Appendix F

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

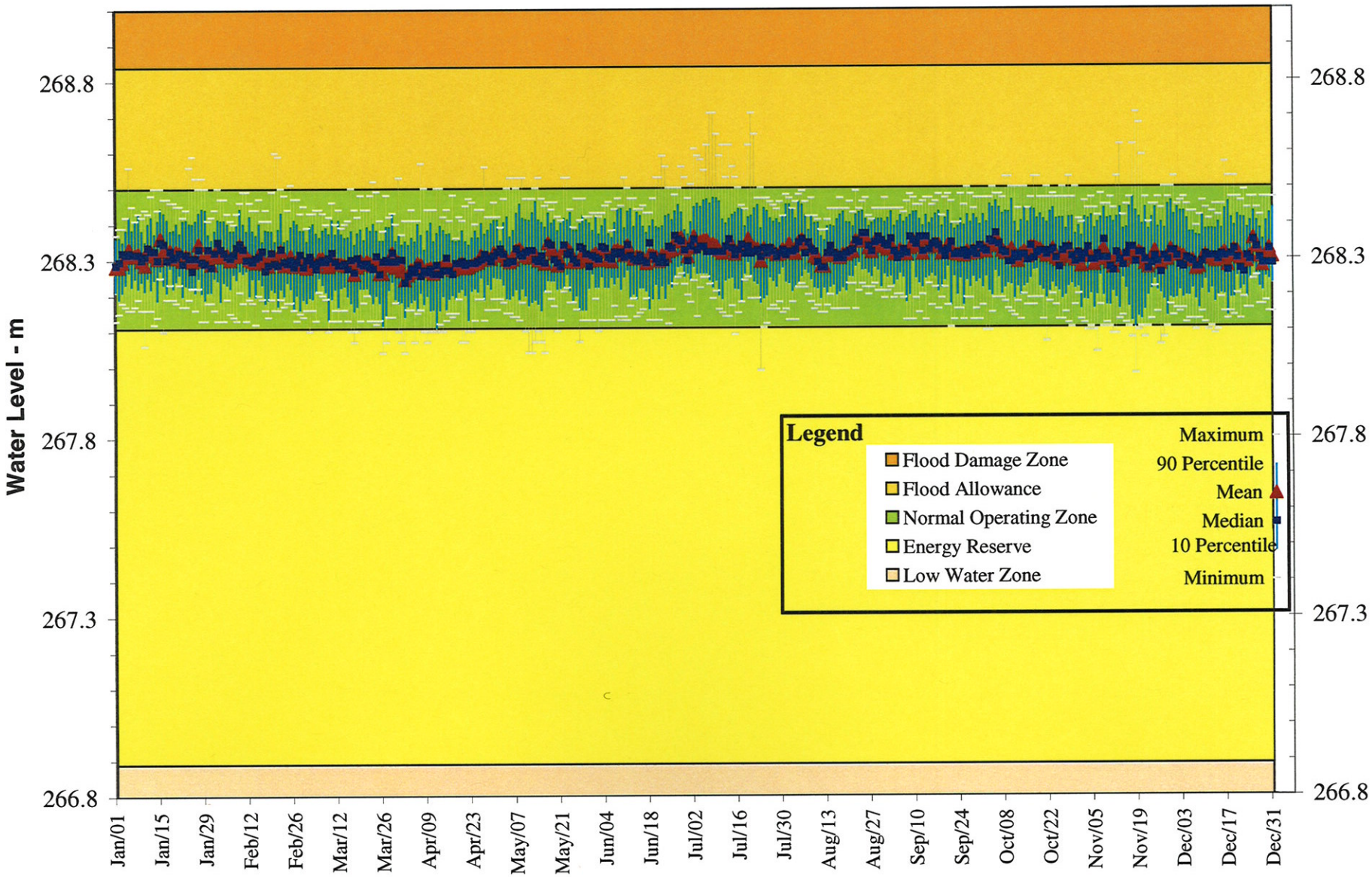
- **ARSP Base Case**
- **ARSP Case One**
- **ARSP Case Two**

Hanna Chute GS

Hanna Chute Reservoir Water Levels

Historical Data 1984 to 2003

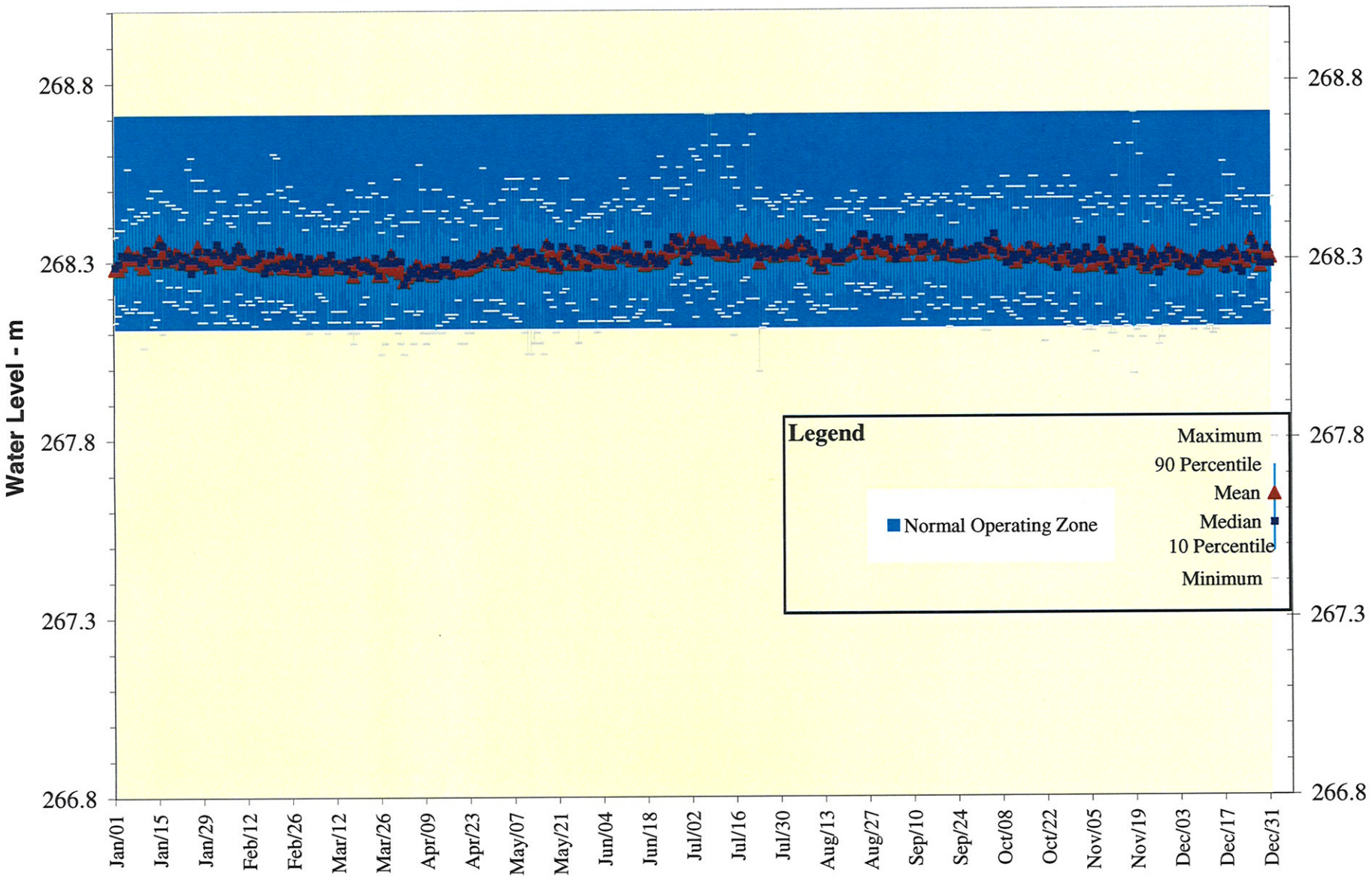
Operating Rules and Daily Water Level Statistics

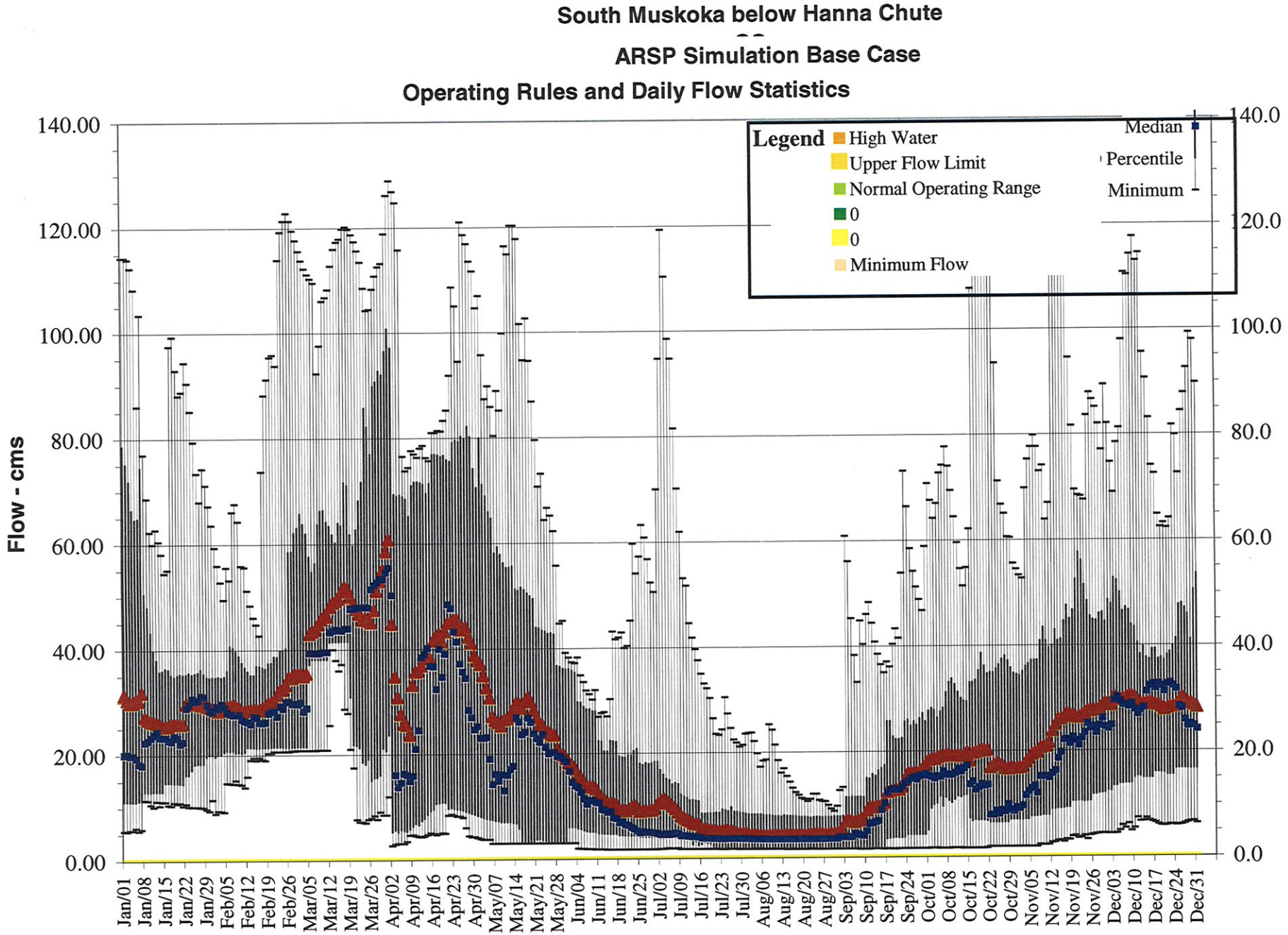


Hanna Chute Reservoir Water Levels

Historical Data 1984 to 2003

Planning Team Option Operating Rules and Daily Water Level Statistics




South Muskoka below Hanna Chute
ARSP Simulation Base Case
Operating Rules and Daily Flow Statistics
Legend
High Water
Upper Flow Limit
Normal Operating Range
0
0
Minimum Flow
Median
Percentile
Minimum
Flow - cms
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
140.0
120.0
100.0
80.0
60.0
40.0
20.0
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

South Muskoka below Hanna Chute GS
ARSP Simulation Base Case
Daily Flows Model Results 1951 to 2000

Walleye Spawning

Min Flow 3 m³/s Achieved 100% of time

No of days above minumum flow

First half of season		*Last half of season*		*For whole season*	
Min	20 days	Min	1 days	Min	21 days
Avg	24.9 days	Avg	21.8 days	Avg	46.7 days
Years Provided	98%	Years Provided	88%	Years Provided	88%

From flow duration curve

%	Flow	
99%	3.00	m³/s
95%	3.15	m³/s

No of days min flow is achievd 21 days

90% *percentile peak flow* 71 m3/s

Summer Minimum 7-day Flow

	Maximum	8.50	m³/s
	Minimum	1.57	m³/s
90%	Percentile	6.02	m³/s
10%	Percentile	1.66	m³/s
	Median	3.26	m³/s
	Mean	3.29	m³/s

Maximum Flows

Regulatory Flood Outflow No of years exceeded Maximum Daily Flow

N/A	m^3/s	0	128.90 m^3/s

Minumum Flows

Min Daily flow	*7-day minimums*			
1.57 m^3/s	2	10	20	return period
	-yr 7Q2	-yr 7Q10	-yr 7Q20	
	3.26	1.66	1.64 m^3/s	

Summer Fluctuations

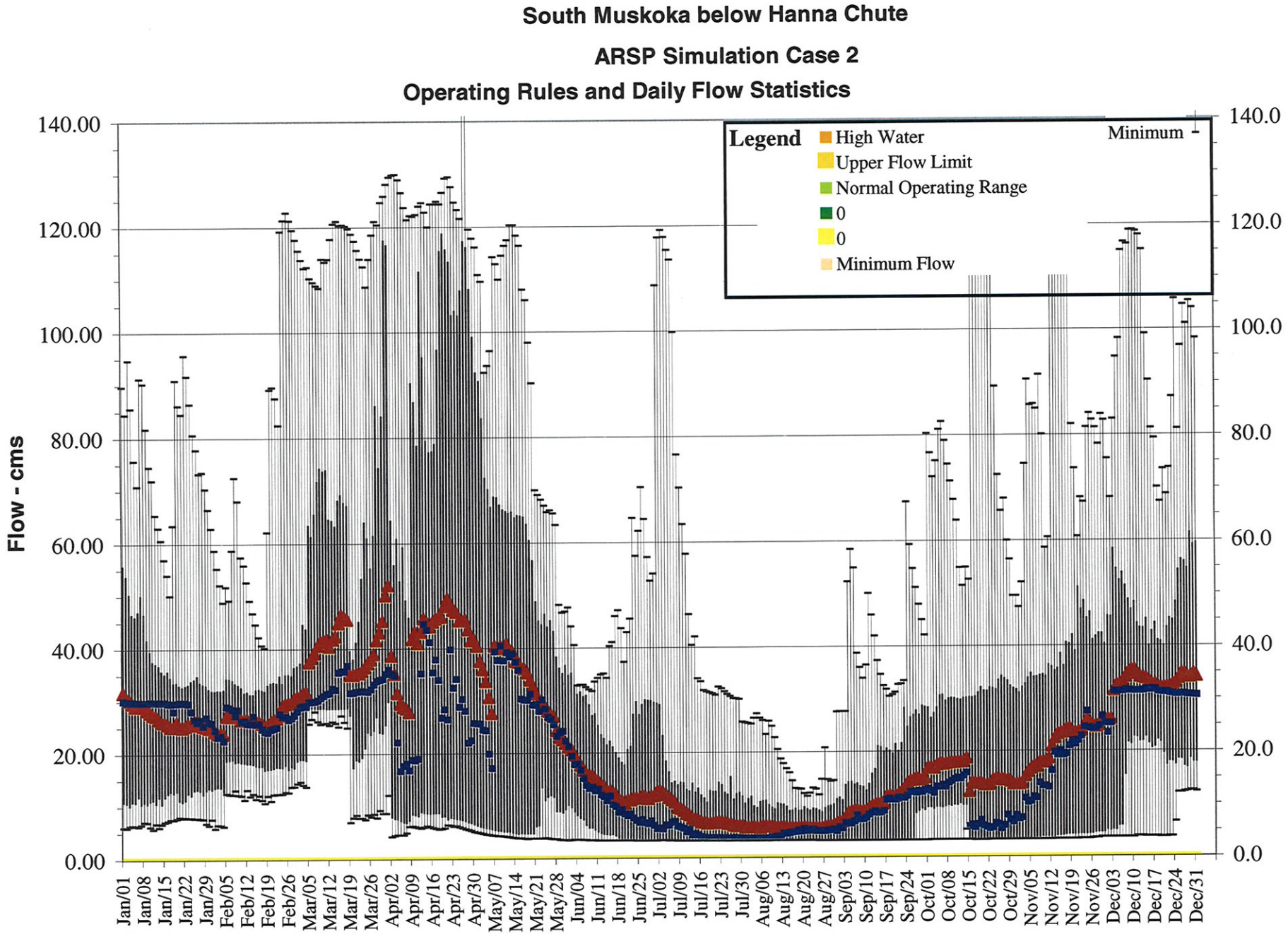
Delta Flow	Average number of daily flow fluctuations per year		
1	16.24		
3	5.66		
5	2.02		
>2.125	8.42	0.5	ratio of summer median

Water Usage

Median Flow		*10% Percentile*	
summer	winter	summer	winter
m^3/s	m^3/s	m^3/s	m^3/s
7.91	29.54	2.10	1.84

Power Generation

	Quarter				
	1	2	3	4	Annual
Flow	35.06	25.98	7.32	23.86	22.98 m^3/s


South Muskoka below Hanna Chute
ARSP Simulation Case 2
Operating Rules and Daily Flow Statistics
Legend
High Water
Upper Flow Limit
Normal Operating Range
0
0
Minimum Flow
Minimum
Flow - cms
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
140.0
120.0
100.0
80.0
60.0
40.0
20.0
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

South Muskoka below Hanna Chute
ARSP Simulation Case 2
Daily Flows Model Results 1951 to 2000

Walleye Spawning

Min Flow 3 m^3/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	Min	24 days	Min	49 days
Avg	25 days	Avg	24 days	Avg	49 days
Years Provided	100%	Years Provided	100%	Years Provided	100%

From flow duration curve

%	Flow	
99%	3.83	m^3/s
95%	4.71	m^3/s

No of days min flow is achievd 49 days

90% *percentile peak flow* 75 m3/s

Summer Minimum 7-day Flow

	Maximum	9.20 m^3/s
	Minimum	3.13 m^3/s
90%	Percentile	5.92 m^3/s
10%	Percentile	3.19 m^3/s
	Median	3.51 m^3/s
	Mean	4.10 m^3/s

Maximum Flows

Regulatory Flood Outflow No of years exceeded Maximum Daily Flow

N/A	m^3/s	0	155.45 m^3/s

Minumum Flows

Min Daily flow	*7-day minimums*			
3.13 m^3/s	2	10	20	return period
	-yr 7Q2	-yr 7Q10	-yr 7Q20	
	3.38	3.19	3.16 m^3/s	

Summer Fluctuations

Delta Flow	Average number of daily flow fluctuations per year		
1	25.84		
3	6.94		
5	3.16		
>2.887	7.42	0.5	ratio of summer median

Water Usage

Median Flow		*10% Percentile*	
summer	winter	summer	winter
m^3/s	m^3/s	m^3/s	m^3/s
8.99	29.78	3.33	3.22

Power Generation

	Quarter				
	1	2	3	4	Annual
Flow	31.09	29.63	8.17	23.29	22.98 m^3/s