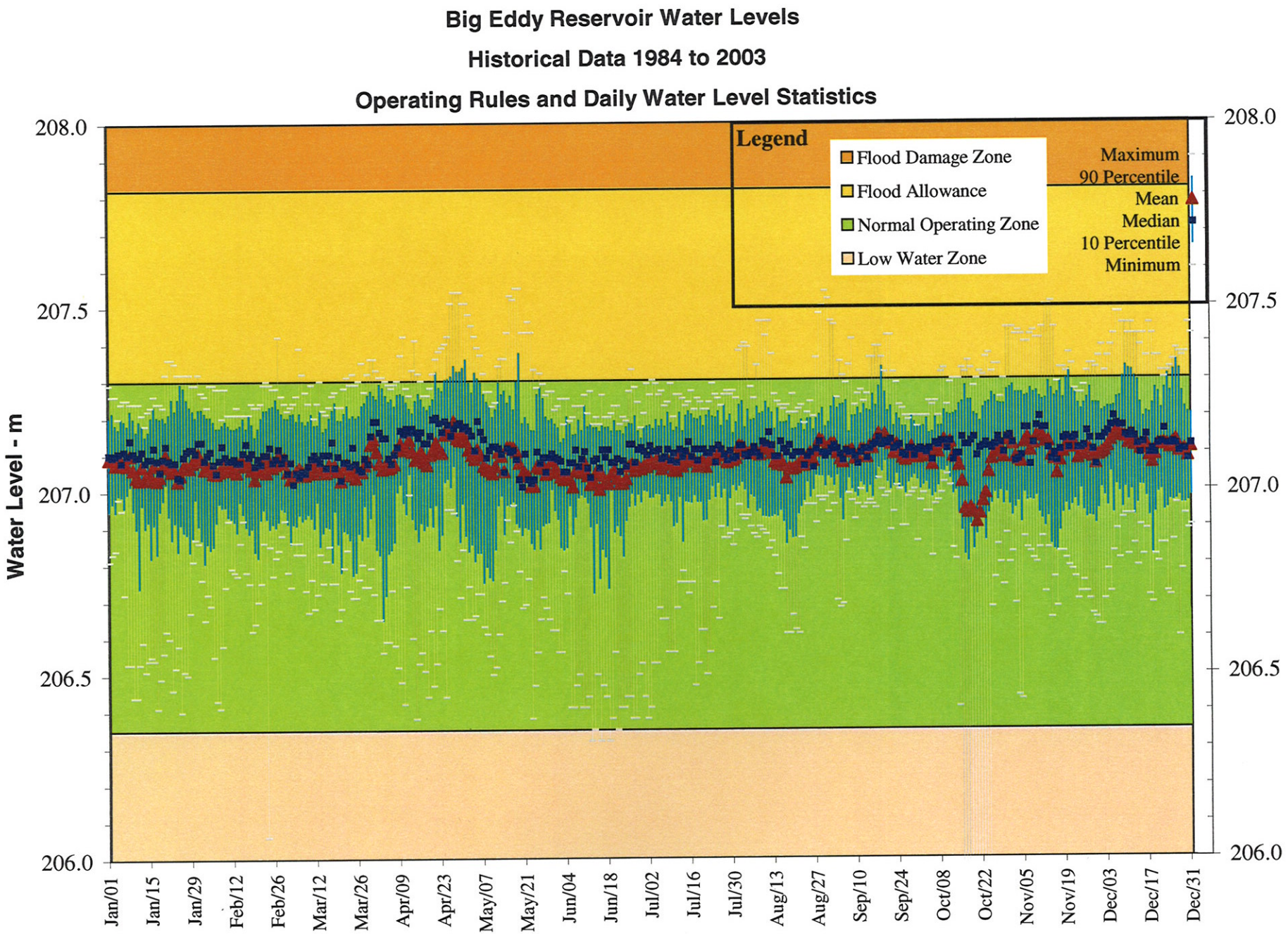
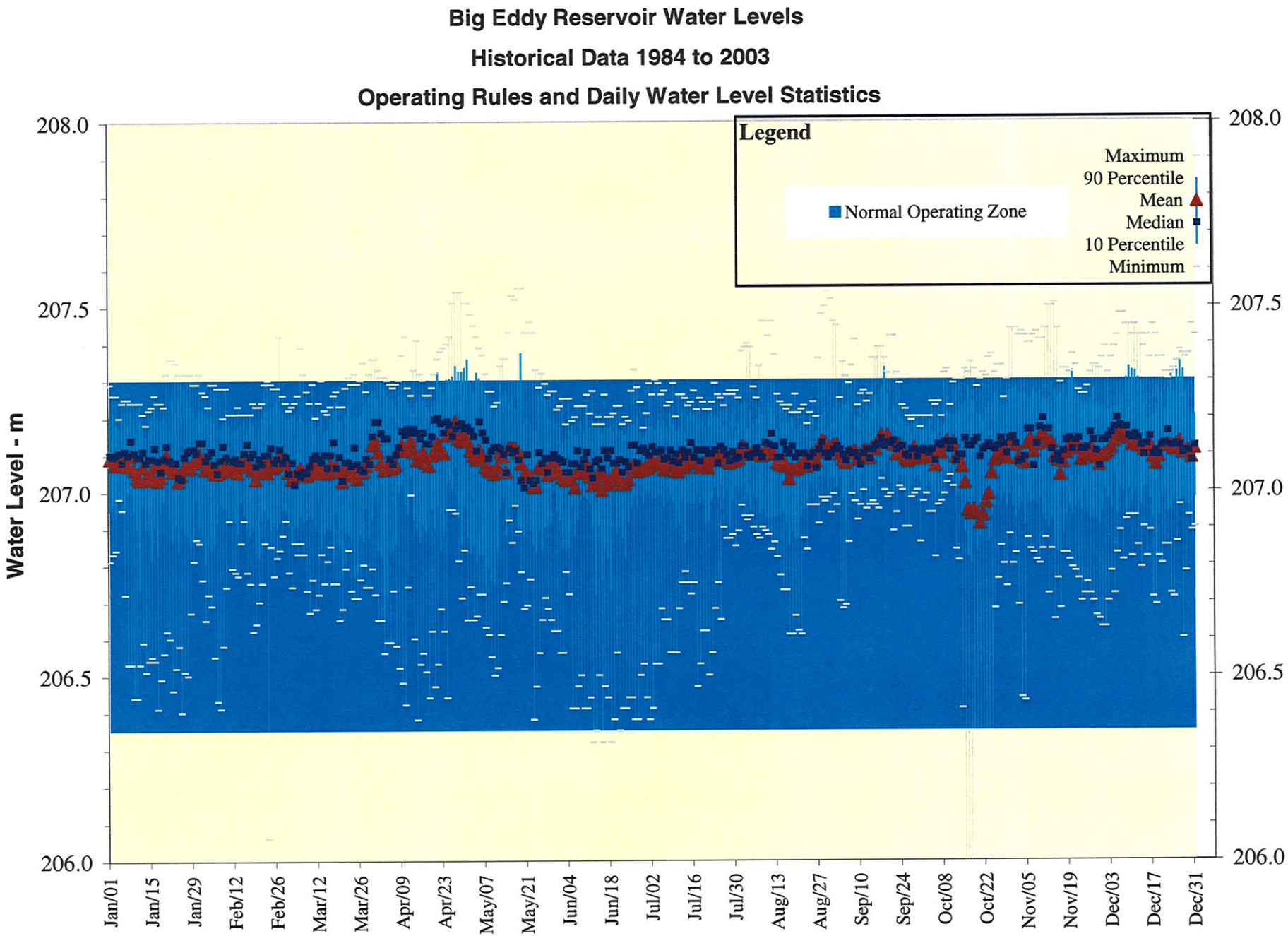
Appendix F

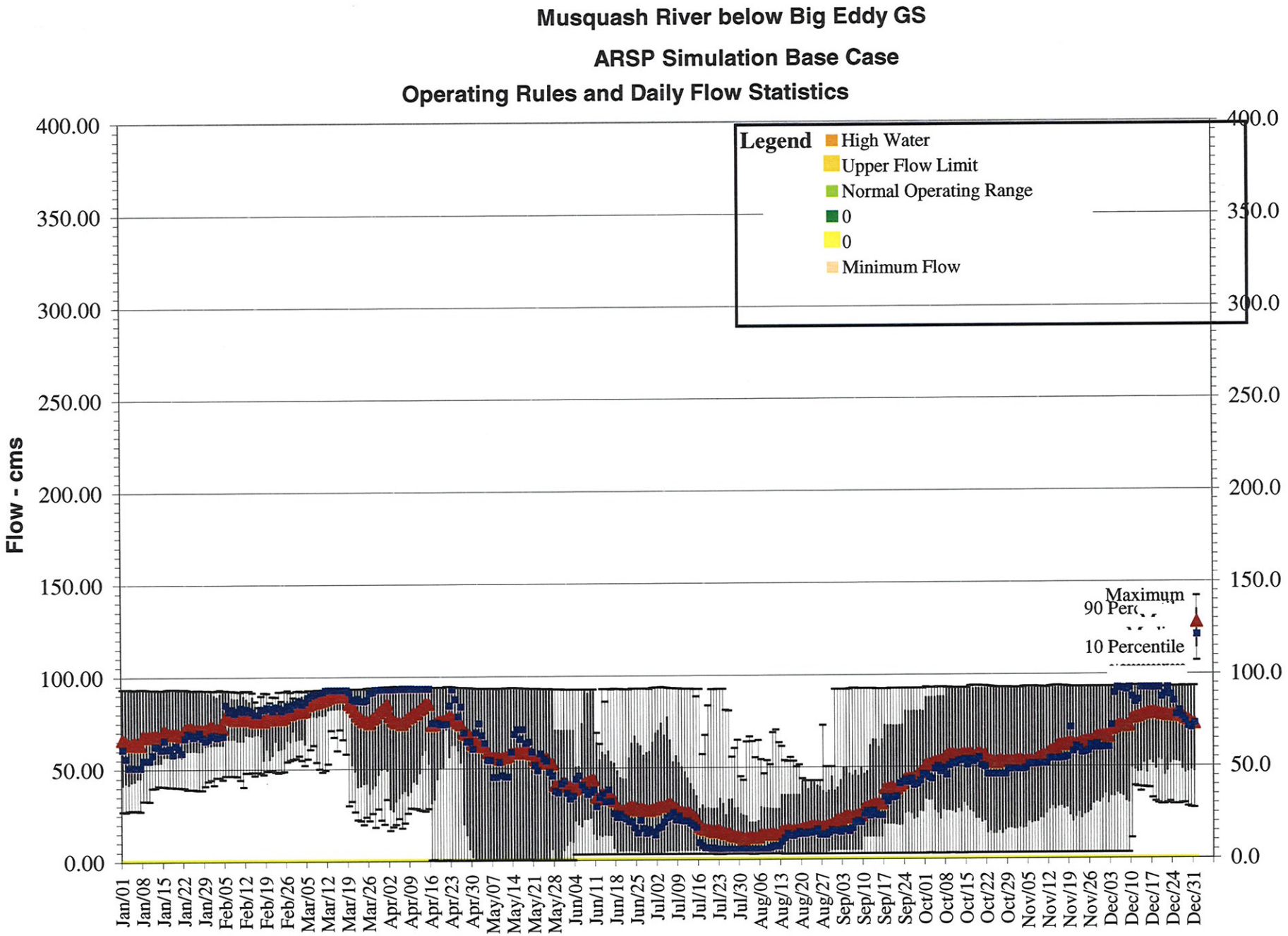
Option Development Process
ARSP Modeling and Analysis
of Lake Levels and River Flows

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

Big Eddy GS


Big Eddy Reservoir Water Levels
Historical Data 1984 to 2003
Operating Rules and Daily Water Level Statistics
Water Level - m
208.0
207.5
207.0
206.5
206.0
Legend
Flood Damage Zone
Flood Allowance
Normal Operating Zone
Low Water Zone
Maximum
90 Percentile
Mean
Median
10 Percentile
Minimum
Jan/01
Jan/15
Jan/29
Feb/12
Feb/26
Mar/12
Mar/26
Apr/09
Apr/23
May/07
May/21
Jun/04
Jun/18
Jul/02
Jul/16
Jul/30
Aug/13
Aug/27
Sep/10
Sep/24
Oct/08
Oct/22
Nov/05
Nov/19
Dec/03
Dec/17
Dec/31


Big Eddy Reservoir Water Levels
Historical Data 1984 to 2003
Operating Rules and Daily Water Level Statistics
Legend
Normal Operating Zone
Maximum
90 Percentile
Mean
Median
10 Percentile
Minimum
Water Level - m
208.0
207.5
207.0
206.5
206.0
Jan/01
Jan/15
Jan/29
Feb/12
Feb/26
Mar/12
Mar/26
Apr/09
Apr/23
May/07
May/21
Jun/04
Jun/18
Jul/02
Jul/16
Jul/30
Aug/13
Aug/27
Sep/10
Sep/24
Oct/08
Oct/22
Nov/05
Nov/19
Dec/03
Dec/17
Dec/31


Musquash River below Big Eddy GS
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 Perc
10 Percentile
Flow - cms
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
400.0
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

Musquash River below Big Eddy GS
ARSP Simulation Base Case
Daily Flows Model Results 1951 to 2000

Walleye Spawning

Min Flow 3 m^3/s Achieved 89% of time

No of days above minumum flow

First half of season		*Last half of season*		*For whole season*	
Min	6 days	Min	0 days	Min	6 days
Avg	22.06 days	Avg	20.9 days	Avg	42.96 days
Years Provided	70%	Years Provided	82%	Years Provided	70%

From flow duration curve

%	Flow	*No of days min flow is achievd*		
99%	0.05 m^3/s	6 days	90%	*percentile peak flow*
95%	0.21 m^3/s		93 m3/s	

Summer Minimum 7-day Flow

	Maximum	22.85 m^3/s
	Minimum	3.01 m^3/s
90%	Percentile	14.62 m^3/s
10%	Percentile	3.03 m^3/s
	Median	5.09 m^3/s
	Mean	7.42 m^3/s

Maximum Flows

Regulatory Flood Outflow	No of years exceeded	Maximum Daily Flow

N/A	m^3/s	0	94.52 m^3/s

Minumum Flows

Min Daily flow	*7-day minimums*		
	2	10	20 return period
	-yr 7Q2	-yr 7Q10	-yr 7Q20
0.03 m^3/s	5.05	0.16	0.07 m^3/s

Summer Fluctuations

Delta Flow	Average number of daily flow fluctuations per year
1	48.14
3	29.92
5	19.84
>8.5475	10.00

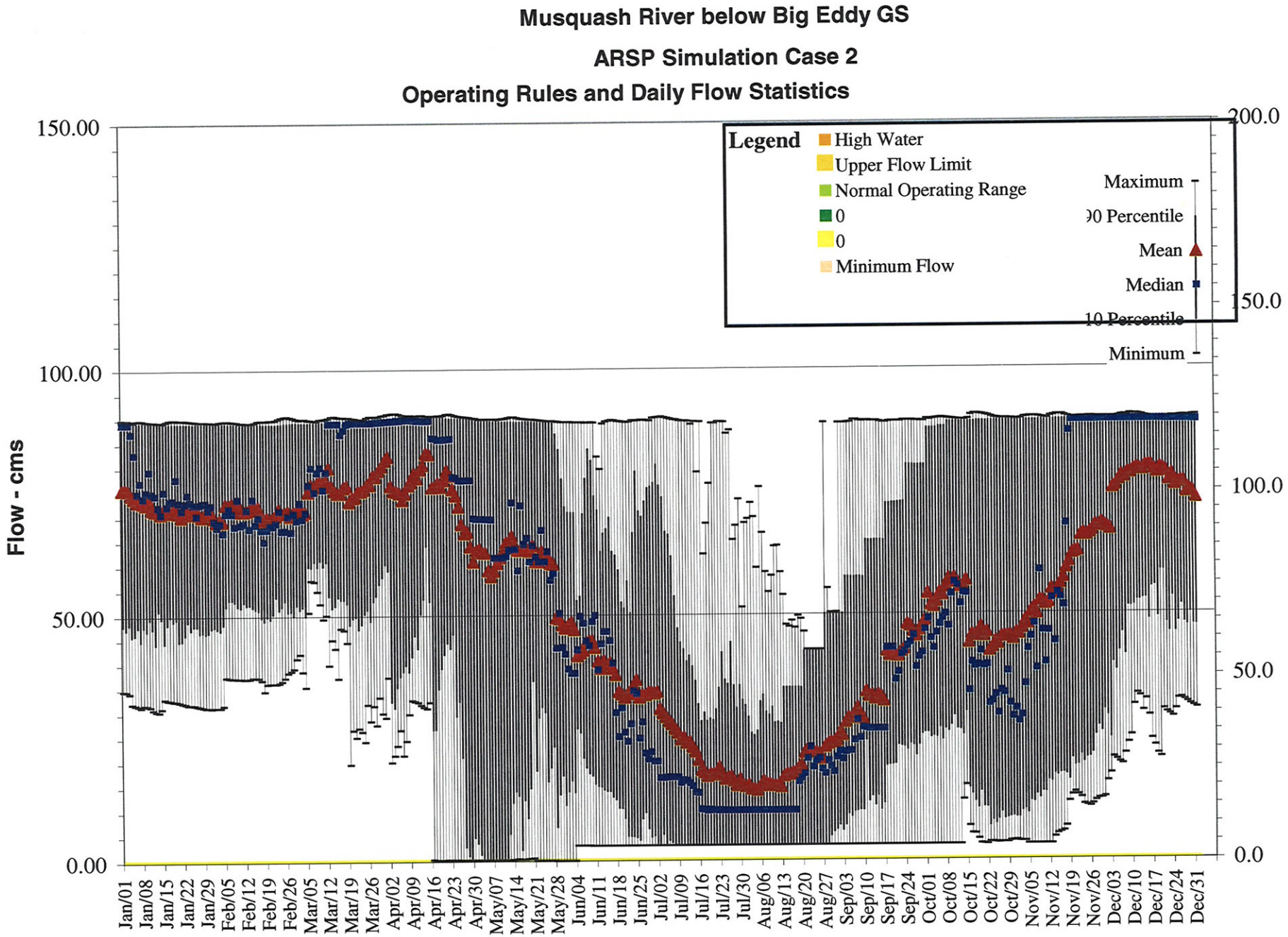
0.5 ratio of summer median

Water Usage

Median Flow		*10% Percentile*	
summer	winter	summer	winter
m^3/s	m^3/s	m^3/s	m^3/s
27.76	81.73	5.03	0.16

Power Generation

	Quarter				
	1	2	3	4	Annual
Flow	76.22	54.92	22.88	63.03	54.14 m^3/s


Musquash River below Big Eddy GS
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
150.00
100.00
50.00
0.00
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
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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

Musquash River below Big Eddy GS
ARSP Simulation Case 2
Daily Flows Model Results 1951 to 2000

Walleye Spawning

Min Flow 3 m³/s Achieved 91% of time

No of days above minumum flow

First half of season

Min	3 days
Avg	21.72 days
Years Provided	72%

Last half of season

Min	0 days
Avg	21.56 days
Years Provided	86%

For whole season

Min	3 days
Avg	43.28 days
Years Provided	72%

From flow duration curve

%	Flow
99%	0.05 m³/s
95%	0.25 m³/s

No of days min flow is achievd 3 days

90% percentile peak flow 90 m3/s

Summer Minimum 7-day Flow

	Maximum	33.10 m³/s
	Minimum	3.02 m³/s
90%	Percentile	21.47 m³/s
10%	Percentile	3.03 m³/s
	Median	10.02 m³/s
	Mean	10.16 m³/s

Maximum Flows

Regulatory Flood Outflow No of years exceeded Maximum Daily Flow

N/A	m³/s	0	91.17 m³/s

Minumum Flows

Min Daily flow	*7-day minimums*		
0.03 m³/s	2	10	20 return period
	-yr 7Q2	-yr 7Q10	-yr 7Q20
	5.83	0.19	0.07 m³/s

Summer Fluctuations

Delta Flow	Average number of daily flow fluctuations per year
1	41.08
3	27.54
5	17.84
>11.70575	5.64

0.5 ratio of summer median

Water Usage

Median Flow		*10% Percentile*	
summer m³/s	winter m³/s	summer m³/s	winter m³/s
31.41	85.80	3.12	0.16

Power Generation

	Quarter				
	1	2	3	4	Annual
Flow	73.12	58.22	25.56	61.37	54.46 m³/s