Appendix F

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

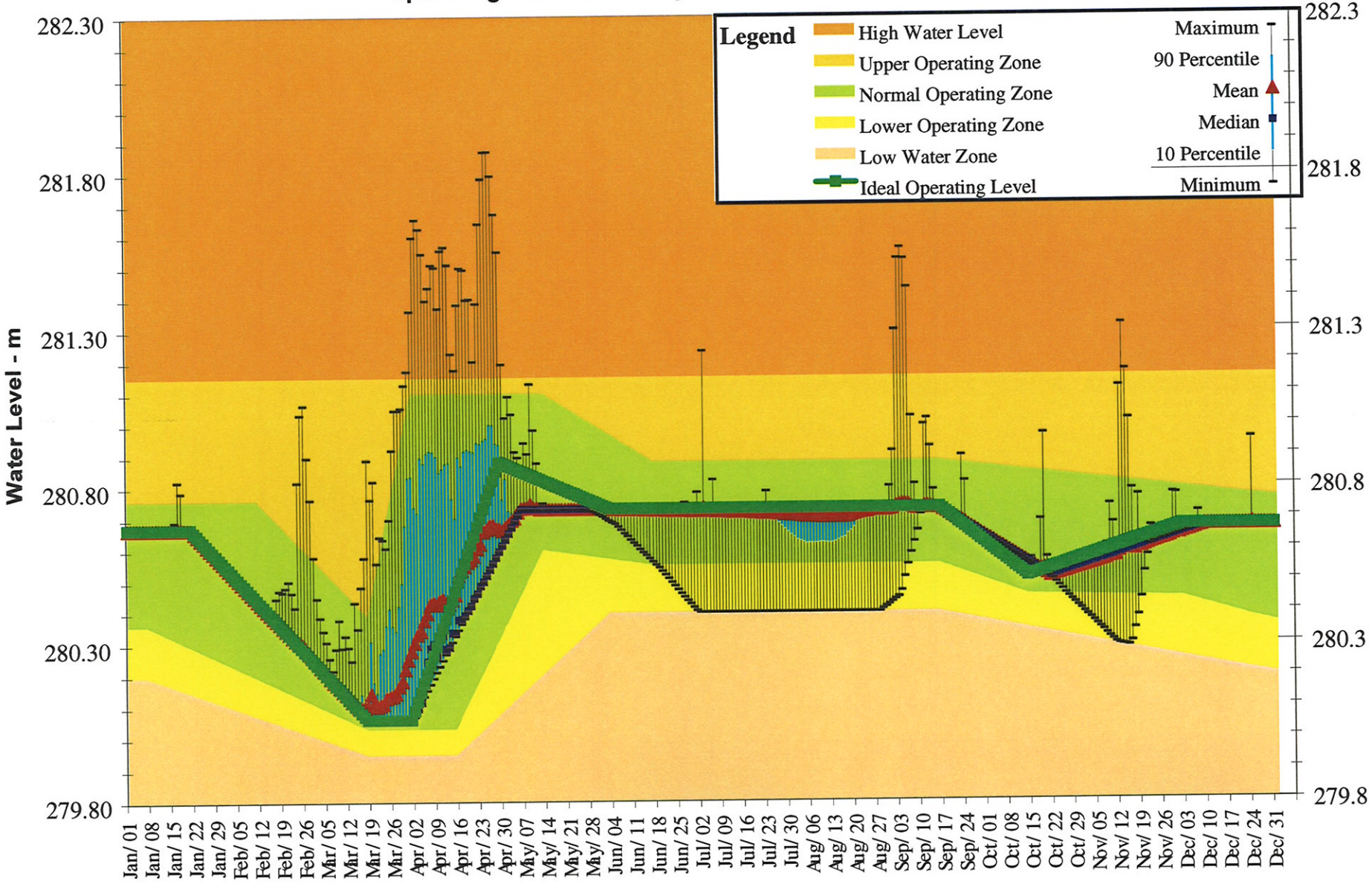
- **ARSP Base Case**
- **ARSP Case One**
- **ARSP Case Two**

Mary Lake

Mary Lake Water Levels

ARSP Simulation Base Case

Operating Rules and Daily Water Level Statistics



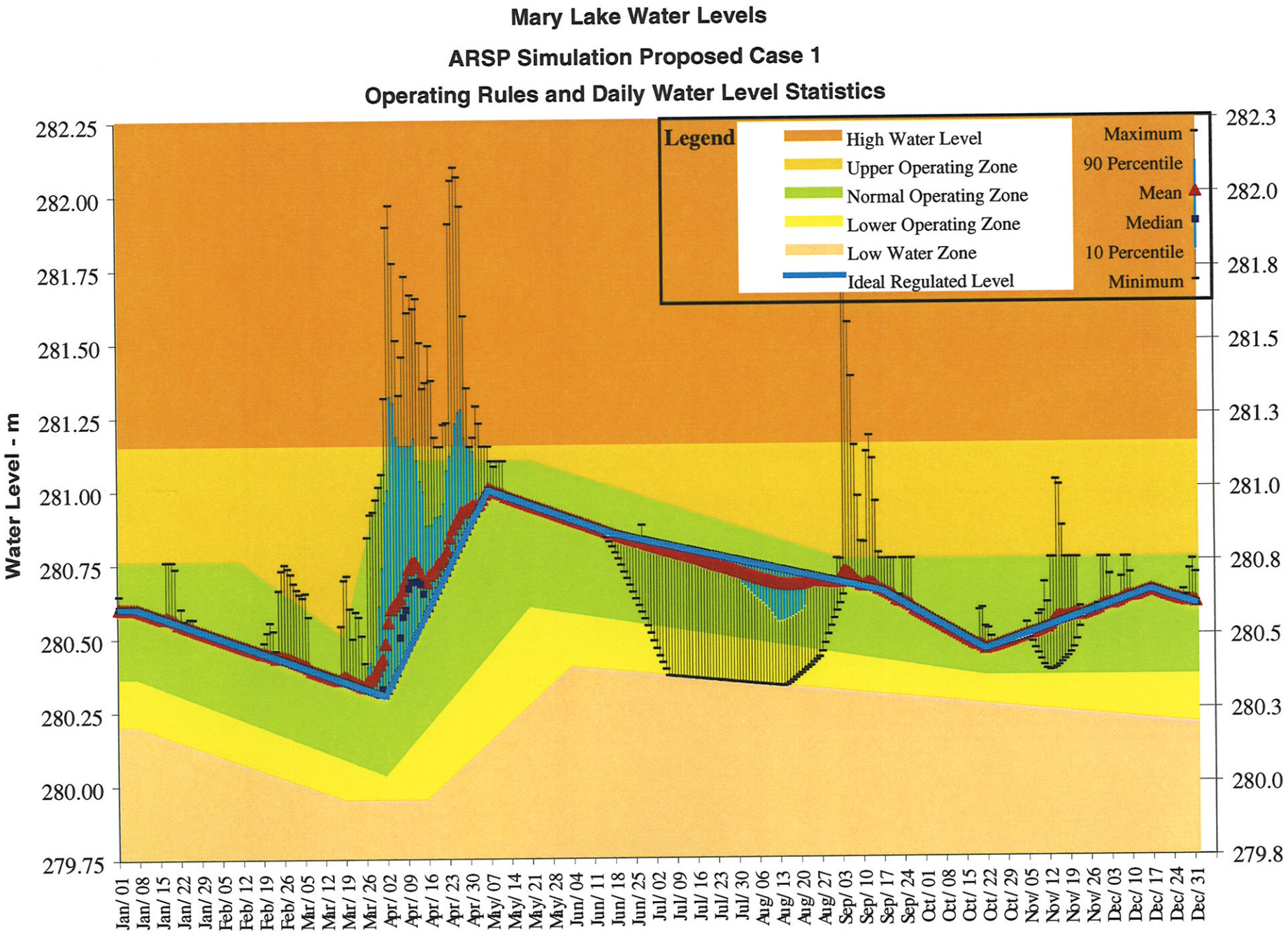
Mary Lake Water
Levels
ARSP Simulation Base Case

Peak Water Levels	
HWZ	281.15
No of Days in Exceedance	65
No of Years Exceeded	16
Maximum WL	281.87

Time of spring peak levels before April 30	
Percentile	0.90
Peak percentile WL	281.00
Date of peak	26-Apr
Tolerance	0
Tolerated WL	281.00
Date tolerated exceeded	26-Apr

Summer recreation levels Jun-15 to Sep-30	
90 and 10 percentile range	
Max 90%	280.73
Min 10%	280.62
Range	0.11

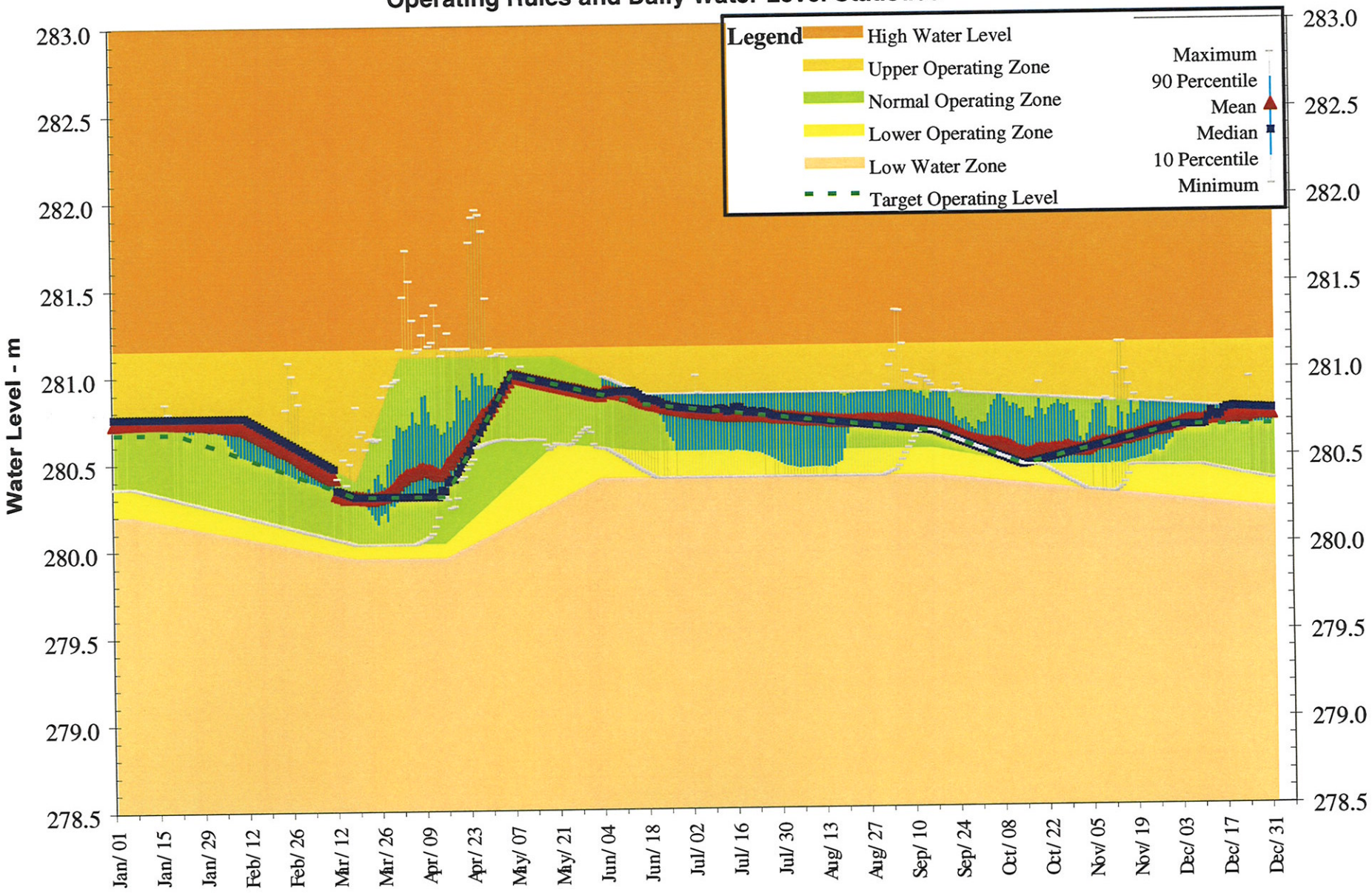
Median range	
Max Median	280.73
Min Median	280.64
Range	0.09


Mary Lake Water Levels
ARSP Simulation Proposed Case 1
Operating Rules and Daily Water Level Statistics
Water Level - m
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
282.25
282.00
281.75
281.50
281.25
281.00
280.75
280.50
280.25
280.00
279.75
282.3
282.0
281.8
281.5
281.3
281.0
280.8
280.5
280.3
280.0
279.8
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

Mary Lake Water Levels

ARSP Simulation Case 2

Operating Rules and Daily Water Level Statistics



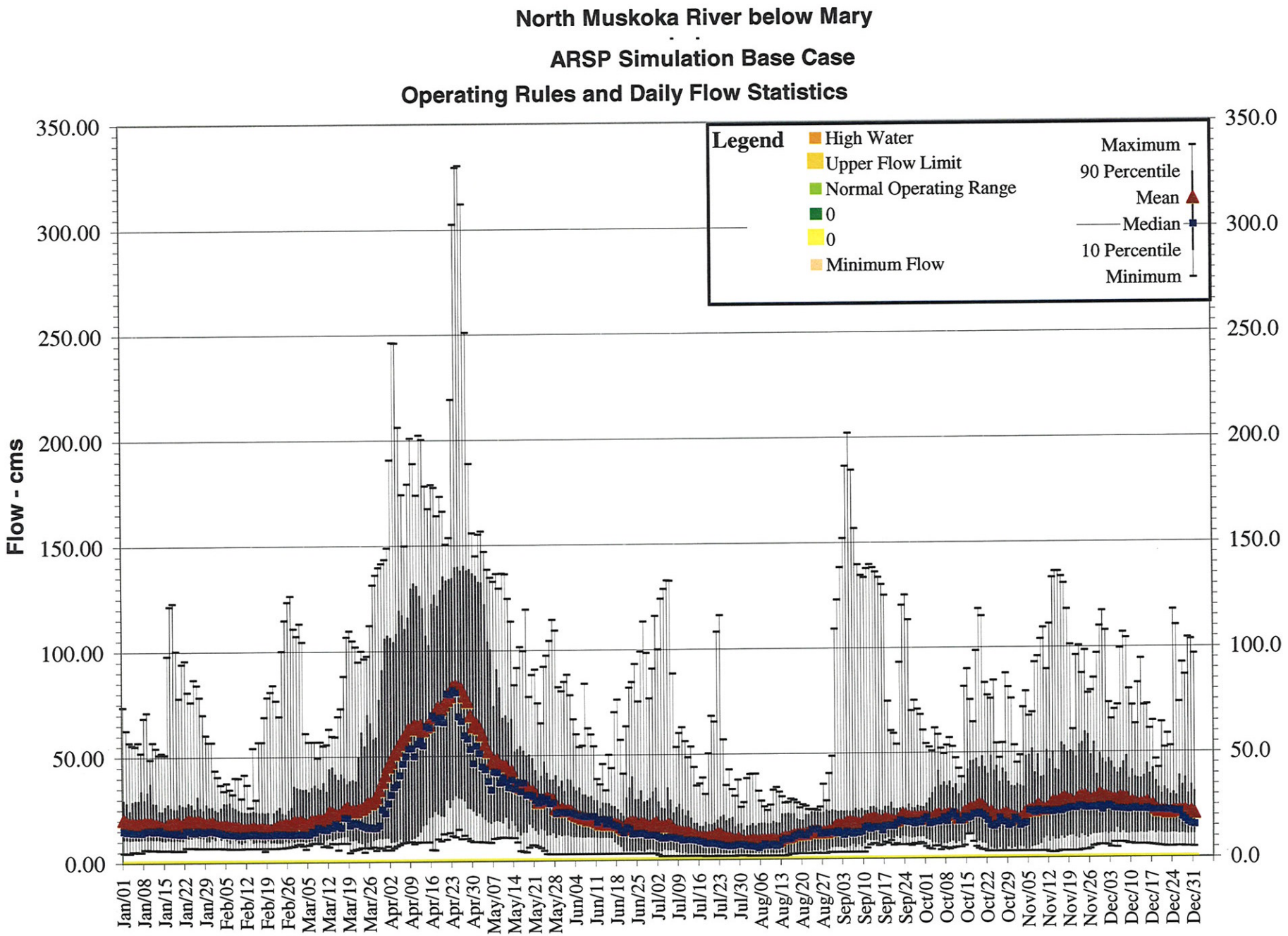
Mary Lake Water Levels
ARSP Simulation Case 2

Peak Water Levels	
HWZ	281.15
No of Days in Exceedance	20
No of Years Exceeded	5
Maximum WL	281.95

Time of spring peak levels before April 30	
Percentile	0.90
Peak percentile WL	281.01
Date of peak	24-Apr
Tolerance	0
Tolerated WL	281.01
Date tolerated exceeded	24-Apr

Summer recreation levels Jun-15 to Sep-30	
90 and 10 percentile range	
Max 90%	280.90
Min 10%	280.44
Range	0.45
Median range	
Max Median	280.88
Min Median	280.55
Range	0.33

Spring Peak Water Level	
Maximum - 50 yr Average	281.07
Date - 50 yr Average	6/May
Summer Average Level	280.75


North Muskoka River below Mary
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
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 Mary Lake
ARSP Simulation Base Case
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	*Last half of season*	*For whole season*
Min	25 days	24 days	49 days
Avg	25 days	24 days	49 days
Years Provided	100%	100%	100%

From flow duration curve

%	Flow	
99%	6.40	m³/s
95%	11.49	m³/s

No of days min flow is achievd
49 days

90% percentile peak flow
105 m3/s

Summer Minimum 7-day Flow

	Maximum	14.74 m³/s
	Minimum	1.67 m³/s
90%	Percentile	9.20 m³/s
10%	Percentile	3.00 m³/s
	Median	5.02 m³/s
	Mean	5.61 m³/s

Maximum Flows

DOM Summer Max Flow No of years exceeded Maximum Daily Flow

125 m³/s		2	330.25 m³/s

Minumum Flows

Min Daily flow	*7-day minimums*		
1.66 m³/s	2	10	20 return period
	-yr 7Q2	-yr 7Q10	-yr 7Q20
	4.91	3.00	3.00 m³/s

Summer Fluctuations

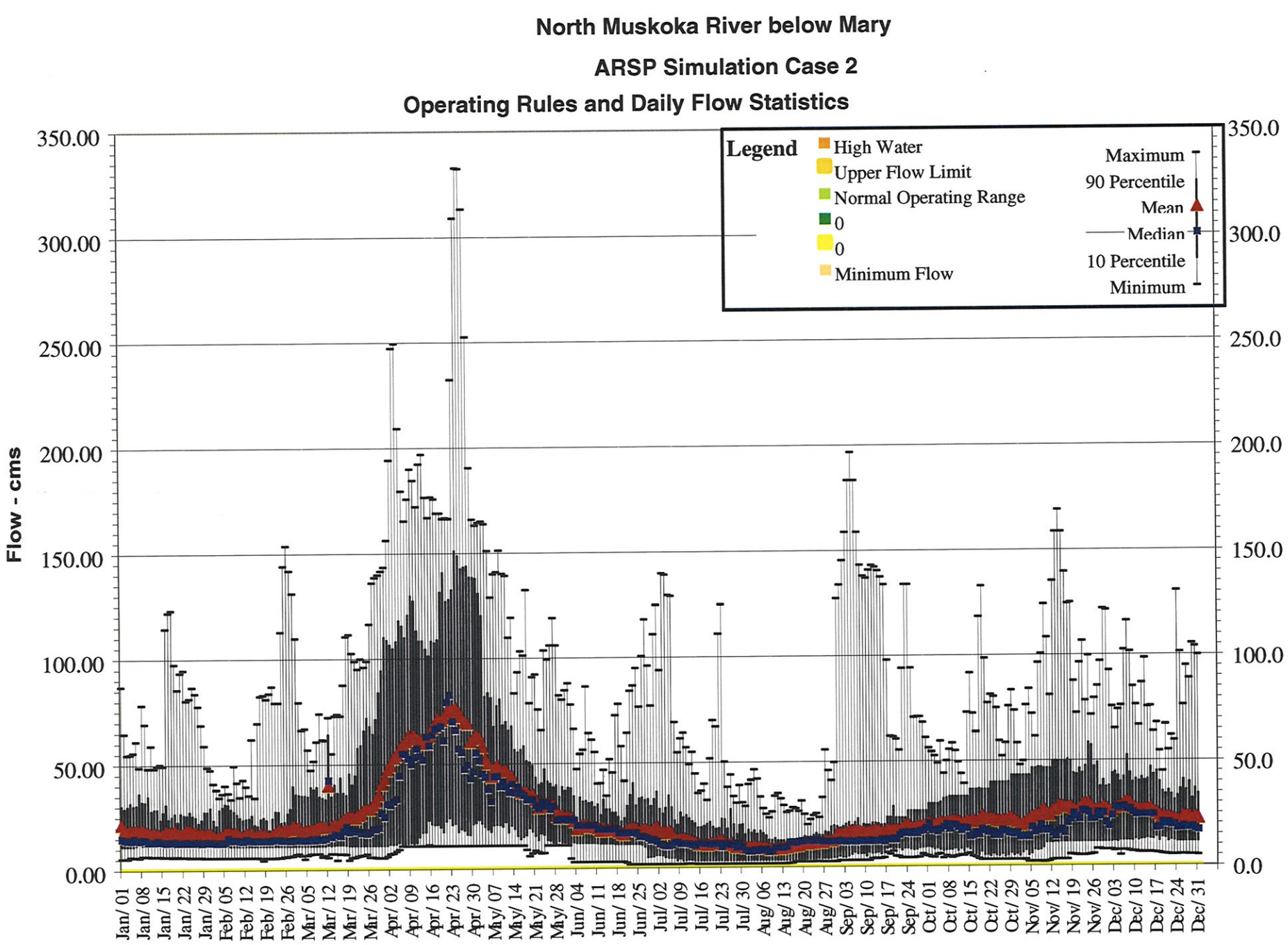
Delta Flow	Average number of daily flow fluctuations per year		
1	45.38		
3	20.82		
5	11.44		
>5.8525	8.80	0.5	ratio of summer median

Water Usage

Median Flow		*10% Percentile*	
summer m³/s	winter m³/s	summer m³/s	winter m³/s
14.92	20.47	4.58	2.42

Power Generation

	Quarter				
	1	2	3	4	Annual
Flow	19.85	41.19	13.63	23.47	24.52 m³/s


North Muskoka River below Mary
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 Mary Lake
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		*No of days*			
99%	11.00	m³/s	*min flow is achievd*		90%	*percentile peak flow*
95%	11.60	m³/s	49	days	103	m3/s

Summer Minimum 7-day Flow

	Maximum	11.97	m³/s
	Minimum	1.67	m³/s
90%	Percentile	11.11	m³/s
10%	Percentile	3.00	m³/s
	Median	5.12	m³/s

Mean 5.89 m³/s

Maximum Flows

DOM Summer Max Flow		No of years exceeded	Maximum Daily Flow	
125	m³/s	3	332.73	m³/s

Minumum Flows

Min Daily flow		*7-day minimums*			
		2	10	20	return period
		-yr 7Q2	-yr 7Q10	-yr 7Q20	
1.66	m³/s	5.09	3.00	1.82	m³/s

Summer Fluctuations

Delta Flow	Average number of daily flow fluctuations per year		
1	38.66		
3	17.20		
5	9.60		
>5.7535	7.70	0.5	ratio of summer median

Water Usage

Median Flow		*10% Percentile*	
summer	winter	summer	winter
m³/s	m³/s	m³/s	m³/s
13.57	17.77	4.65	1.97

Power Generation

	Quarter				Annual	
	1	2	3	4		
Flow	20.15	40.75	13.30	23.94	24.51	m³/s

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ARSP Modeling and Analysis
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