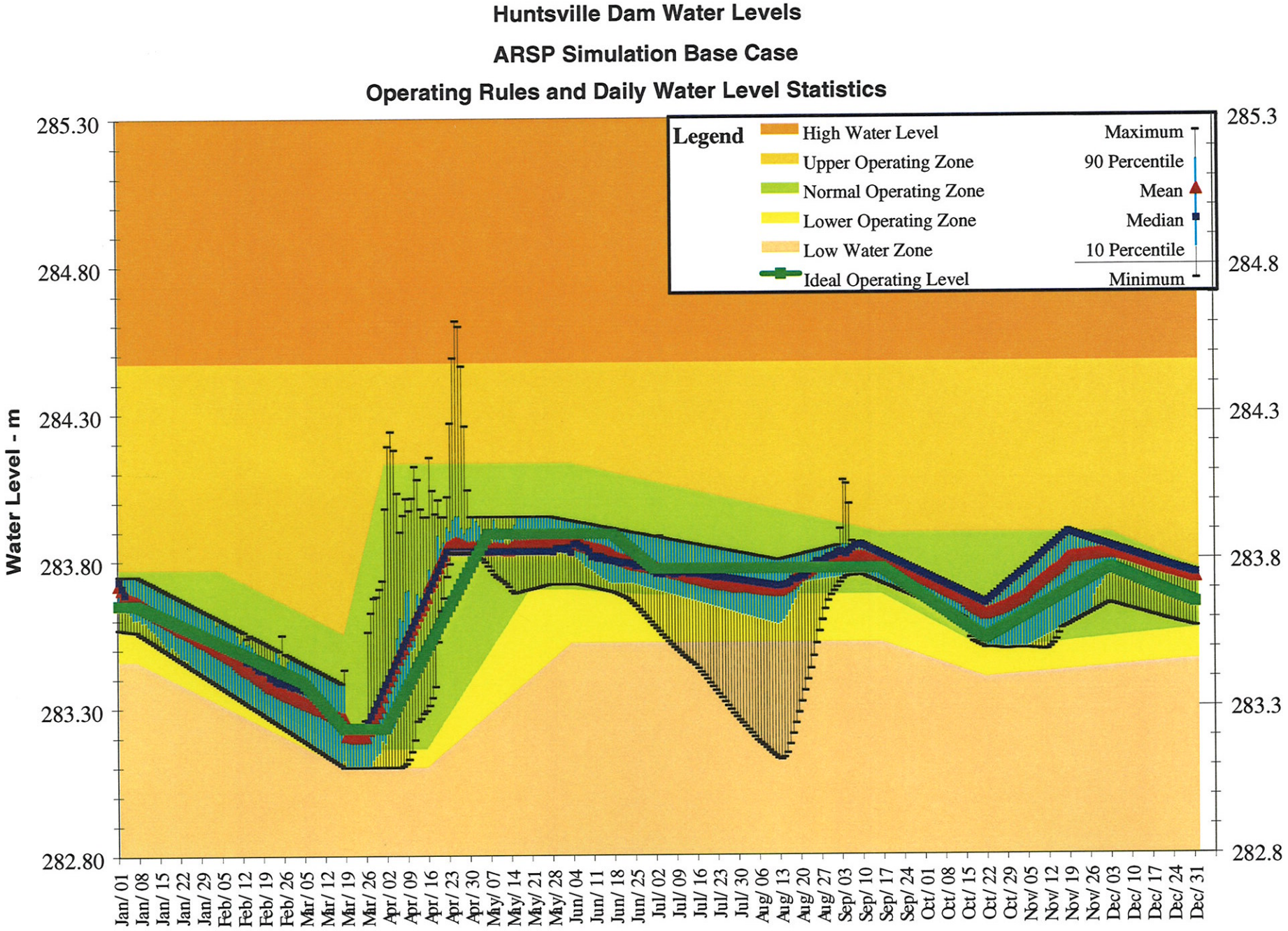
Appendix F

Option Development Process
ARSP Modeling and Analysis
of Lake Levels and River Flows

- **ARSP Base Case**
- **ARSP Case One**
- **ARSP Case Two**

Huntsville Lake


Huntsville Dam Water Levels
ARSP Simulation Base Case
Operating Rules and Daily Water Level Statistics
Legend
High Water Level
Upper Operating Zone
Normal Operating Zone
Lower Operating Zone
Low Water Zone
Ideal Operating Level
Maximum
90 Percentile
Mean
Median
10 Percentile
Minimum
Water Level - m
285.30
284.80
284.30
283.80
283.30
282.80
285.3
284.8
284.3
283.8
283.3
282.8
Jan/ 01
Jan/ 08
Jan/ 15
Jan/ 22
Jan/ 29
Feb/ 05
Feb/ 12
Feb/ 19
Feb/ 26
Mar/ 05
Mar/ 12
Mar/ 19
Mar/ 26
Apr/ 02
Apr/ 09
Apr/ 16
Apr/ 23
Apr/ 30
May/ 07
May/ 14
May/ 21
May/ 28
Jun/ 04
Jun/ 11
Jun/ 18
Jun/ 25
Jul/ 02
Jul/ 09
Jul/ 16
Jul/ 23
Jul/ 30
Aug/ 06
Aug/ 13
Aug/ 20
Aug/ 27
Sep/ 03
Sep/ 10
Sep/ 17
Sep/ 24
Oct/ 01
Oct/ 08
Oct/ 15
Oct/ 22
Oct/ 29
Nov/ 05
Nov/ 12
Nov/ 19
Nov/ 26
Dec/ 03
Dec/ 10
Dec/ 17
Dec/ 24
Dec/ 31

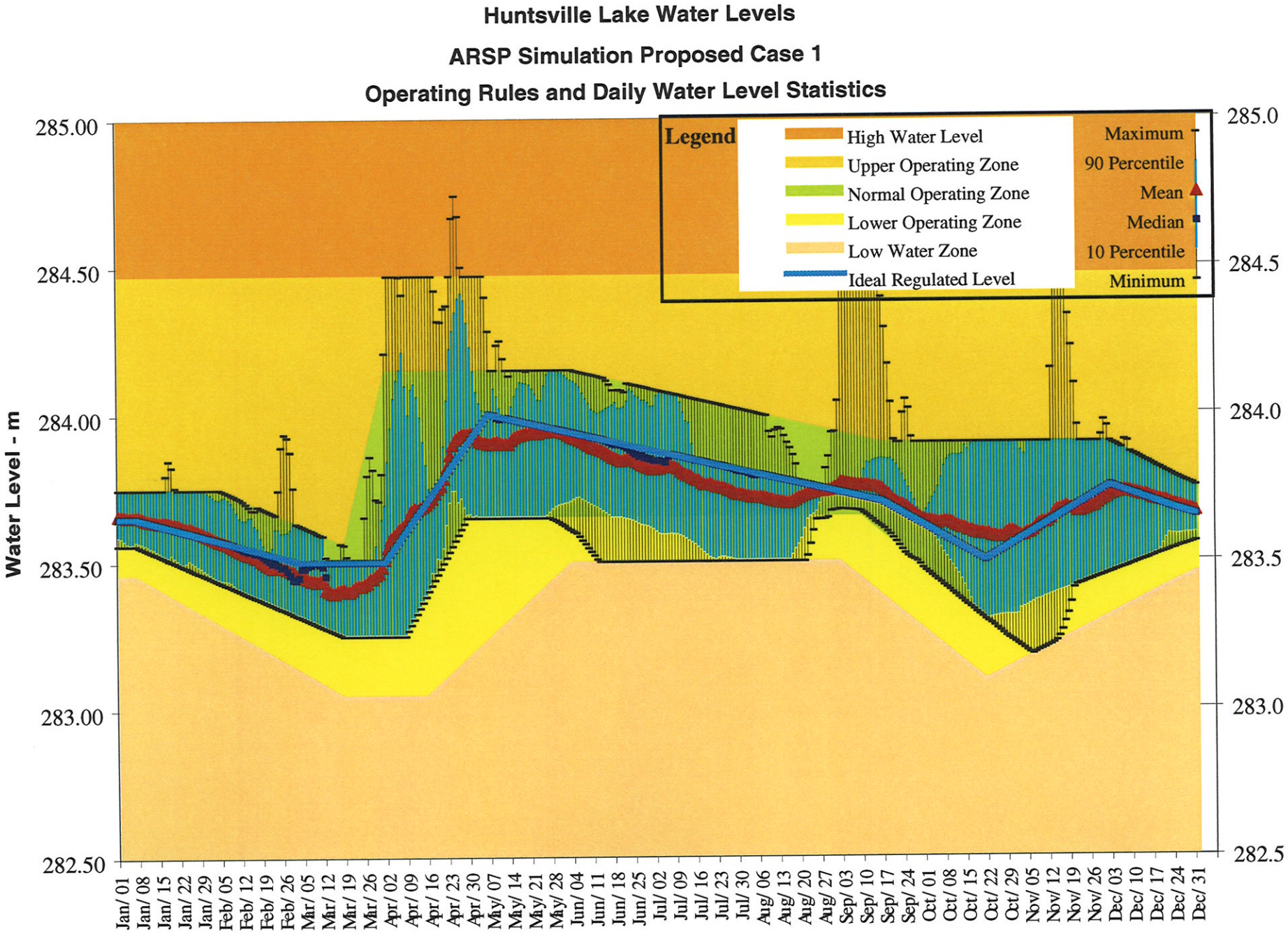
Huntsville Dam Water Levels
ARSP Simulation Base Case

Peak Water Levels	
HWZ	284.47
No of Days in Exceedance	3
No of Years Exceeded	1
Maximum WL	284.61

Time of spring peak levels before April 30	
Percentile	0.90
Peak percentile WL	283.95
Date of peak	25-Apr
Tolerance	0
Tolerated WL	283.95
Date tolerated exceeded	25-Apr

Summer recreation levels Jun-15 to Sep-30	
90 and 10 percentile range	
Max 90%	283.91
Min 10%	283.58
Range	0.33

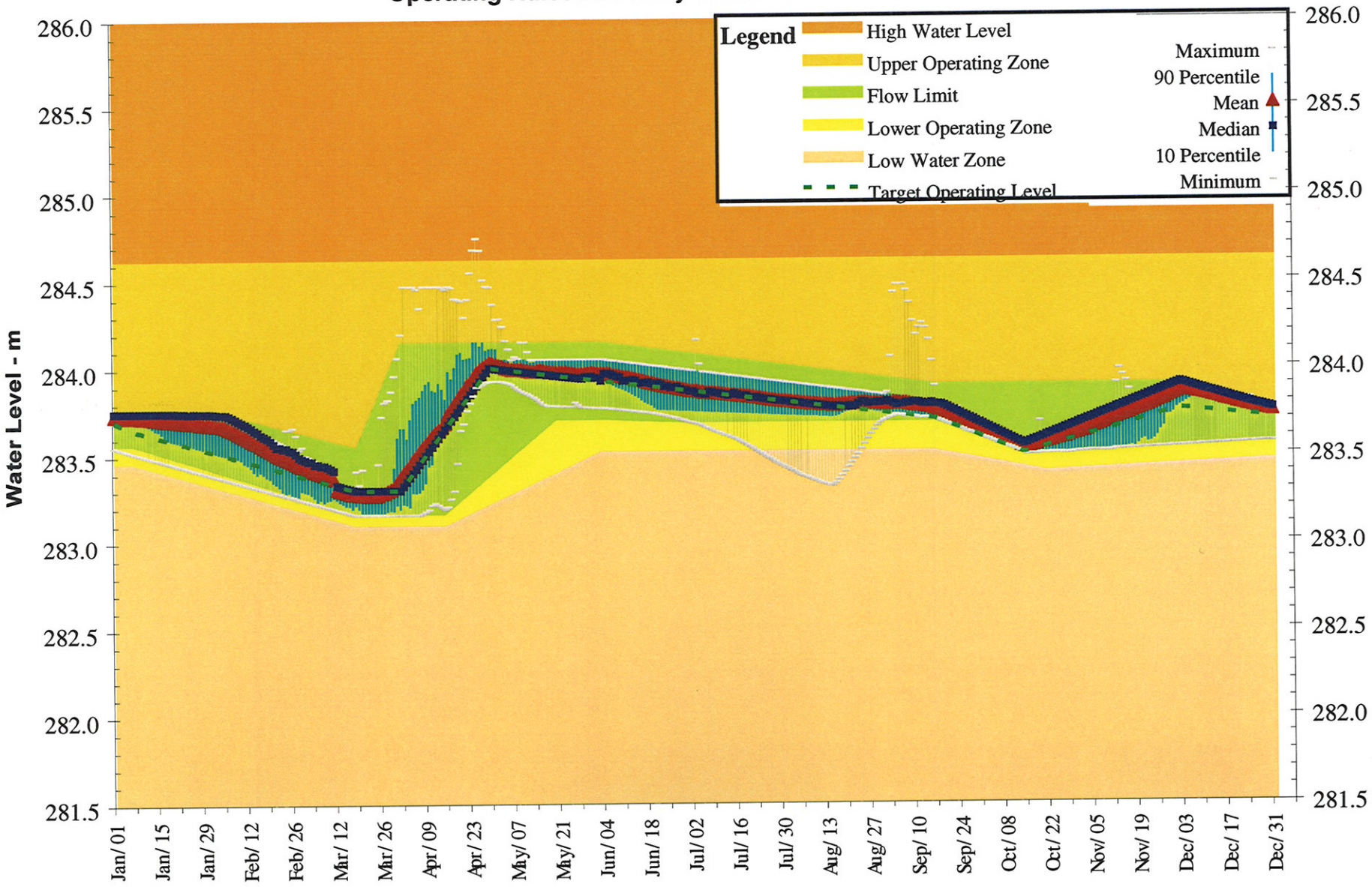
Median range	
Max Median	283.85
Min Median	283.71
Range	0.14


Huntsville Lake Water Levels
ARSP Simulation Proposed Case 1
Operating Rules and Daily Water Level Statistics
Legend
High Water Level
Upper Operating Zone
Normal Operating Zone
Lower Operating Zone
Low Water Zone
Ideal Regulated Level
Maximum
90 Percentile
Mean
Median
10 Percentile
Minimum
Water Level - m
285.00
284.50
284.00
283.50
283.00
282.50
285.0
284.5
284.0
283.5
283.0
282.5
Jan/ 01
Jan/ 08
Jan/ 15
Jan/ 22
Jan/ 29
Feb/ 05
Feb/ 12
Feb/ 19
Feb/ 26
Mar/ 05
Mar/ 12
Mar/ 19
Mar/ 26
Apr/ 02
Apr/ 09
Apr/ 16
Apr/ 23
Apr/ 30
May/ 07
May/ 14
May/ 21
May/ 28
Jun/ 04
Jun/ 11
Jun/ 18
Jun/ 25
Jul/ 02
Jul/ 09
Jul/ 16
Jul/ 23
Jul/ 30
Aug/ 06
Aug/ 13
Aug/ 20
Aug/ 27
Sep/ 03
Sep/ 10
Sep/ 17
Sep/ 24
Oct/ 01
Oct/ 08
Oct/ 15
Oct/ 22
Oct/ 29
Nov/ 05
Nov/ 12
Nov/ 19
Nov/ 26
Dec/ 03
Dec/ 10
Dec/ 17
Dec/ 24
Dec/ 31

Huntsville Dam Water Levels

ARSP Simulation Case 2

Operating Rules and Daily Water Level Statistics



Huntsville Dam Water Levels
ARSP Simulation Case 2

Peak Water Levels	
HWZ	284.62
No of Days in Exceedance	3
No of Years Exceeded	1
Maximum WL	284.75

Time of spring peak levels before April 30	
Percentile	0.90
Peak percentile WL	284.15
Date of peak	24-Apr
Tolerance	0
Tolerated WL	284.15
Date tolerated exceeded	24-Apr

Summer recreation levels Jun-15 to Sep-30

90 and 10 percentile range

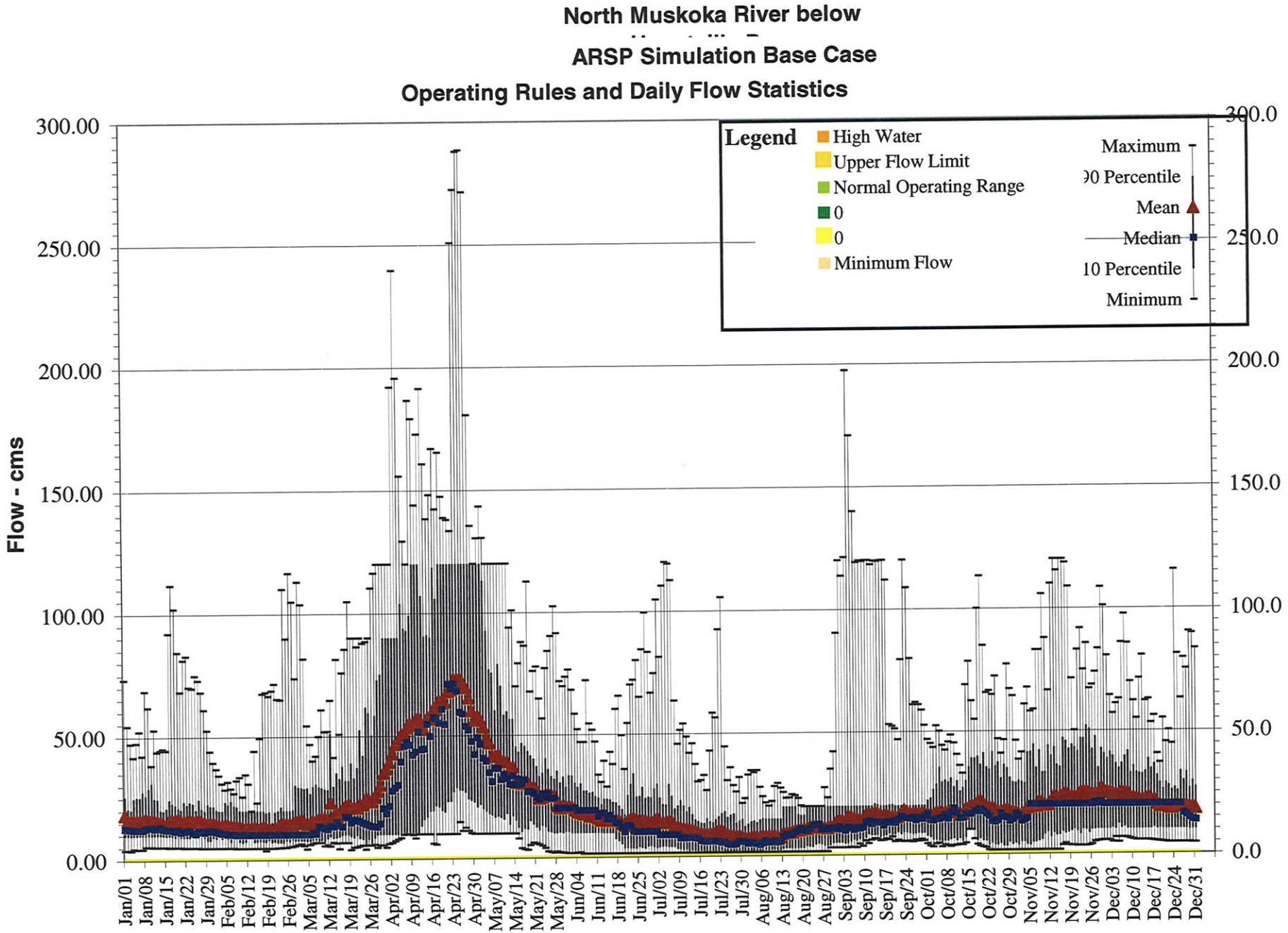
Max 90%	284.02
Min 10%	283.60
Range	0.42

Median range

Max Median	283.91
Min Median	283.68
Range	0.24

Spring Peak Water Level

Maximum - 50 yr Average	284.14
Date - 50 yr Average	29/Apr
Summer Average Level	283.82


North Muskoka River below
ARSP Simulation Base Case
Operating Rules and Daily Flow Statistics
Legend
High Water
Upper Flow Limit
Normal Operating Range
0
0
Minimum Flow
Maximum
90 Percentile
Mean
Median
10 Percentile
Minimum
Flow - cms
300.00
250.00
200.00
150.00
100.00
50.00
0.00
300.0
250.0
200.0
150.0
100.0
50.0
0.0
Jan/01
Jan/08
Jan/15
Jan/22
Jan/29
Feb/05
Feb/12
Feb/19
Feb/26
Mar/05
Mar/12
Mar/19
Mar/26
Apr/02
Apr/09
Apr/16
Apr/23
Apr/30
May/07
May/14
May/21
May/28
Jun/04
Jun/11
Jun/18
Jun/25
Jul/02
Jul/09
Jul/16
Jul/23
Jul/30
Aug/06
Aug/13
Aug/20
Aug/27
Sep/03
Sep/10
Sep/17
Sep/24
Oct/01
Oct/08
Oct/15
Oct/22
Oct/29
Nov/05
Nov/12
Nov/19
Nov/26
Dec/03
Dec/10
Dec/17
Dec/24
Dec/31

Flow Evaluation

Yellow cells indicate values that can be changed for analysis

North Muskoka River below Hunstville Dam
ARSP Simulation Base Case
Daily Flows Model Results 1951 to 2000

Walleye Spawning

Min Flow 0 m^3/s Achieved #N/A of time

No of days above minumum flow

First half of season

Min	25 days
Avg	25 days
Years Provided	100%

Last half of season

Min	24 days
Avg	24 days
Years Provided	100%

For whole season

Min	49 days
Avg	49 days
Years Provided	100%

From flow duration curve

%	Flow
99%	5.81 m^3/s
95%	10.00 m^3/s

No of days min flow is achievd
49 days

90% *percentile peak flow*
90 m3/s

Summer Minimum 7-day Flow

Maximum	12.06 m^3/s
Minimum	1.50 m^3/s
90% Percentile	8.10 m^3/s
10% Percentile	1.52 m^3/s
Median	4.26 m^3/s
Mean	4.63 m^3/s

Maximum Flows

Regulatory Flood Outflow — No of years exceeded — Maximum Daily Flow

234 m³/s		2	288.56 m³/s

Minumum Flows

Min Daily flow	*7-day minimums*		
1.50 m³/s	2	10	20 return period
	-yr 7Q2	-yr 7Q10	-yr 7Q20
	4.20	1.52	1.50 m³/s

Summer Fluctuations

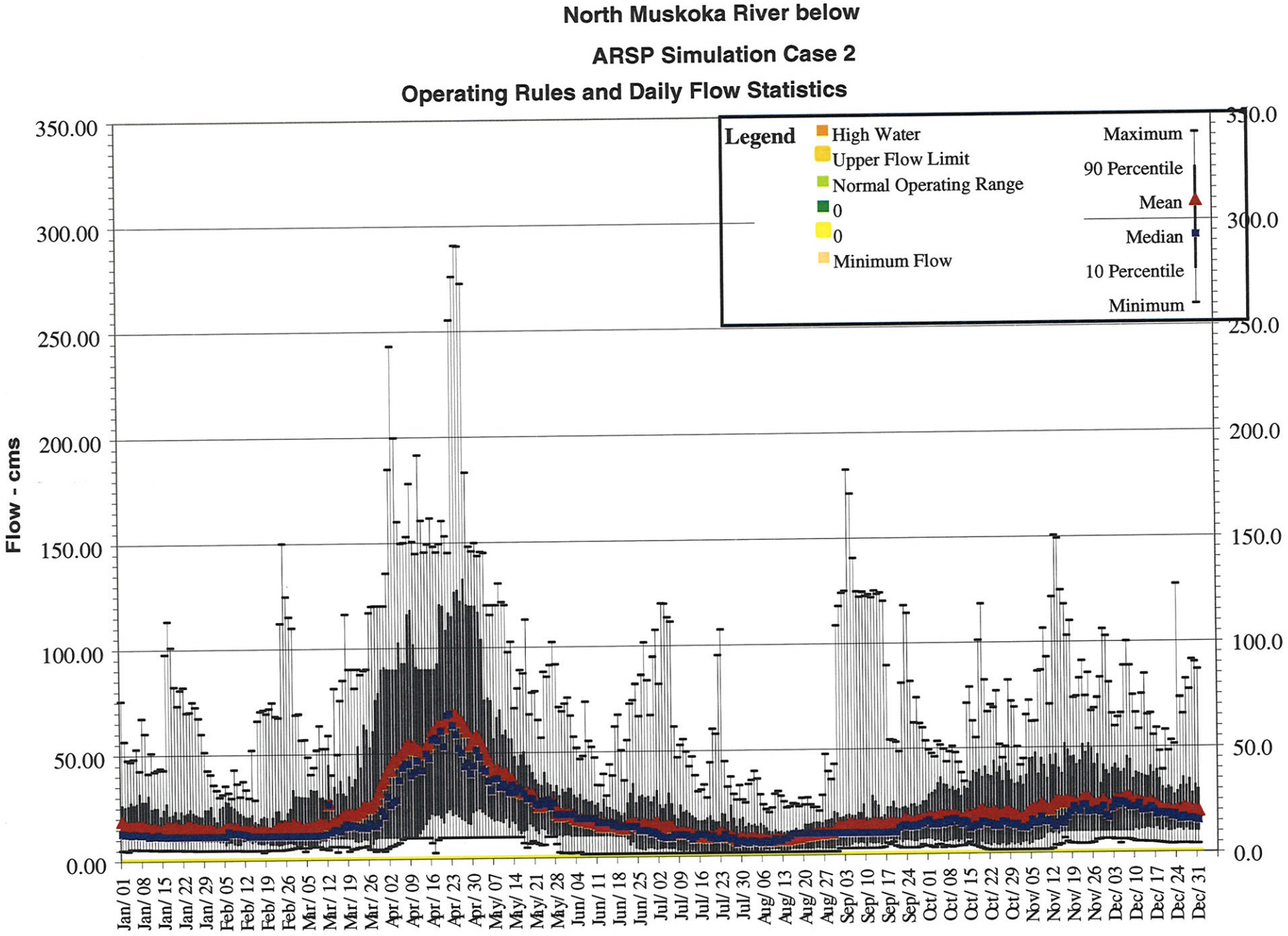
Delta Flow	Average number of daily flow fluctuations per year		
1	40.40		
3	17.22		
5	8.58		
>5.0115	8.54	0.5	ratio of summer median

Water Usage

Median Flow		*10% Percentile*	
summer	winter	summer	winter
m³/s	m³/s	m³/s	m³/s
12.94	17.50	3.96	1.50

Power Generation

	Quarter				
	1	2	3	4	Annual
Flow	16.79	36.07	11.80	20.29	21.22 m³/s


North Muskoka River below
ARSP Simulation Case 2
Operating Rules and Daily Flow Statistics
Legend
High Water
Upper Flow Limit
Normal Operating Range
0
0
Minimum Flow
Maximum
90 Percentile
Mean
Median
10 Percentile
Minimum
Flow - cms
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
Jan/ 01
Jan/ 08
Jan/ 15
Jan/ 22
Jan/ 29
Feb/ 05
Feb/ 12
Feb/ 19
Feb/ 26
Mar/ 05
Mar/ 12
Mar/ 19
Mar/ 26
Apr/ 02
Apr/ 09
Apr/ 16
Apr/ 23
Apr/ 30
May/ 07
May/ 14
May/ 21
May/ 28
Jun/ 04
Jun/ 11
Jun/ 18
Jun/ 25
Jul/ 02
Jul/ 09
Jul/ 16
Jul/ 23
Jul/ 30
Aug/ 06
Aug/ 13
Aug/ 20
Aug/ 27
Sep/ 03
Sep/ 10
Sep/ 17
Sep/ 24
Oct/ 01
Oct/ 08
Oct/ 15
Oct/ 22
Oct/ 29
Nov/ 05
Nov/ 12
Nov/ 19
Nov/ 26
Dec/ 03
Dec/ 10
Dec/ 17
Dec/ 24
Dec/ 31

Flow Evaluation

Yellow cells indicate values that can be changed for analysis

North Muskoka River below Hunstville Dam
ARSP Simulation Case
2
Daily Flows Model Results 1951 to 2000

Walleye Spawning

Min Flow **0** m³/s Achieved #N/A of time

No of days above minumum flow

First half of season

Min	25	days
Avg	25	days
Years Provided	100%	

Last half of season

Min	24	days
Avg	24	days
Years Provided	100%	

For whole season

Min	49	days
Avg	49	days
Years Provided	100%	

From flow duration curve

%	Flow	
99%	10.00	m³/s
95%	10.00	m³/s

No of days min flow is achievd

49 days

90%	*percentile peak flow*
90	m3/s

Summer Minimum 7-day Flow

	Maximum	10.26	m³/s
	Minimum	1.50	m³/s
90%	Percentile	10.00	m³/s
10%	Percentile	1.62	m³/s
	Median	4.29	m³/s
	Mean	4.82	m³/s

Maximum Flows

Regulatory Flood Outflow		No of years exceeded	Maximum Daily Flow	
234	m³/s	2	290.73	m³/s

Minumum Flows

Min Daily flow		*7-day minimums*			
		2	10	20	return period
		-yr 7Q2	-yr 7Q10	-yr 7Q20	
1.50	m³/s	4.19	1.62	1.50	m³/s

Summer Fluctuations

Delta Flow	Average number of daily flow fluctuations per year		
1	36.98		
3	15.74		
5	8.64		
>5	8.64	0.5	ratio of summer median

Water Usage

Median Flow		*10% Percentile*	
summer	winter	summer	winter
m³/s	m³/s	m³/s	m³/s
11.26	15.56	3.89	1.50

Power Generation

	Quarter					
	1	2	3	4	Annual	
Flow	17.19	35.52	11.33	20.91	21.22	m³/s