.547	91.1	45.259	3.369	30.596	9.625	1.669	0.119	0.145
13	1997	0.594	88.3	54.301	3.733	35.759	13.069	1.739	0.132	0.083
14	2001	0.642	99.8	58.154	4.045	37.376	14.143	2.590	0.181	0.138
15	1983	0.689	110.7	63.089	4.713	43.199	13.284	1.893	0.132	0.146
16	1996	0.736	137.9	71.978	5.444	51.827	12.997	1.710	0.181	0.240
17	1993	0.783	122.2	76.757	5.639	53.052	15.985	2.081	0.143	0.143
18	1991	0.830	143.5	94.539	7.119	65.530	19.317	2.572	0.137	0.147
19	1987	0.877	147.8	98.851	7.170	65.987	21.493	4.201	0.141	0.139
20	1989	0.925	226.6	180.992	13.806	127.778	33.762	5.645	0.159	0.116
21	1990	0.972	237.2	182.766	14.008	131.233	32.631	4.894	0.158	0.193

Loading Simulated Result Form Completed



❁ Sampling Stochastic Dynamic Programming (SSDP)

- Establishing **monthly optimal multi-reservoir operating policy** considering the uncertainties of inflows
- Deriving joint operating policy for multi-reservoir system in Korea during the 9-months of reservoir drawdown period using stochastic optimization model



Basin Information & Input data

Real-time Water Management System - [Geum River Basin Information]

File(E) Models(M) Options(O) About(A)

Main RRFS SSDP CoMOM KORSIM QUAL2E

Program Main : SSDP Sub : Geum River Basin Informatio Move

Geum River Basin Information

Analysis period: 2003-01

Yongdam Dam
Initial Water Level (EL.m)
255.12

Daecheong Dam
Initial Water Level (EL.m)
72.11

SSDP General Input Data

The Number of State
Yongdam 30 Daecheong 20 * The maximum state is 100.

Yongdam Dam Information

Hydropower production (MG River)	55.05	Minimum Storage	69
Hydropower production (G River)	44.99	Flood Storage	676.4
Geum River Max Power Capacity	6.2	Normal High Storage	742.5
MG River Min Release (CMS)	4	Emergency Release	31.65
Geum River Min Release (CMS)	5	Non Flood Season Rel Lt	20
MG River Max Release (CMS)	14.2		

Daecheong Dam

Minimum Storage (MCM)	451.7	Minimum Release	21
Normal High Storage (MCM)	1241.7	Maximum Release	264
Hydropower production (MG River)	62.07		

Common Parameters

WS Penalty (Won/M ³)	16	Required water for ctrl point	Intake (CMS)
Intake ratio		Okcheon	5.9
		Gongju	30
Daejeon	0.627	Gyuam	30
Cheongju	0.373	Ganggyeong	30
		Jeonju	4.2
		Djeon-Cju	12.8
		Buyeo	0.58

Update Monthly Target Water Level Simulation of Monthly Operations

SSDP Information screen loaded.



Running & Results

SSDP ESP operation

Real-time Water Management System - [SSDP ESP - Update Monthly Target Water Level]

File(E) Models(M) Options(O) About(A)

Main RRF5 SSDP CoMOM KORSIM QUAL2E

Program Main : SSDP Sub : ESP monthly operation Move

Simulation of Monthly Operation - Input data specification

ESP monthly operation 2003-01

Initial Water Level
Yongdam : 255.12 EL.m Daecheong : 72.11 EL.m

SSARR-ESP inflow 2003-01-01

Scna Period 1983 ~ 2002 Scna Count : 20 execute

(Unit : CMS)

Scenario	B01	B02	B03	B04	B05
1983/01	2.19	1.42	3.70	3.85	2.43
1984/01	1.52	0.99	3.51	2.62	1.86
1985/01	2.06	1.15	4.04	3.37	2.49
1986/01	2.40	1.06	3.47	3.20	2.41
1987/01	6.22	2.93	7.22	6.73	4.74

execute SSDP-ESP

ESP Simulation Result

Target Water Level	Simulated Water Level	Hydropower	Water Shortage	Release
(Unit : EL.m)				
Date	Yongdam	Daecheong		
03/01	254.53	70.55		

Simulation of Monthly Operation - Result

Target Water Level Graph - Yongdam Reservoir

Target Water Level - Yongdam Reservoir

Target Water Level Graph - Daecheong Reservoir

Target Water Level - Daecheong Reservoir

Upload Database

Analysis of SSDP ESP result completed.



Simulation of SSDP HIST

Real-time Water Management System - [SSDP Hist - Simulation of Monthly Operations]

File(E) Models(M) Options(O) About(A)

Main RRFs SSDP CoMOM KORSIM QUAL2E

Program Main : SSDP Sub : Hist Simulation of Monthly O Move

Simulation of Monthly Operations in a year - Input data specification

Non-flood season operation (present month~end of June) 2003-01

Initial Water Level
 Yongdam : 255.12 EL.m Daechyeong : 72.11 EL.m

Basin Inflow Data (Unit : CMS)

Basin	Oct	Nov	Dec	Jan	Feb	Mar
1	17.66	7.66	13.46	32.82	10.09	13.18
2	10.77	4.32	6.05	14.06	4.36	8.33
3	34.42	8.80	14.58	35.18	7.66	13.83
4	29.29	10.42	15.86	37.76	11.14	14.83
5	28.91	10.11	15.69	33.83	12.03	9.24

execute SSDP/Hist

SSDP/Hist Simulation Result

Date	Yongdam	Daechyeong
03/01	256.18	70.88
03/02	253.65	70.46
03/03	253.50	69.39
03/04	252.46	68.01
03/05	250.42	66.74
03/06	248.75	65.20

Simulation of Monthly Operation - Result

Simulated Water Level Transition Graph - Yongdam Reservoir

Simulated Water Level Transition Graph - Daechyeong Reservoir

Upload Database

Analysis of SSDP/Hist result completed.



❁ CoMOM 4.0

- Establishing a coordinated multi-reservoir daily operation that finds an efficient operating policy to meet the monthly storage target
- Supplying water efficiently to minimize unnecessary spill, maintains flood reserve volume and keep water storage high so that it can maximize the head and the efficiency of hydro turbine operation



Basin information & Input data

Real-time Water Management System - [CoMOM - Input Data Setting]

File(E) Models(M) Options(O) About(A)

Main RRFs SSSP CoMOM KORSIM QUAL2E

Program Main : CoMOM Sub : Inputdata Move

CoMOM Geum River Basin Information

2003-01-01 < >

CoMOM Input data Setting

Start date : 2003-01-01 End date : 2003-01-31 Set data

Analysis Interval : daily user-defined 2

Initial & Target Water Level

Water Level	Date	Yongdam(EL.m)	Daechong(EL.m)
Initial Water Level	2003-01-01	255.12	72.11
Target Water Level	2003-01-31	253.14	71.28

Water Uses

Date	D01	D02	D03	D04	D05
2003-01-01	4.2	4.6	12.1	0.0	6.5
2003-01-02	4.2	4.6	12.1	0.0	6.5
2003-01-03	4.2	4.6	12.7	0.0	6.5
2003-01-04	4.2	4.6	12.7	0.0	6.5
2003-01-05	4.2	4.6	12.7	0.0	6.5
2003-01-06	4.2	4.6	12.7	0.0	6.5

Sub-basin Inflows

Date	B01	B02	B03	B04	B05
2003-01-01	2.4	1.7	1.2	2.7	2.6
2003-01-02	2.4	1.7	1.1	2.6	2.6
2003-01-03	2.3	1.7	1.1	2.6	2.6
2003-01-04	2.3	1.6	1.1	2.6	2.6
2003-01-05	2.3	1.6	1.1	2.6	2.6
2003-01-06	2.3	1.6	1.1	2.6	2.6

Each function

Run Option Setting Result View

CoMOM input loaded



Options & Parameter setting

CoMOM Option Setting

CoMOM Option Setting

Reservoirs

ID	R01	R02
Name	YongDam	DaeChung
Flood Water	265.5	80.0
Normal High Water	263.5	76.5
Flood Restrict Water	261.5	72.0
Minimum Operation	228.5	60.0
Low Water	228.5	60.0
Reservoir Zones	10.0	13.0

Control Points

ID	C01	C02	C03	C04	C05
Name	YDU	YDD	ST	HT	OC
Maximum Discharge	0.0	0.0	0.0	0.0	0.0
UB	0.0	15.0	0.0	0.0	0.0
LB	0.0	0.0	0.0	0.0	0.0
Environmental Flow	0.0	0.0	0.0	0.0	0.0

Hydropowers

ID	P11	P12
Name	YongDam1	YongDam2
Maximum Water Use	16.9	6.2
Tail Water Level	76.7	205.0
Numbers of Power	2.0	2.0
Generating Hours	24.0	24.0

Demand Sites

ID	D01	D02	D03	D04	D05
Name	JJ	DJ	CJ	DCD	GA
Return Flow	0.0	0.0	0.0	0.0	0.0

Spillways

ID	S01	S02
Name	S01	S02
Release Water Level	0.0	0.0
Carrying Capacity	8593.8	14370.4

Sub-basin

ID	B01	B02	B03	B04	B05
Name	B01	B02	B03	B04	B05
RRF[Municipal &]	0.65	0.65	0.65	0.65	0.65
RRF[Agricultural]	0.35	0.35	0.35	0.35	0.35

Channel

ID	H01	H02	H03	H06	H08
Name	YD_ST	ST_HT	HT_OC	MP_GJ	GJ_GA
Carrying Capacity	-1.0	-1.0	-1.0	-1.0	-1.0

Outlets

ID	O01
Name	YD
Carrying Capacity	10.0
Minimum Release	0.0

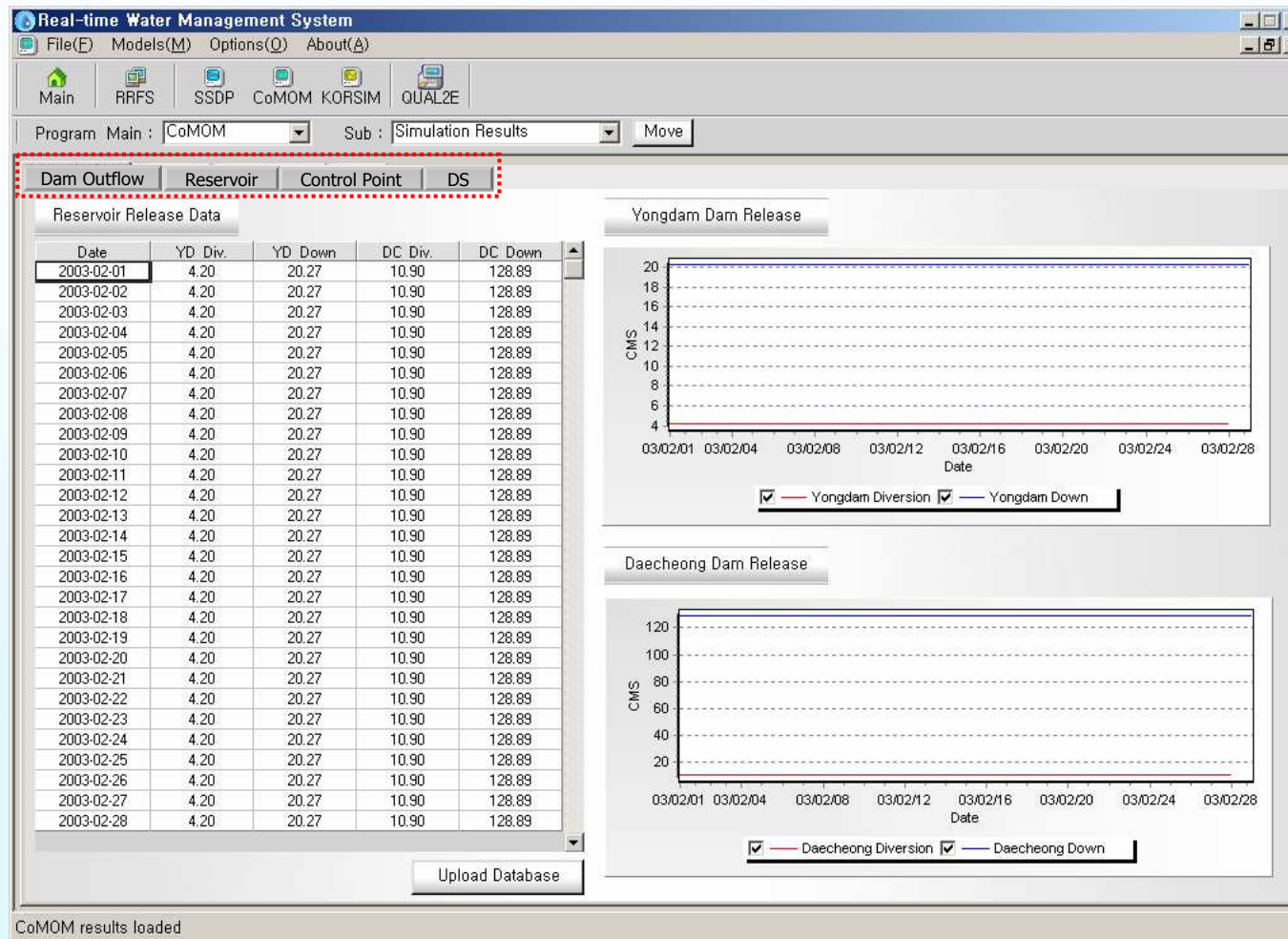
Weights Basin Information **Close**

CoMOM main

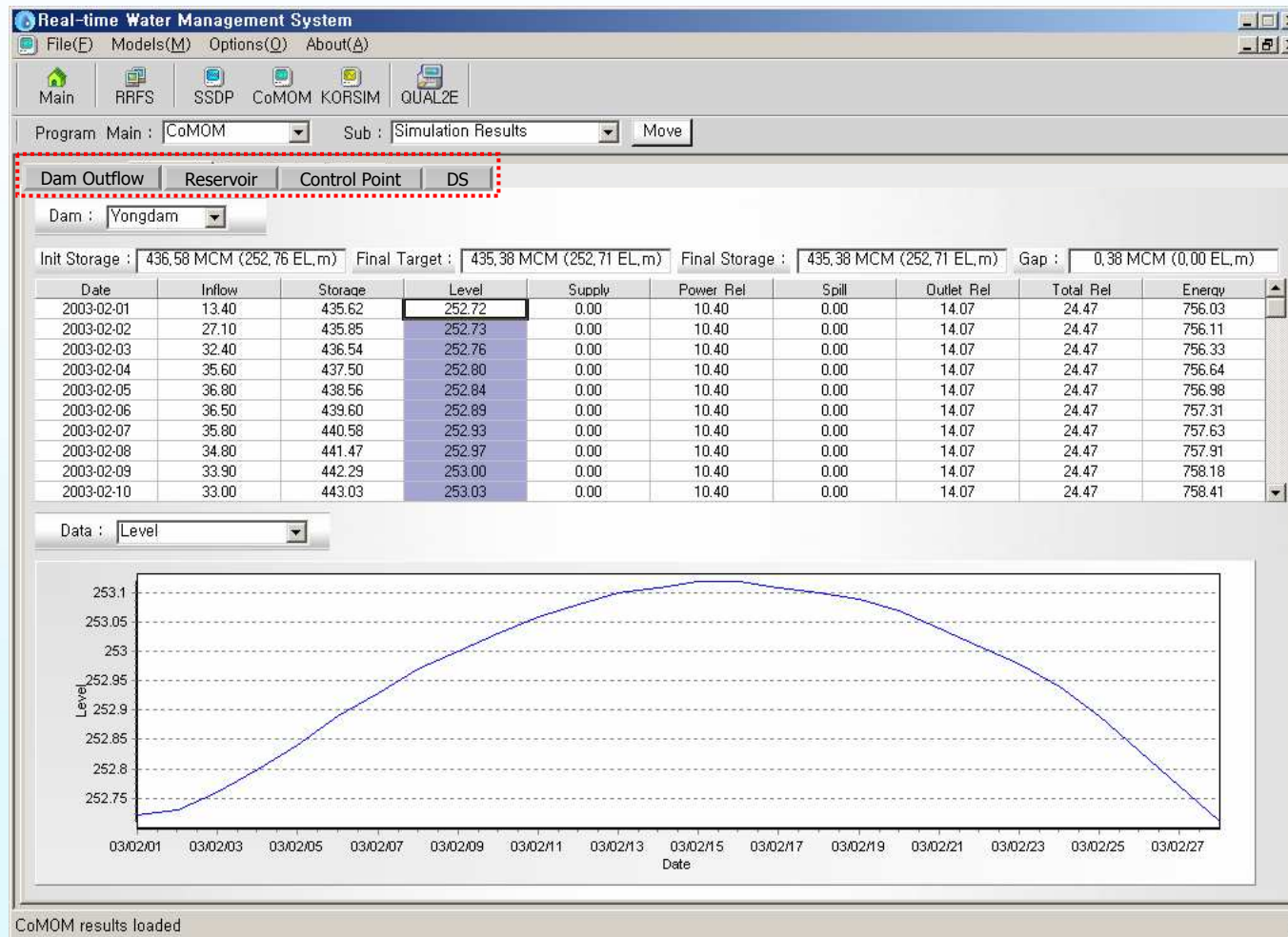


Running & Results

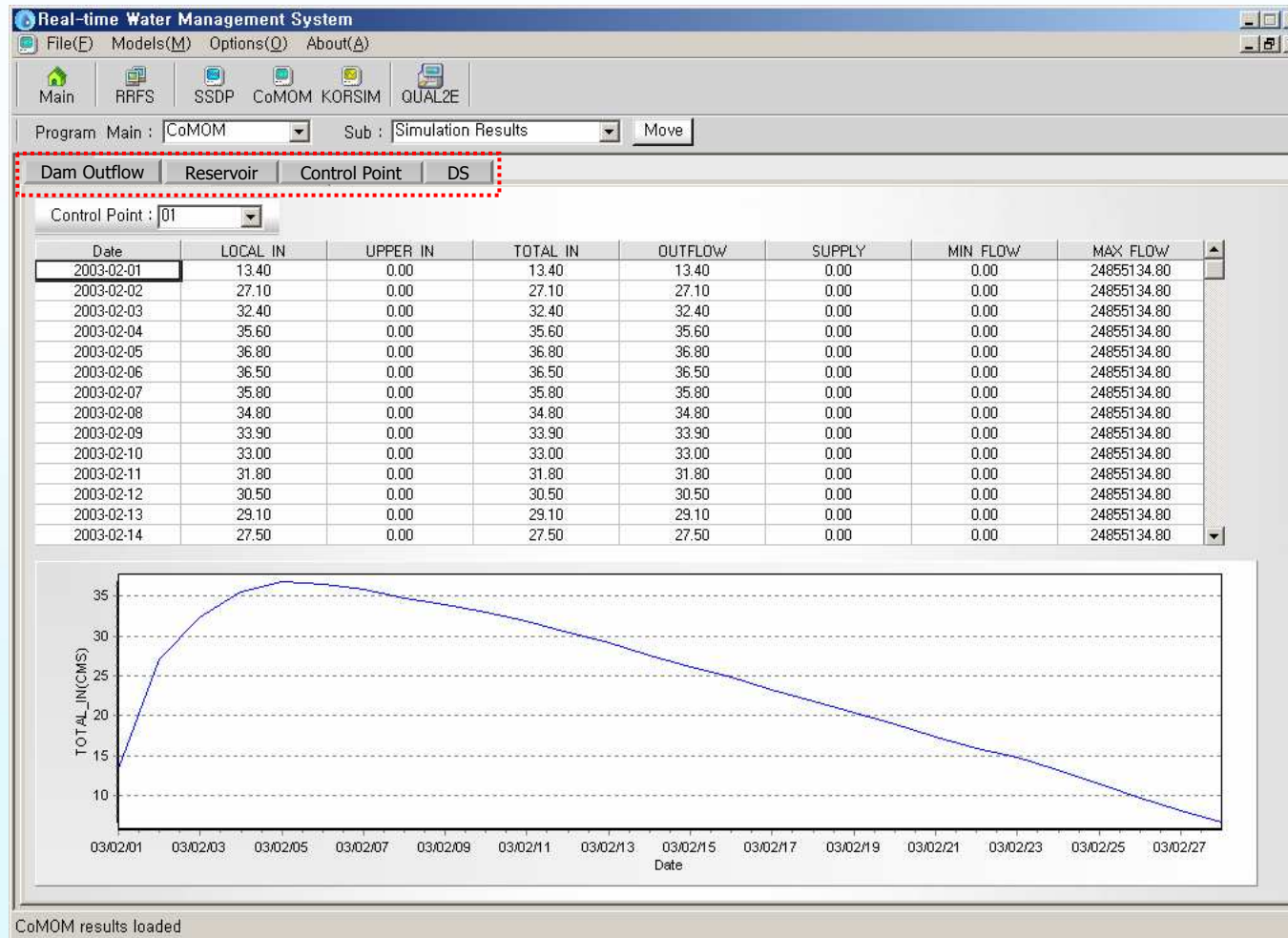
❁ Reservoir outflow control



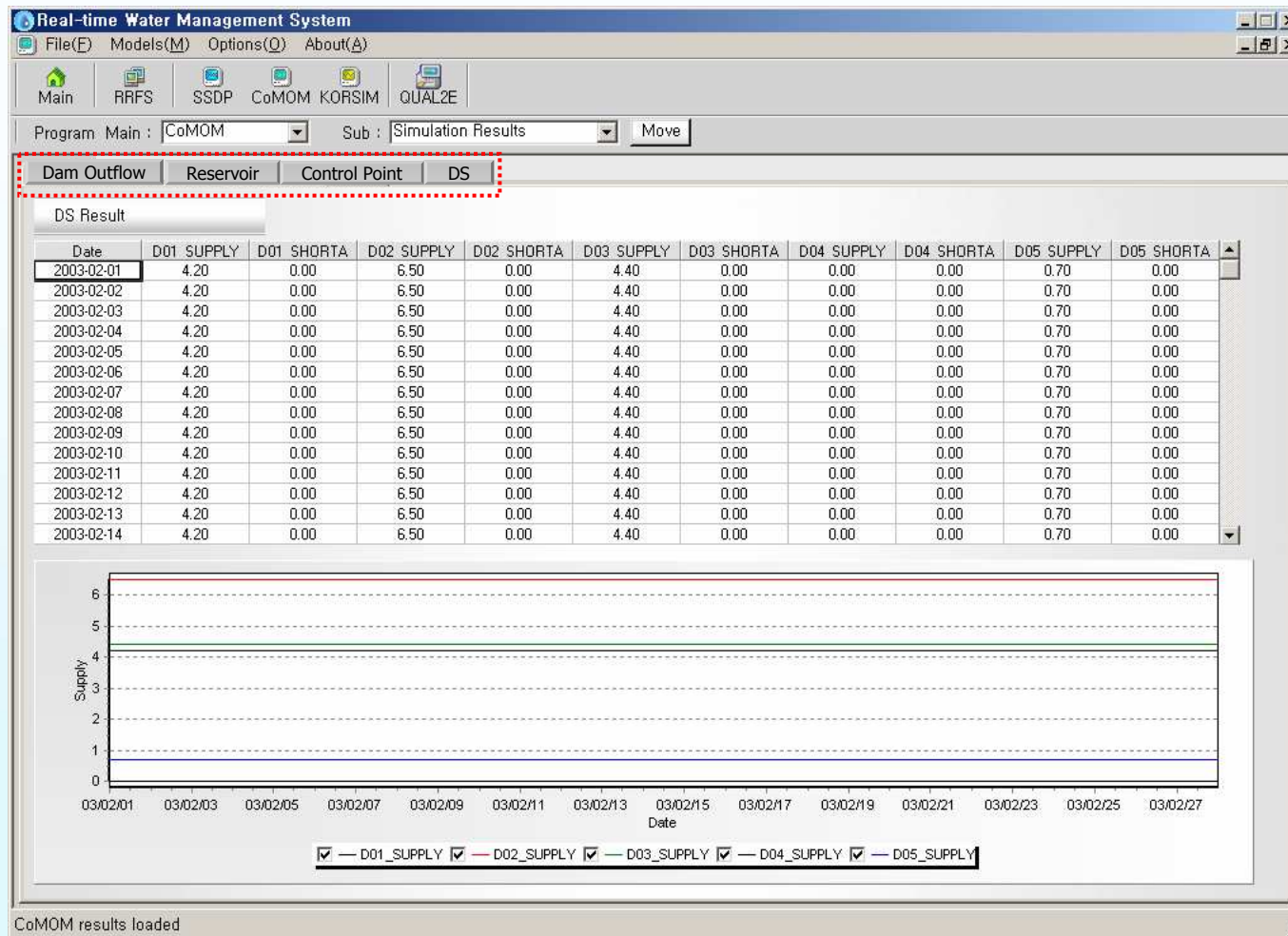
Reservoir condition



Control point condition



❁ Demand site condition



CoMOM results loaded



❁ KOWACO RESERVOIR SYSTEM SIMULATION MODEL (KORSIM)

- ❁ Reservoir system simulation model to incorporate reservoir operation rules and various constraints related to water management
- ❁ Improvement of operating environment by automation and formulation



Basin Information & Input data

Real-time Water Management System - [KORSIM - Input Data Setting]

File(E) Models(M) Options(O) About(A)

Main RRFs SSSP CoMOM KORSIM QUAL2E

Program Main : KorSIM Sub : Inputdata Move

KORSIM Geum River Basin Information

2003-01-01 < >

KORSIM Input data setting

Operation Period: 2003-01-01 ~ 2003-01-31 Data Set Up

Time Step: Daily Monthly 10-Day Unit: CMS 10^m

Simulation Option: Release Import SOP Hedging QUASI-OPT

IOPREAL: Observed Data Target Diversion FlowType: Actual Flow Natural Flow

Dam Outflow Priority: Use YD Dam Down DC Diversion Channel Routing: No Route Route

Inflow | Release Import | Demand (M&I) | Demand (Agri.)

Date	Basin01	Basin02	Basin03	Basin04	Basin05
2003-01-01	2.4	1.7	1.2	2.7	2.6
2003-01-02	2.4	1.7	1.1	2.6	2.6
2003-01-03	2.3	1.7	1.1	2.6	2.6
2003-01-04	2.3	1.6	1.1	2.6	2.6
2003-01-05	2.3	1.6	1.1	2.6	2.6
2003-01-06	2.3	1.6	1.1	2.6	2.6
2003-01-07	4.8	2.2	4.1	2.6	2.5
2003-01-08	5.2	2.3	4.8	2.6	2.5
2003-01-09	3.0	1.7	2.0	2.5	5.1
2003-01-10	2.9	1.6	1.3	2.5	5.6
2003-01-11	2.7	1.6	1.2	2.5	3.0
2003-01-12	2.4	1.6	1.2	2.5	2.7

Option Setting Make Input Data Run Result View

KORSIM input loaded



Operation control

Option setting

Real-time Water Management System - [KorSIM - Option Setting]

File(E) Models(M) Options(O) About(A)

Main RRFS SSSP CoMOM KORSIM QUAL2E

Program Main : KorSIM Sub : Setting options Move

Operation Option Specific Power

Reservoir

Initial Water Level Yongdam (EL,m) 255.12

Initial Water Level Daechyeong (EL,m) 72.11

Non Flood Season Maximum Release [CMS]

Yongdam 25.0

Daechyeong 264.0

Check Calendar Day

Year	Month	Day	# of Check Days
			0

Select

Monthly Minimum And Target Release [CMS]

	YD Min	YD Tot	DC Min	DC Tot
Jan	5.0	8.0	20.3	24.4
Feb	5.0	8.0	20.3	24.4
Mar	5.0	8.0	20.3	24.4
Apr	5.0	8.0	21.2	25.3
May	5.0	8.0	24.2	28.3
Jun	5.0	8.0	38.4	62.5
Jul	5.0	8.0	44.6	48.7
Aug	5.0	8.0	41.5	45.6
Sep	5.0	8.0	38.4	42.5
Oct	5.0	8.0	20.3	52.0
Nov	5.0	8.0	20.3	42.0
Dec	5.0	8.0	20.3	24.4

Monthly Diversion [CMS]

	YD	DC
Jan	15.0	12.8
Feb	15.0	12.8
Mar	15.0	12.8
Apr	14.0	13.0
May	15.0	13.7
Jun	16.0	22.3
Jul	15.0	18.9
Aug	15.0	18.1
Sep	15.0	17.5
Oct	15.0	12.8
Nov	15.0	12.8
Dec	15.0	12.8

Monthly Check Flow of Control Point

of Check Points 4 Select

# of Channel	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Rate	Remarks
1	2	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	1.5	/YD_Dam
2	7	20.3	20.3	20.3	21.2	24.2	58.4	44.6	41.5	38.4	20.3	20.3	1.0	/DC_Dam
3	9	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	1.5	/MP-GJ
4	10	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	1.0	/GJ-GA

Set Input Data

KorSIM option loaded

KorSIM main



Parameter & Specific coefficients setting

Real-time Water Management System - [KorSIM - Option Setting]

File(E) Models(M) Options(O) About(A)

Main RRFs SSDP CoMOM KORSIM QUAL2E

Program Main : KorSIM Sub : Setting options Move

Operation Option Specific Power

Return Flow Parameter

	M&I	Aqti.
B01	0.65	0.35
B02	0.65	0.35
B03	0.65	0.35
B04	0.65	0.35
B05	0.65	0.35
B06	0.65	0.35
B07	0.65	0.35
B08	0.65	0.35
B09	0.65	0.35
B10	0.65	0.35

Supply Limited Rate

	SLR
B01	0.85
B02	0.85
B03	0.85
B04	0.85
B05	0.85
B06	0.85
B07	0.85
B08	0.85
B09	0.85
B10	0.85

Hedging And Packing Coefficients

	YD H.	DC H.	YD P.	DC P.
Jan	0	0	0	0
Feb	0	0	0	0
Mar	0	0	0	0
Apr	0	0	0	0
May	0	0	0	0
Jun	0	0	0	0
Jul	0	0	0	0
Aug	0	0	0	0
Sep	0	0	0	0
Oct	0	0	0	0

Channel Diversion

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Remark
1	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	6.20	/8
2	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	/9

Direct Coefficient Values

	# of Coef.s	Coef1	Coef2	Coef3	Coef4	Coef5	Remarks
CH01	0	0.00	0.00	0.00	0.00	0.00	/1*
CH02	3	0.20	0.77	0.03	0.00	0.00	/2
CH03	3	0.36	0.63	0.01	0.00	0.00	/3
CH04	3	0.12	0.83	0.05	0.00	0.00	/4
CH05	0	0.00	0.00	0.00	0.00	0.00	/5
CH06	0	0.00	0.00	0.00	0.00	0.00	/6*
CH07	0	0.80	0.20	0.00	0.00	0.00	/7
CH08	3	0.40	0.60	0.20	0.00	0.00	/8
CH09	2	0.25	0.75	0.00	0.00	0.00	/9
CH10	3	0.33	0.62	0.05	0.00	0.00	/10

Reservoir Water Level (EL,m)

	Yongdam	Daecheong
Dead Water Level	226.5	49.0
Low Water Level	228.5	60.0
Flood Restrict Water Level	261.5	76.5
Normal High Water Level	263.5	76.5
Flood Water Level	265.5	80.0

Set Input Data

KORSIM option loaded

KorSIM main



❁ Power generation setting

Real-time Water Management System - [KorSIM - Option Setting]

File(E) Models(M) Options(O) About(A)

Main RRFS SSDP CoMOM KORSIM QUALZE

Program Main : KorSIM Sub : Setting options Move

Operation Option Specific Power

Power Generation

Yongdam Power Option

# of Powerplants	2	
# of Units	2	2
Tail Water Level (EL,m)	205,0	80,0
Generating Hour (hr)	24,0	24,0
Head Loss (m)	2,0	2,0
Eff. Loss	0,001	0,001
Eff. Control Rate	1,000	1,000
Power Eff.	0,7649	0,6860

Daecheong Power Option

# of Powerplants	1
# of Units	2
Tail Water Level (EL,m)	30,0
Generating Hour (hr)	5,0
Head Loss (m)	2,0
Eff. Loss	0,001
Eff. Control Rate	1,029

Daecheong Power Eff. Table

	25	30	35	40	45	50	55
50	0.425	0.520	0.588	0.623	0.648	0.664	0.675
60	0.550	0.630	0.674	0.702	0.721	0.735	0.749
70	0.657	0.725	0.754	0.770	0.780	0.783	0.791
80	0.750	0.788	0.820	0.830	0.825	0.822	0.831
90	0.795	0.836	0.858	0.870	0.866	0.860	0.859
100	0.840	0.873	0.894	0.902	0.901	0.895	0.888
110	0.880	0.907	0.922	0.927	0.928	0.923	0.913
120	0.892	0.918	0.936	0.950	0.948	0.942	0.928
130	0.882	0.903	0.920	0.930	0.940	0.939	0.931
140	0.870	0.892	0.905	0.918	0.926	0.928	0.925

Set Input Data

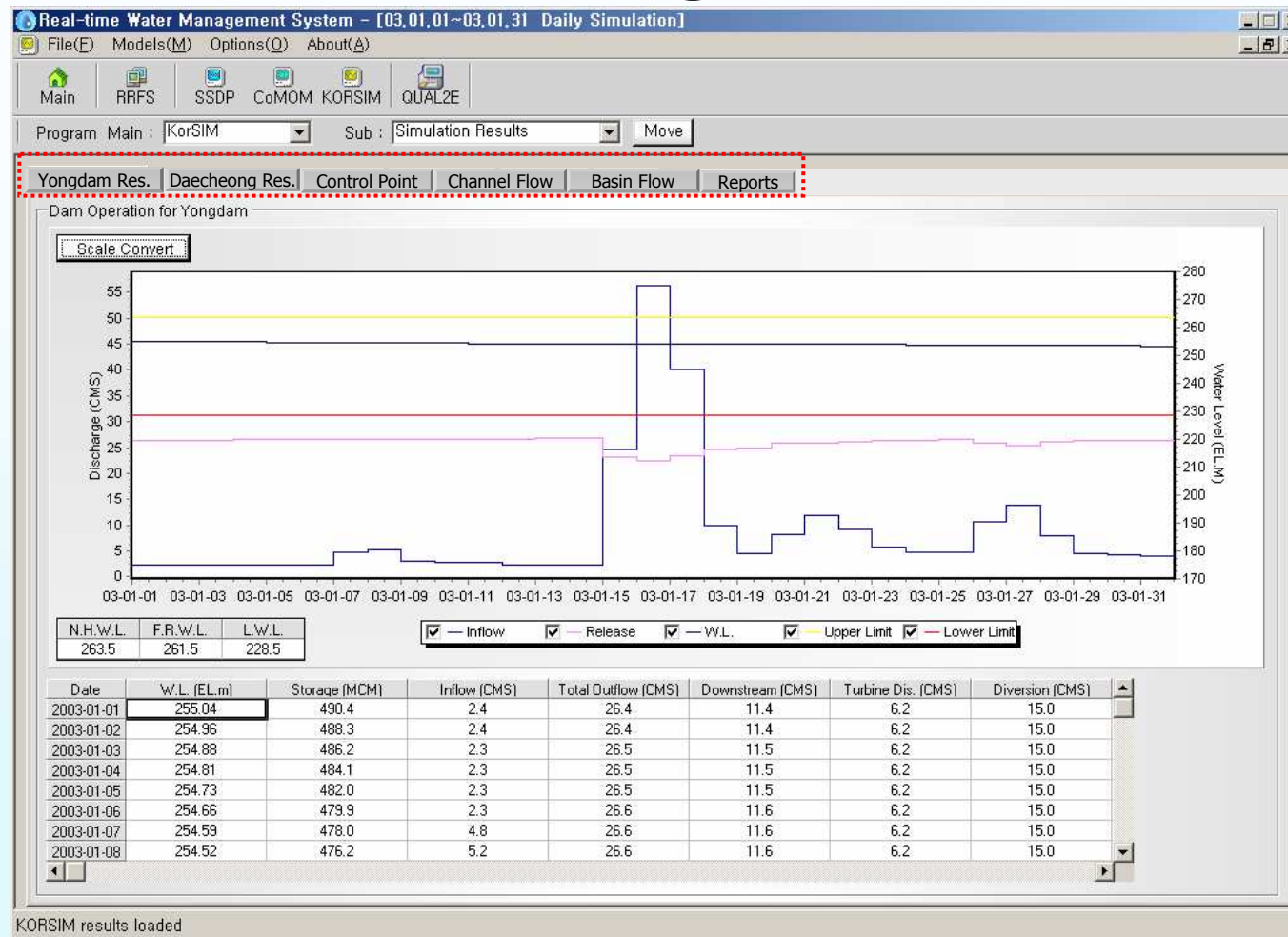
KORSIM option loaded

KorSIM main

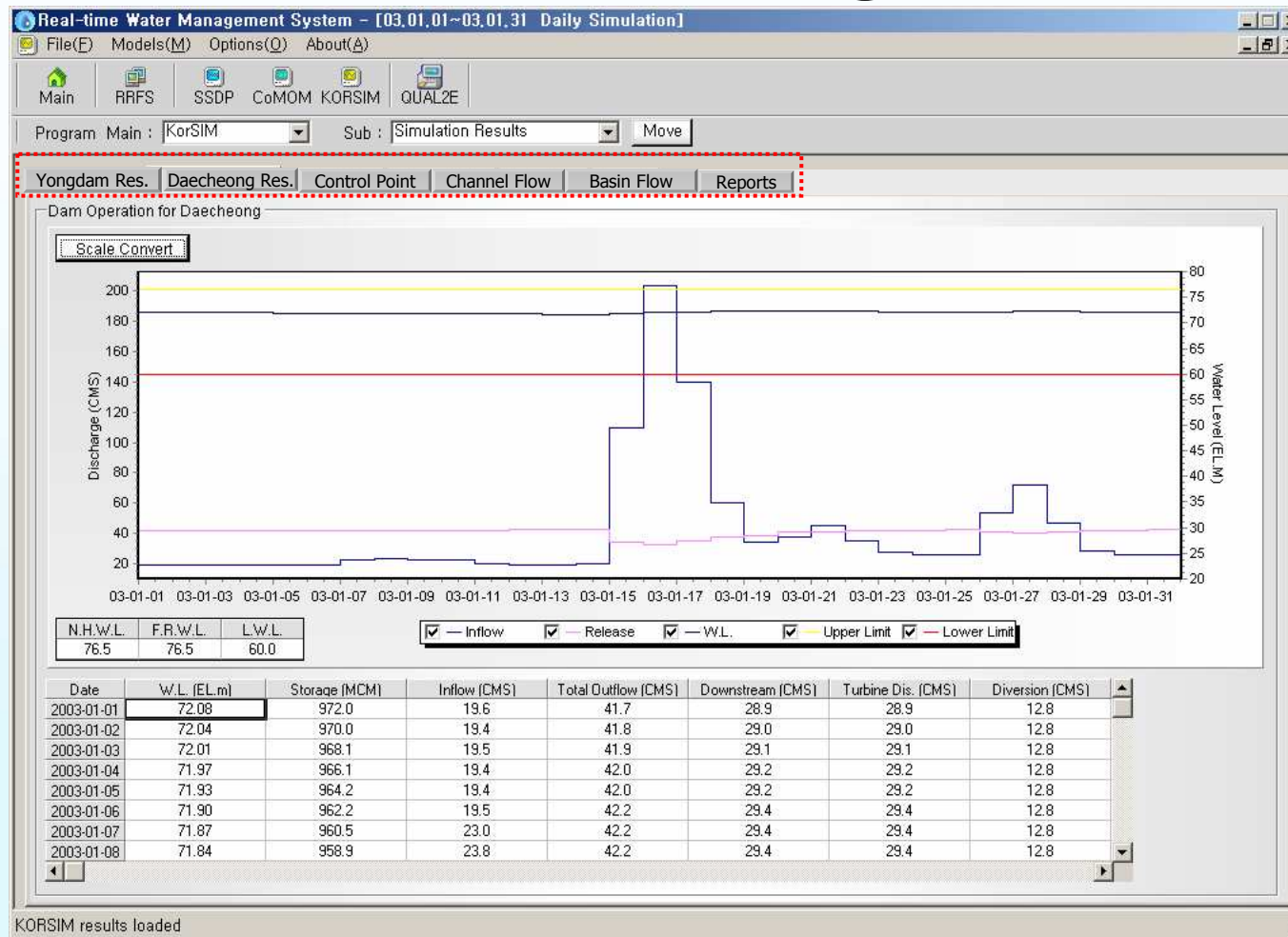


Running & Results

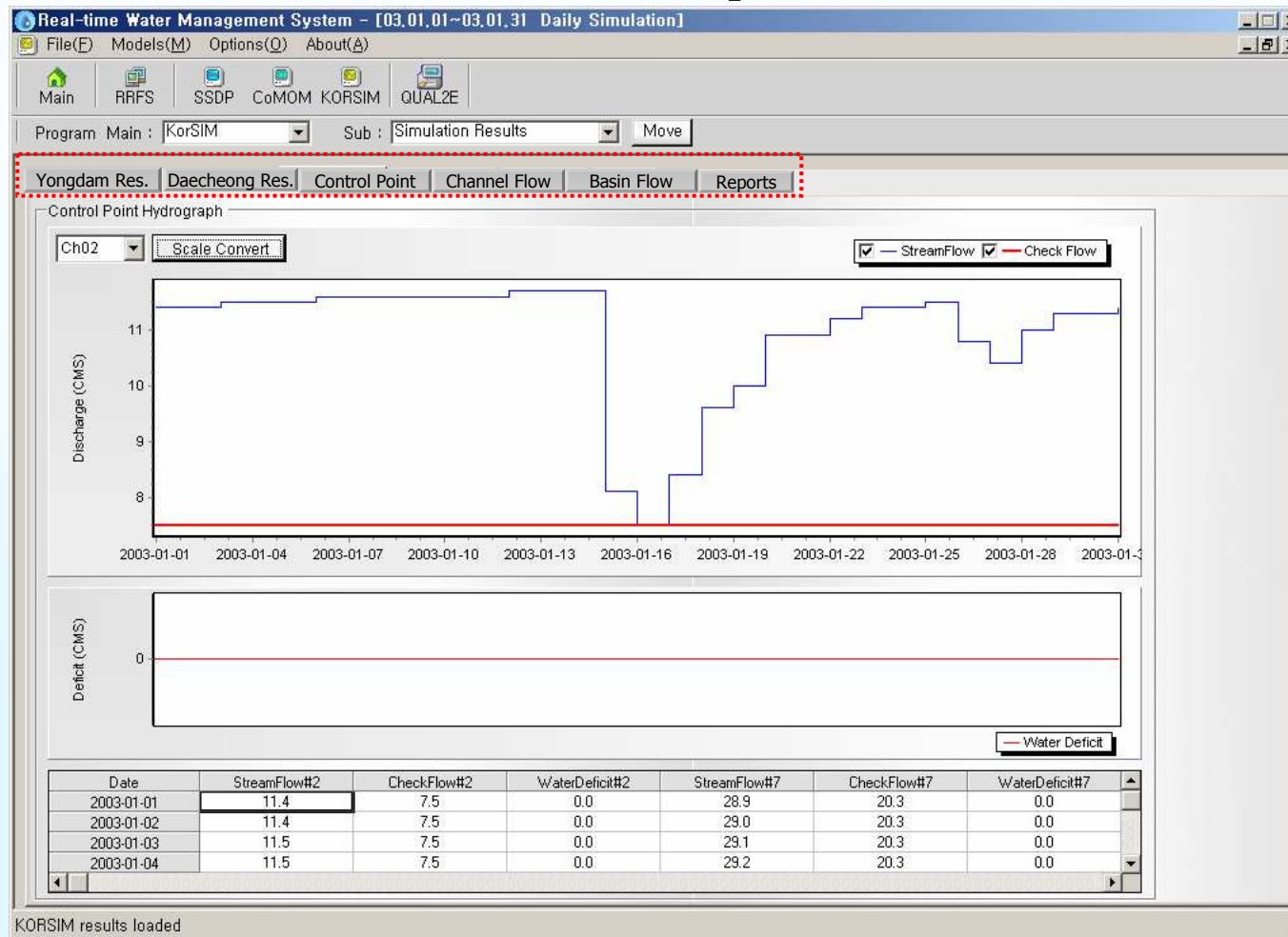
Results simulated for Yongdam reservoir



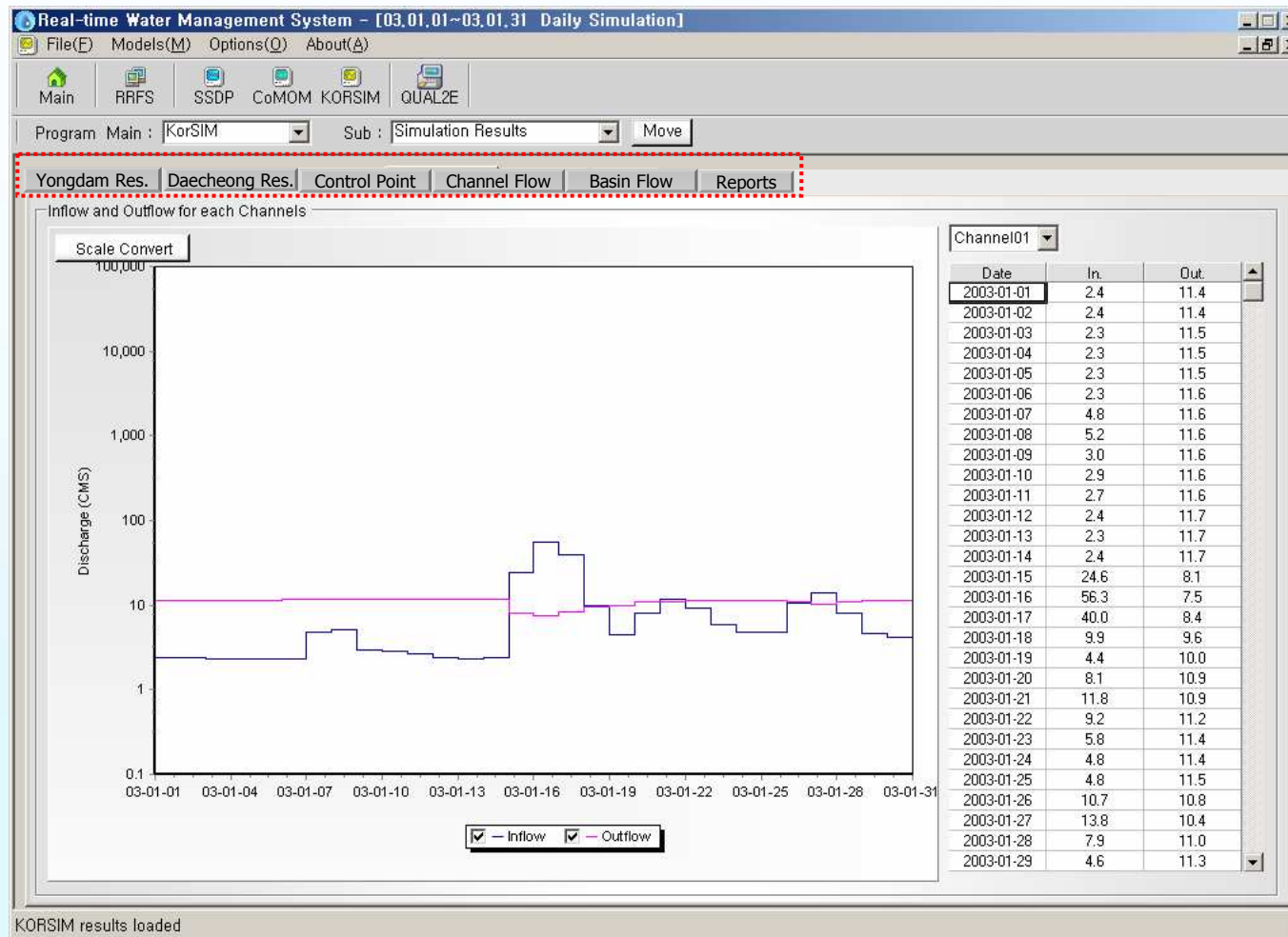
Results simulated for Daecheong reservoir



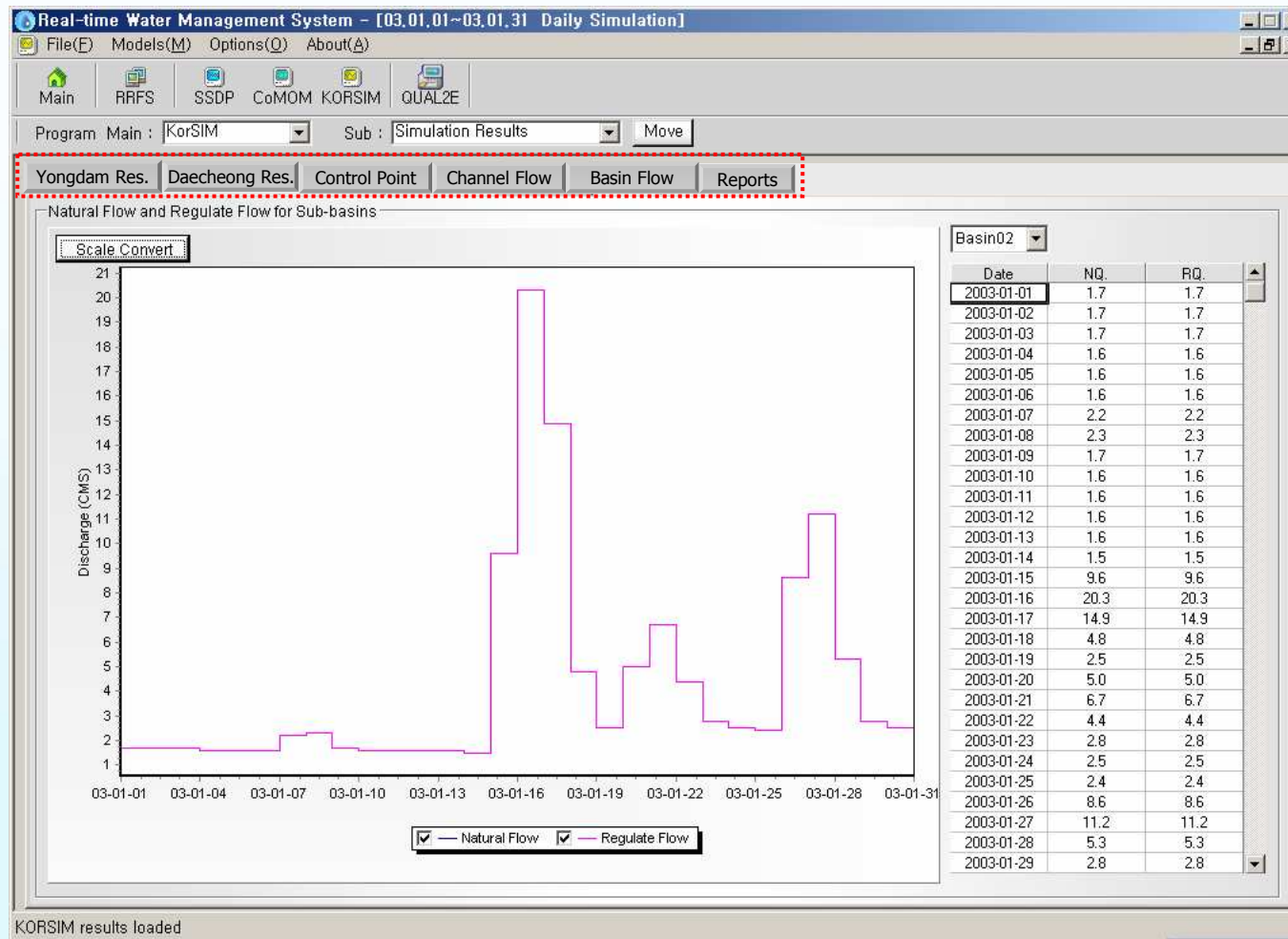
Result simulated at control point



Results simulated for channel flow



Results simulated for basin flow



Reports

Real-time Water Management System - [03.01.01~03.01.31 Daily Simulation]

File(E) Models(M) Options(O) About(A)

Main RRFs SSDP CoMOM KORSIM QUAL2E

Program Main : KorSIM Sub : Simulation Results Move

Yongdam Res. Daecheong Res. Control Point Channel Flow Basin Flow Reports

Yearly Hydropower Generation at Yongdam Res. [MWh]

Year	Power Plant 1	Power Plant 2	Total Energy
2003	12919.2	1631.8	14551.0
Average	12919.2	1631.8	14551.0

Yearly Hydropower Generation at Daecheong Res. [MWh]

Year	Primal Energy	Second Energy	Total Energy
2003	8013.1	0.0	8013.1
Average	8013.1	0.0	8013.1

Shortage Evaluation Indices

# of Channel	Reliability (%)	Resilience (%)	Vulnerability (CMS)	Max. Consecutive Deficit Periods (Days)
2	100.0	0.0	0.00	0
7	100.0	0.0	0.00	0
9	100.0	0.0	0.00	0
10	100.0	0.0	0.00	0

KORSIM results loaded



QUAL2E-PLUS

- Project long term monthly water quality in reservoir downstream to estimate discharge release
- Compute BOD, DO, TN, and TP variations from reservoir downstream to estuary



Basin Information & Input data

Real-time Water Management System - [QUAL2E - Input Data Setting]

File(E) Models(M) Options(O) About(A)

Main RRFs SSDP CoMOM KORSIM QUAL2E

Program Main : QUAL2E Sub : Setting Inputdata Move

QUAL2E Geum River Basin Information

Items : DO

QUAL2E Input Data Setting

Analysis Period : 1999-10 Set Data

Local Climatology

Cloudiness (0~1)	Dry Temp. (°C)	Wet Temp. (°C)	Pressure (millibars)	Wind Spd. (m/sec)
0.4	13.3	10.6	1002.0	0.9

Reach & Point Data

Hydraulics Data Initial Conditions Head Water & Point Load

Head Water

Head	Name	Flow	Temp	DO	BOD
1	DAECHEONG	43.790	20.57	8.29	1.04

Point Load

Point	Name	Inflow (CMS)	Temp (°C)	DO (m/L)	BOD (m/L)
1	w1	-0.338			
2	P1	0.661	17.66	8.68	6.90
3	P(GAP)	93.505	20.57	8.29	5.57
4	w2	0.000			
5	w3	0.000			
6	P2	0.005	17.66	8.68	5.24
7	w4	0.000			
8	w5	-0.043			
9	w6	-0.025			
10	w7	0.000			

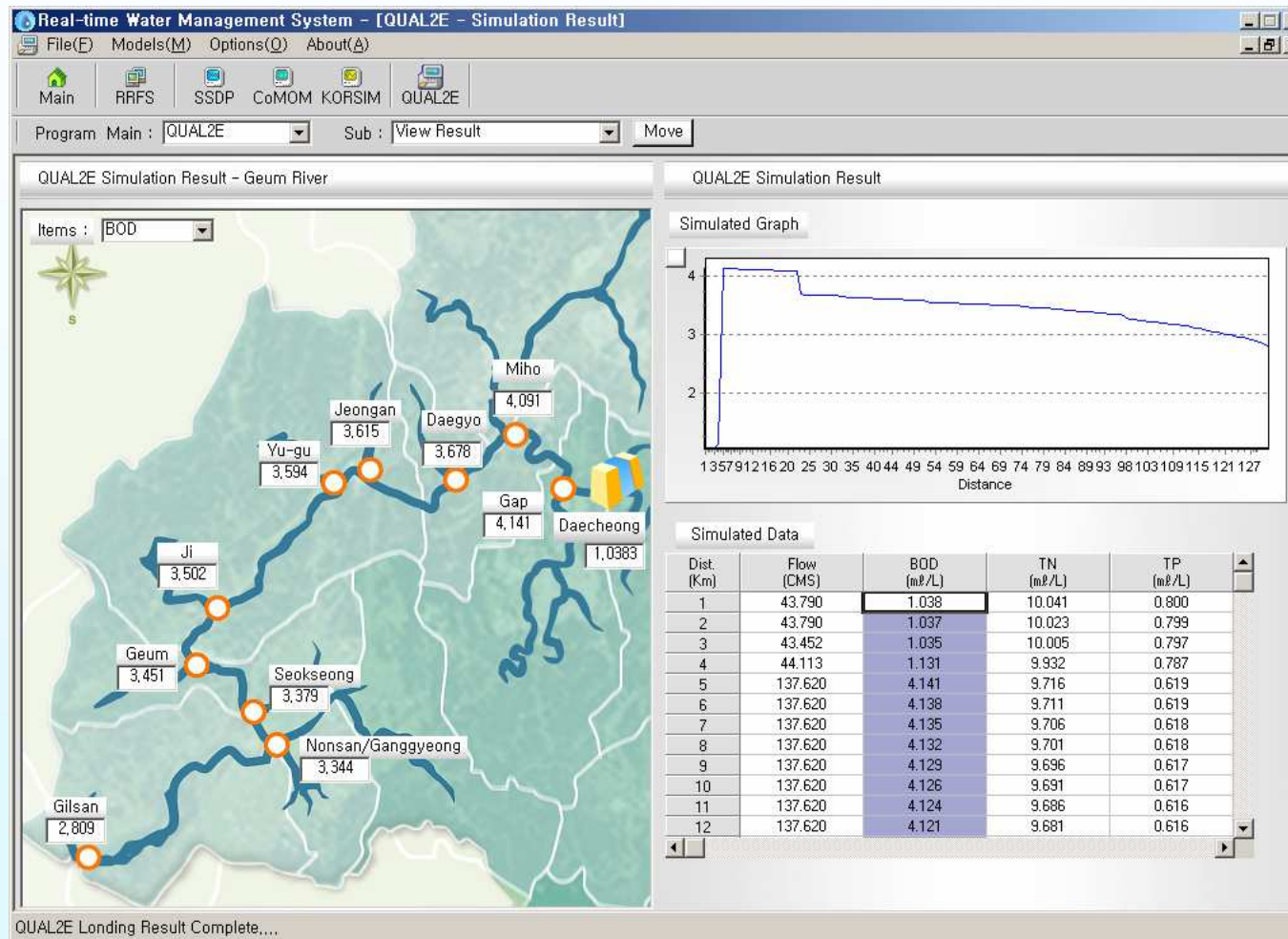
Run View Result

QUAL2E Loading Complete...



Running & Result

Simulated results



IRWMS DB Solution

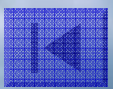
- Data management program which executes transformation and validation of data
- Practical application where the decision making and acquisition of reliable data
- Automated system that supports a data management from inquiry, search, correction, computation, and verification for a raw data, and provides users with GUI environment which is helpful to handle a data set stored in DBMS



❁ Main window

The screenshot shows the main window of the IRWMS Database Solution. The window title is "IRWMS Database Solution - [IRWMS Database Solution Work]". The menu bar includes "Work", "Window", "Option", and "About". The main interface features a date range selector set to "2005-04-01" to "2005-04-30", a "Set Data" button, and a "Compute Rainfall of Sub-basin" button. A left-hand navigation pane lists several data categories: "Rainfall", "Stage & Discharge", "Temperature", "Intake", "Demand", and "Dam". The central area is a data table with columns labeled A through K and rows numbered 1 through 34. The table is currently empty. Above the table, there are buttons for "Save", "Refresh", "Check Null", "Porting", and "Upload". The status bar at the bottom displays the date and time "2005-07-13 16:42:35", the status "RealTime : Off", and a message "DB Testing Complete...".

	A	B	C	D	E	F	G	H	I	J	K
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
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33											
34											

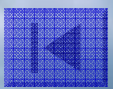


Data Selection

☀ Rainfall data by point

The screenshot shows the IRWMS Database Solution interface. The window title is "IRWMS Database Solution - [IRWMS Database Solution Work]". The menu bar includes "Work", "Window", "Option", and "About". The main area has a date range of "2005-04-01" to "2005-04-30" and buttons for "Set Data" and "Compute Rainfall of Sub-basin". A tree view on the left shows "Rainfall / Check Point" selected. The main table displays rainfall data for 30 days in April 2005, with columns for Date and points AC through CY. The status bar at the bottom shows "2005-07-13 16:43:51", "RealTime : Off", and "DB Testing Complete...".

Date	AC	AN	BC	BE	BG	BG	BP	BR	CJ	CS	CY
2005-04-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-03	1.0	2.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0
2005-04-04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-06	4.0	2.0	1.0	3.0	0.0	7.0	0.0	1.0	1.0	2.0	1.0
2005-04-07	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-09	1.0	7.0	13.0	1.0	14.0	0.0	16.0	20.0	16.0	1.0	24.0
2005-04-10	22.0	21.0	29.0	24.0	28.0	18.0	27.0	19.0	25.0	15.0	27.0
2005-04-11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-18	0.0	3.0	0.0	5.0	16.0	0.0	0.0	0.0	2.0	5.0	0.0
2005-04-19	7.0	9.0	5.0	12.0	7.0	7.0	8.0	6.0	6.0	8.0	5.0
2005-04-20	12.0	7.0	3.0	11.0	5.0	13.0	7.0	5.0	5.0	6.0	3.0
2005-04-21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-27	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-28	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-30	2.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0



❁ Thiessen coefficient management

The screenshot displays the IRWMS Database Solution software interface. The window title is "IRWMS Database Solution - [IRWMS Database Solution Work]". The menu bar includes "Work", "Window", "Option", and "About". The main interface features a date range selector set to "2005-04-01" to "2005-04-30", with buttons for "Set Data" and "Compute Rainfall of Sub-basin".

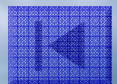
The left sidebar shows a tree view with the following structure:

- Rainfall
 - Rainfall / Check Point
 - Thiessen Coef.
 - Basin 01**
 - Basin 02
 - Basin 03
 - Basin 04
 - Basin 05
 - Basin 06
 - Basin 07
 - Basin 08
 - Basin 09
 - Basin 10
 - Basin 11
 - Basin 12
 - Rainfall / Sub-basin
 - Stage & Discharge
 - Temperature
 - Intake
 - Demand
 - Dam

The main area displays a table for "Basin 01" with the following data:

Code	Name	Thissen
9000027	AC	0.1092
9000025	BG	0.1182
9000023	GB2	0.1268
9000022	JA(DC)	0.0877
9000030	JC2	0.1063
9000029	JCW	0.0981
9000028	JG	0.1017
9000021	JS(DC)	0.0663
9000024	MJ(YD)	0.0631
9000026	SJ	0.1226

The status bar at the bottom shows the date "2005-07-13 16:44:44", "RealTime : Off", and "DB Testing Complete...".



Mean Areal precipitation

IRWMS Database Solution - [IRWMS Database Solution Work]

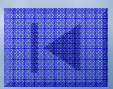
Work Window Option About

2005-04-01 ~ 2005-04-30 Set Data Compute Rainfall of Sub-basin

Rainfall / Sub-basin Save Refresh Check Null Porting Upload

Date	B01	B02	B03	B04	B05	B06	B07	B08	B09	B10	B11
2005-04-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-03	0.3	1.5	0.5	2.8	1.2	0.5	0.3	0.0	0.0	0.7	0.1
2005-04-04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-06	4.5	2.3	3.5	1.0	1.1	1.3	1.1	0.4	0.8	2.5	0.9
2005-04-07	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.0
2005-04-08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-09	1.6	0.9	0.5	1.7	6.1	6.0	14.4	17.1	23.2	6.7	21.8
2005-04-10	17.5	18.7	14.2	17.5	19.8	17.9	29.2	26.9	25.5	20.9	17.3
2005-04-11	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-18	0.1	2.6	0.1	2.9	5.1	1.8	3.5	7.6	0.4	0.0	0.0
2005-04-19	7.6	11.0	7.3	8.4	8.5	6.2	5.1	7.0	5.5	6.3	6.7
2005-04-20	10.1	7.0	7.5	5.7	6.6	5.7	4.3	6.0	4.2	6.0	4.8
2005-04-21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-22	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-27	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-28	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-29	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005-04-30	1.3	0.3	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.2

2005-07-13 16:45:10 RealTime : Off DB Testing Complete...



Water level data

IRWMS Database Solution - [IRWMS Database Solution Work]

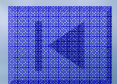
Work Window Option About

2005-04-01 ~ 2005-04-30 Set Data Compute Rainfall of Sub-basin

Stage Save Refresh Check Null Porting Upload

Date	ST	HT	OC	MP	HG	GJ	GA	GG	HG
2005-04-01	0.25	0.63	0.45	0.22	-1.96	0.34	1.01	2.85	1.64
2005-04-02	0.28	0.62	0.43	0.22	-1.96	0.34	0.90	2.76	1.56
2005-04-03	0.27	0.61	0.46	0.21	-1.95	0.35	0.99	2.86	1.67
2005-04-04	0.27	0.62	0.44	0.22	-1.96	0.34	1.10	2.96	1.76
2005-04-05	0.26	0.62	0.43	0.21	-1.97	0.33	1.09	2.93	1.71
2005-04-06	0.25	0.61	0.39	0.18	-1.97	0.31	0.90	2.74	1.54
2005-04-07	0.27	0.61	0.40	0.21	-1.97	0.32	0.97	2.84	1.63
2005-04-08	0.28	0.61	0.41	0.21	-1.97	0.32	1.01	2.87	1.65
2005-04-09	0.29	0.64	0.43	0.24	-1.96	0.33	0.86	2.72	1.55
2005-04-10	0.33	0.65	0.46	0.40	-1.57	0.72	1.11	2.90	1.63
2005-04-11	0.44	0.74	0.56	0.27	-1.44	0.91	0.96	2.75	1.57
2005-04-12	0.37	0.70	0.56	0.25	-1.69	0.66	1.01	2.80	1.57
2005-04-13	0.34	0.70	0.53	0.26	-1.79	0.55	0.97	2.82	1.62
2005-04-14	0.31	0.63	0.47	0.24	-1.85	0.49	0.94	2.76	1.52
2005-04-15	0.30	0.65	0.46	0.24	-1.88	0.45	0.82	2.69	1.51
2005-04-16	0.29	0.65	0.46	0.23	-1.91	0.41	0.95	2.81	1.62
2005-04-17	0.29	0.65	0.45	0.21	-1.93	0.39	0.91	2.74	1.55
2005-04-18	0.28	0.62	0.44	0.22	-1.91	0.36	0.80	2.66	1.49
2005-04-19	0.25	0.60	0.40	0.22	-1.89	0.42	0.90	2.75	1.56
2005-04-20	0.29	0.64	0.42	0.35	-1.81	0.53	1.06	2.92	1.70
2005-04-21	0.35	0.66	0.48	0.25	-1.85	0.49	1.13	2.96	1.71
2005-04-22	0.32	0.67	0.47	0.23	-1.90	0.42	0.92	2.79	1.58
2005-04-23	0.31	0.66	0.47	0.22	-1.92	0.39	1.02	2.88	1.68
2005-04-24	0.30	0.64	0.45	0.21	-1.94	0.35	1.13	3.00	1.80
2005-04-25	0.25	0.62	0.43	0.20	-1.95	0.35	0.96	2.79	1.57
2005-04-26	0.26	0.61	0.39	0.22	-1.95	0.33	0.85	2.71	1.52
2005-04-27	0.24	0.58	0.38	0.20	-1.96	0.33	0.92	2.78	1.57
2005-04-28	0.22	0.58	0.34	0.20	-1.96	0.31	0.99	2.85	1.62
2005-04-29	0.24	0.58	0.34	0.19	-1.96	0.31	0.89	2.73	1.51
2005-04-30	0.24	0.58	0.34	0.20	-1.97	0.30	0.82	2.67	1.49

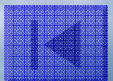
2005-07-13 16:46:35 RealTime : Off DB Testing Complete...



❁ Reservoir inflow & outflow

The screenshot shows the IRWMS Database Solution software interface. The window title is "IRWMS Database Solution - [IRWMS Database Solution Work]". The menu bar includes "Work", "Window", "Option", and "About". The main area displays a table titled "Dam Inflow_Outflow" with columns for "Date", "YD Out.", "DC In.", and "DC Out.". The data covers the period from 2005-04-01 to 2005-04-30. The status bar at the bottom indicates "2005-07-13 16:47:07", "RealTime : Off", and "DB Testing Complete...".

Date	YD Out.	DC In.	DC Out.
2005-04-01	15.2	37.8	32.7
2005-04-02	15.4	21.1	31.3
2005-04-03	15.4	38.1	33.0
2005-04-04	15.4	27.2	32.3
2005-04-05	15.4	27.5	32.6
2005-04-06	15.4	26.2	31.3
2005-04-07	15.4	27.4	32.5
2005-04-08	15.4	28.2	33.3
2005-04-09	15.4	33.0	33.0
2005-04-10	15.4	41.1	30.9
2005-04-11	15.4	48.6	33.3
2005-04-12	15.4	41.8	26.5
2005-04-13	15.4	32.7	22.5
2005-04-14	15.5	27.4	22.3
2005-04-15	15.4	21.1	26.2
2005-04-16	15.4	33.3	33.3
2005-04-17	15.4	27.1	32.2
2005-04-18	15.3	33.6	33.6
2005-04-19	15.3	28.1	33.2
2005-04-20	21.2	33.3	33.3
2005-04-21	26.9	38.0	32.9
2005-04-22	26.9	37.4	32.3
2005-04-23	26.9	35.9	25.7
2005-04-24	26.8	27.8	38.0
2005-04-25	26.8	30.5	30.5
2005-04-26	26.8	26.6	31.7
2005-04-27	26.8	23.6	33.8
2005-04-28	26.7	22.1	32.3
2005-04-29	26.6	22.0	32.2
2005-04-30	26.4	20.9	31.1



❁ Dam release

IRWMS Database Solution - [IRWMS Database Solution Work]

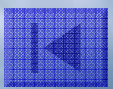
Work Window Option About

2005-04-01 ~ 2005-04-30 Set Data Compute Rainfall of Sub-basin

Discharge Save Refresh Check Null Porting Upload

Date	YD OUT.	ST	HT	OC	DC IN.	DC OUT.	MP	HG	GJ	GA	GG
2005-04-01	32.7				37.8	32.7					
2005-04-02	31.3				21.1	31.3					
2005-04-03	33.0				38.1	33.0					
2005-04-04	32.3				27.2	32.3					
2005-04-05	32.6				27.5	32.6					
2005-04-06	31.3				26.2	31.3					
2005-04-07	32.5				27.4	32.5					
2005-04-08	33.3				28.2	33.3					
2005-04-09	33.0				33.0	33.0					
2005-04-10	30.9				41.1	30.9					
2005-04-11	33.3				48.6	33.3					
2005-04-12	26.5				41.8	26.5					
2005-04-13	22.5				32.7	22.5					
2005-04-14	22.3				27.4	22.3					
2005-04-15	26.2				21.1	26.2					
2005-04-16	33.3				33.3	33.3					
2005-04-17	32.2				27.1	32.2					
2005-04-18	33.6				33.6	33.6					
2005-04-19	33.2				28.1	33.2					
2005-04-20	33.3				33.3	33.3					
2005-04-21	32.9				38.0	32.9					
2005-04-22	32.3				37.4	32.3					
2005-04-23	25.7				35.9	25.7					
2005-04-24	38.0				27.8	38.0					
2005-04-25	30.5				30.5	30.5					
2005-04-26	31.7				26.6	31.7					
2005-04-27	33.8				23.6	33.8					
2005-04-28	32.3				22.1	32.3					
2005-04-29	32.2				22.0	32.2					
2005-04-30	31.1				20.9	31.1					

2005-07-13 16:49:09 RealTime : Off DB Testing Complete...



Temperature

IRWMS Database Solution - [IRWMS Database Solution Work]

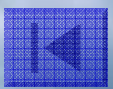
Work Window Option About

2002-04-01 ~ 2002-04-30 [Set Data] Compute Rainfall of Sub-basin

- Rainfall
- Stage & Discharge
- Temperature
 - Temperature / Station
- Intake
- Demand
- Dam

Temperature / Station									
Date	JS	GS	CP	BE	DJ	CJ	BY	GS	
2002-04-01	6.8	7.3	7.5	6.6	7.8	7.6	7.3	7.1	
2002-04-02	7.0	7.4	7.8	6.7	8.0	7.6	7.6	7.3	
2002-04-03	7.3	8.1	8.4	7.4	8.9	8.4	8.2	8.0	
2002-04-04	7.6	9.0	9.3	8.2	9.9	9.5	9.0	8.9	
2002-04-05	8.1	9.7	10.3	8.9	10.6	10.2	9.6	9.2	
2002-04-06	8.2	9.5	10.1	8.8	10.5	10.2	9.3	9.4	
2002-04-07	9.0	10.4	10.4	9.6	11.2	11.1	10.3	9.9	
2002-04-08	8.0	10.7	10.6	10.0	11.5	11.2	10.8	10.2	
2002-04-09	8.5	10.7	10.7	10.0	11.4	11.0	10.9	10.2	
2002-04-10	7.7	10.2	10.3	9.8	11.1	10.8	10.7	9.6	
2002-04-11	9.0	10.8	11.1	10.3	11.6	11.3	11.1	10.3	
2002-04-12	9.2	11.0	11.3	10.3	11.8	11.6	11.1	10.5	
2002-04-13	8.6	10.5	11.4	9.9	11.6	11.2	10.4	10.2	
2002-04-14	8.9	10.9	11.7	10.5	12.0	11.8	11.1	10.4	
2002-04-15	9.6	11.7	12.1	11.2	12.7	12.3	11.5	10.9	
2002-04-16	9.7	10.9	11.4	10.3	12.0	11.7	11.1	10.8	
2002-04-17	10.7	11.2	12.1	10.6	12.4	12.0	11.3	11.3	
2002-04-18	11.6	11.9	12.3	11.1	12.7	12.6	11.8	11.7	
2002-04-19	11.1	12.3	12.9	11.6	13.5	13.3	12.6	12.2	
2002-04-20	12.0	12.8	13.2	12.1	13.8	13.5	12.8	12.4	
2002-04-21	12.6	13.0	13.2	12.3	14.1	13.9	13.3	12.8	
2002-04-22	12.2	13.1	13.8	12.5	14.1	13.8	13.0	12.9	
2002-04-23	12.1	13.5	14.3	12.9	14.4	14.2	13.4	12.8	
2002-04-24	12.0	13.4	14.2	12.7	14.4	14.1	13.5	13.0	
2002-04-25	11.4	13.8	14.5	13.1	14.6	14.3	13.6	13.2	
2002-04-26	12.6	14.2	14.5	13.4	14.8	14.6	14.2	13.5	
2002-04-27	13.3	14.2	14.8	13.7	15.0	14.8	14.1	13.5	
2002-04-28	13.4	13.9	14.2	13.5	14.8	14.5	13.8	13.7	
2002-04-29	14.2	14.6	14.8	13.9	15.5	15.3	14.8	14.2	
2002-04-30	14.2	15.0	15.1	14.3	15.8	15.7	15.0	14.5	

2005-07-13 16:51:20 RealTime : Off DB Testing Complete...



Intake flow

IRWMS Database Solution - [IRWMS Database Solution Work]

Work Window Option About

2002-04-01 ~ 2002-04-30 Set Data Compute Rainfall of Sub-basin

Intake (DEV) Save Refresh Check Null Porting Upload

Date	CJ	DJ	SS
2002-04-01	4.5	7.0	0.7
2002-04-02	4.5	7.0	0.7
2002-04-03	4.5	7.0	0.7
2002-04-04	4.5	7.0	0.7
2002-04-05	4.5	7.0	0.7
2002-04-06	4.5	7.0	0.7
2002-04-07	4.5	7.0	0.7
2002-04-08	4.5	7.0	0.7
2002-04-09	4.5	7.0	0.7
2002-04-10	4.5	7.0	0.7
2002-04-11	4.5	7.0	0.7
2002-04-12	4.5	7.0	0.7
2002-04-13	4.5	7.0	0.7
2002-04-14	4.5	7.0	0.7
2002-04-15	4.5	7.0	0.7
2002-04-16	4.5	7.0	0.7
2002-04-17	4.5	7.0	0.7
2002-04-18	4.5	7.0	0.7
2002-04-19	4.5	7.0	0.7
2002-04-20	4.5	7.0	0.7
2002-04-21	4.5	7.0	0.7
2002-04-22	4.5	7.0	0.7
2002-04-23	4.5	7.0	0.7
2002-04-24	4.5	7.0	0.7
2002-04-25	4.5	7.0	0.7
2002-04-26	4.5	7.0	0.7
2002-04-27	4.5	7.0	0.7
2002-04-28	4.5	7.0	0.7
2002-04-29	4.5	7.0	0.7
2002-04-30	4.5	7.0	0.7

2005-07-13 16:51:45 RealTime : Off DB Testing Complete...

❁ Demand flow

IRWMS Database Solution - [IRWMS Database Solution Work]

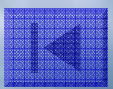
Work Window Option About

2002-04-01 ~ 2002-04-30 Set Data Compute Rainfall of Sub-basin

Domestic Save Refresh Check Null Porting Upload

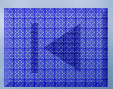
Date	B01	B02	B03	B04	B05	B06	B07	B08	B09	B10	B11
2002-04-01	0.1	0.1	0.1	0.3	0.9	5.0	2.5	0.4	0.4	0.3	0.1
2002-04-02	0.1	0.1	0.1	0.3	0.9	5.0	2.5	0.4	0.4	0.3	0.1
2002-04-03	0.1	0.1	0.1	0.3	0.9	5.0	2.5	0.4	0.4	0.3	0.1
2002-04-04	0.1	0.1	0.1	0.3	0.9	5.0	2.5	0.4	0.4	0.3	0.1
2002-04-05	0.1	0.1	0.1	0.3	0.9	5.0	2.5	0.4	0.4	0.3	0.1
2002-04-06	0.1	0.1	0.1	0.3	0.9	5.0	2.5	0.4	0.4	0.3	0.1
2002-04-07	0.1	0.1	0.1	0.3	0.9	5.0	2.5	0.4	0.4	0.3	0.1
2002-04-08	0.1	0.1	0.1	0.3	0.9	5.0	2.5	0.4	0.4	0.3	0.1
2002-04-09	0.1	0.1	0.1	0.3	0.9	5.0	2.5	0.4	0.4	0.3	0.1
2002-04-10	0.1	0.1	0.1	0.3	0.9	5.0	2.5	0.4	0.4	0.3	0.1
2002-04-11	0.1	0.1	0.1	0.3	0.9	5.0	2.5	0.4	0.4	0.3	0.1
2002-04-12	0.1	0.1	0.1	0.3	0.9	5.0	2.5	0.4	0.4	0.3	0.1
2002-04-13	0.1	0.1	0.1	0.3	0.9	5.0	2.5	0.4	0.4	0.3	0.1
2002-04-14	0.1	0.1	0.1	0.3	0.9	5.0	2.5	0.4	0.4	0.3	0.1
2002-04-15	0.1	0.1	0.1	0.3	0.9	5.0	2.5	0.4	0.4	0.3	0.1
2002-04-16	0.1	0.1	0.1	0.3	0.9	5.0	2.5	0.4	0.4	0.3	0.1
2002-04-17	0.1	0.1	0.1	0.3	0.9	5.0	2.5	0.4	0.4	0.3	0.1
2002-04-18	0.1	0.1	0.1	0.3	0.9	5.0	2.5	0.4	0.4	0.3	0.1
2002-04-19	0.1	0.1	0.1	0.3	0.9	5.0	2.5	0.4	0.4	0.3	0.1
2002-04-20	0.1	0.1	0.1	0.3	0.9	5.0	2.5	0.4	0.4	0.3	0.1
2002-04-21	0.1	0.1	0.1	0.3	0.9	5.0	2.5	0.4	0.4	0.3	0.1
2002-04-22	0.1	0.1	0.1	0.3	0.9	5.0	2.5	0.4	0.4	0.3	0.1
2002-04-23	0.1	0.1	0.1	0.3	0.9	5.0	2.5	0.4	0.4	0.3	0.1
2002-04-24	0.1	0.1	0.1	0.3	0.9	5.0	2.5	0.4	0.4	0.3	0.1
2002-04-25	0.1	0.1	0.1	0.3	0.9	5.0	2.5	0.4	0.4	0.3	0.1
2002-04-26	0.1	0.1	0.1	0.3	0.9	5.0	2.5	0.4	0.4	0.3	0.1
2002-04-27	0.1	0.1	0.1	0.3	0.9	5.0	2.5	0.4	0.4	0.3	0.1
2002-04-28	0.1	0.1	0.1	0.3	0.9	5.0	2.5	0.4	0.4	0.3	0.1
2002-04-29	0.1	0.1	0.1	0.3	0.9	5.0	2.5	0.4	0.4	0.3	0.1
2002-04-30	0.1	0.1	0.1	0.3	0.9	5.0	2.5	0.4	0.4	0.3	0.1

2005-07-13 16:52:08 RealTime : Off DB Testing Complete...



Observation dam data

Date	YD	DC
2002-04-01	20.6	23.5
2002-04-02	20.6	23.4
2002-04-03	20.6	23.5
2002-04-04	20.6	31.5
2002-04-05	20.6	31.5
2002-04-06	20.6	31.2
2002-04-07	20.6	31.5
2002-04-08	20.6	31.5
2002-04-09	20.6	31.5
2002-04-10	20.6	31.4
2002-04-11	20.7	31.4
2002-04-12	20.7	31.4
2002-04-13	20.7	24.5
2002-04-14	20.7	24.5
2002-04-15	20.7	24.5
2002-04-16	21.5	31.5
2002-04-17	21.6	31.5
2002-04-18	21.6	31.5
2002-04-19	21.6	24.5
2002-04-20	21.7	24.5
2002-04-21	21.7	31.5
2002-04-22	21.7	31.5
2002-04-23	21.7	31.5
2002-04-24	21.7	31.5
2002-04-25	21.7	31.5
2002-04-26	21.7	31.5
2002-04-27	21.7	31.5
2002-04-28	21.7	31.5
2002-04-29	21.7	31.5
2002-04-30	21.7	31.5





Thank you