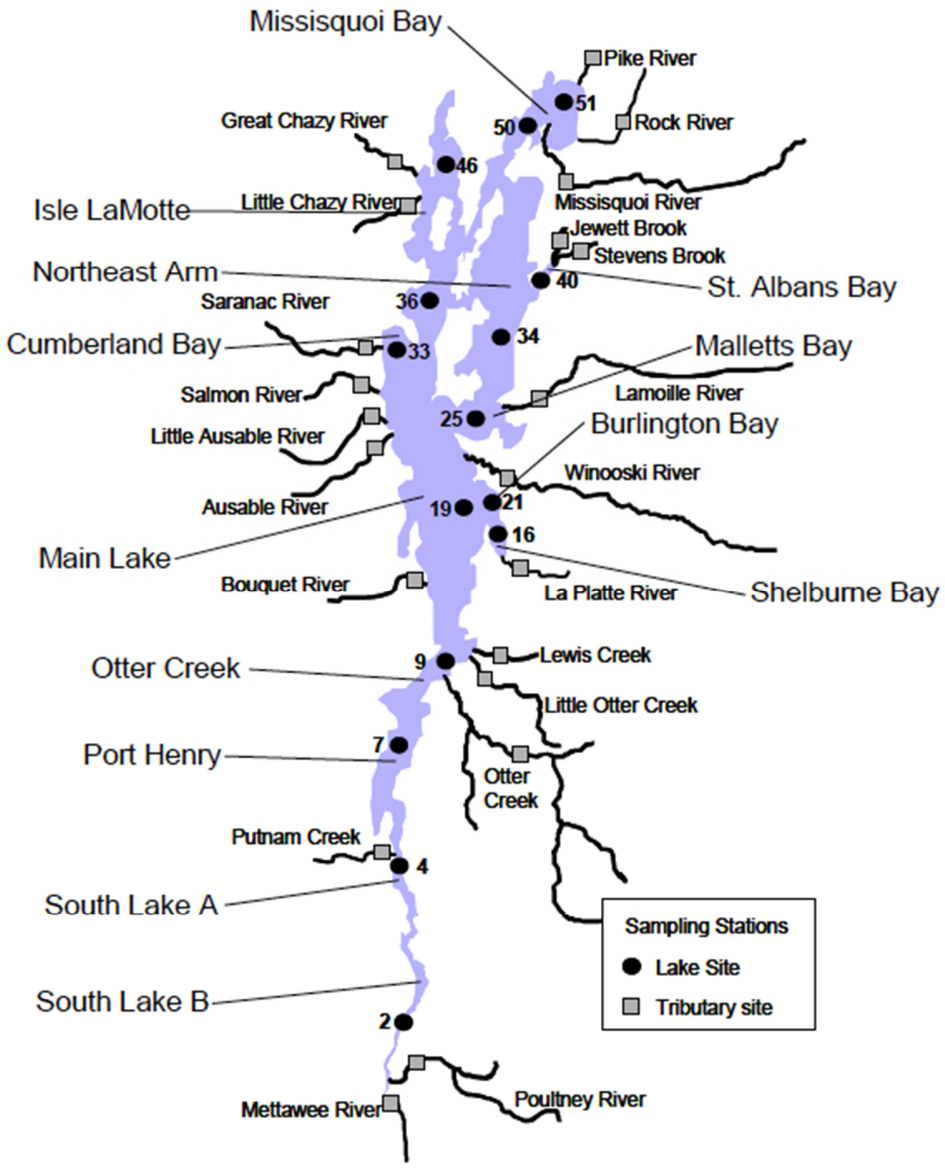
APPENDIX A

FLUX Results


Missisquoi Bay
Pike River
51
Great Chazy River
50
Rock River
46
Missisquoi River
Isle LaMotte
Little Chazy River
Jewett Brook
Stevens Brook
Northeast Arm
40
St. Albans Bay
Saranac River
36
Cumberland Bay
34
33
Malletts Bay
Salmon River
Lamoille River
25
Little Ausable River
Burlington Bay
Winooski River
Ausable River
19
21
16
Main Lake
Bouquet River
La Platte River
Shelburne Bay
Otter Creek
9
Lewis Creek
Little Otter Creek
Port Henry
7
Otter Creek
Putnam Creek
4
South Lake A
Sampling Stations
Lake Site
Tributary site
South Lake B
2
Poultney River
Mettawee River

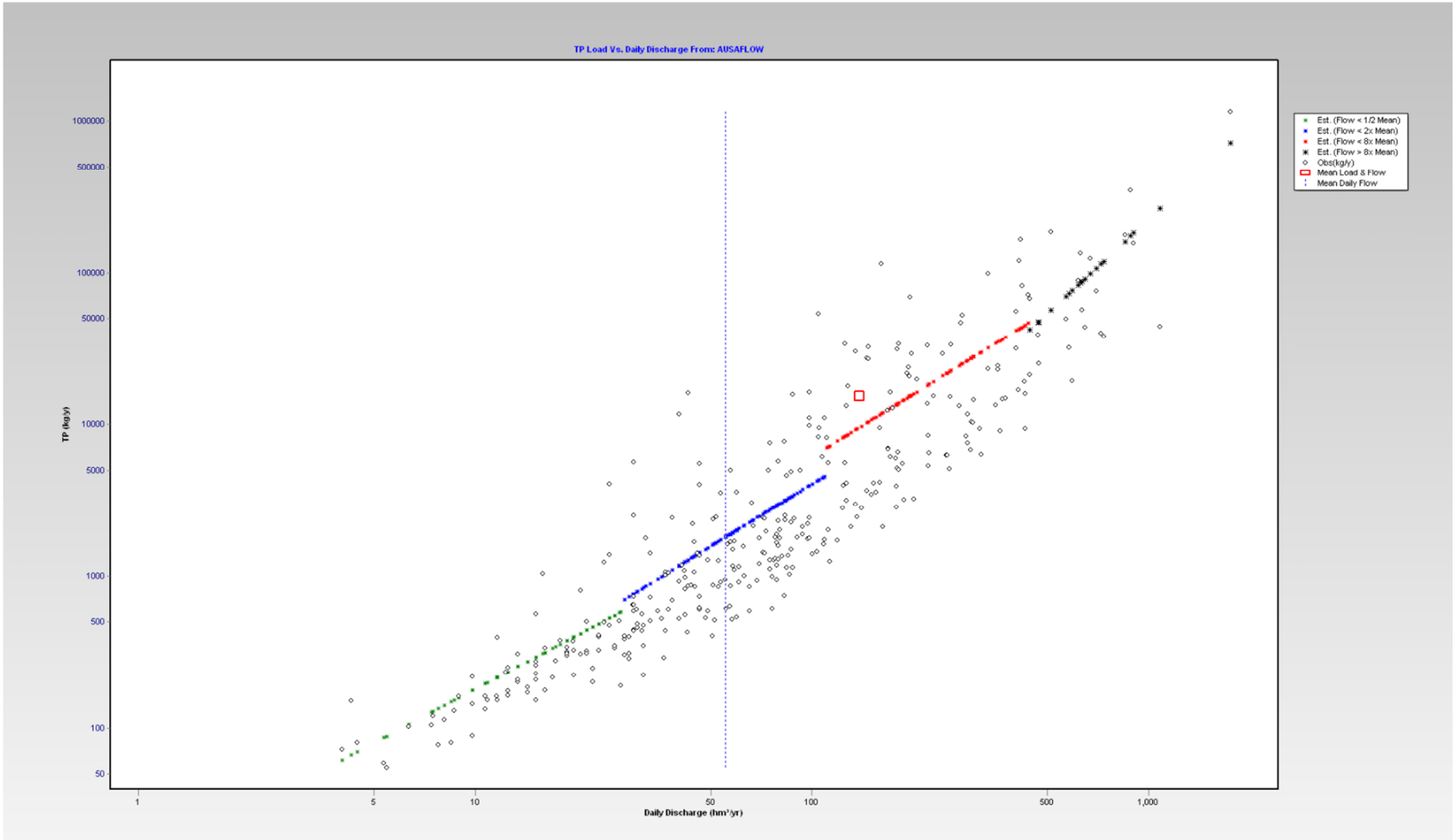


Figure A.1: Ausable – FLUX Results - Discharge versus TP Load (CV=0.144, R^2=0.83)

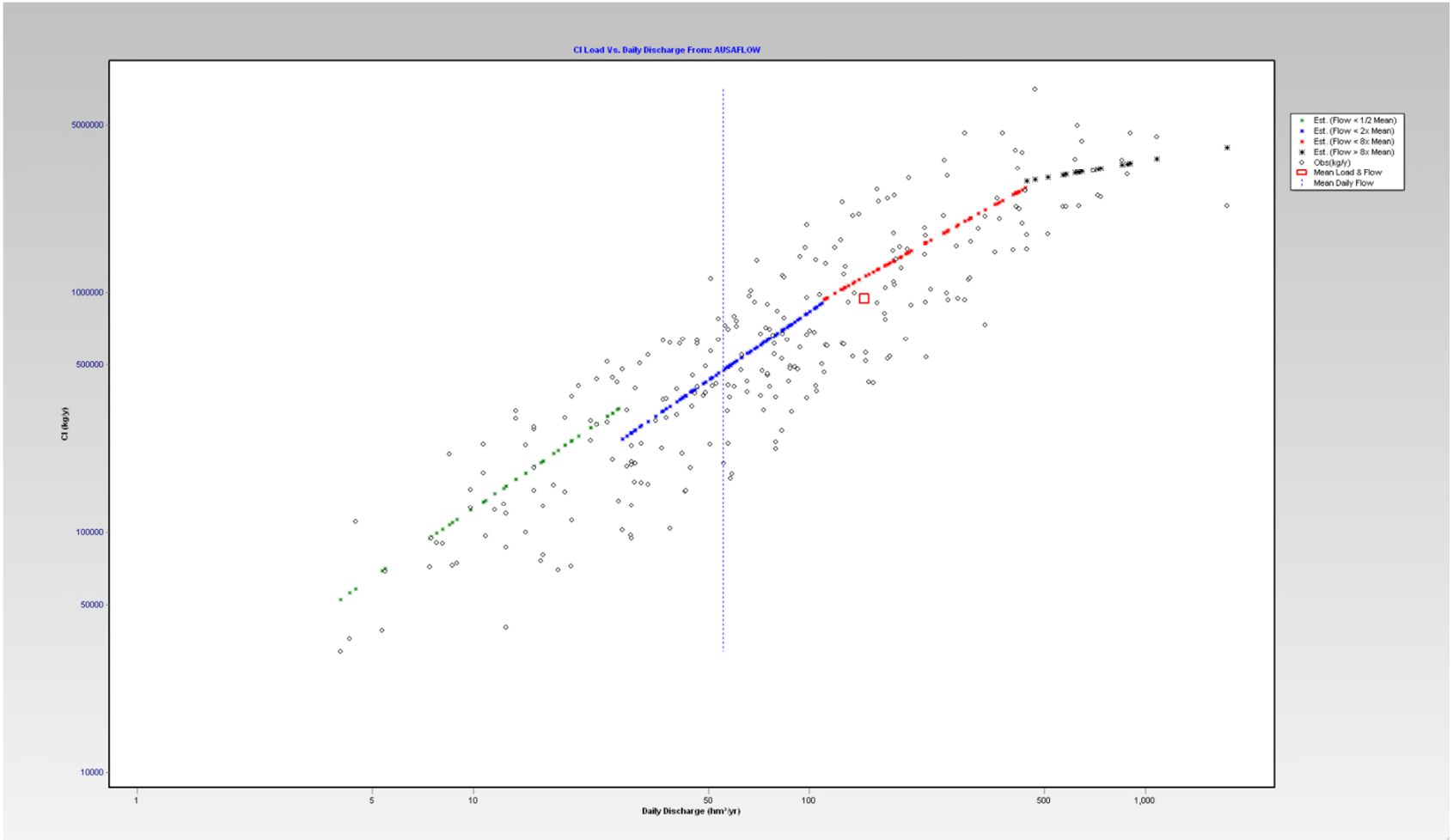


Figure A.2: Ausable – FLUX Results - Discharge versus CL Load (CV=0.034, R^2=0.78)

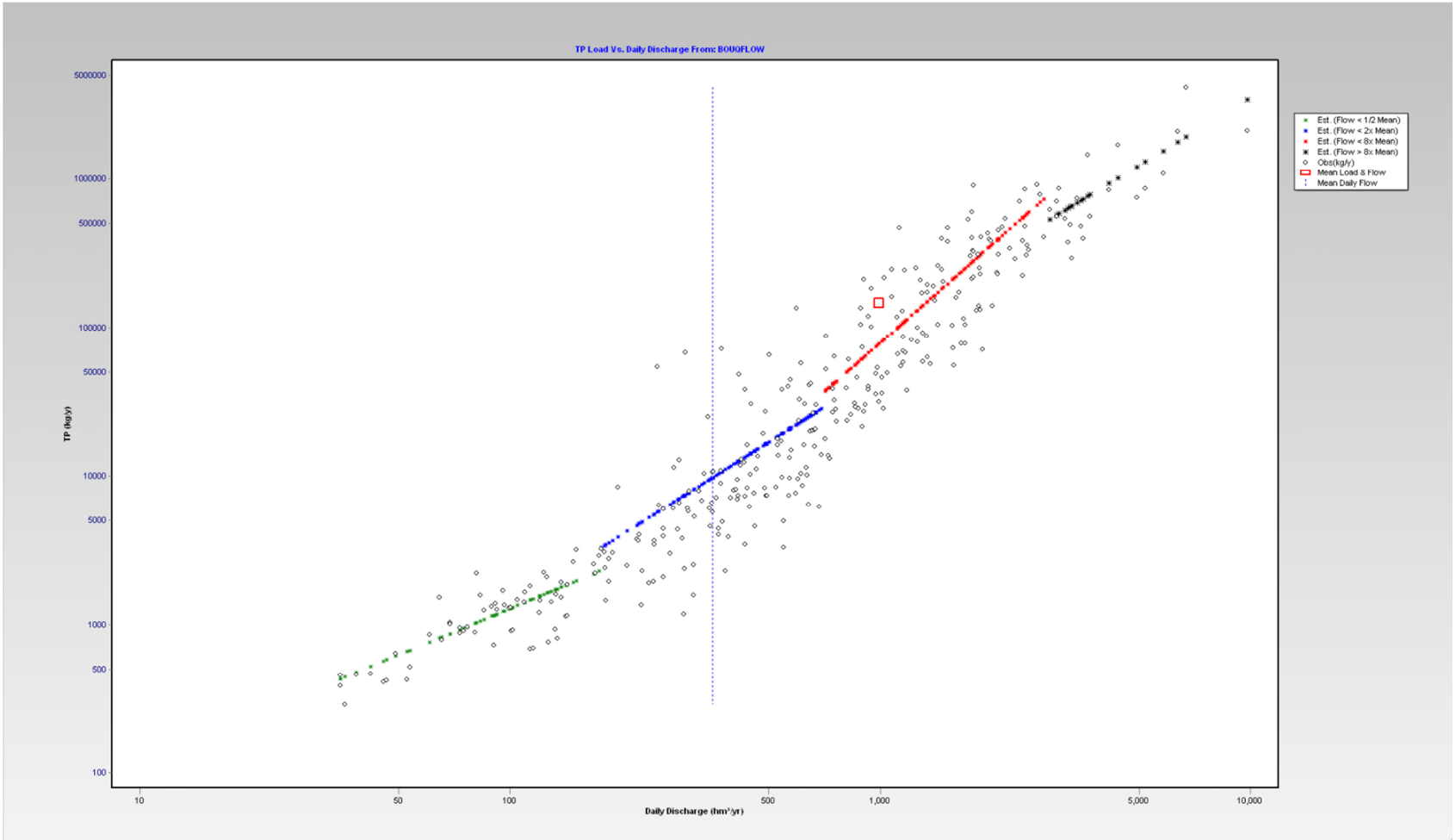


Figure A.3: Bouquet – FLUX Results - Discharge versus TP Load (CV=0.050, R^2=0.90)

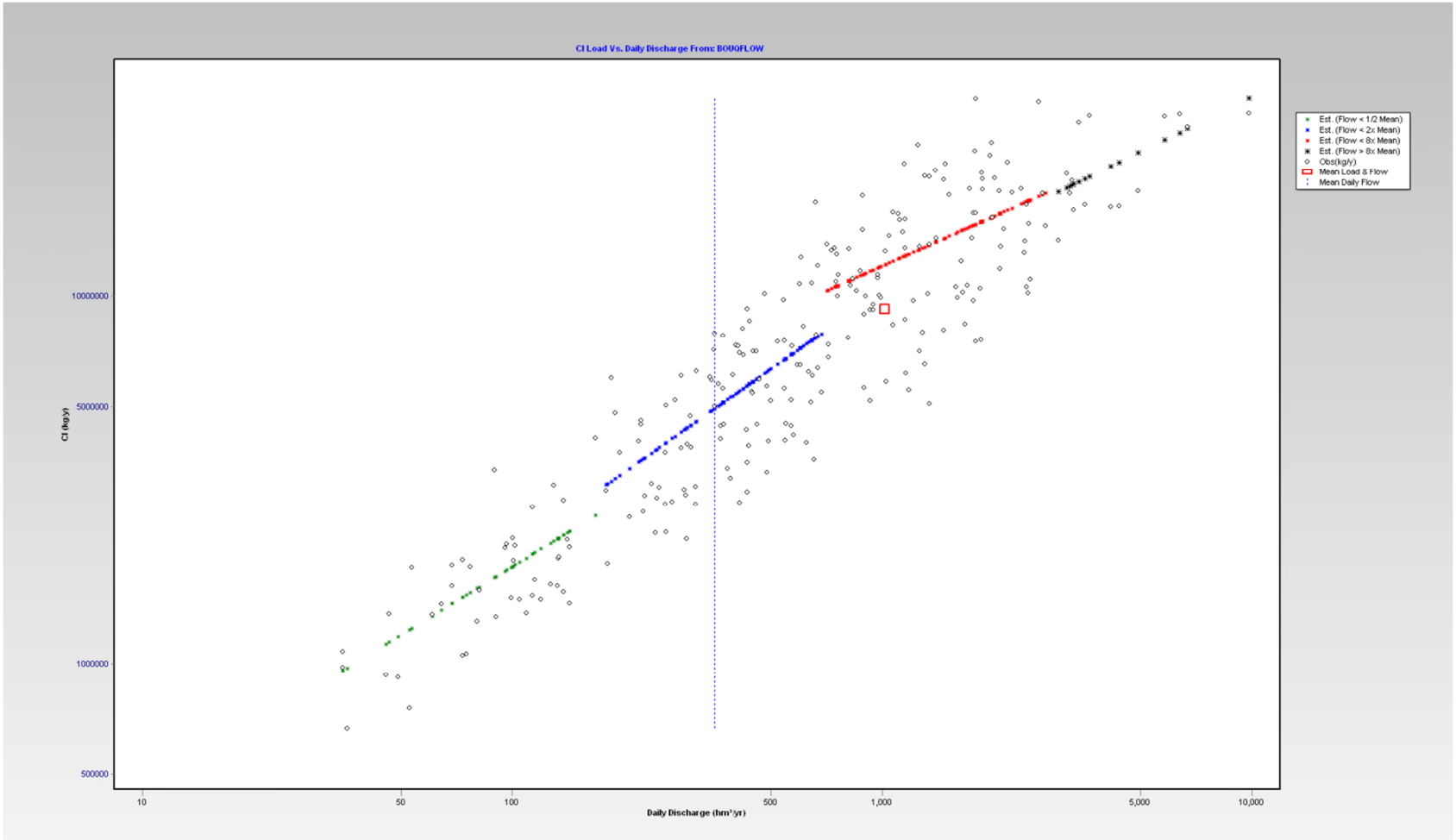


Figure A.4: Bouquet – FLUX Results - Discharge versus CL Load (CV=0.024, R^2=0.84)

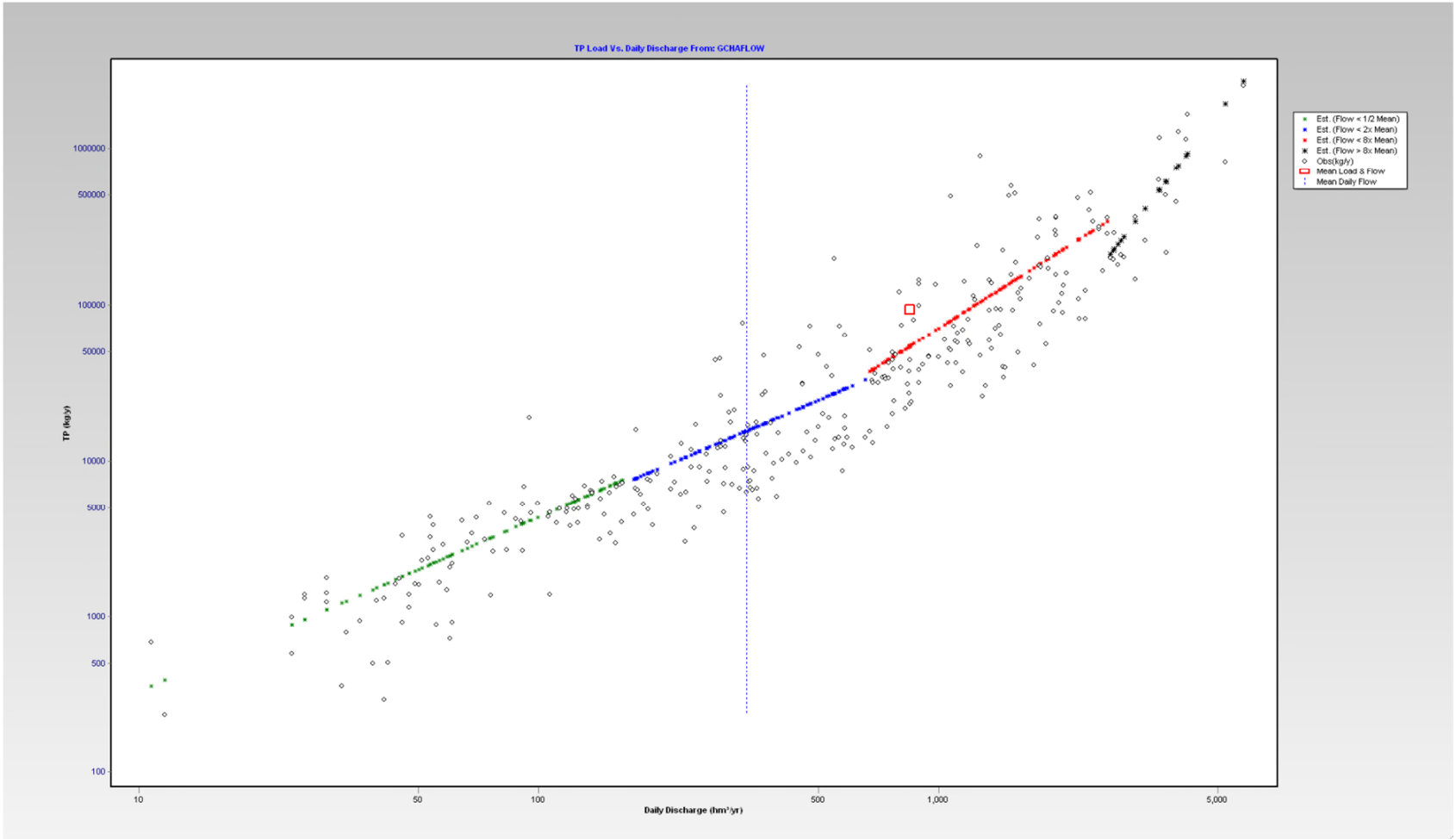


Figure A.5: Great Chazy – FLUX Results - Discharge versus TP Load (CV=0.058, R^2=0.87)

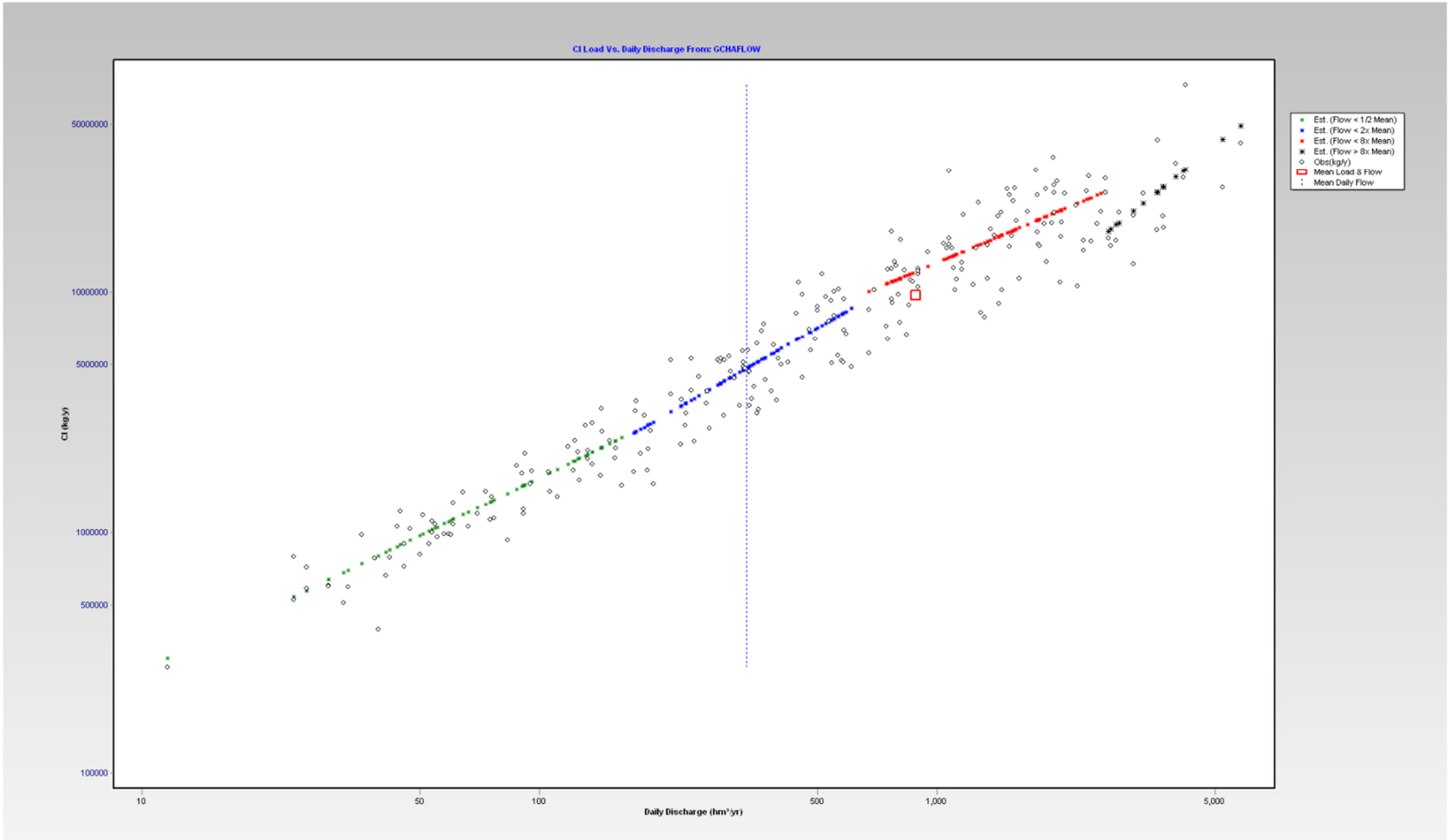


Figure A.6: Great Chazy – FLUX Results - Discharge versus CL Load (CV=0.020, R^2=0.93)

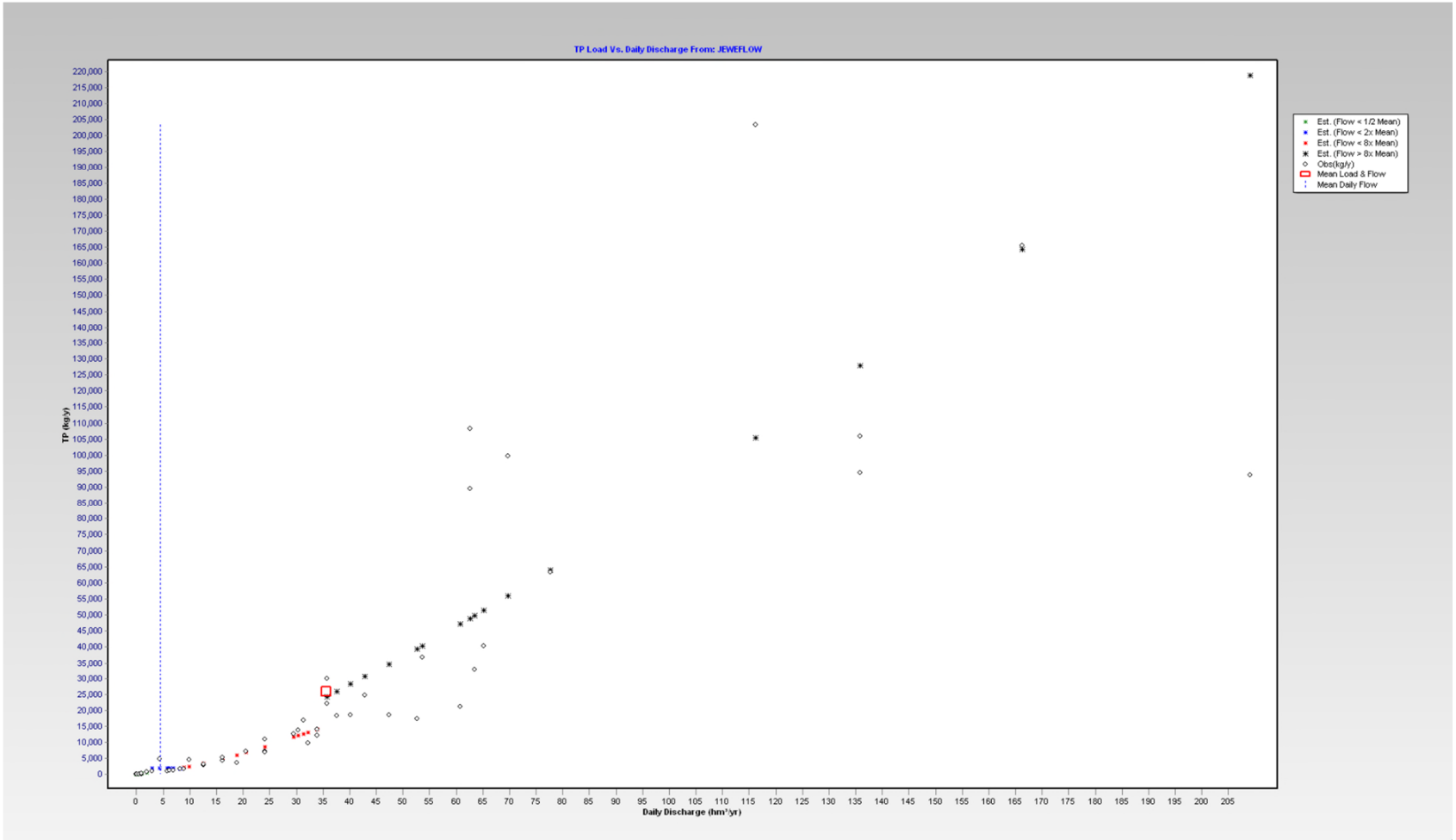


Figure A.7: Jewet – FLUX Results - Discharge versus TP Load (CV=0.314, R^2=0.94)

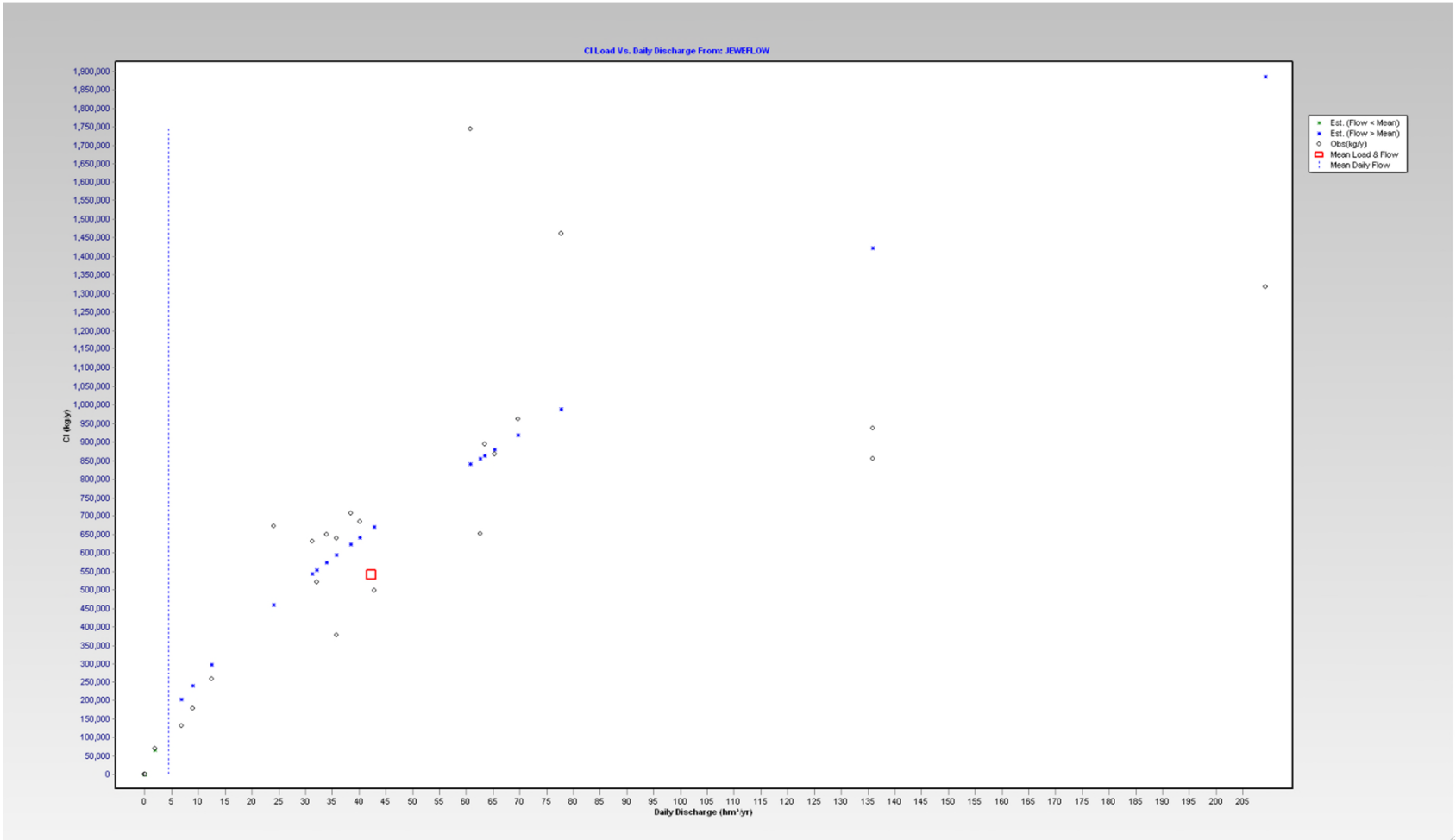


Figure A.8: Jewet – FLUX Results - Discharge versus CL Load (CV=0.125, R^2=0.98)

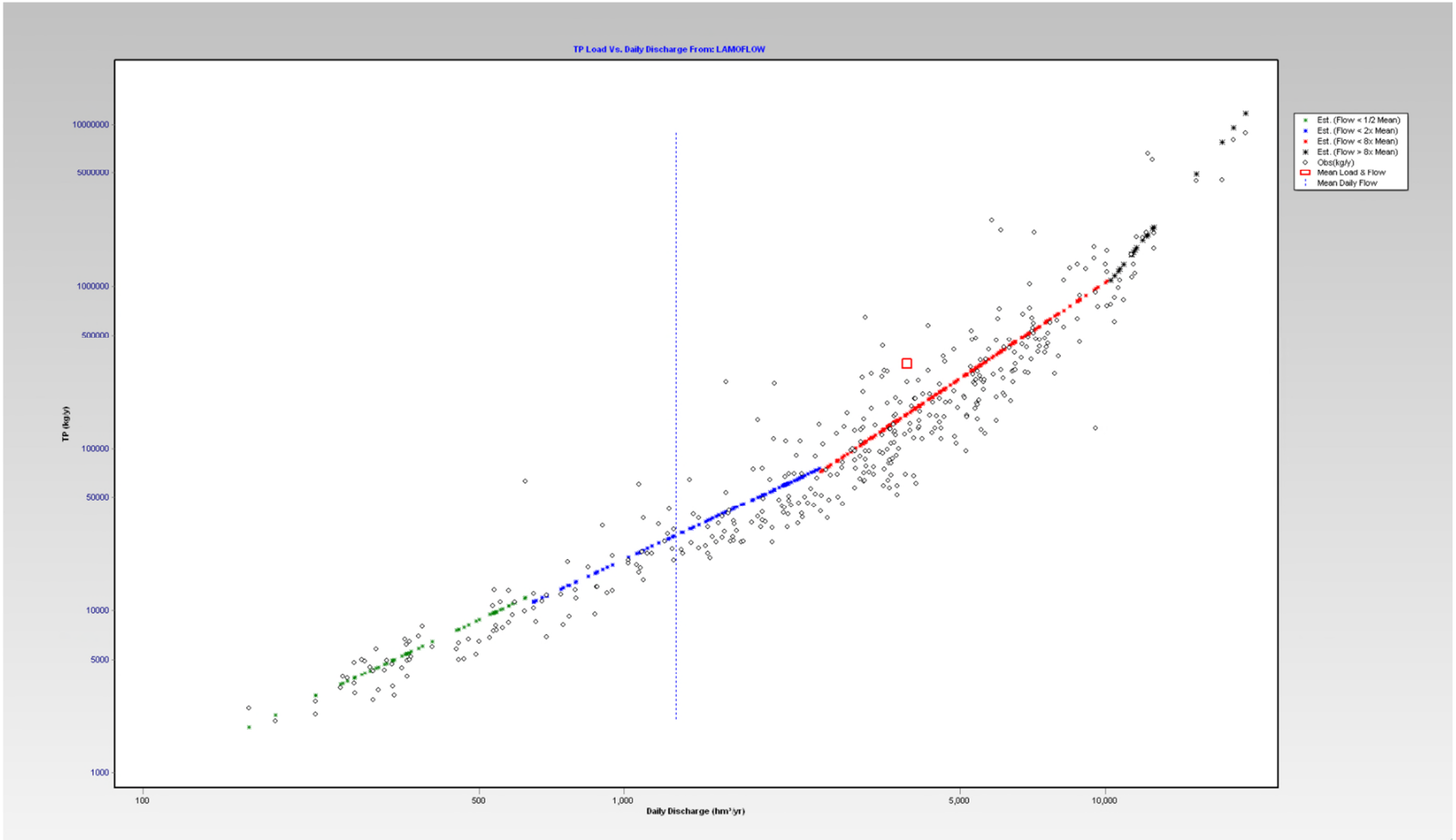


Figure A.9: Lamoille – FLUX Results - Discharge versus TP Load (CV=0.045, R^2=0.90)

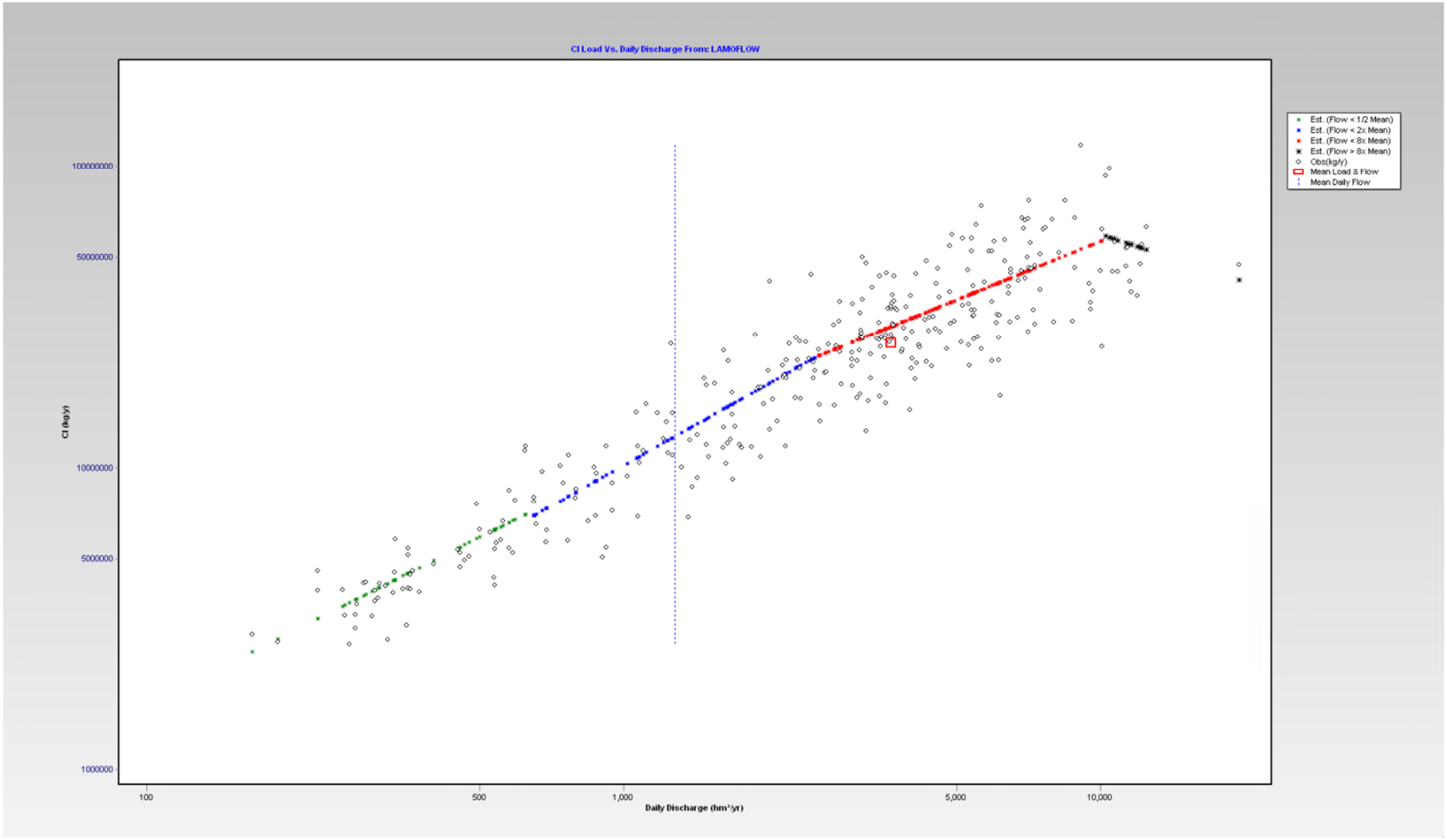


Figure A.10: Lamoille – FLUX Results - Discharge versus CL Load (CV=0.020, R^2=0.88)

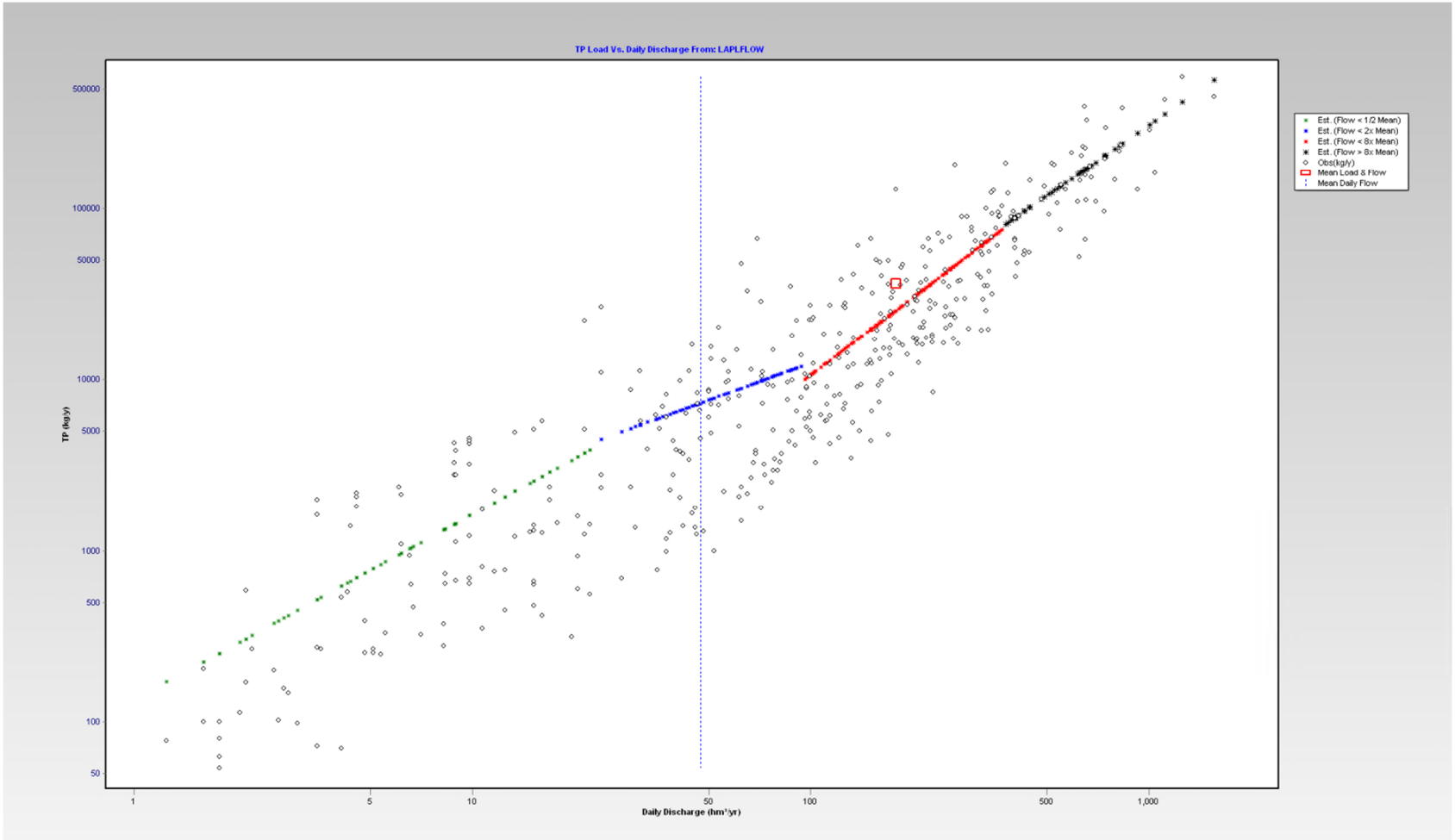


Figure A.11: La Platte – FLUX Results - Discharge versus TP Load (CV=0.044, R^2=0.83)

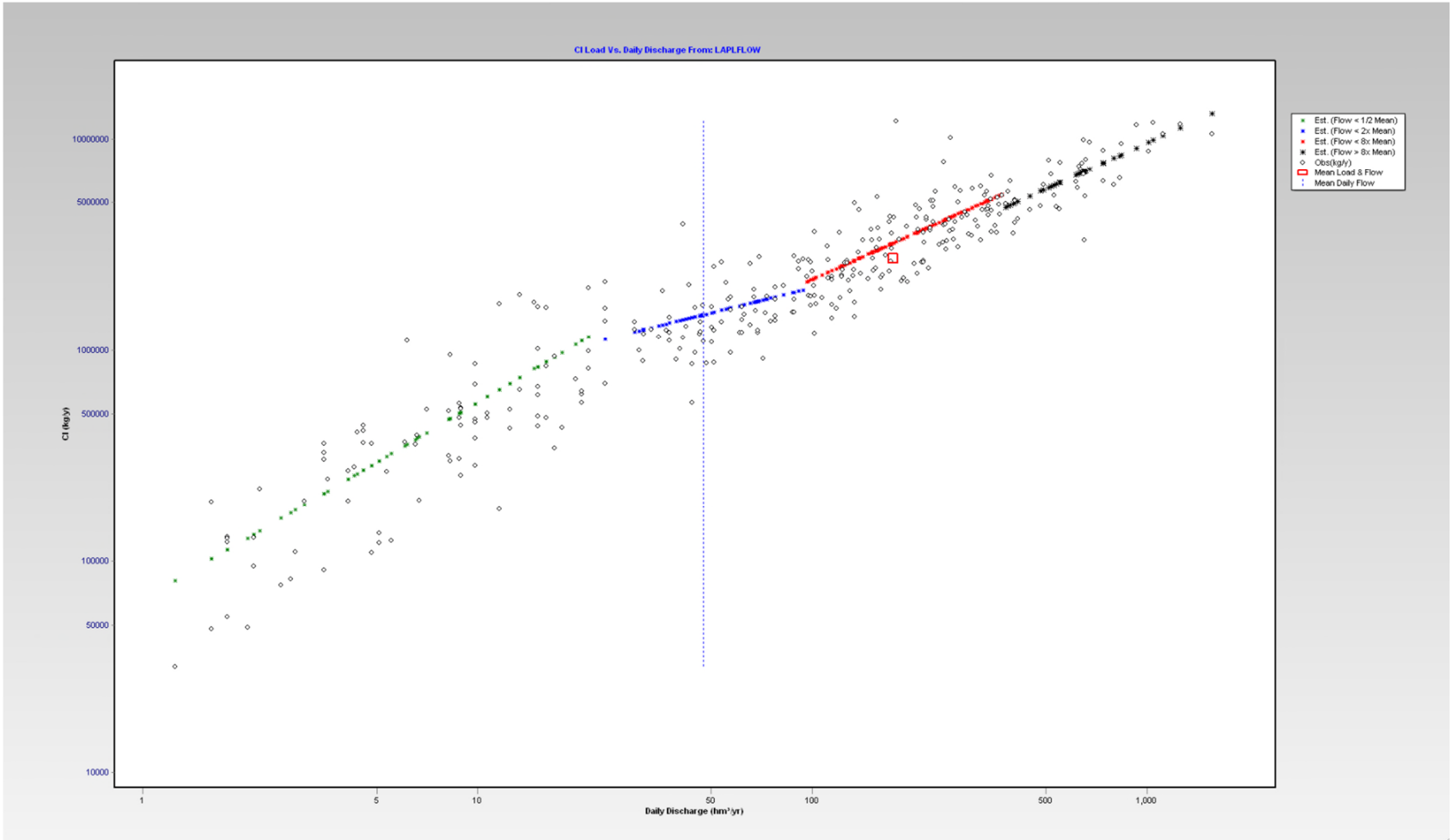


Figure A.12: La Platte – FLUX Results - Discharge versus CL Load (CV=0.028, R^2=0.89)

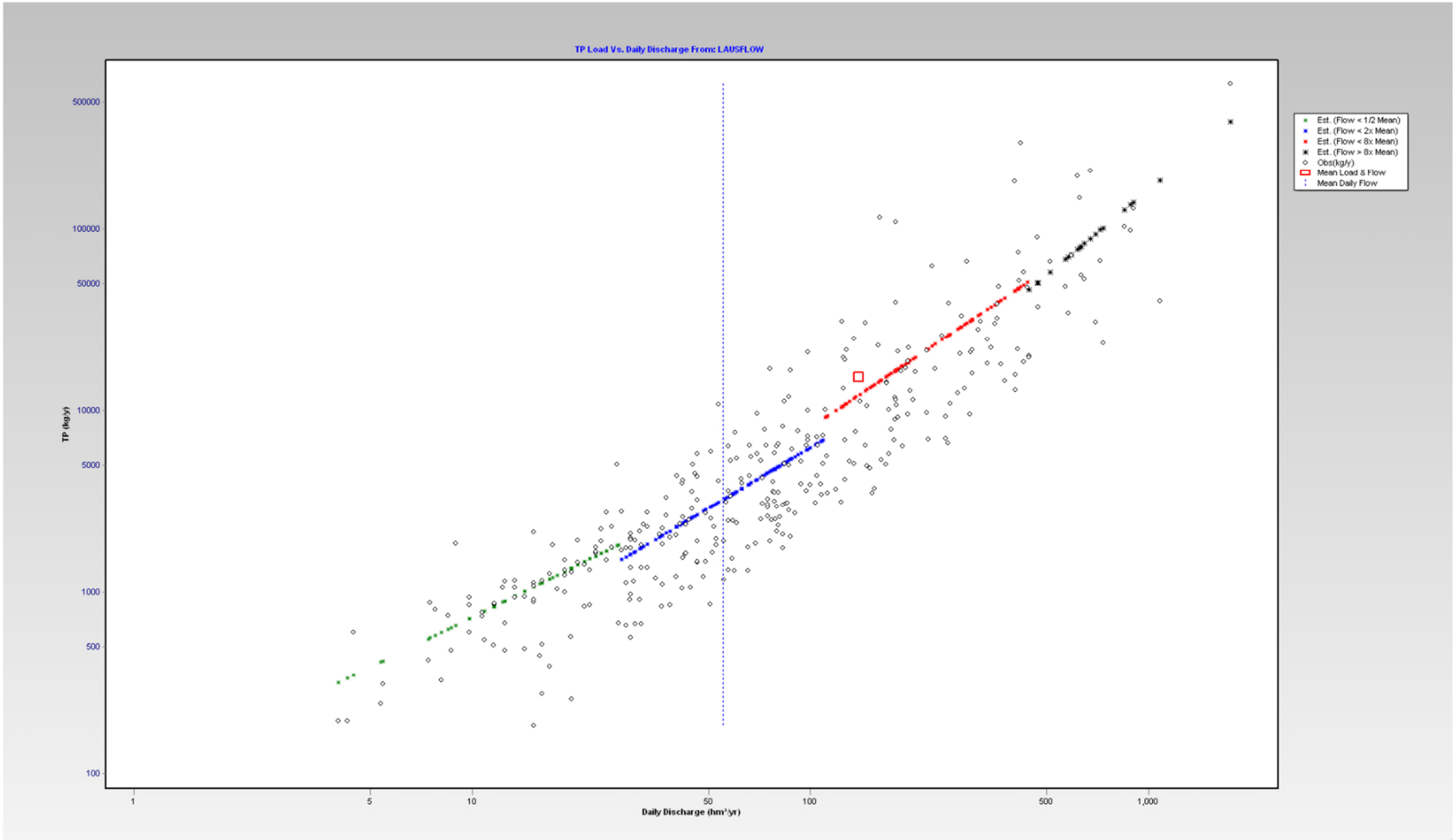


Figure A.13: Little Ausable – FLUX Results - Discharge versus TP Load (CV=0.077, R^2=0.81)

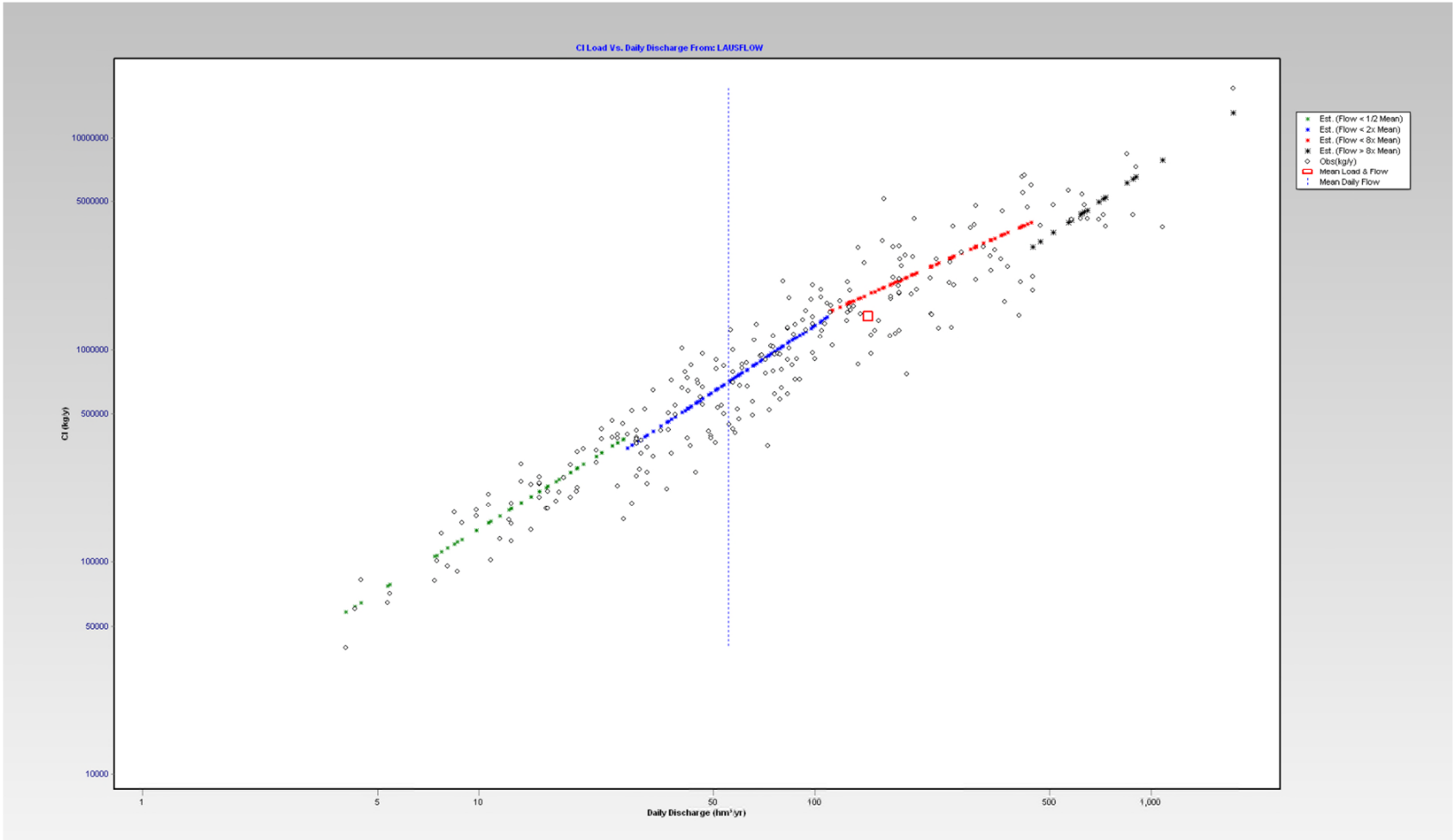


Figure A.14: Little Ausable – FLUX Results - Discharge versus CL Load (CV=0.024, R^2=0.90)

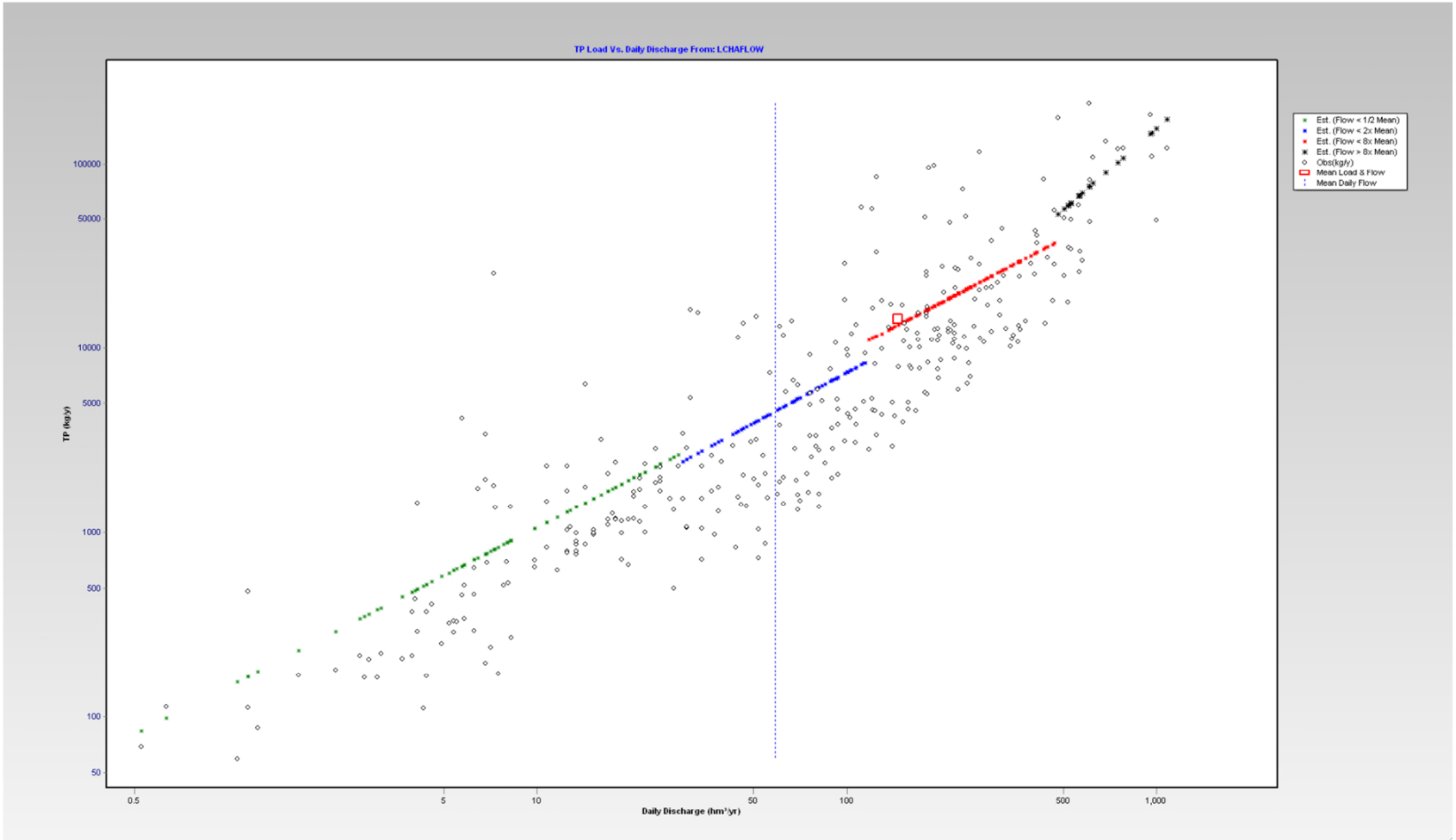


Figure A.15: Little Chazy – FLUX Results - Discharge versus TP Load (CV=0.062, R^2=0.79)

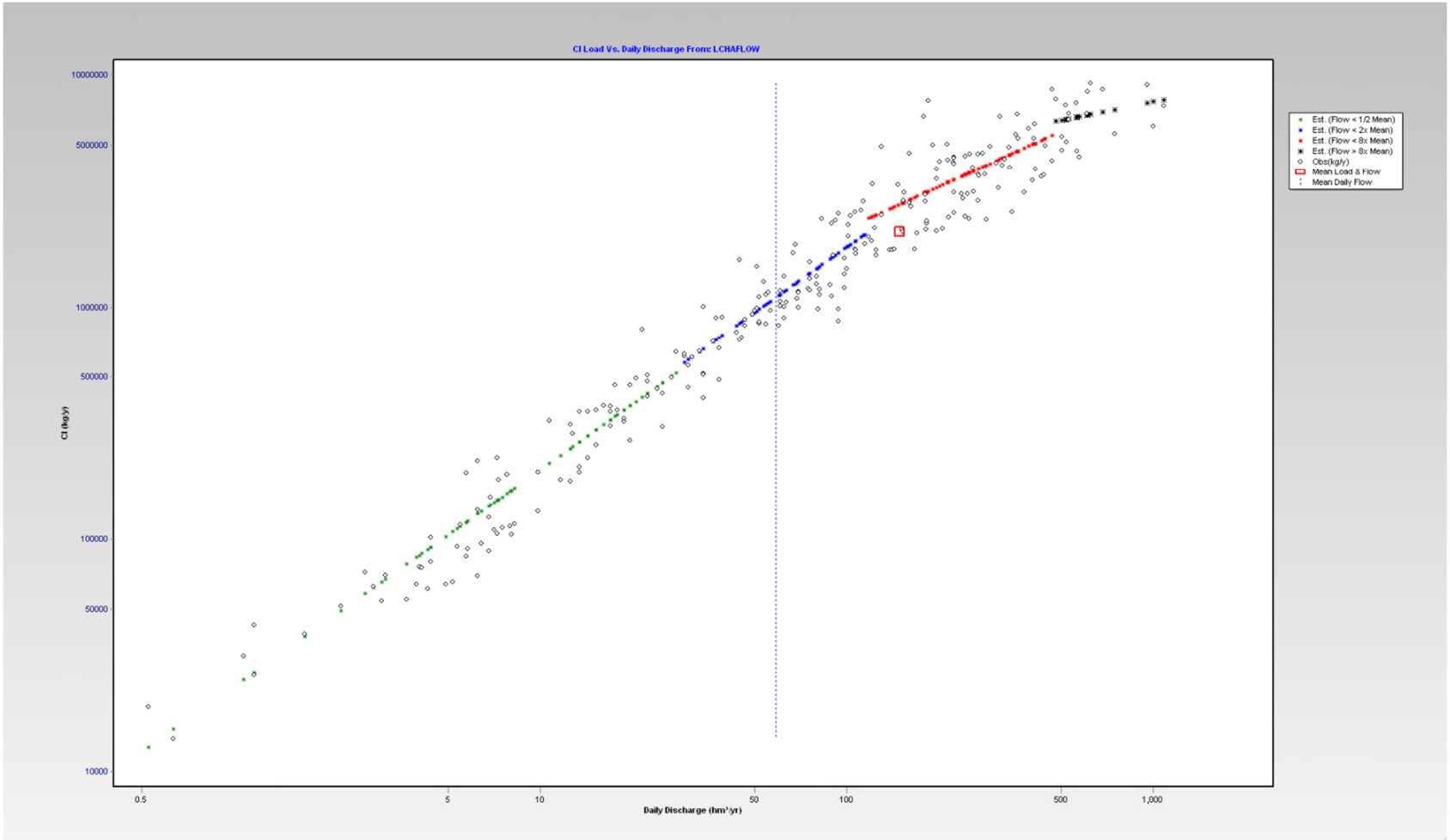


Figure A.16: Little Chazy – FLUX Results - Discharge versus CL Load (CV=0.021, R^2=0.96)

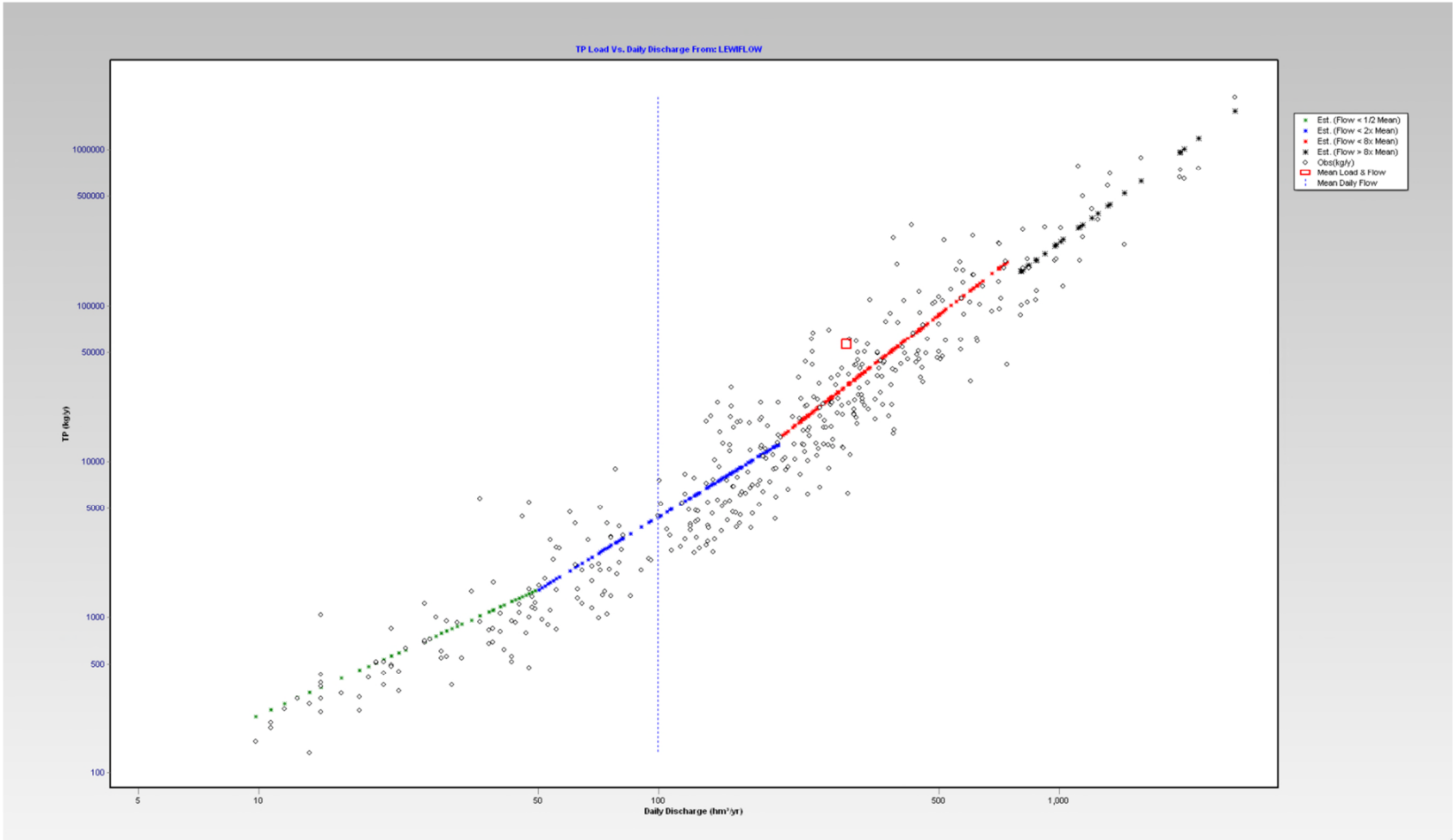


Figure A.17 Lewis – FLUX Results - Discharge versus TP Load (CV=0.041, R^2=0.91)

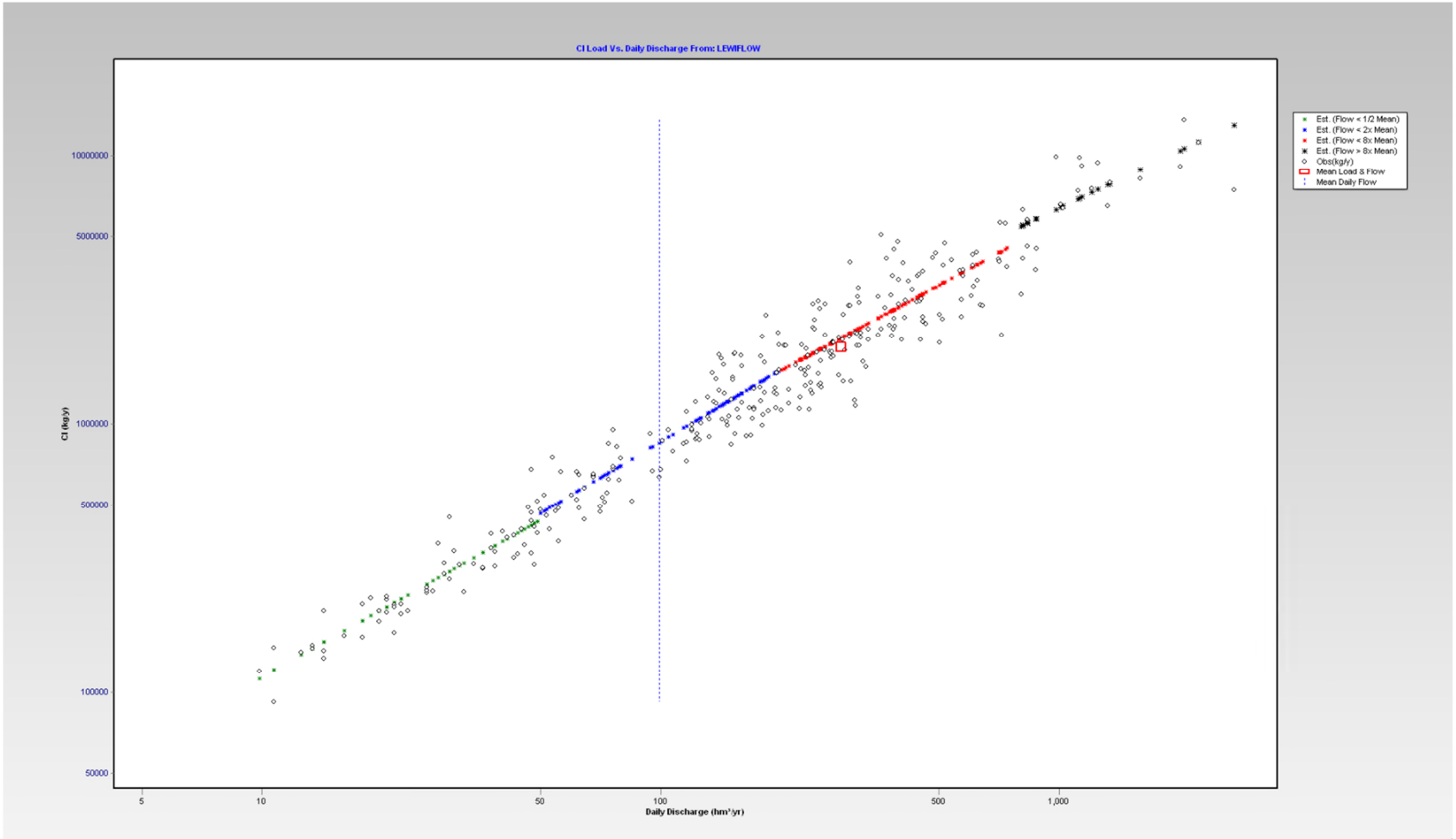


Figure A.18 Lewis – FLUX Results - Discharge versus CL Load (CV=0.014, R^2=0.95)

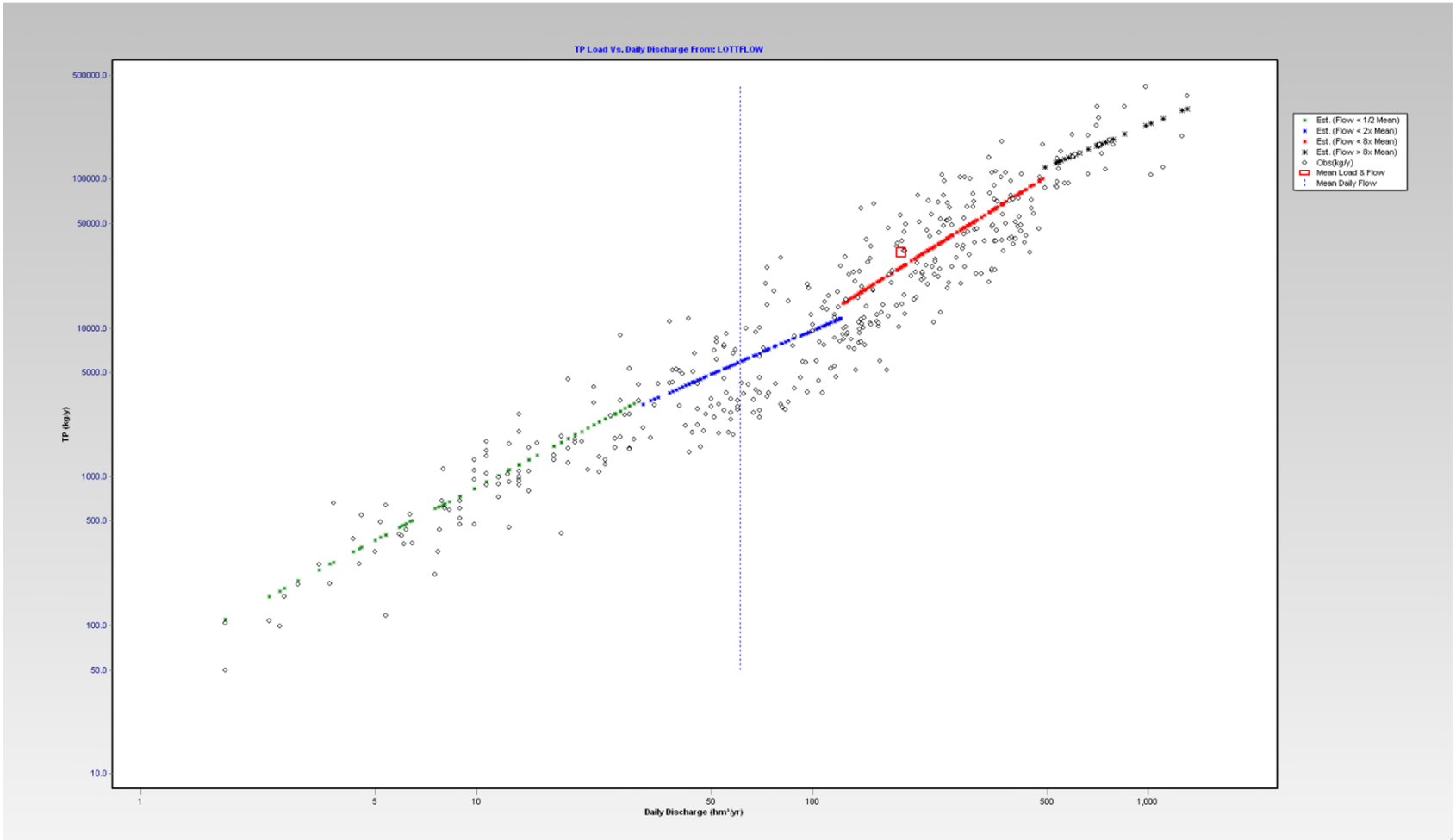


Figure A.19 Little Otter – FLUX Results - Discharge versus TP Load (CV=0.034, R^2=0.90)

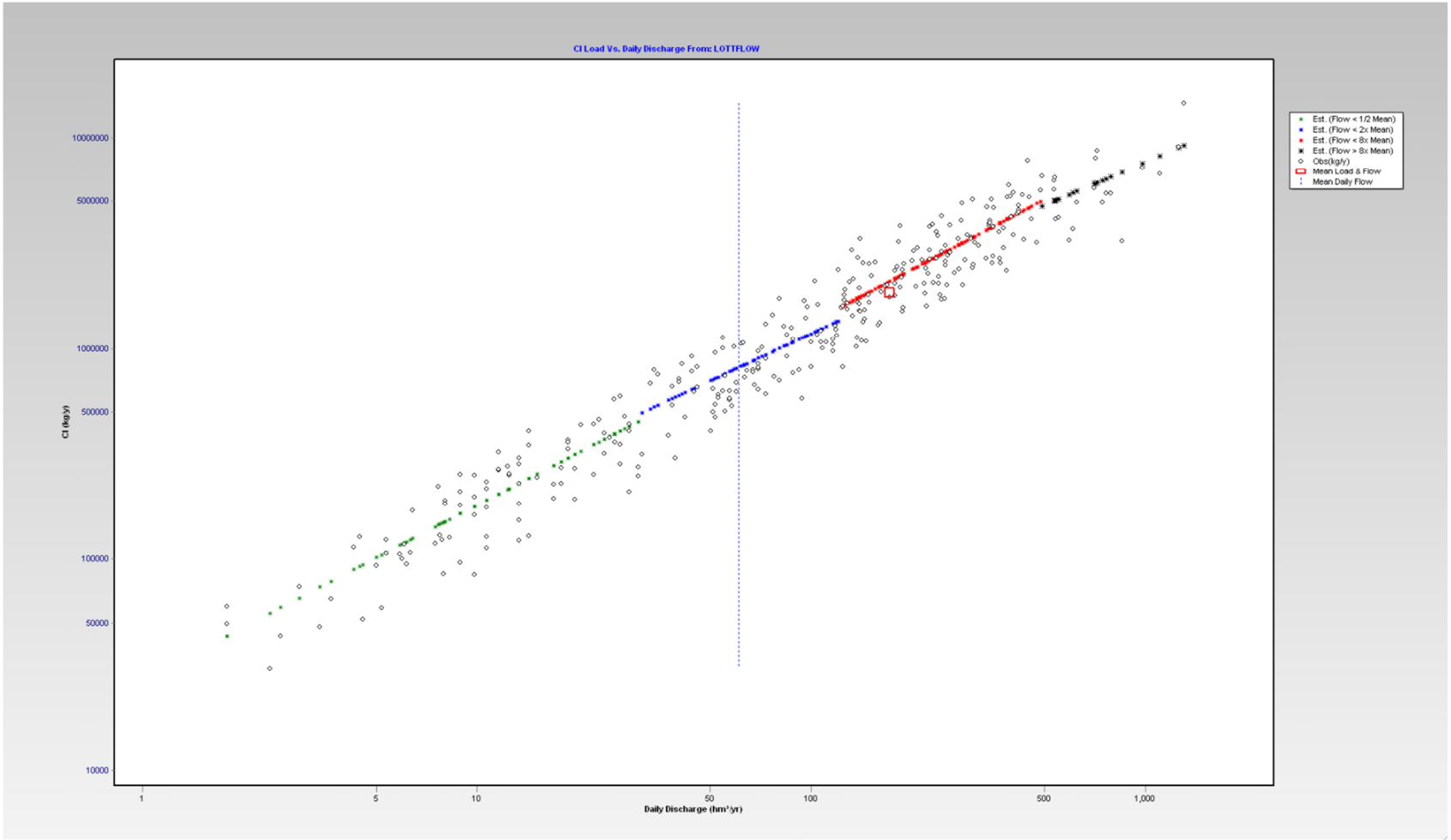


Figure A.20 Little Otter – FLUX Results - Discharge versus CL Load (CV=0.018, R^2=0.94)

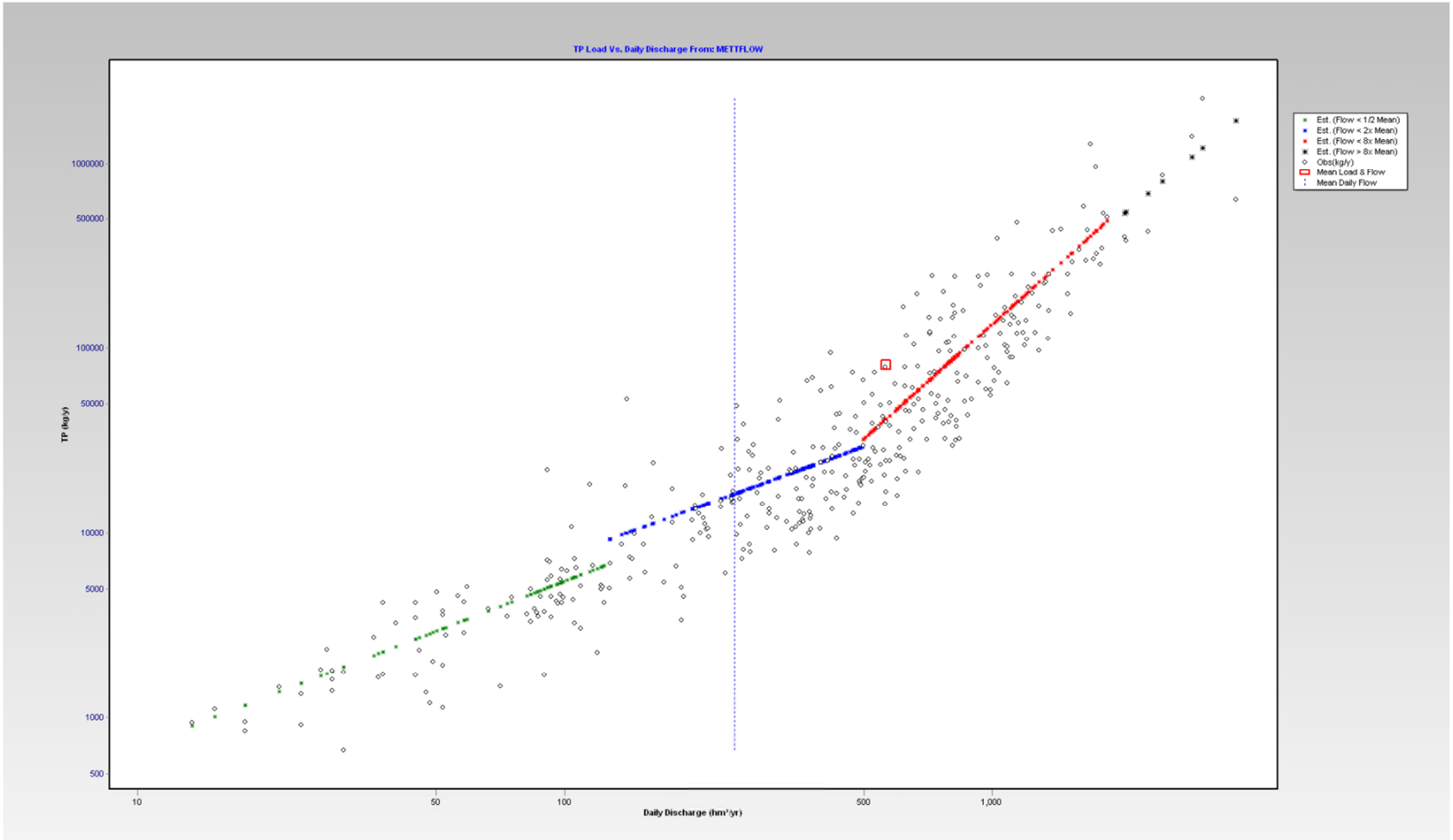


Figure A.21 Mettawee – FLUX Results - Discharge versus TP Load (CV=0.109, R^2=0.85)

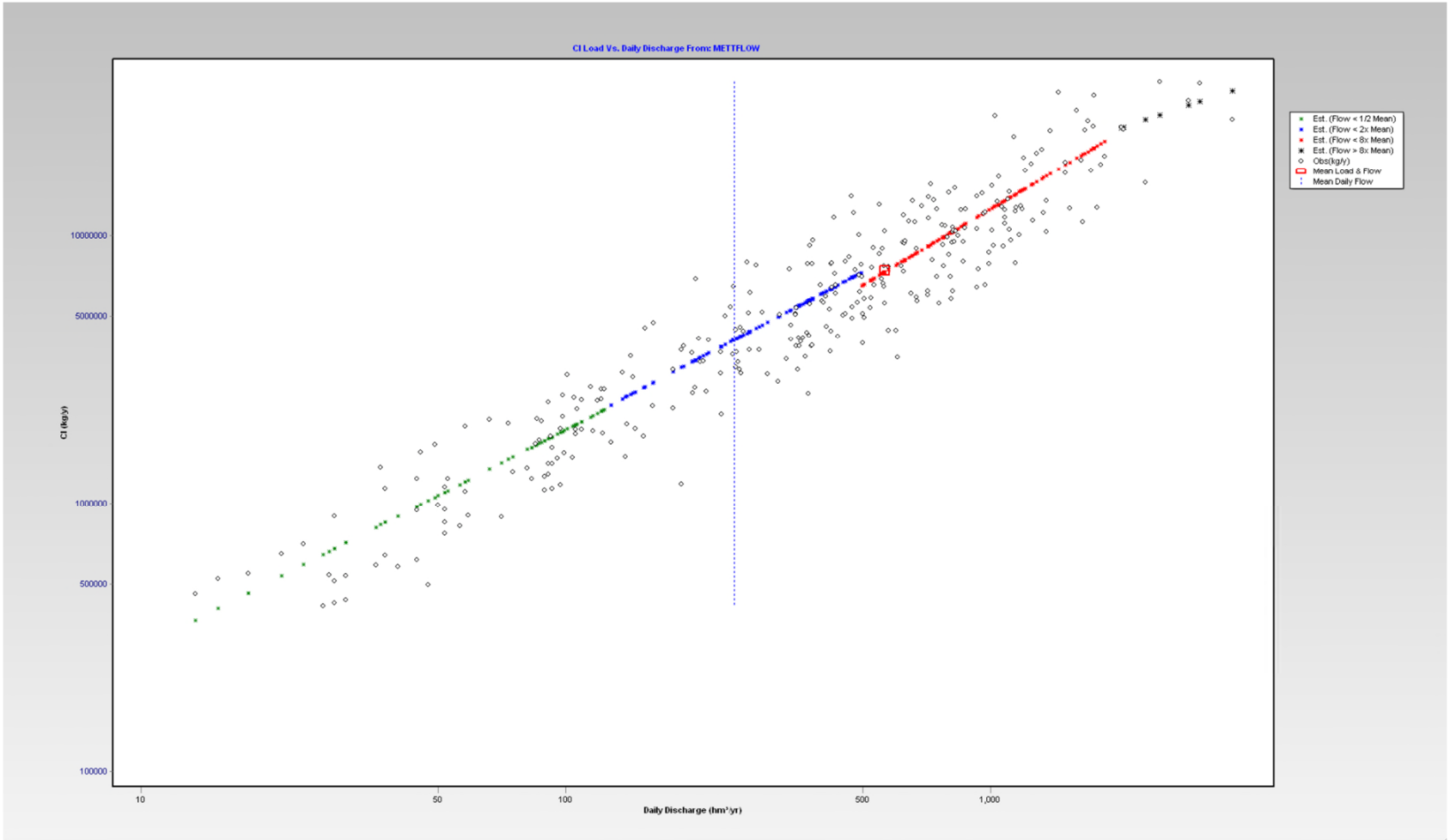


Figure A.22 Mettawee – FLUX Results - Discharge versus CL Load (CV=0.021, R^2=0.90)

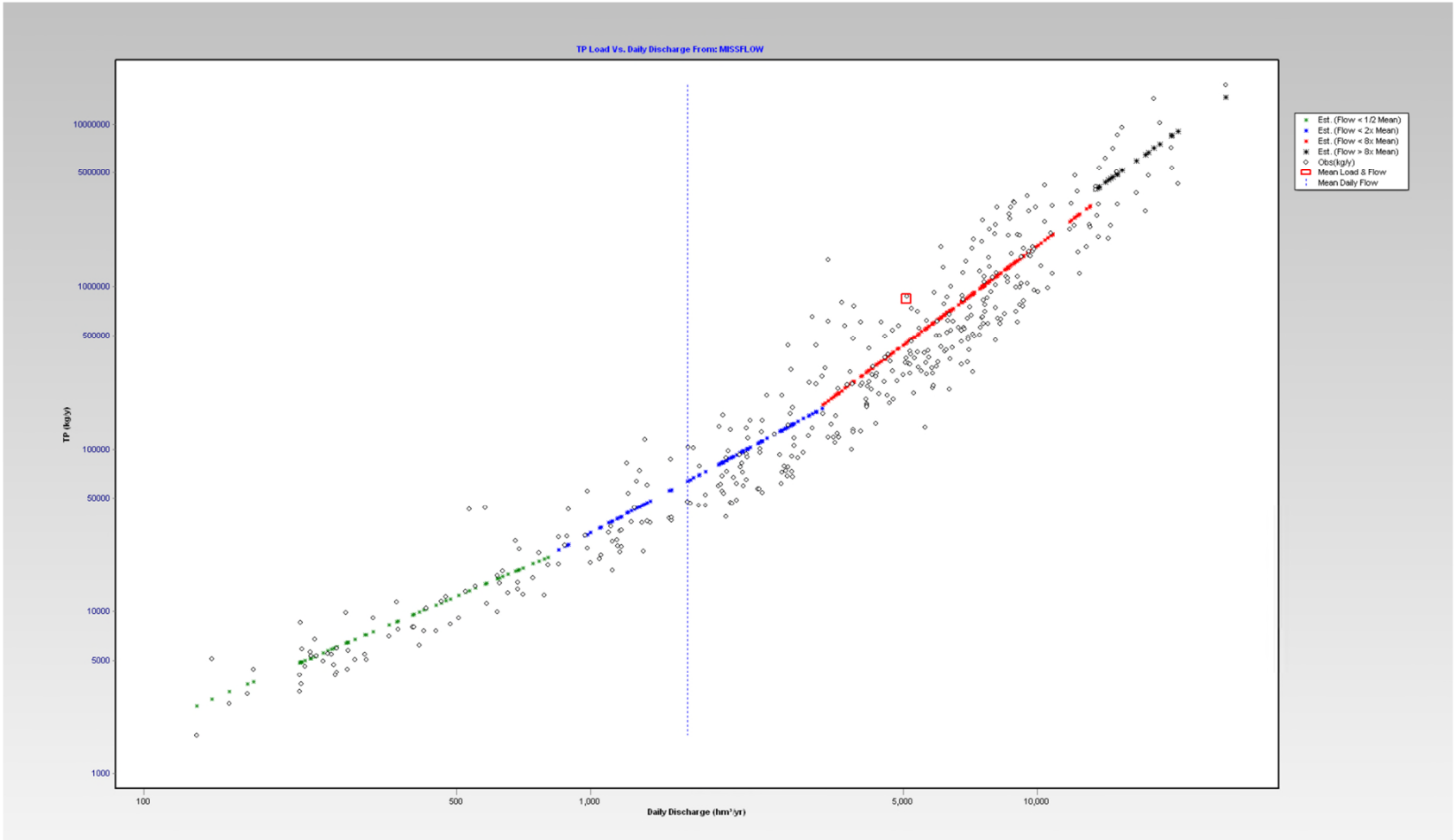


Figure A.23 Missisquoi – FLUX Results - Discharge versus TP Load (CV=0.040, R^2=0.90)

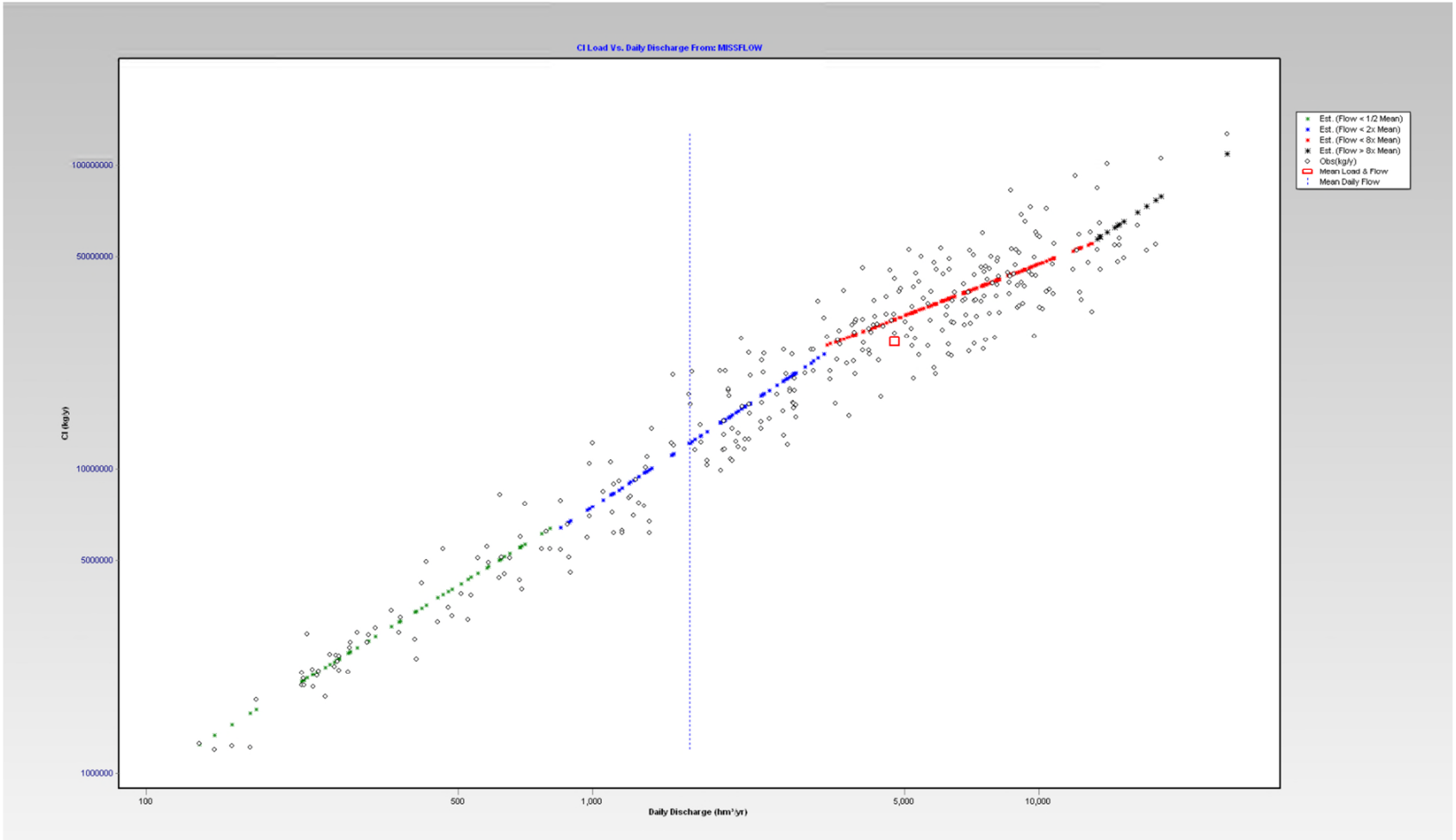


Figure A.24 Missisquoi – FLUX Results - Discharge versus CL Load (CV=0.016, R^2=0.95)

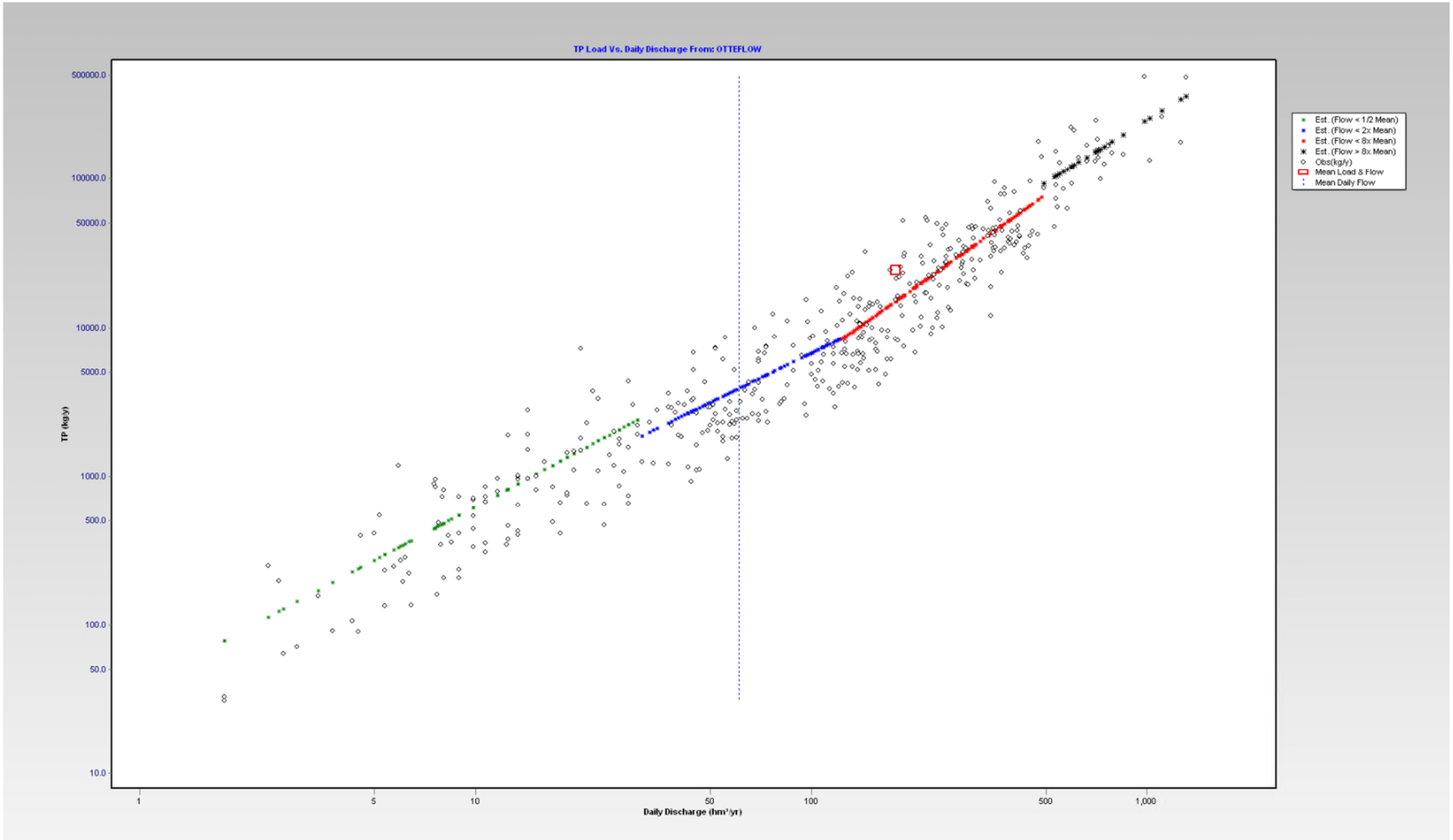


Figure A.25 Otter – FLUX Results - Discharge versus TP Load (CV=0.035, R^2=0.91)

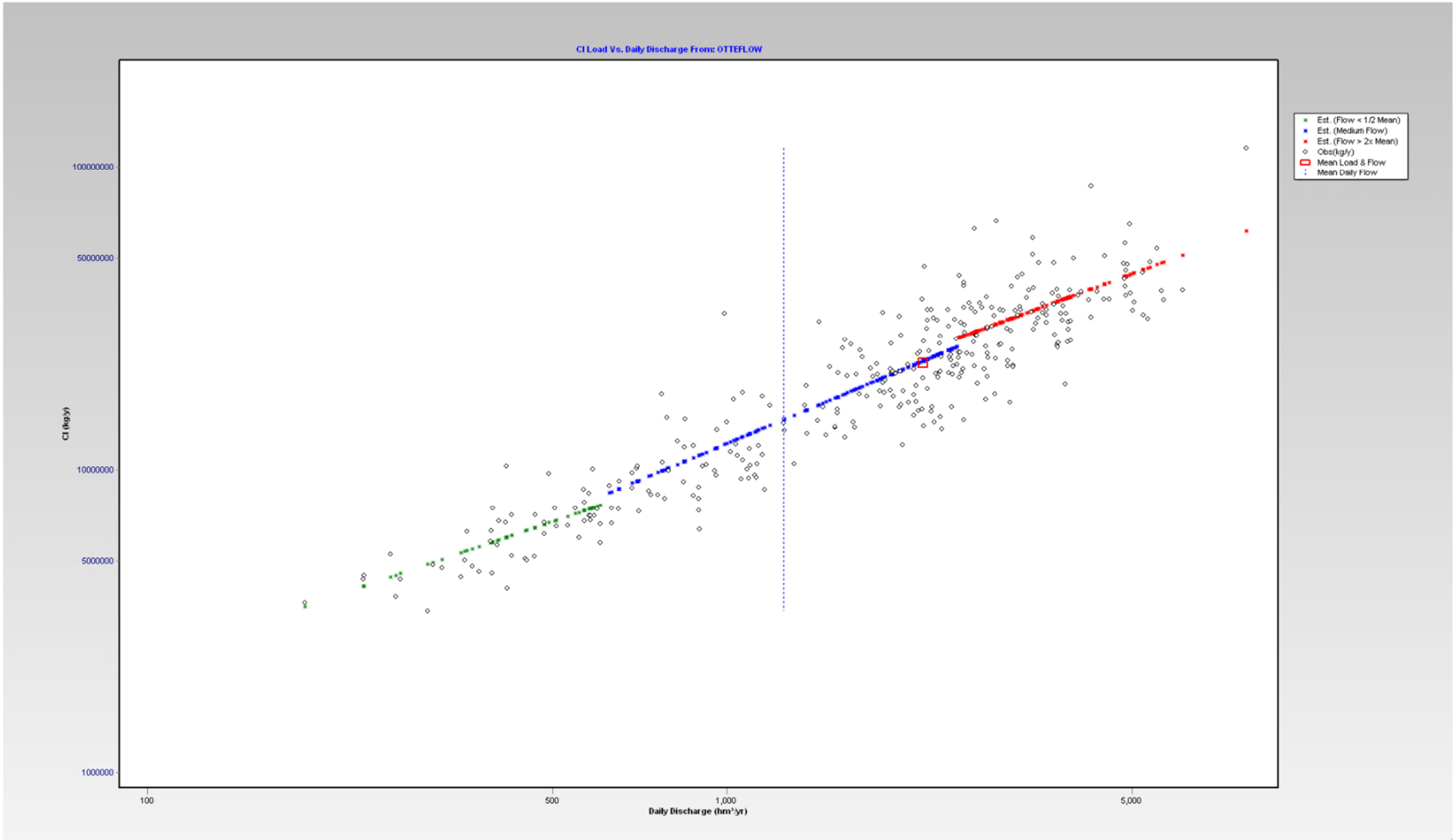


Figure A.26 Otter – FLUX Results - Discharge versus CL Load (CV=0.018, R^2=0.96)

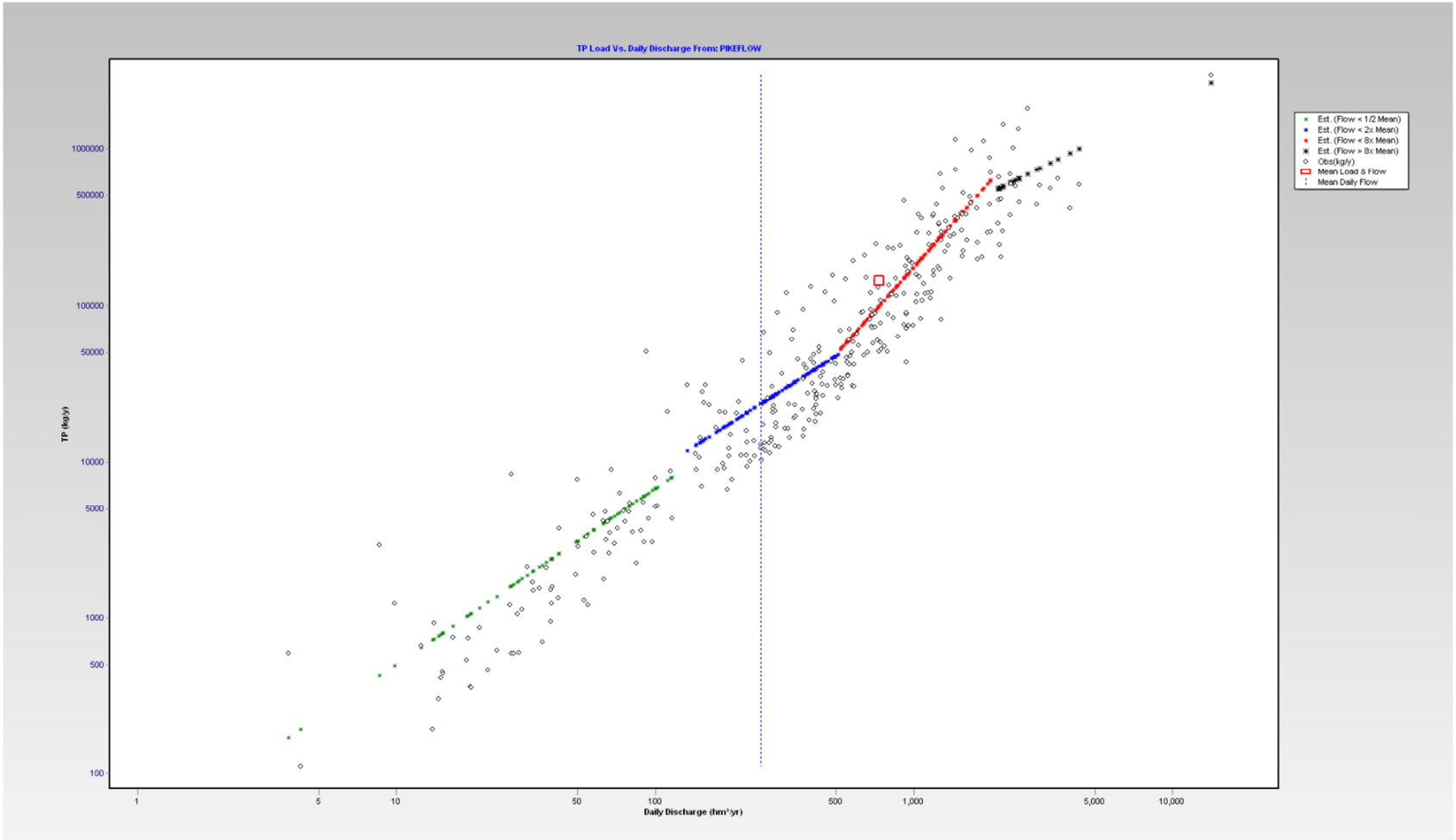


Figure A.27 Pike – FLUX Results - Discharge versus TP Load (CV=0.056, R^2=0.90)

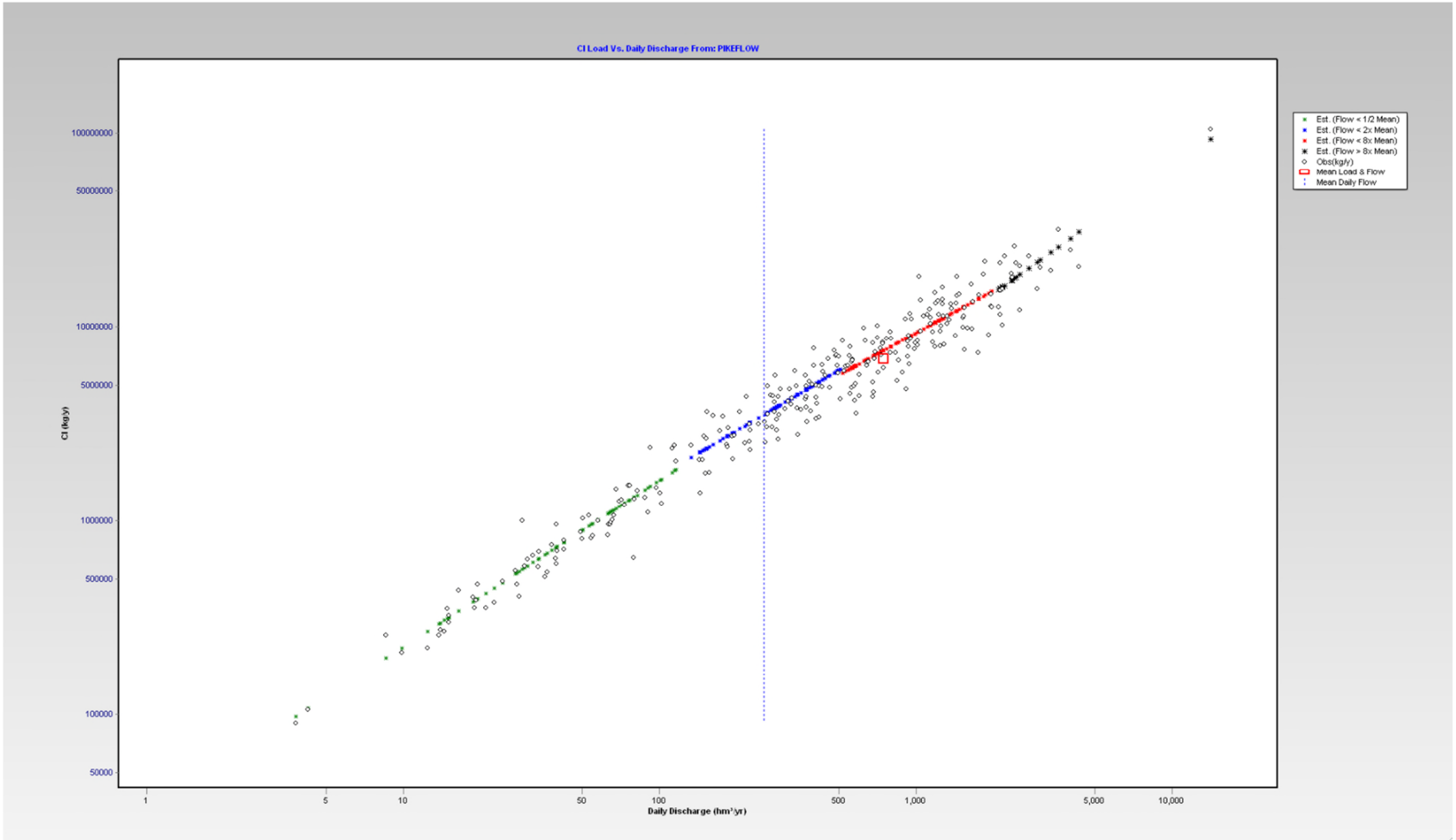


Figure A.28 Pike – FLUX Results - Discharge versus CL Load (CV=0.017, R^2=0.96)

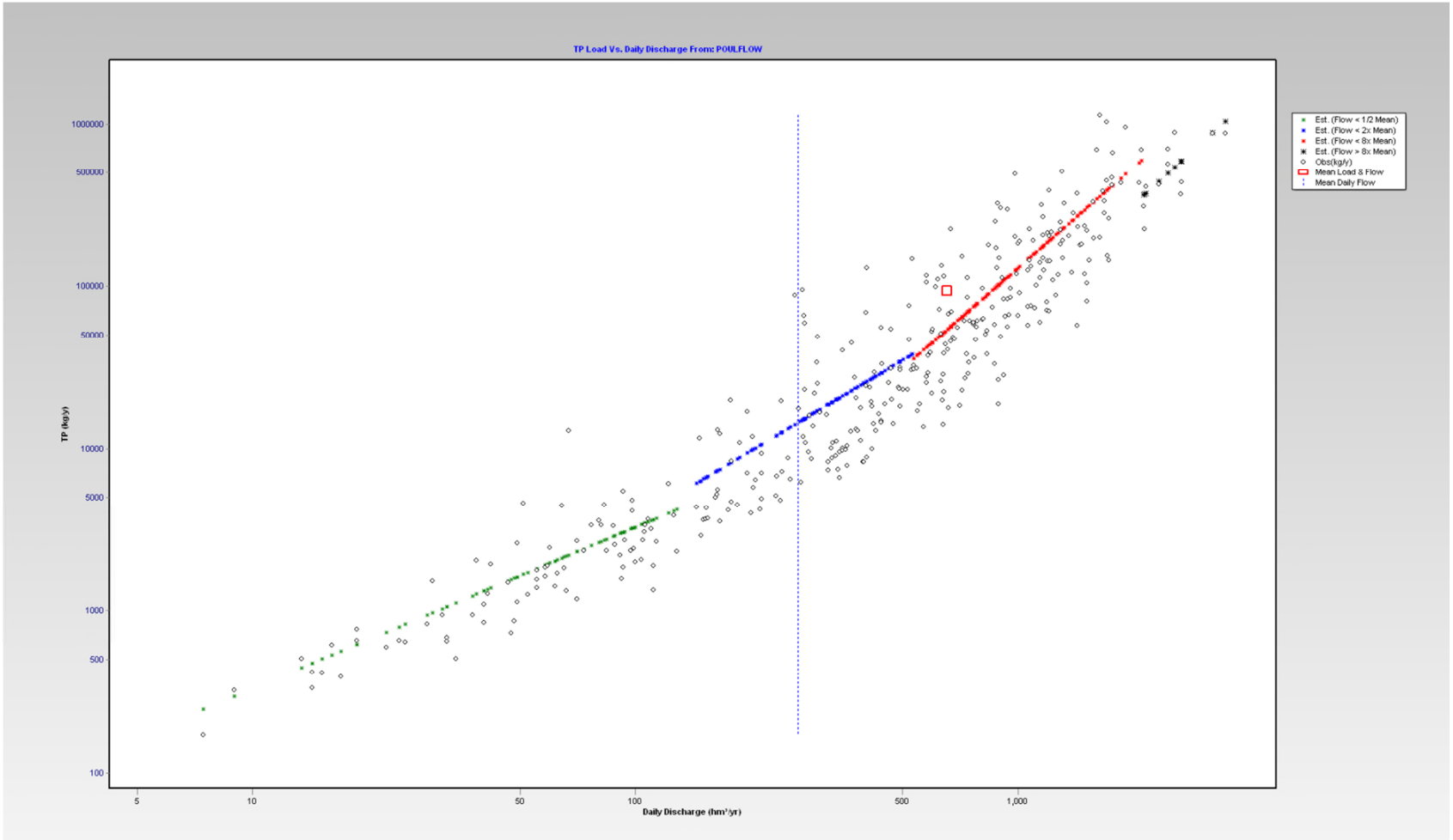


Figure A.29 Poultney – FLUX Results - Discharge versus TP Load (CV=0.043, R^2=0.89)

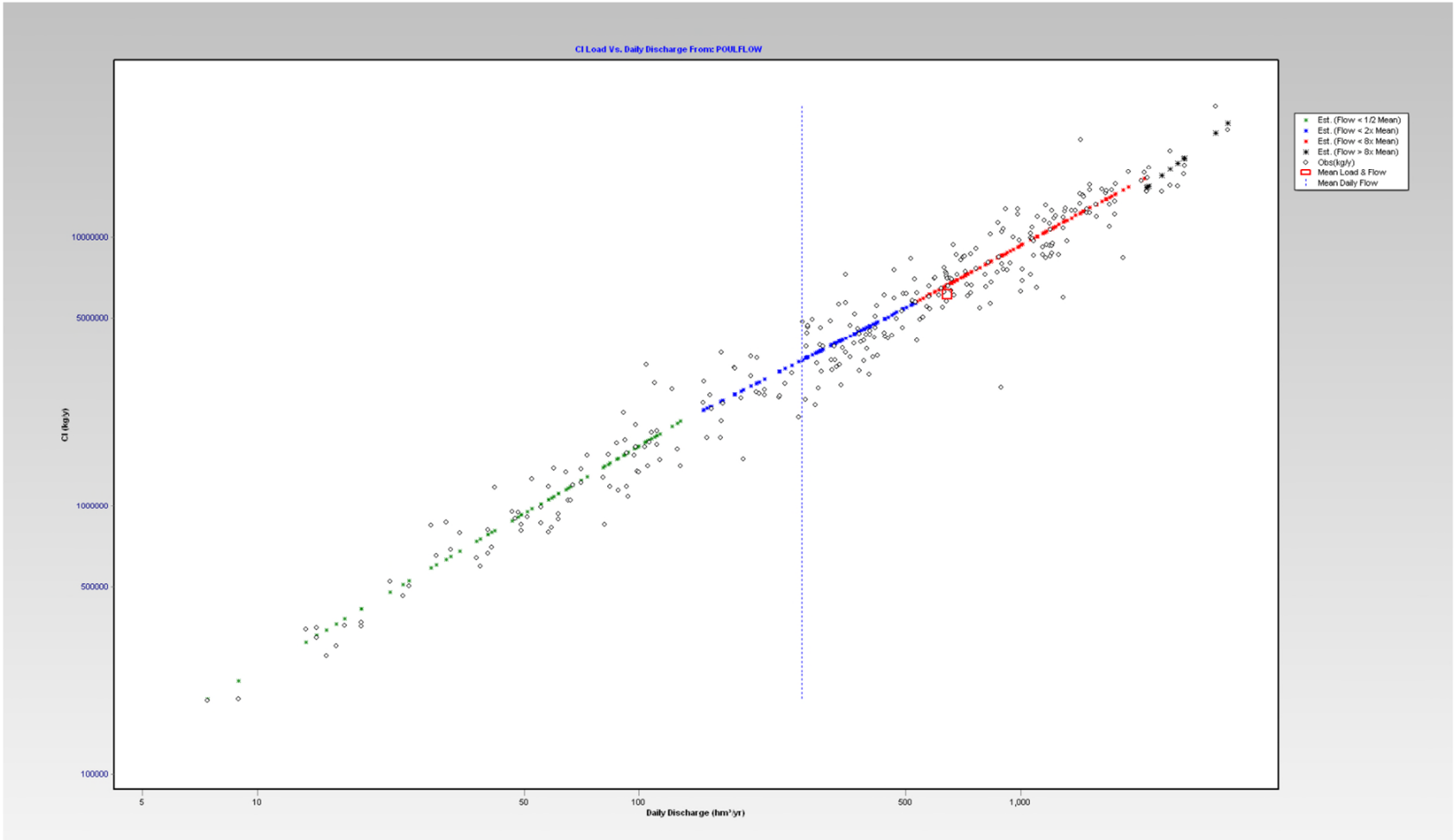


Figure A.30 Poultney – FLUX Results - Discharge versus CL Load (CV=0.015, R^2=0.96)

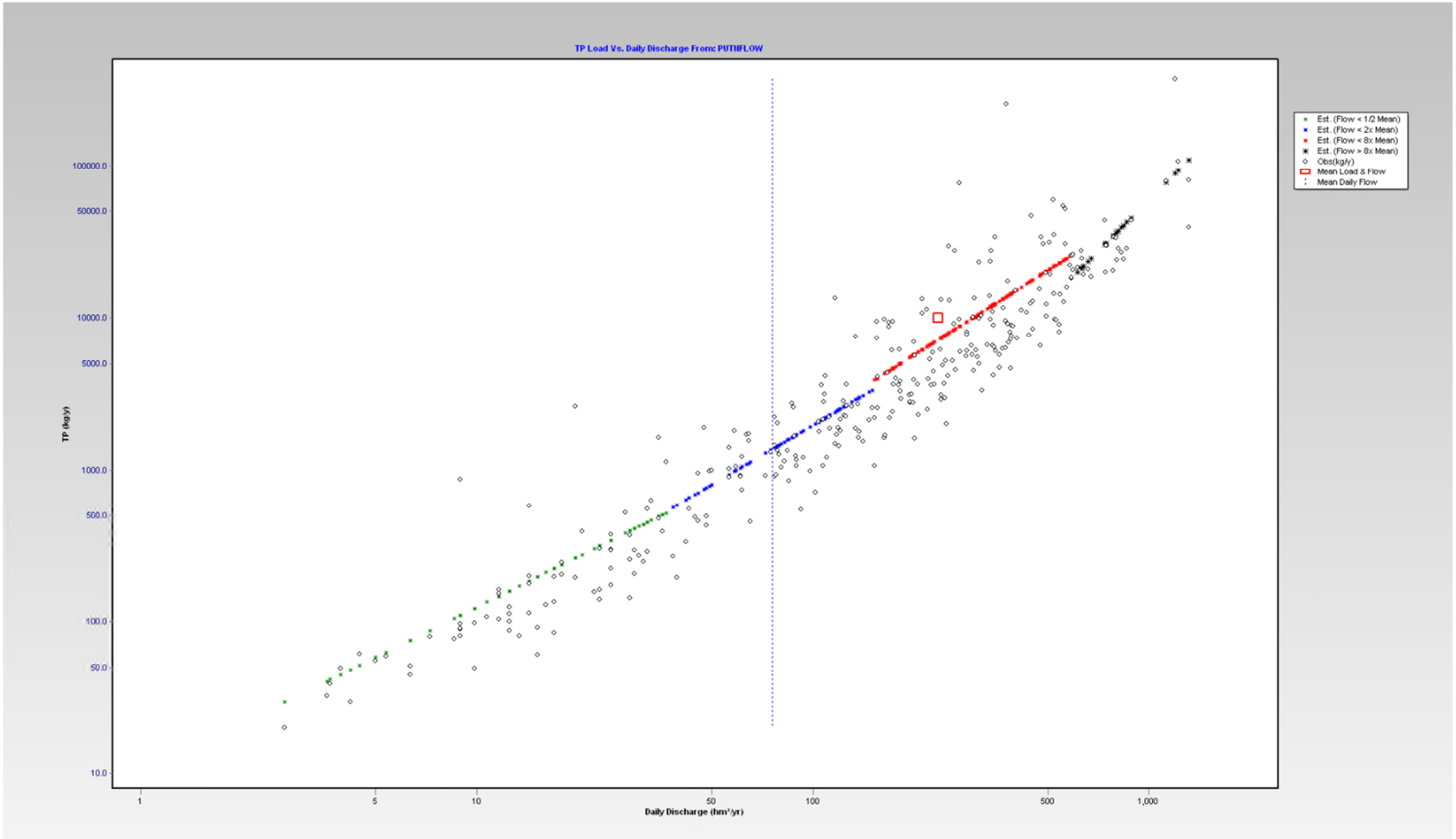


Figure A.31 Putnam – FLUX Results - Discharge versus TP Load (CV=0.067, R^2=0.90)

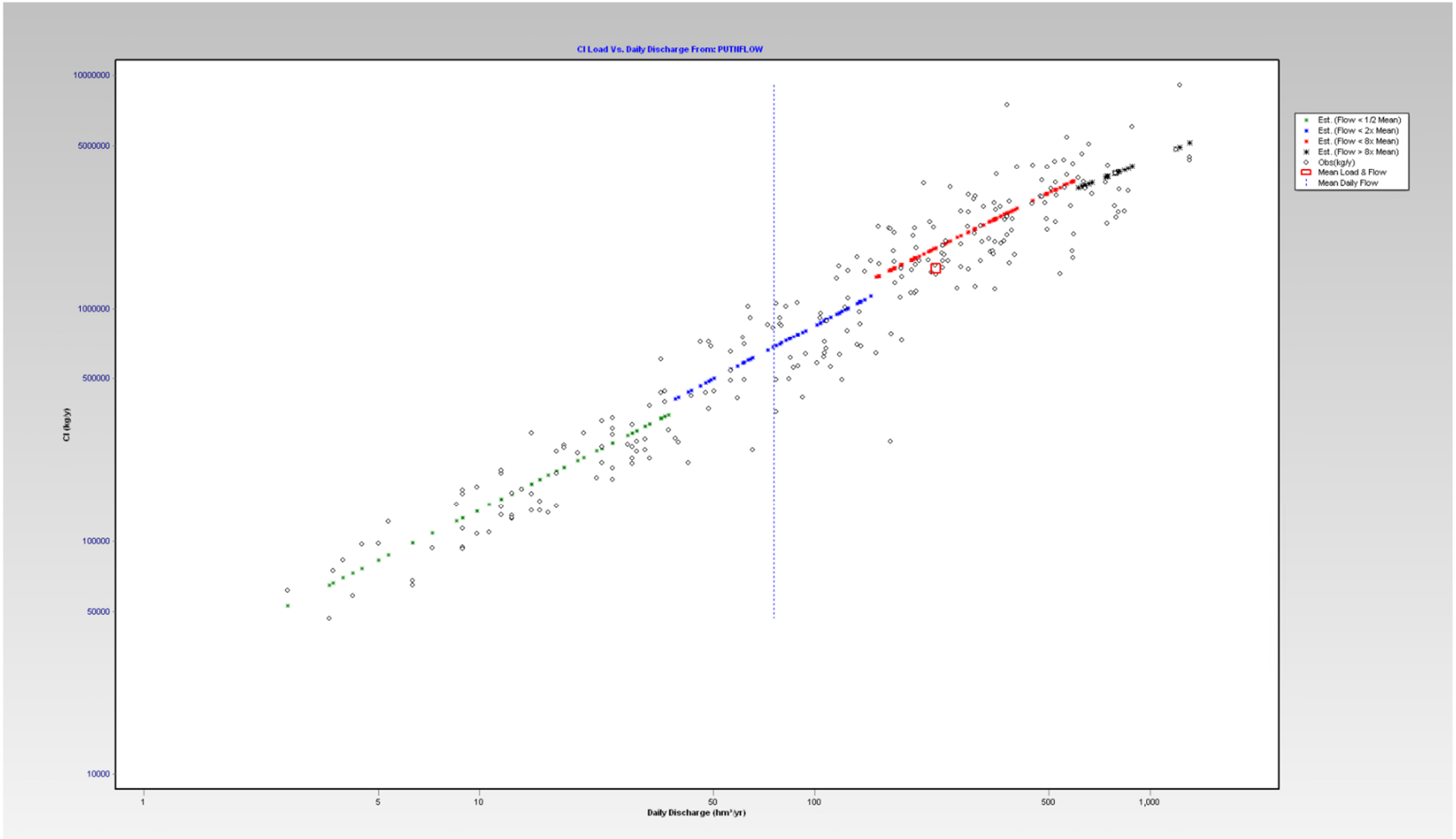


Figure A.32 Putnam – FLUX Results - Discharge versus CL Load (CV=0.025, R^2=0.92)

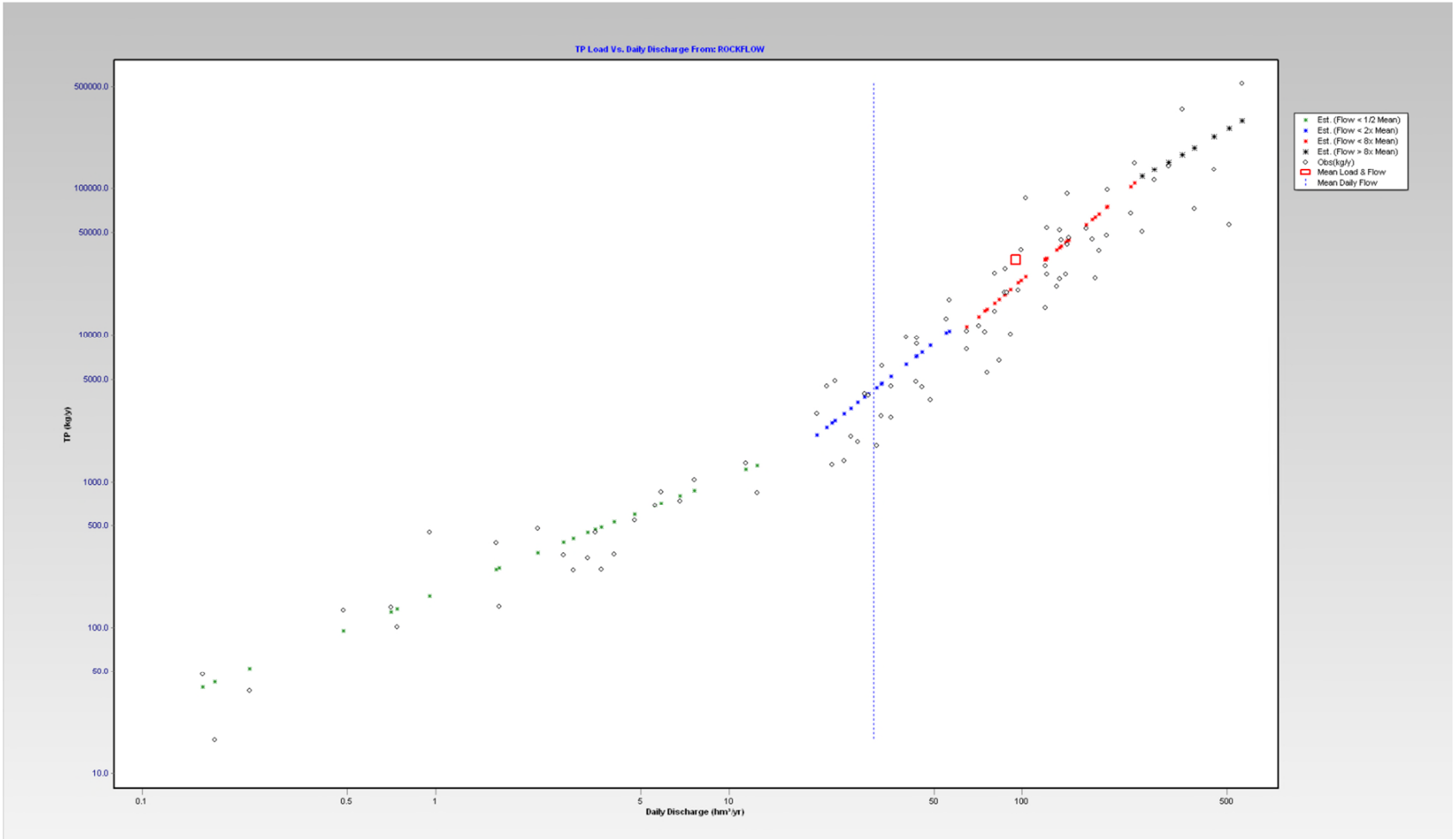


Figure A.33 Rock – FLUX Results - Discharge versus TP Load (CV=0.131, R^2=0.93)

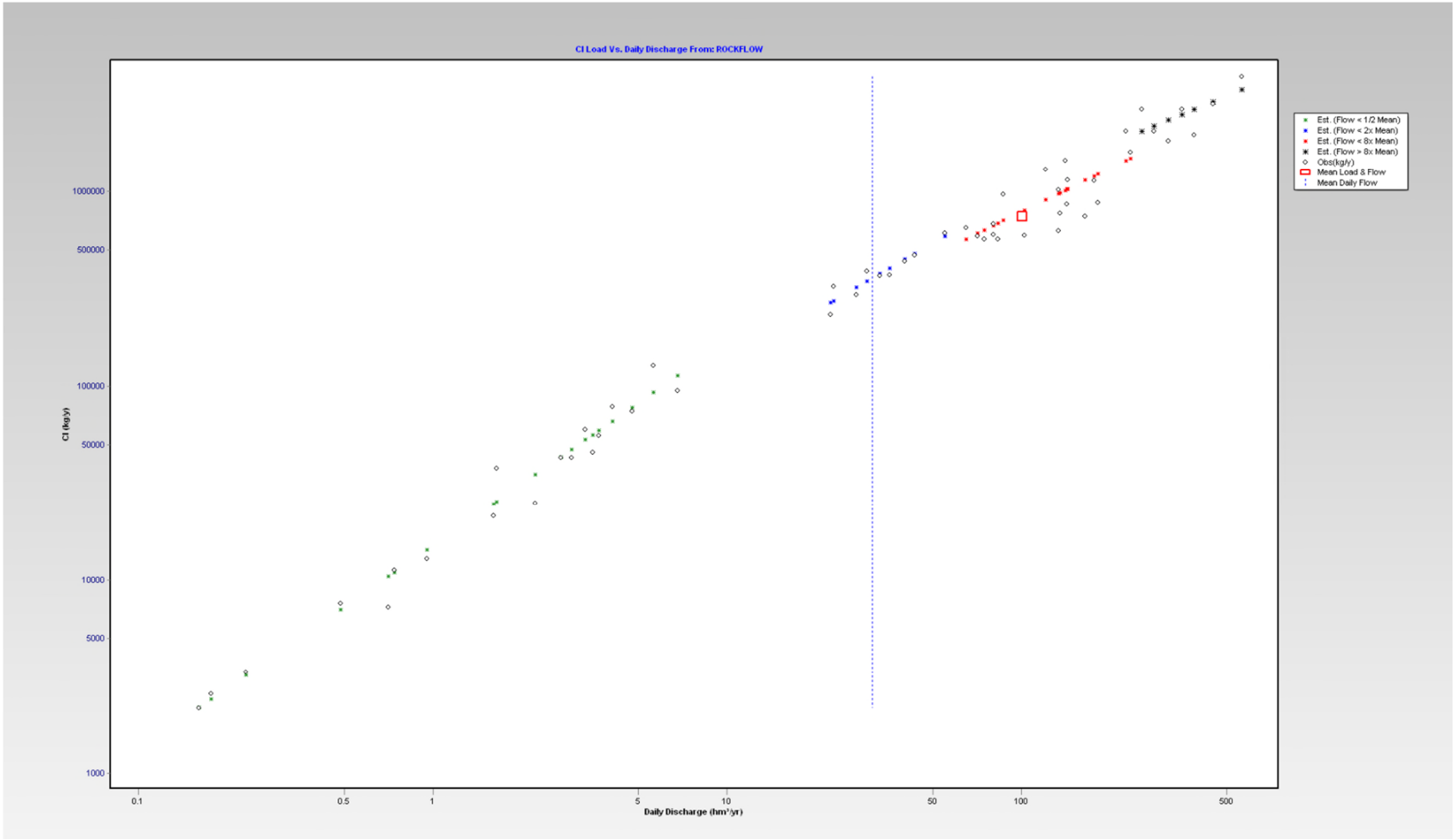


Figure A.34 Rock – FLUX Results - Discharge versus CL Load (CV=0.033, R^2=0.98)

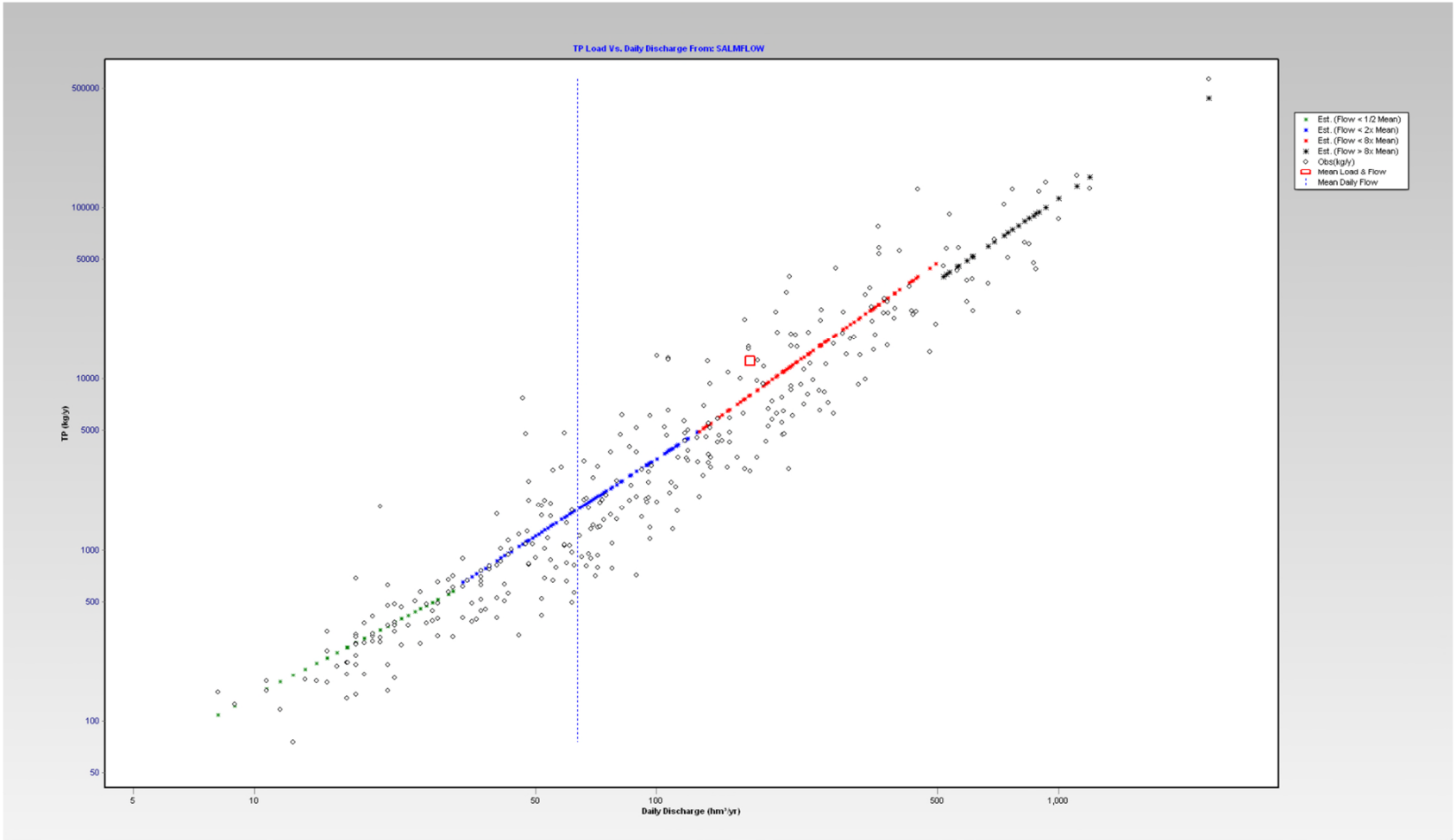


Figure A.35 Salmon – FLUX Results - Discharge versus TP Load (CV=0.044, R^2=0.91)

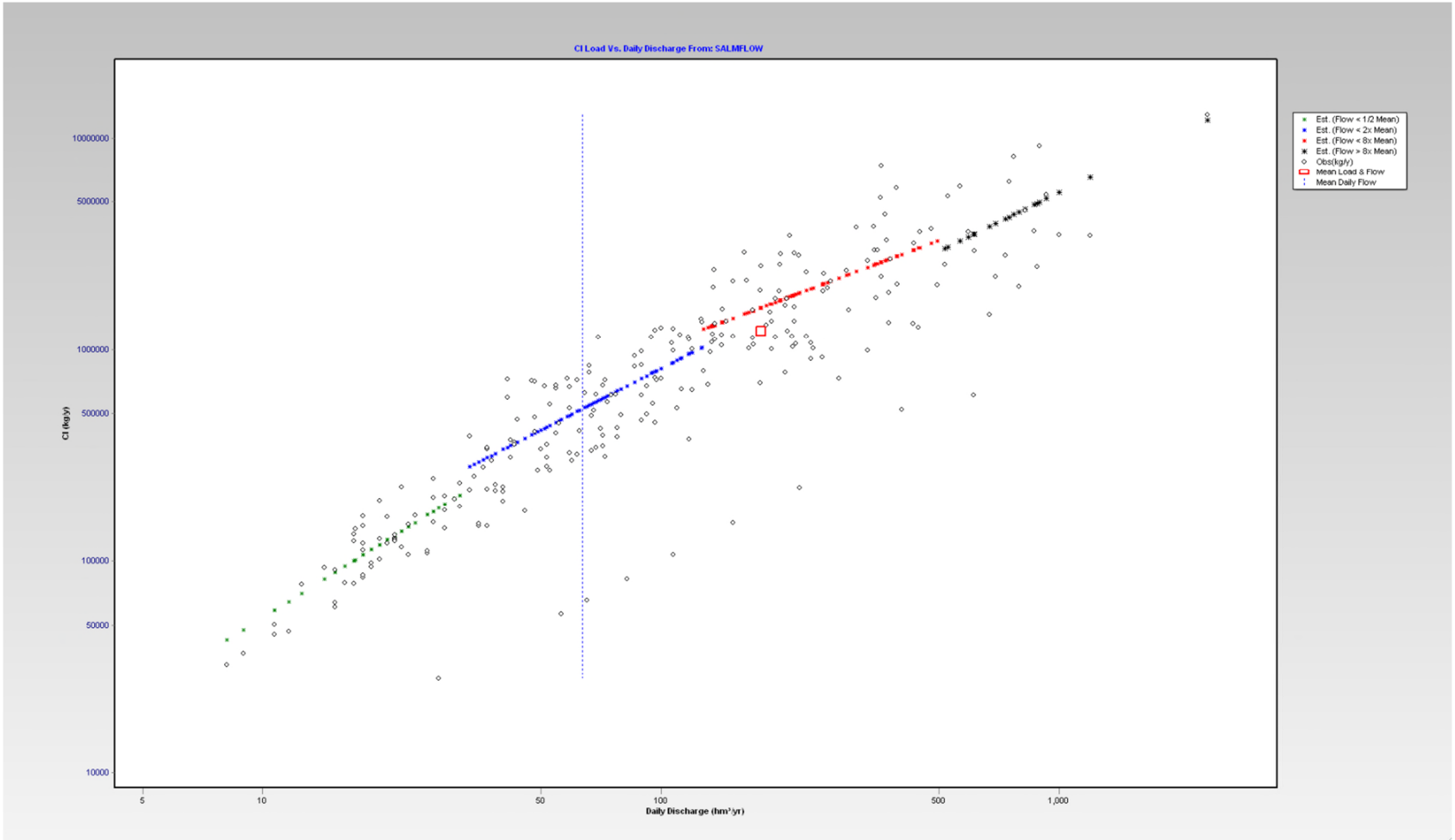


Figure A.36 Salmon – FLUX Results - Discharge versus CL Load (CV=0.029, R^2=0.81)

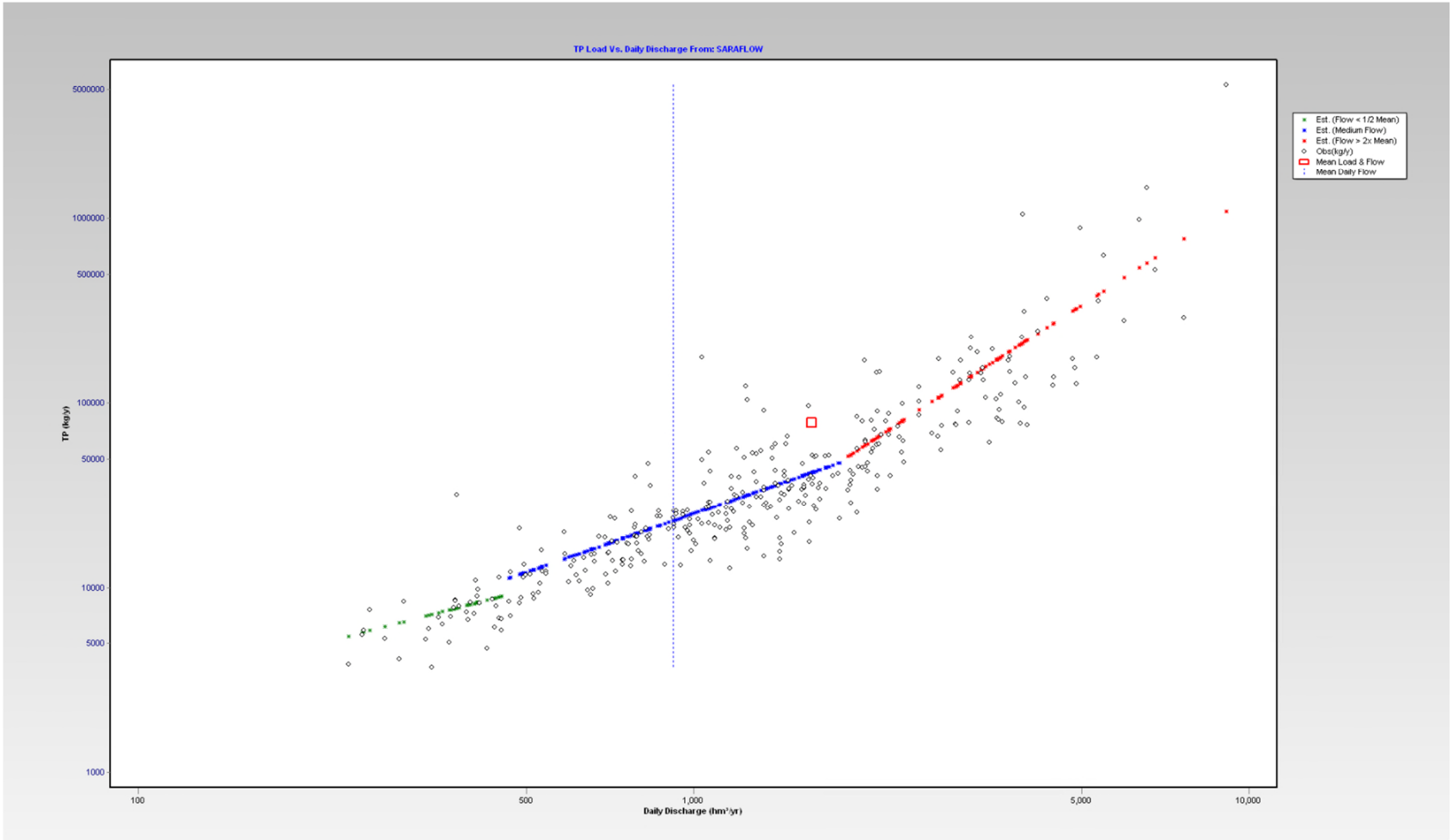


Figure A.37 Saranac– FLUX Results - Discharge versus TP Load (CV=0.037, R^2=0.82)

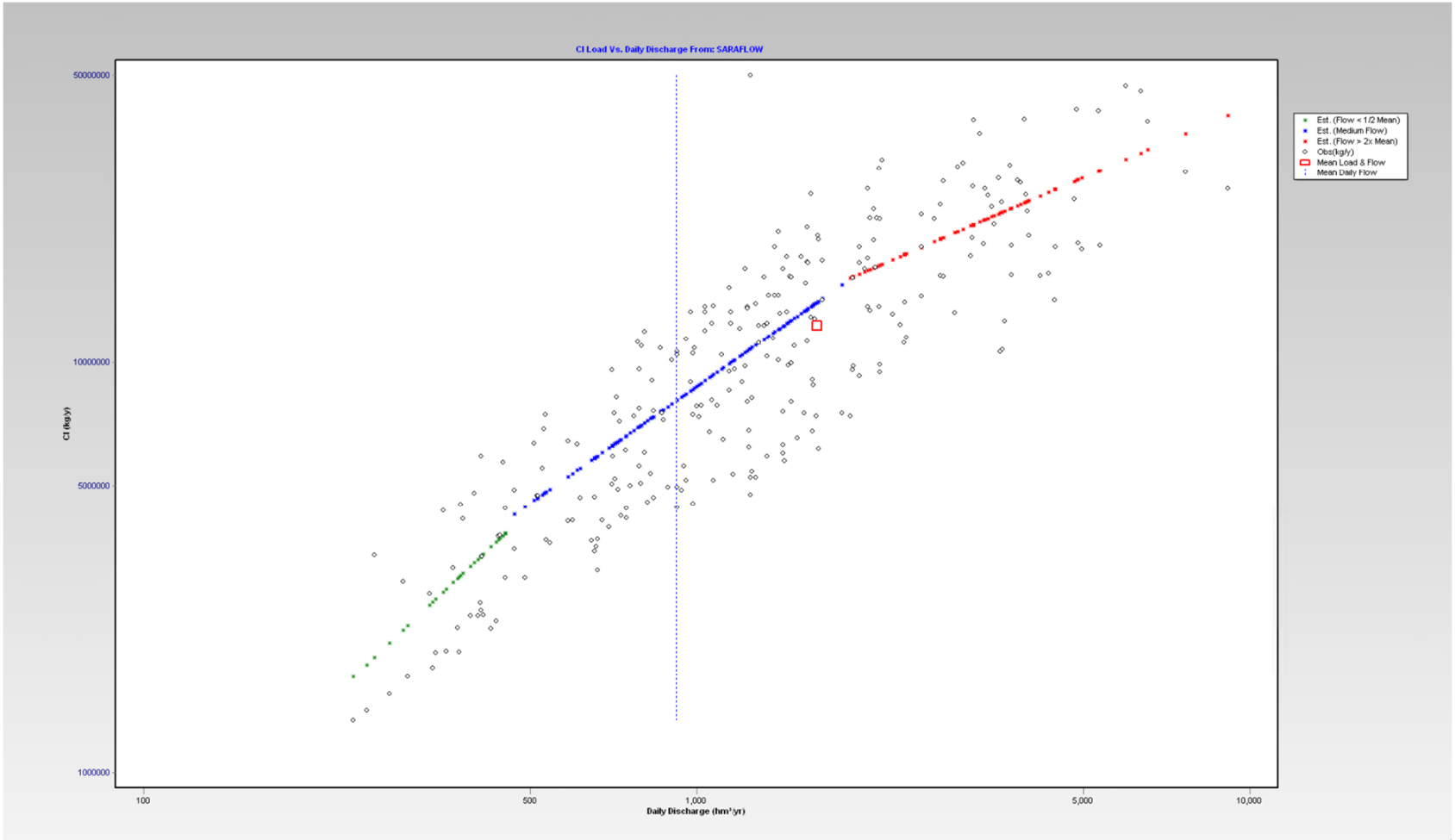


Figure A.38 Saranac– FLUX Results - Discharge versus CL Load (CV=0.025, R^2=0.75)

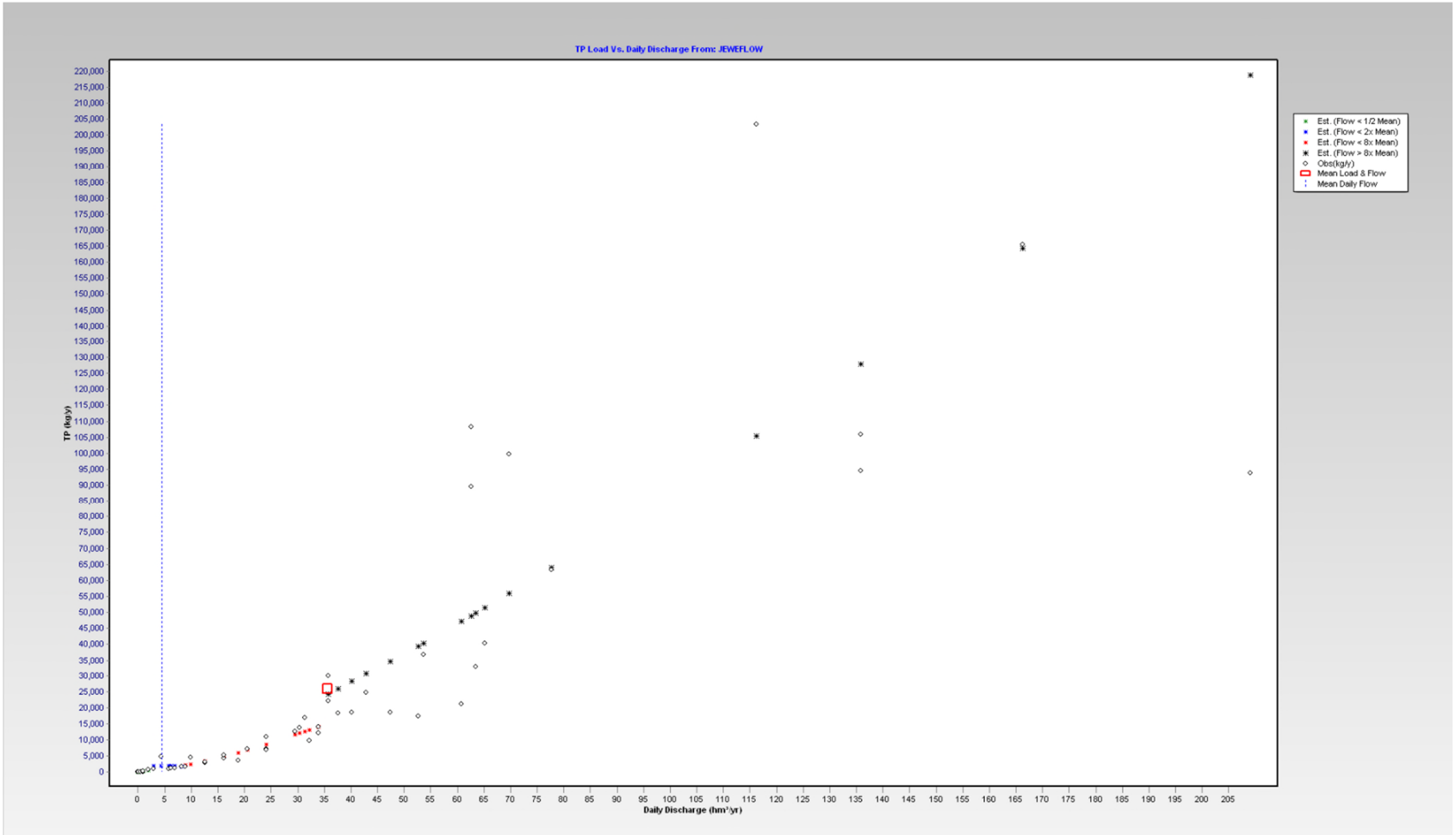


Figure A.39 Stevens– FLUX Results - Discharge versus TP Load (CV=0.155, R^2=0.80)

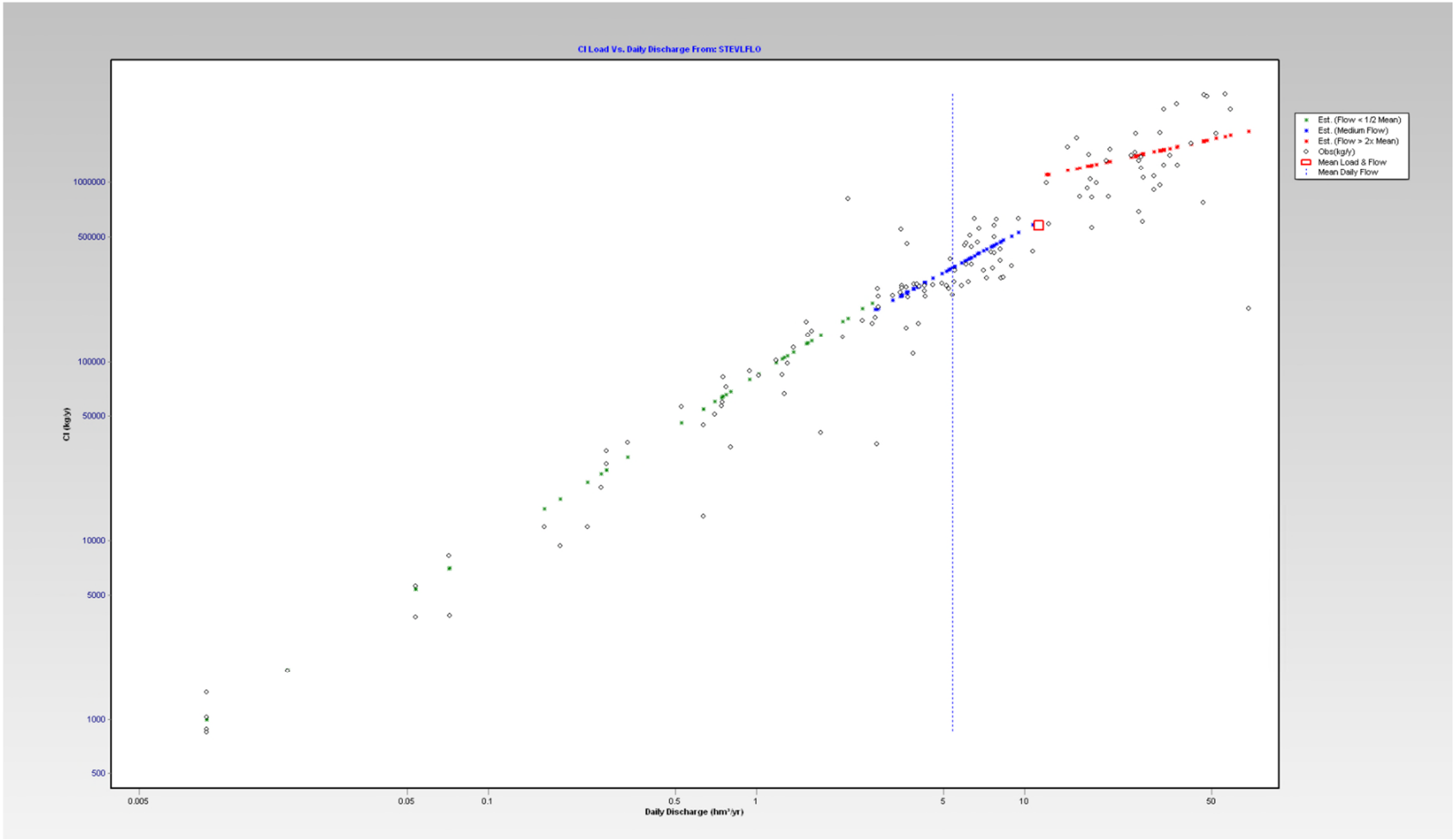


Figure A.40 Stevens– FLUX Results - Discharge versus CL Load (CV=0.150, R^2=0.80)

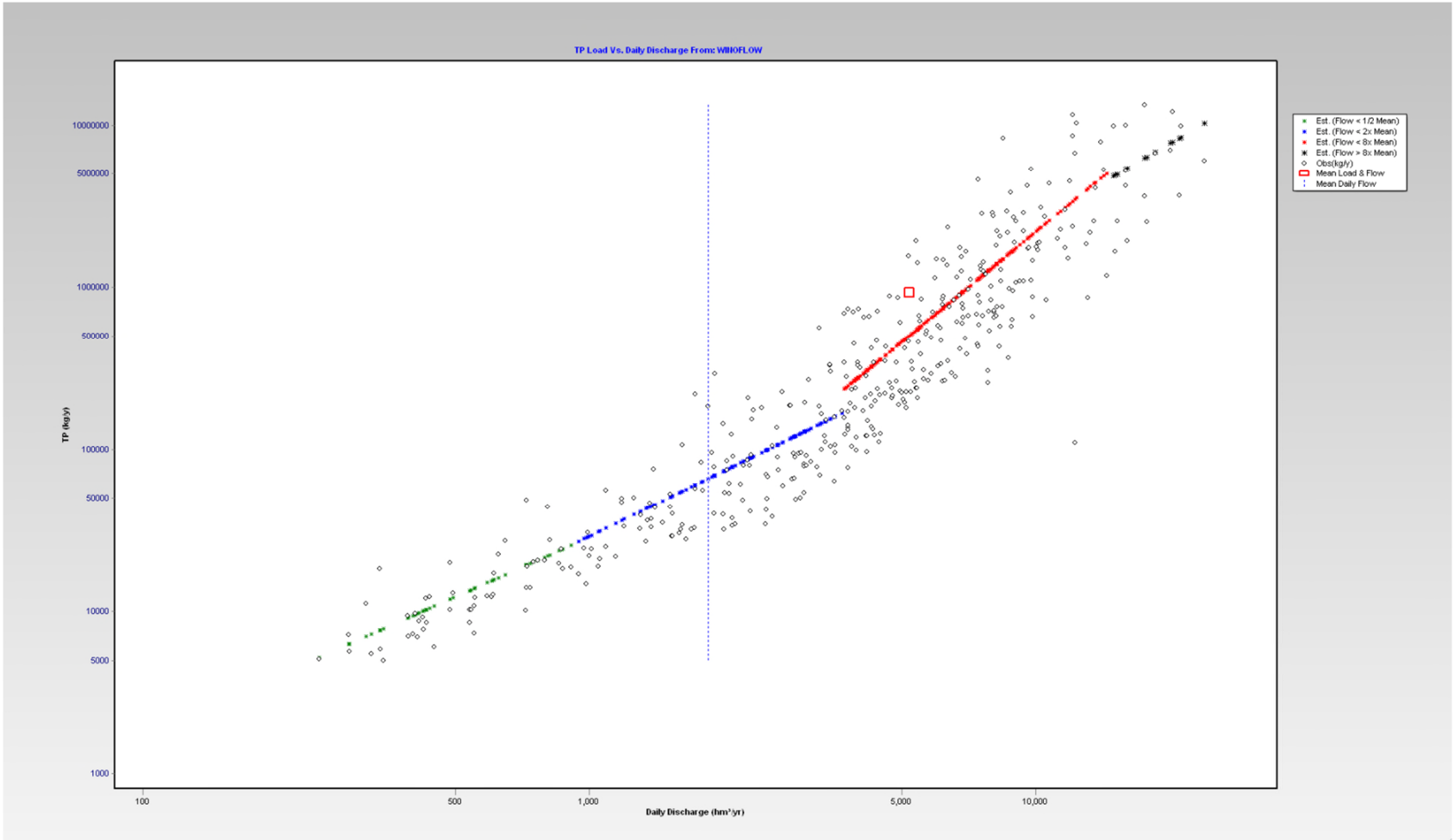


Figure A.41 Winooski– FLUX Results - Discharge versus TP Load (CV=0.047, R^2=0.87)

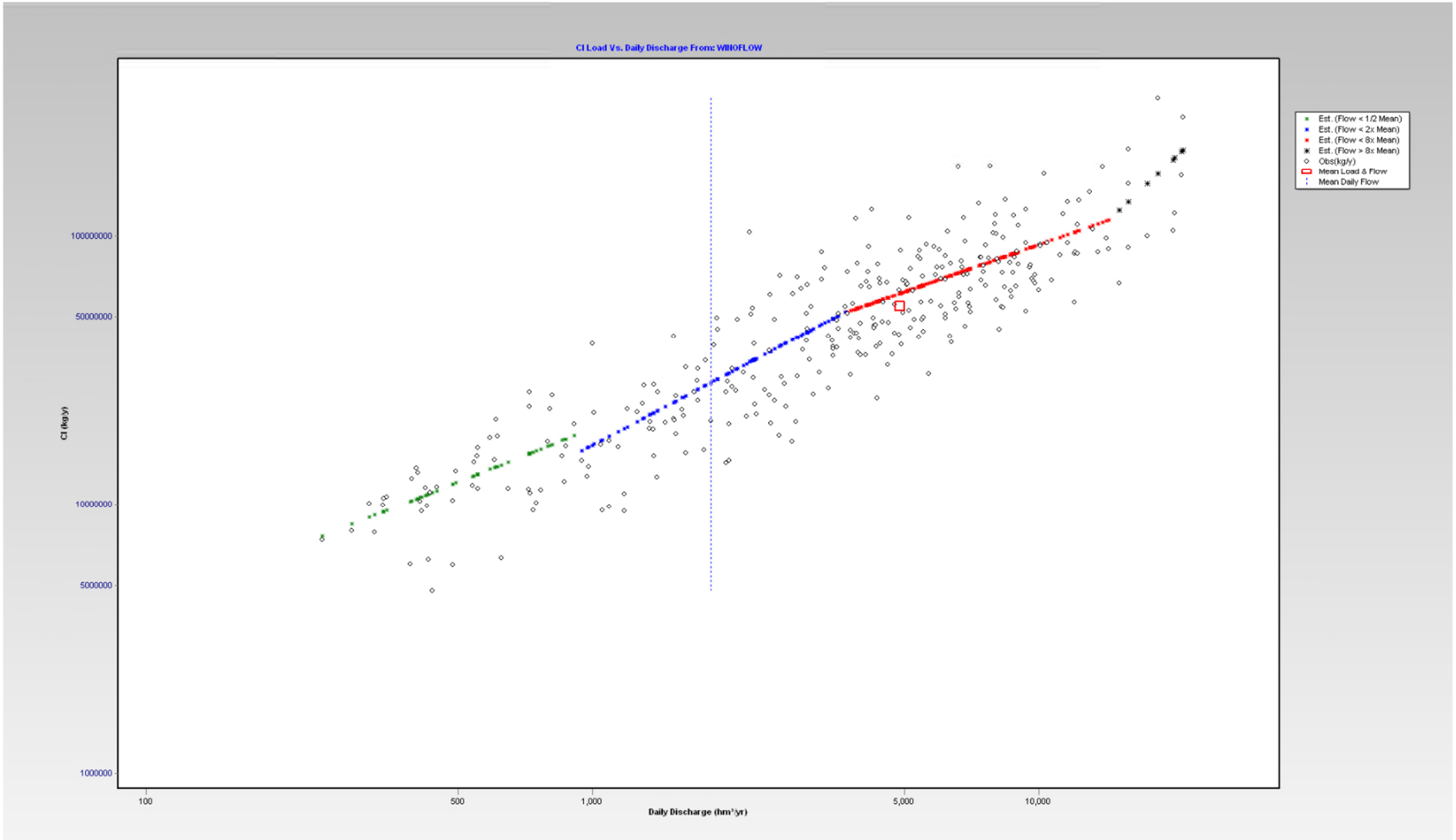


Figure A.42 Winooski– FLUX Results - Discharge versus CL Load (CV=0.025, R^2=0.81)

Appendix B

BATHTUB Calibration Baseline Inputs

Table B-1 presents baseline (2001-2010 average) flows, loads (and/or flow-weighted concentrations), and CV values used as inputs to calibrate the model, including the monitored FLUX tributary inputs, the unmonitored area estimates from SWAT, the wastewater inputs from each facility discharging directly to the lake segment, and withdrawals.

Table B-1. Flows, Loads, Concentrations and CV values used as Inputs for the BATHTUB Calibration (2001-2010)

Tributary Name	Tributary Type	Segment Number	Flow (hm3/yr) Mean	CV	Conserv. Subst (mg/L) Mean	CV	Total P (ppb) Mean	CV	Ortho P (ppb) Mean	CV	Input Source
Mettawee	Tributary	1	615.39	0.050	18.17	0.021	78.08	0.129	29.29	0.069	Monitored FLUX estimate
Poultney	Tributary	1	386.87	0.050	12.24	0.015	88.98	0.168	21.71	0.069	Monitored FLUX estimate
Segment 1 Ungaged	Tributary	1	142.32	0.200	11.99	0.200	56.25	0.168	13.73	0.069	From SWAT Model
Putnam	Tributary	2	89.35	0.050	10.30	0.025	26.08	0.125	8.56	0.069	Monitored FLUX estimate
Segment 2 Ungaged	Tributary	2	640.04	0.200	10.30	0.200	65.17	0.125	21.39	0.069	From SWAT Model
Segment 3 Ungaged	Tributary	3	145.48	0.200	13.80	0.200	94.38	0.111	49.89	0.069	From SWAT Model
Lewis	Tributary	4	98.98	0.050	8.94	0.014	95.09	0.112	23.01	0.069	Monitored FLUX estimate
L. Otter	Tributary	4	74.72	0.050	13.80	0.018	134.10	0.111	70.89	0.069	Monitored FLUX estimate
Otter	Tributary	4	1637.83	0.050	12.96	0.018	70.98	0.125	33.69	0.069	Monitored FLUX estimate
Segment 4 Ungaged	Tributary	4	30.14	0.200	13.80	0.200	166.94	0.111	88.25	0.069	From SWAT Model
Ausable	Tributary	5	805.30	0.050	12.40	0.034	42.11	0.198	10.04	0.069	Monitored FLUX estimate
Bouquet	Tributary	5	339.08	0.050	16.43	0.024	60.76	0.159	13.76	0.069	Monitored FLUX estimate
L. Ausable	Tributary	5	52.58	0.050	14.03	0.024	72.10	0.121	37.15	0.069	Monitored FLUX estimate
Salmon	Tributary	5	60.67	0.050	9.52	0.029	37.08	0.107	14.76	0.069	Monitored FLUX estimate
Winooski	Tributary	5	1855.38	0.050	19.54	0.025	82.57	0.142	12.38	0.069	Monitored FLUX estimate
Segment 5 Ungaged	Tributary	5	300.38	0.200	9.52	0.200	40.53	0.107	16.13	0.069	From SWAT Model
LaPlatte	Tributary	6	55.76	0.050	26.49	0.028	117.72	0.119	65.97	0.069	Monitored FLUX estimate
Segment 6 Ungaged	Tributary	6	21.61	0.200	26.53	0.200	141.38	0.119	79.23	0.069	From SWAT Model
Segment 7 Ungaged	Tributary	7	4.50	0.200	26.21	0.200	186.08	0.119	104.28	0.069	From SWAT Model
Saranac	Tributary	8	917.05	0.050	10.71	0.025	27.40	0.072	11.55	0.069	Monitored FLUX estimate
Segment 8 Ungaged	Tributary	8	50.71	0.200	9.96	0.200	148.71	0.072	62.70	0.069	From SWAT Model
Lamoille	Tributary	9	1346.94	0.050	10.13	0.020	38.90	0.104	11.32	0.069	Monitored FLUX estimate
Segment 9 Ungaged	Tributary	9	58.32	0.200	10.03	0.200	68.05	0.104	19.79	0.069	From SWAT Model
Segment 10 Ungaged	Tributary	10	206.19	0.200	10.03	0.200	88.09	0.104	25.612	0.069	From SWAT Model
Jewet	Tributary	11	4.01	0.050	30.27	0.125	397.22	0.289	316.07	0.069	Monitored FLUX estimate

Tributary Name	Tributary Type	Segment Number	Flow (hm3/yr) Mean	CV	Conserv. Subst (mg/L) Mean	CV	Total P (ppb) Mean	CV	Ortho P (ppb) Mean	CV	Input Source
Stevens	Tributary	11	12.37	0.200	54.01	0.150	569.90	0.204	219.47	0.069	Monitored FLUX estimate
Segment 11 Ungaged	Tributary	11	35.37	0.200	30.27	0.200	143.88	0.289	114.48	0.069	From SWAT Model
Missisquoi	Tributary	12	1723.87	0.050	7.03	0.016	83.44	0.117	21.02	0.069	Monitored FLUX estimate
Pike	Tributary	12	352.38	0.050	12.56	0.017	112.20	0.109	50.78	0.069	Monitored FLUX estimate
Rock	Tributary	12	64.13	0.200	9.87	0.033	264.94	0.127	76.44	0.069	Monitored FLUX estimate
Segment 12 Ungaged	Tributary	12	61.51	0.200	6.96	0.200	125.57	0.117	31.64	0.069	From SWAT Model
Great Chazy	Tributary	13	385.32	0.050	15.53	0.020	64.35	0.135	32.92	0.069	Monitored FLUX estimate
L. Chazy	Tributary	13	59.24	0.050	19.27	0.021	83.89	0.172	59.66	0.069	Monitored FLUX estimate
Segment 13 Ungaged	Tributary	13	97.87	0.200	15.42	0.200	115.9933	0.135	58.99	0.069	From SWAT Model
Crown Point	Point Source	2	0.05	0.050	99.96	0.100	3214.40	0.100	3214.40	0.069	Wastewater Input
International Paper	Point Source	2	22.21	0.050	414.84	0.046	196.70	0.170	196.70	0.069	Wastewater Input
Ticonderoga	Point Source	2	1.63	0.050	95.96	0.244	1288.78	0.170	1288.78	0.069	Wastewater Input
Orwell	Point Source	2	0.03	0.050	99.96	0.100	2955.74	0.100	2955.74	0.069	Wastewater Input
Port Henry	Point Source	3	0.70	0.050	55.98	0.137	1907.17	0.110	1907.17	0.069	Wastewater Input
Westport	Point Source	3	0.18	0.050	77.97	0.068	1891.60	0.130	1891.60	0.069	Wastewater Input
Vergennes	Point Source	4	0.53	0.050	69.97	0.068	344.87	0.200	344.87	0.069	Wastewater Input
Peru-Valcour	Point Source	5	0.01	0.050	99.96	0.100	2450.42	0.100	2450.42	0.069	Wastewater Input
Burlington North	Point Source	5	1.57	0.050	70.97	0.054	375.52	0.100	375.52	0.069	Wastewater Input
Weed Fish Culture Station	Point Source	5	8.79	0.050	99.96	0.100	35.13	0.100	35.13	0.069	Wastewater Input
Shelburne No1	Point Source	6	0.46	0.050	100.96	0.042	372.10	0.160	372.10	0.069	Wastewater Input
Shelburne No2	Point Source	6	0.47	0.050	118.95	0.100	383.89	0.100	383.89	0.069	Wastewater Input
S. Burlington Bart. Bay	Point Source	6	0.81	0.050	117.96	0.076	234.58	0.180	234.58	0.069	Wastewater Input
Burlington Main	Point Source	7	6.04	0.050	103.96	0.078	468.83	0.120	468.83	0.069	Wastewater Input
Burlington Main WWTP	Point Source	7	0.59	0.200	26.21	0.200	1468.64	0.119	822.99	0.069	Wastewater Input - CSO Facility
Champlain Park	Point Source	8	0.14	0.050	149.89	0.157	2938.23	0.200	2938.23	0.069	Wastewater Input
Plattsburgh	Point Source	8	7.90	0.050	75.97	0.061	1130.74	0.150	1130.74	0.069	Wastewater Input
Brown Ledge Camp	Point Source	9	0.00	0.050	99.96	0.100	2004.07	0.100	2004.07	0.069	Wastewater Input
Northwest State Correction	Point Source	11	0.04	0.020	55.98	0.050	138.28	0.280	138.28	0.069	Wastewater Input
St. Albans City	Point Source	11	0.81	0.050	117.96	0.076	234.58	0.180	234.58	0.069	Wastewater Input
Venise-en Quebec	Point Source	12	0.00	0.050	0.00	0.100	0.00	0.100	0.00	0.069	Wastewater Input
Swanton	Point Source	12	0.67	0.050	121.95	0.082	502.28	0.340	502.28	0.069	Wastewater Input
Rouses Point	Point Source	13	0.99	0.050	99.96	0.100	1687.29	0.100	1687.29	0.069	Wastewater Input

Tributary Name	Tributary Type	Segment Number	Flow (hm3/yr) Mean	CV	Conserv. Subst (mg/L) Mean	CV	Total P (ppb) Mean	CV	Ortho P (ppb) Mean	CV	Input Source
Wyeth Research	Point Source	13	0.06	0.050	465.82	0.500	1128.42	0.280	1128.42	0.069	Wastewater Input
Alburg	Point Source	13	0.07	0.050	99.96	0.100	38.55	0.100	38.55	0.069	Wastewater Input
International Paper	Withdrawal	2	22.21	0.100	0.01	0.100	0.01	0.100	4.00	0.069	Withdrawal Data
Tri-Town Water District	Withdrawal	3	0.80	0.100	0.01	0.100	0.01	0.100	4.00	0.069	Withdrawal Data
Weed Fish Culture Station	Withdrawal	5	8.79	0.100	0.01	0.100	0.01	0.100	4.00	0.069	Withdrawal Data
Champlain Water District	Withdrawal	5	11.50	0.100	0.01	0.100	0.01	0.100	4.00	0.069	Withdrawal Data
Burlington City	Withdrawal	5	7.60	0.100	0.01	0.100	0.01	0.100	4.00	0.069	Withdrawal Data
St. Albans City	Withdrawal	10	1.00	0.100	0.01	0.100	0.01	0.100	4.00	0.069	Withdrawal Data
Swanton Village	Withdrawal	12	1.10	0.100	0.01	0.100	0.01	0.100	4.00	0.069	Withdrawal Data
Richelieu Outflow	Withdrawal	13	12481.18	0.050	10.30	0.100	0.01	0.100	0.01	0.069	Final Outflow

NOTE: reflects loads resulting from Impervious Area SWAT revisions using the 2011 VT DEC Impervious layer (VT LandLandcov_IMPERVLCB2011)

Table B- 2. Un-Monitored Watershed Flows for Two-year Modeled Periods (From SWAT)

Area Draining to Lake Segment		Area (km^2)	Two-year Modeled Period Flows (hm^3/yr)									
			1991-92	1993-94	1995-96	1997-98	1999-00	2001-02	2003-04	2005-06	2007-08	2009-10
South Lake B	1	130	119.8	135.5	128.7	153.3	121.0	95.0	147.3	156.0	197.9	115.6
South Lake A	2	159	505.8	561.1	567.1	684.1	534.5	415.3	675.7	726.5	842.1	541.4
Port Henry	3	157	120.5	102.2	79.6	151.4	121.7	88.5	151.0	175.2	177.8	135.7
Otter Creek	4	26	25.2	20.3	19.4	29.1	26.5	19.4	33.5	34.5	36.0	27.3
Main Lake	5	127	265.9	253.7	265.1	378.9	271.5	201.3	314.3	333.2	382.0	274.1
Shelburne Bay	6	39	19.2	19.6	18.9	30.2	18.6	14.4	23.0	24.3	29.0	19.6
Burlington Bay	7	3	3.95	3.80	3.88	5.84	3.91	3.12	4.74	5.02	5.82	4.11
Cumberland Bay	8	104	33.9	41.3	30.2	59.6	32.8	29.5	66.8	58.5	62.4	37.1
Mallets Bay	9	46	50.6	47.9	50.2	75.1	50.9	36.5	61.3	66.6	76.7	50.6
Northeast Arm	10	95	161.1	144.5	130.2	219.8	128.8	148.5	232.4	228.9	242.0	180.6
St. Albans Bay	11	6	28.7	24.8	23.6	38.3	23.0	27.2	38.6	39.4	41.2	30.7
Missisquoi Bay	12	63	46.2	42.5	34.0	66.1	35.2	40.5	70.6	68.2	74.1	55.0
Isle LaMotte	13	73	56.3	69.9	43.8	118.3	58.9	46.6	134.5	126.0	123.6	61.4

NOTE: Does NOT reflect loads resulting from Impervious Area SWAT revisions using the 2011 VT DEC Impervious layer (VT LandLandcov_IMPERVLCB2011). The two-year period BATHTUB models were not revised to reflect those loads.

Table B-3. Un-Monitored Watershed TP Loads for Two-year Modeled Periods (From SWAT)

Area Draining to Lake Segment		Area (km^2)	Two-year Modeled Period TP Loads (mt/yr)									
			1991-92	1993-94	1995-96	1997-98	1999-00	2001-02	2003-04	2005-06	2007-08	2009-10
South Lake B	1	130	6.3	7.2	6.5	9.2	7.1	4.9	8.3	8.9	11.4	6.3
South Lake A	2	159	34.5	43.4	35.8	48.5	37.7	20.1	46.1	55.3	43.4	43.6
Port Henry	3	157	12.2	12.7	8.5	16.1	12.8	7.3	16.0	16.3	14.6	14.3
Otter Creek	4	26	5.2	3.9	2.3	5.4	6.0	2.4	6.4	6.3	4.3	5.7
Main Lake	5	127	11.9	10.4	8.9	18.6	11.8	7.5	13.4	14.4	12.8	12.9
Shelburne Bay	6	39	3.3	3.2	2.8	4.7	3.2	2.4	3.8	3.9	3.6	3.6
Burlington Bay	7	3	0.84	0.81	0.76	0.95	0.76	0.72	0.83	0.91	0.90	0.88
Cumberland Bay	8	104	4.2	4.8	4.8	9.2	4.6	4.6	10.6	9.3	8.2	5.0
Mallets Bay	9	46	3.9	3.8	3.7	6.0	4.1	2.8	4.9	5.2	4.5	4.4
Northeast Arm	10	95	18.0	15.5	11.0	24.7	16.0	12.7	21.6	22.9	15.5	18.2
St. Albans Bay	11	6	4.6	3.6	3.4	6.5	4.1	3.9	5.7	5.9	4.9	5.0
Missisquoi Bay	12	63	6.7	6.4	5.8	10.6	6.1	7.0	8.7	8.9	8.3	6.1
Isle LaMotte	13	73	8.0	8.9	5.7	15.5	8.2	6.9	15.0	14.7	12.8	7.8

NOTE: Does NOT reflect loads resulting from Impervious Area SWAT revisions using the 2011 VT DEC Impervious layer (VT LandLandcov_IMPERVLCB2011). The two-year period BATHTUB models were not revised to reflect those loads.

Table B-4. CV values used for Tributary TP Loads for Two-year Modeled Periods (from VTDEC)

Trib Name	91-92	93-94	95-96	97-98	99-2000	01-02	03-04	05-06	07-08	09-10
Ausable	0.201	0.189	0.298	0.241	0.220	0.235	0.157	0.160	0.234	0.204
Bouquet	0.210	0.194	0.225	0.214	0.222	0.212	0.155	0.127	0.119	0.184
Great Chazy	0.175	0.172	0.197	0.344	0.210	0.162	0.131	0.095	0.166	0.121
Jewet	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.189
Lamoille	0.088	0.046	0.069	0.179	0.186	0.148	0.097	0.057	0.135	0.082
LaPlatte	0.084	0.157	0.166	0.108	0.139	0.139	0.132	0.118	0.100	0.106
L. Ausable	0.237	0.321	0.282	0.297	0.254	0.125	0.135	0.146	0.078	0.121
L. Chazy	0.252	0.179	0.210	0.233	0.350	0.242	0.243	0.109	0.133	0.133
Lewis	0.110	0.124	0.170	0.126	0.178	0.118	0.137	0.131	0.069	0.104
L. Otter	0.078	0.165	0.081	0.130	0.120	0.136	0.117	0.096	0.095	0.111
Mettawee	0.131	0.145	0.169	0.182	0.074	0.152	0.179	0.090	0.125	0.100
Missisquoi	0.102	0.148	0.138	0.126	0.145	0.133	0.115	0.099	0.123	0.117
Otter	0.125	0.114	0.114	0.129	0.126	0.122	0.154	0.078	0.121	0.150
Pike	0.156	0.128	0.134	0.076	0.119	0.115	0.105	0.111	0.081	0.135
Poultney	0.198	0.116	0.170	0.156	0.131	0.125	0.159	0.136	0.084	0.336
Putnam	0.299	0.127	0.531	0.199	0.139	0.105	0.112	0.091	0.140	0.175
Rock	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.113
Salmon	0.190	0.188	0.170	0.177	0.163	0.113	0.107	0.081	0.093	0.141
Saranac	0.064	0.077	0.118	0.110	0.075	0.063	0.074	0.049	0.060	0.114
Stevens	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.400
Winooski	0.104	0.139	0.218	0.137	0.177	0.119	0.153	0.157	0.121	0.162

ND = Not Determined, missing data

Appendix B

BATHTUB Calibration Baseline Inputs

Table B-1 presents baseline (2001-2010 average) flows, loads (and/or flow-weighted concentrations), and CV values used as inputs to calibrate the model, including the monitored FLUX tributary inputs, the unmonitored area estimates from SWAT, the wastewater inputs from each facility discharging directly to the lake segment, and withdrawals.

Table B-1. Flows, Loads, Concentrations and CV values used as Inputs for the BATHTUB Calibration (2001-2010)

Tributary Name	Tributary Type	Segment Number	Flow (hm3/yr) Mean	CV	Conserv. Subst (mg/L) Mean	CV	Total P (ppb) Mean	CV	Ortho P (ppb) Mean	CV	Input Source
Mettawee	Tributary	1	615.39	0.050	18.17	0.021	78.08	0.129	29.29	0.069	Monitored FLUX estimate
Poultney	Tributary	1	386.87	0.050	12.24	0.015	88.98	0.168	21.71	0.069	Monitored FLUX estimate
Segment 1 Ungaged	Tributary	1	142.32	0.200	11.99	0.200	56.25	0.168	13.73	0.069	From SWAT Model
Putnam	Tributary	2	89.35	0.050	10.30	0.025	26.08	0.125	8.56	0.069	Monitored FLUX estimate
Segment 2 Ungaged	Tributary	2	640.04	0.200	10.30	0.200	65.17	0.125	21.39	0.069	From SWAT Model
Segment 3 Ungaged	Tributary	3	145.48	0.200	13.80	0.200	94.38	0.111	49.89	0.069	From SWAT Model
Lewis	Tributary	4	98.98	0.050	8.94	0.014	95.09	0.112	23.01	0.069	Monitored FLUX estimate
L. Otter	Tributary	4	74.72	0.050	13.80	0.018	134.10	0.111	70.89	0.069	Monitored FLUX estimate
Otter	Tributary	4	1637.83	0.050	12.96	0.018	70.98	0.125	33.69	0.069	Monitored FLUX estimate
Segment 4 Ungaged	Tributary	4	30.14	0.200	13.80	0.200	166.94	0.111	88.25	0.069	From SWAT Model
Ausable	Tributary	5	805.30	0.050	12.40	0.034	42.11	0.198	10.04	0.069	Monitored FLUX estimate
Bouquet	Tributary	5	339.08	0.050	16.43	0.024	60.76	0.159	13.76	0.069	Monitored FLUX estimate
L. Ausable	Tributary	5	52.58	0.050	14.03	0.024	72.10	0.121	37.15	0.069	Monitored FLUX estimate
Salmon	Tributary	5	60.67	0.050	9.52	0.029	37.08	0.107	14.76	0.069	Monitored FLUX estimate
Winooski	Tributary	5	1855.38	0.050	19.54	0.025	82.57	0.142	12.38	0.069	Monitored FLUX estimate
Segment 5 Ungaged	Tributary	5	300.38	0.200	9.52	0.200	40.53	0.107	16.13	0.069	From SWAT Model
LaPlatte	Tributary	6	55.76	0.050	26.49	0.028	117.72	0.119	65.97	0.069	Monitored FLUX estimate
Segment 6 Ungaged	Tributary	6	21.61	0.200	26.53	0.200	141.38	0.119	79.23	0.069	From SWAT Model
Segment 7 Ungaged	Tributary	7	4.50	0.200	26.21	0.200	186.08	0.119	104.28	0.069	From SWAT Model
Saranac	Tributary	8	917.05	0.050	10.71	0.025	27.40	0.072	11.55	0.069	Monitored FLUX estimate
Segment 8 Ungaged	Tributary	8	50.71	0.200	9.96	0.200	148.71	0.072	62.70	0.069	From SWAT Model
Lamoille	Tributary	9	1346.94	0.050	10.13	0.020	38.90	0.104	11.32	0.069	Monitored FLUX estimate
Segment 9 Ungaged	Tributary	9	58.32	0.200	10.03	0.200	68.05	0.104	19.79	0.069	From SWAT Model
Segment 10 Ungaged	Tributary	10	206.19	0.200	10.03	0.200	88.09	0.104	25.612	0.069	From SWAT Model
Jewet	Tributary	11	4.01	0.050	30.27	0.125	397.22	0.289	316.07	0.069	Monitored FLUX estimate

Tributary Name	Tributary Type	Segment Number	Flow (hm3/yr) Mean	CV	Conserv. Subst (mg/L) Mean	CV	Total P (ppb) Mean	CV	Ortho P (ppb) Mean	CV	Input Source
Stevens	Tributary	11	12.37	0.200	54.01	0.150	569.90	0.204	219.47	0.069	Monitored FLUX estimate
Segment 11 Ungaged	Tributary	11	35.37	0.200	30.27	0.200	143.88	0.289	114.48	0.069	From SWAT Model
Missisquoi	Tributary	12	1723.87	0.050	7.03	0.016	83.44	0.117	21.02	0.069	Monitored FLUX estimate
Pike	Tributary	12	352.38	0.050	12.56	0.017	112.20	0.109	50.78	0.069	Monitored FLUX estimate
Rock	Tributary	12	64.13	0.200	9.87	0.033	264.94	0.127	76.44	0.069	Monitored FLUX estimate
Segment 12 Ungaged	Tributary	12	61.51	0.200	6.96	0.200	125.57	0.117	31.64	0.069	From SWAT Model
Great Chazy	Tributary	13	385.32	0.050	15.53	0.020	64.35	0.135	32.92	0.069	Monitored FLUX estimate
L. Chazy	Tributary	13	59.24	0.050	19.27	0.021	83.89	0.172	59.66	0.069	Monitored FLUX estimate
Segment 13 Ungaged	Tributary	13	97.87	0.200	15.42	0.200	115.9933	0.135	58.99	0.069	From SWAT Model
Crown Point	Point Source	2	0.05	0.050	99.96	0.100	3214.40	0.100	3214.40	0.069	Wastewater Input
International Paper	Point Source	2	22.21	0.050	414.84	0.046	196.70	0.170	196.70	0.069	Wastewater Input
Ticonderoga	Point Source	2	1.63	0.050	95.96	0.244	1288.78	0.170	1288.78	0.069	Wastewater Input
Orwell	Point Source	2	0.03	0.050	99.96	0.100	2955.74	0.100	2955.74	0.069	Wastewater Input
Port Henry	Point Source	3	0.70	0.050	55.98	0.137	1907.17	0.110	1907.17	0.069	Wastewater Input
Westport	Point Source	3	0.18	0.050	77.97	0.068	1891.60	0.130	1891.60	0.069	Wastewater Input
Vergennes	Point Source	4	0.53	0.050	69.97	0.068	344.87	0.200	344.87	0.069	Wastewater Input
Peru-Valcour	Point Source	5	0.01	0.050	99.96	0.100	2450.42	0.100	2450.42	0.069	Wastewater Input
Burlington North	Point Source	5	1.57	0.050	70.97	0.054	375.52	0.100	375.52	0.069	Wastewater Input
Weed Fish Culture Station	Point Source	5	8.79	0.050	99.96	0.100	35.13	0.100	35.13	0.069	Wastewater Input
Shelburne No1	Point Source	6	0.46	0.050	100.96	0.042	372.10	0.160	372.10	0.069	Wastewater Input
Shelburne No2	Point Source	6	0.47	0.050	118.95	0.100	383.89	0.100	383.89	0.069	Wastewater Input
S. Burlington Bart. Bay	Point Source	6	0.81	0.050	117.96	0.076	234.58	0.180	234.58	0.069	Wastewater Input
Burlington Main	Point Source	7	6.04	0.050	103.96	0.078	468.83	0.120	468.83	0.069	Wastewater Input
Burlington Main WWTP	Point Source	7	0.59	0.200	26.21	0.200	1468.64	0.119	822.99	0.069	Wastewater Input - CSO Facility
Champlain Park	Point Source	8	0.14	0.050	149.89	0.157	2938.23	0.200	2938.23	0.069	Wastewater Input
Plattsburgh	Point Source	8	7.90	0.050	75.97	0.061	1130.74	0.150	1130.74	0.069	Wastewater Input
Brown Ledge Camp	Point Source	9	0.00	0.050	99.96	0.100	2004.07	0.100	2004.07	0.069	Wastewater Input
Northwest State Correction	Point Source	11	0.04	0.020	55.98	0.050	138.28	0.280	138.28	0.069	Wastewater Input
St. Albans City	Point Source	11	0.81	0.050	117.96	0.076	234.58	0.180	234.58	0.069	Wastewater Input
Venise-en Quebec	Point Source	12	0.00	0.050	0.00	0.100	0.00	0.100	0.00	0.069	Wastewater Input
Swanton	Point Source	12	0.67	0.050	121.95	0.082	502.28	0.340	502.28	0.069	Wastewater Input
Rouses Point	Point Source	13	0.99	0.050	99.96	0.100	1687.29	0.100	1687.29	0.069	Wastewater Input

Tributary Name	Tributary Type	Segment Number	Flow (hm3/yr) Mean	CV	Conserv. Subst (mg/L) Mean	CV	Total P (ppb) Mean	CV	Ortho P (ppb) Mean	CV	Input Source
Wyeth Research	Point Source	13	0.06	0.050	465.82	0.500	1128.42	0.280	1128.42	0.069	Wastewater Input
Alburg	Point Source	13	0.07	0.050	99.96	0.100	38.55	0.100	38.55	0.069	Wastewater Input
International Paper	Withdrawal	2	22.21	0.100	0.01	0.100	0.01	0.100	4.00	0.069	Withdrawal Data
Tri-Town Water District	Withdrawal	3	0.80	0.100	0.01	0.100	0.01	0.100	4.00	0.069	Withdrawal Data
Weed Fish Culture Station	Withdrawal	5	8.79	0.100	0.01	0.100	0.01	0.100	4.00	0.069	Withdrawal Data
Champlain Water District	Withdrawal	5	11.50	0.100	0.01	0.100	0.01	0.100	4.00	0.069	Withdrawal Data
Burlington City	Withdrawal	5	7.60	0.100	0.01	0.100	0.01	0.100	4.00	0.069	Withdrawal Data
St. Albans City	Withdrawal	10	1.00	0.100	0.01	0.100	0.01	0.100	4.00	0.069	Withdrawal Data
Swanton Village	Withdrawal	12	1.10	0.100	0.01	0.100	0.01	0.100	4.00	0.069	Withdrawal Data
Richelieu Outflow	Withdrawal	13	12481.18	0.050	10.30	0.100	0.01	0.100	0.01	0.069	Final Outflow

NOTE: Reflects revised SWAT loads resulting from Impervious Area SWAT revisions using the 2011 VT DEC Impervious layer (VT LandLandcov_IMPERVLCB2011)

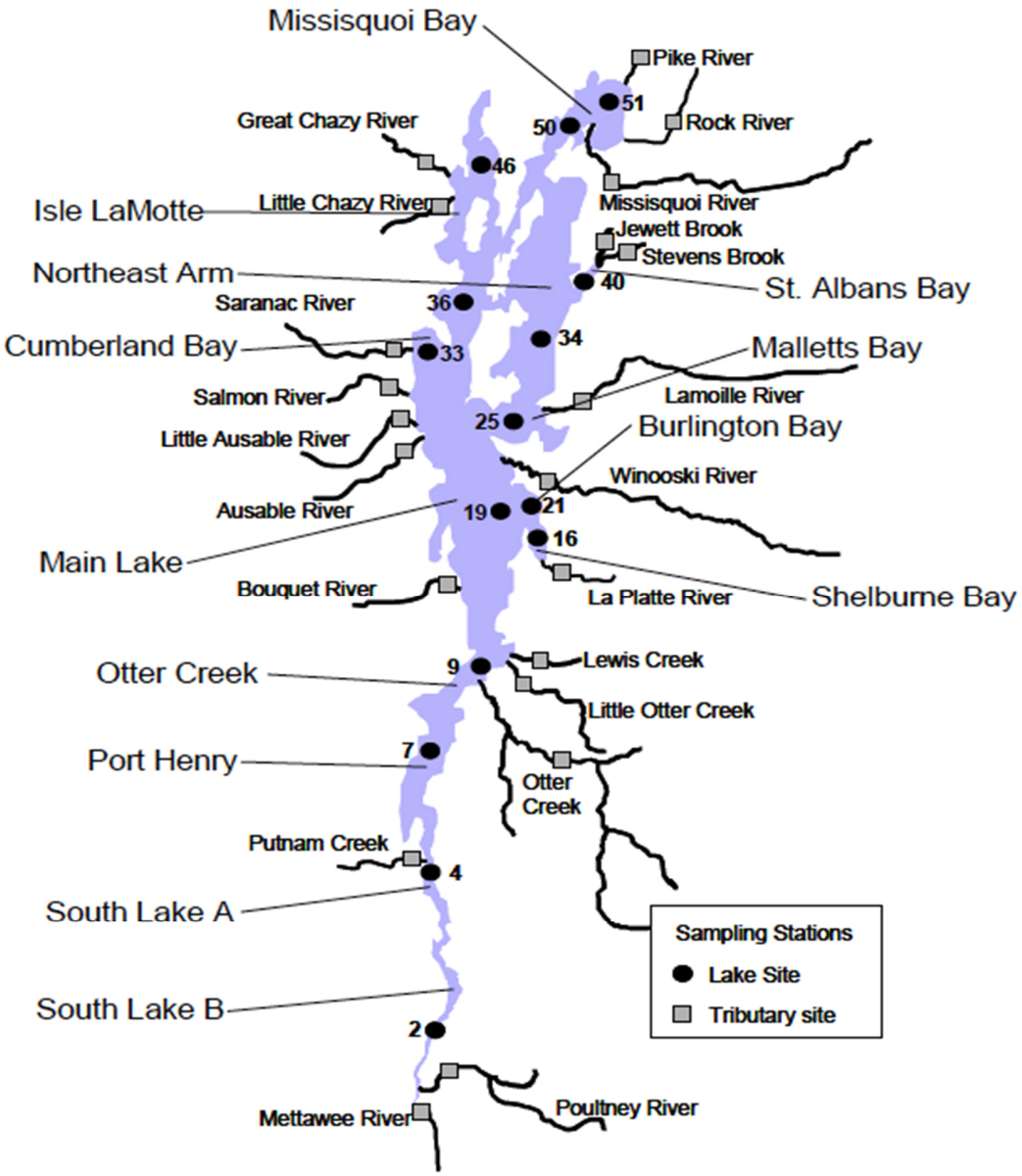
Table B-2. CV values used for Tributary TP Loads for Two-year Modeled Periods (from VTDEC)

Trib Name	91-92	93-94	95-96	97-98	99-2000	01-02	03-04	05-06	07-08	09-10
Ausable	0.201	0.189	0.298	0.241	0.220	0.235	0.157	0.160	0.234	0.204
Bouquet	0.210	0.194	0.225	0.214	0.222	0.212	0.155	0.127	0.119	0.184
Great Chazy	0.175	0.172	0.197	0.344	0.210	0.162	0.131	0.095	0.166	0.121
Jewet	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.189
Lamoille	0.088	0.046	0.069	0.179	0.186	0.148	0.097	0.057	0.135	0.082
LaPlatte	0.084	0.157	0.166	0.108	0.139	0.139	0.132	0.118	0.100	0.106
L. Ausable	0.237	0.321	0.282	0.297	0.254	0.125	0.135	0.146	0.078	0.121
L. Chazy	0.252	0.179	0.210	0.233	0.350	0.242	0.243	0.109	0.133	0.133
Lewis	0.110	0.124	0.170	0.126	0.178	0.118	0.137	0.131	0.069	0.104
L. Otter	0.078	0.165	0.081	0.130	0.120	0.136	0.117	0.096	0.095	0.111
Mettawee	0.131	0.145	0.169	0.182	0.074	0.152	0.179	0.090	0.125	0.100
Missisquoi	0.102	0.148	0.138	0.126	0.145	0.133	0.115	0.099	0.123	0.117
Otter	0.125	0.114	0.114	0.129	0.126	0.122	0.154	0.078	0.121	0.150
Pike	0.156	0.128	0.134	0.076	0.119	0.115	0.105	0.111	0.081	0.135
Poultney	0.198	0.116	0.170	0.156	0.131	0.125	0.159	0.136	0.084	0.336
Putnam	0.299	0.127	0.531	0.199	0.139	0.105	0.112	0.091	0.140	0.175
Rock	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.113
Salmon	0.190	0.188	0.170	0.177	0.163	0.113	0.107	0.081	0.093	0.141
Saranac	0.064	0.077	0.118	0.110	0.075	0.063	0.074	0.049	0.060	0.114
Stevens	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.400
Winooski	0.104	0.139	0.218	0.137	0.177	0.119	0.153	0.157	0.121	0.162

ND = Not Determined, missing data

Appendix C

BATHTUB CALIBRATION RESULTS


Missisquoi Bay
Pike River
51
Great Chazy River
50
Rock River
46
Missisquoi River
Isle LaMotte
Little Chazy River
Jewett Brook
Stevens Brook
Northeast Arm
40
St. Albans Bay
Saranac River
36
Cumberland Bay
34
33
Malletts Bay
Salmon River
Lamoille River
25
Little Ausable River
Burlington Bay
Winooski River
Ausable River
19
21
16
Main Lake
Bouquet River
La Platte River
Shelburne Bay
Otter Creek
9
Lewis Creek
Little Otter Creek
Port Henry
7
Otter Creek
Putnam Creek
4
South Lake A
Sampling Stations
Lake Site
Tributary site
South Lake B
2
Poultney River
Mettawee River

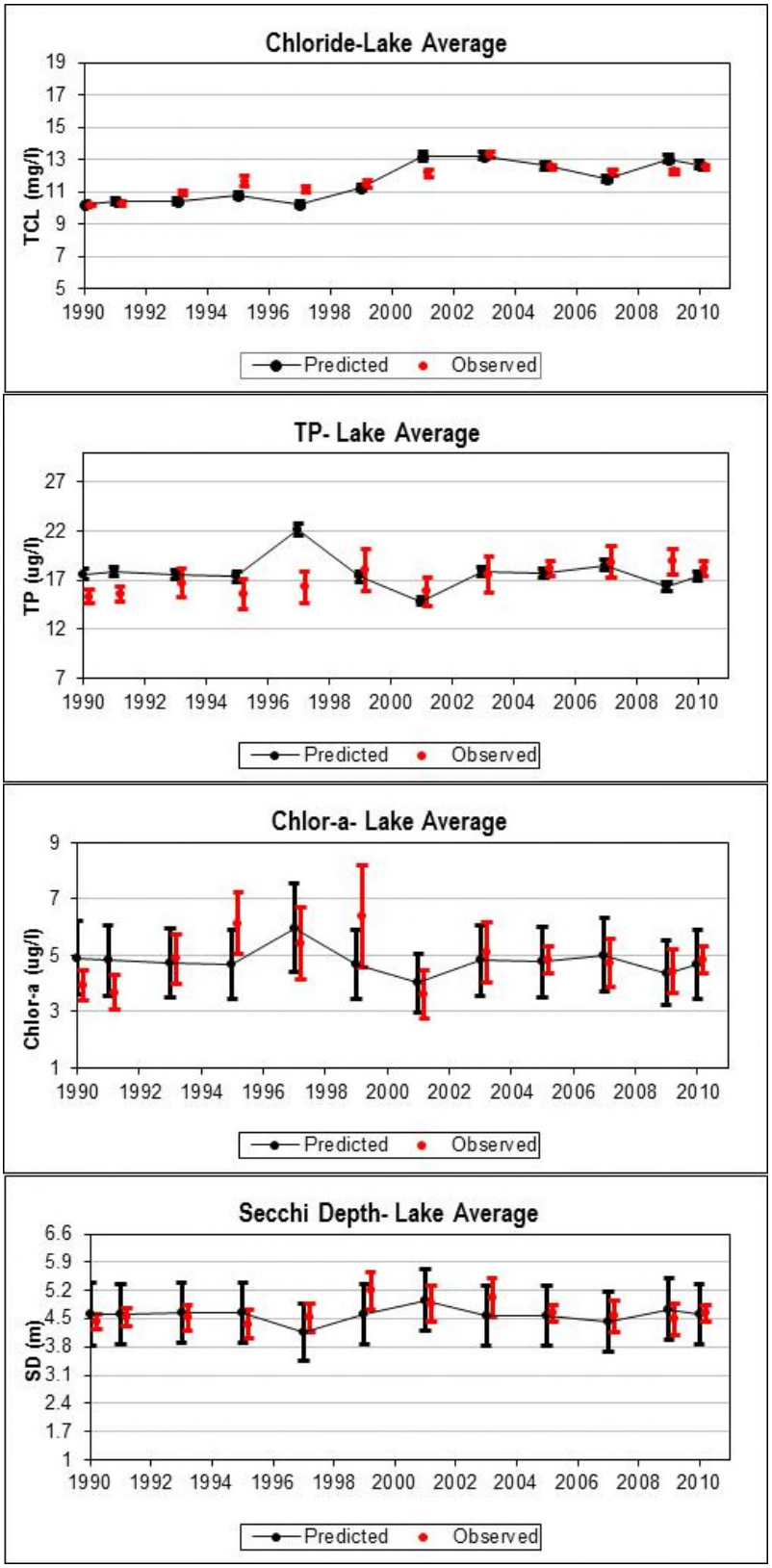


Figure C.1: BATHTUB Model Calibration Results – Lake-Wide Area-Weighted Averages

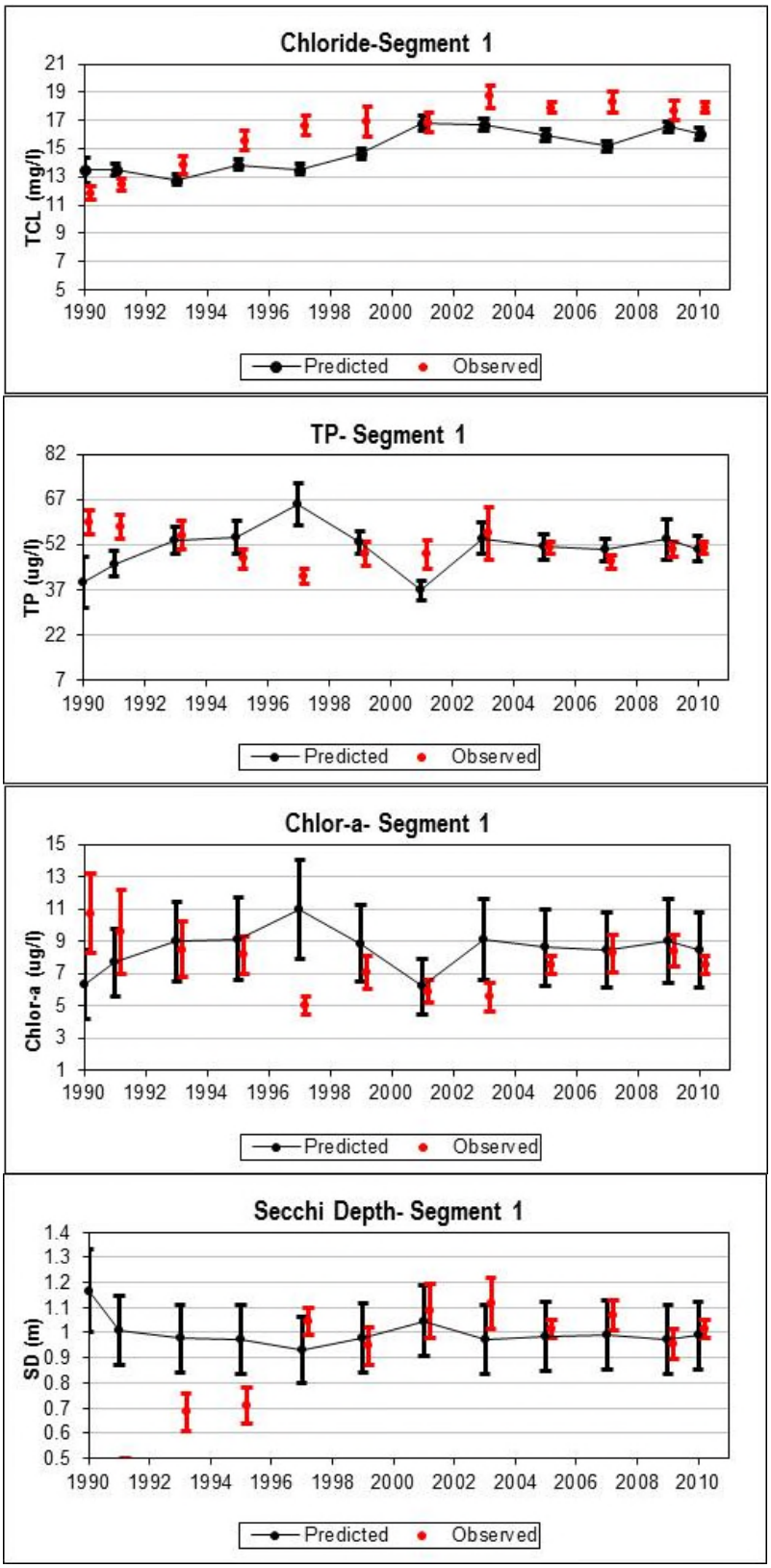


Figure C.2: BATHTUB Model Calibration Results – Segment 1 – South Lake B

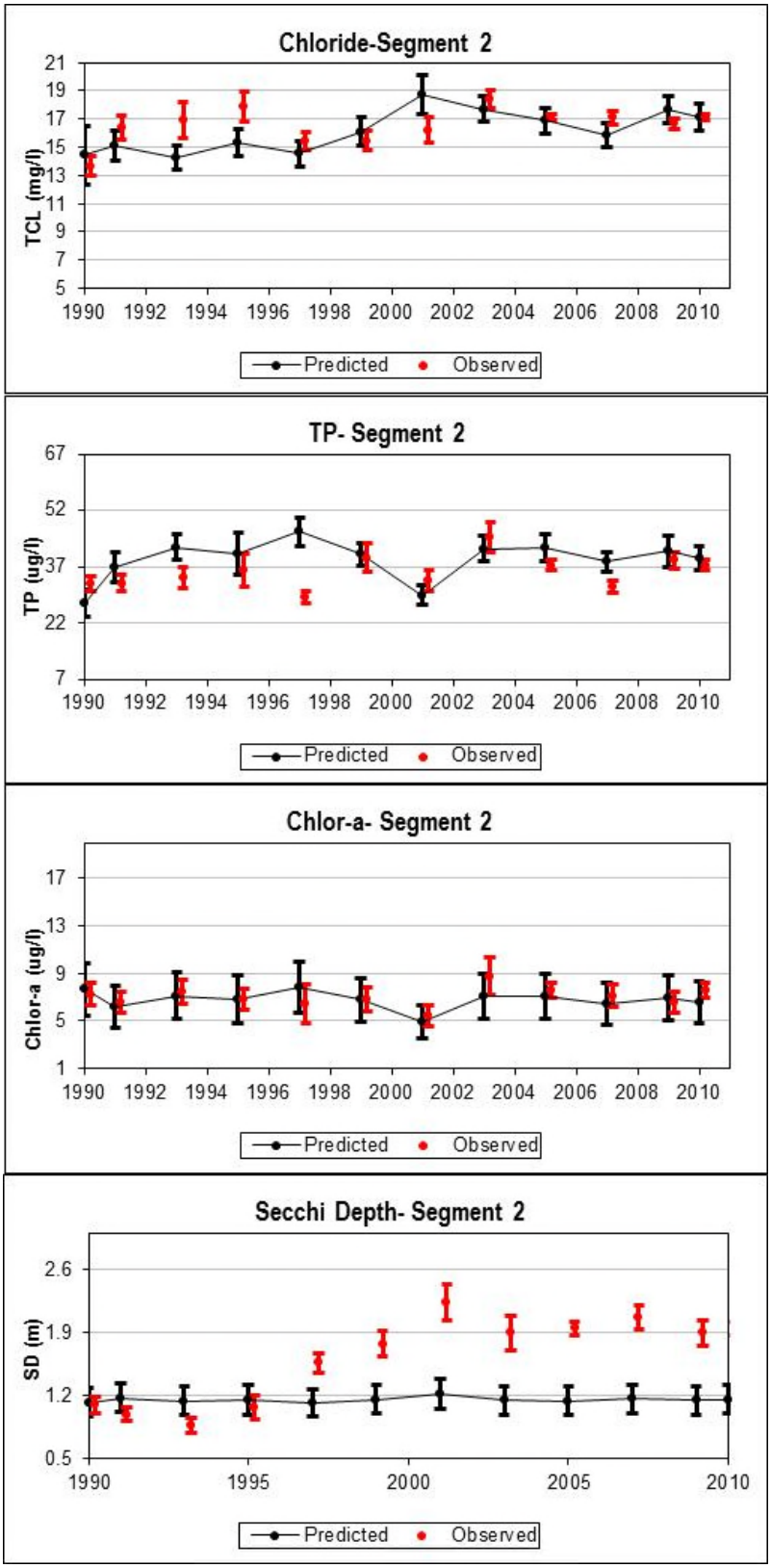


Figure C.3: BATHTUB Model Calibration Results – Segment 2 – South Lake A

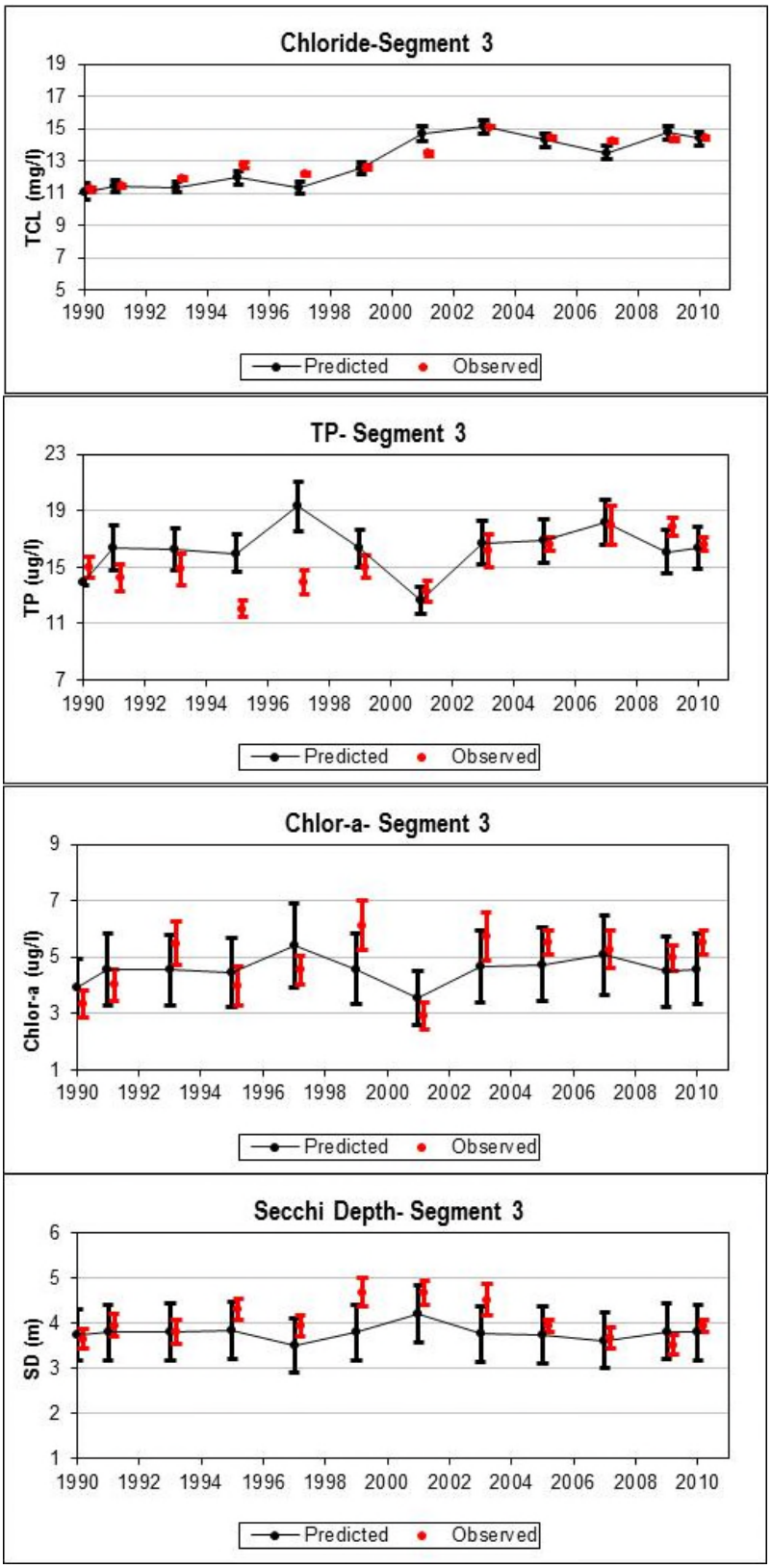


Figure C.4: BATHTUB Model Calibration Results – Segment 3 – Port Henry

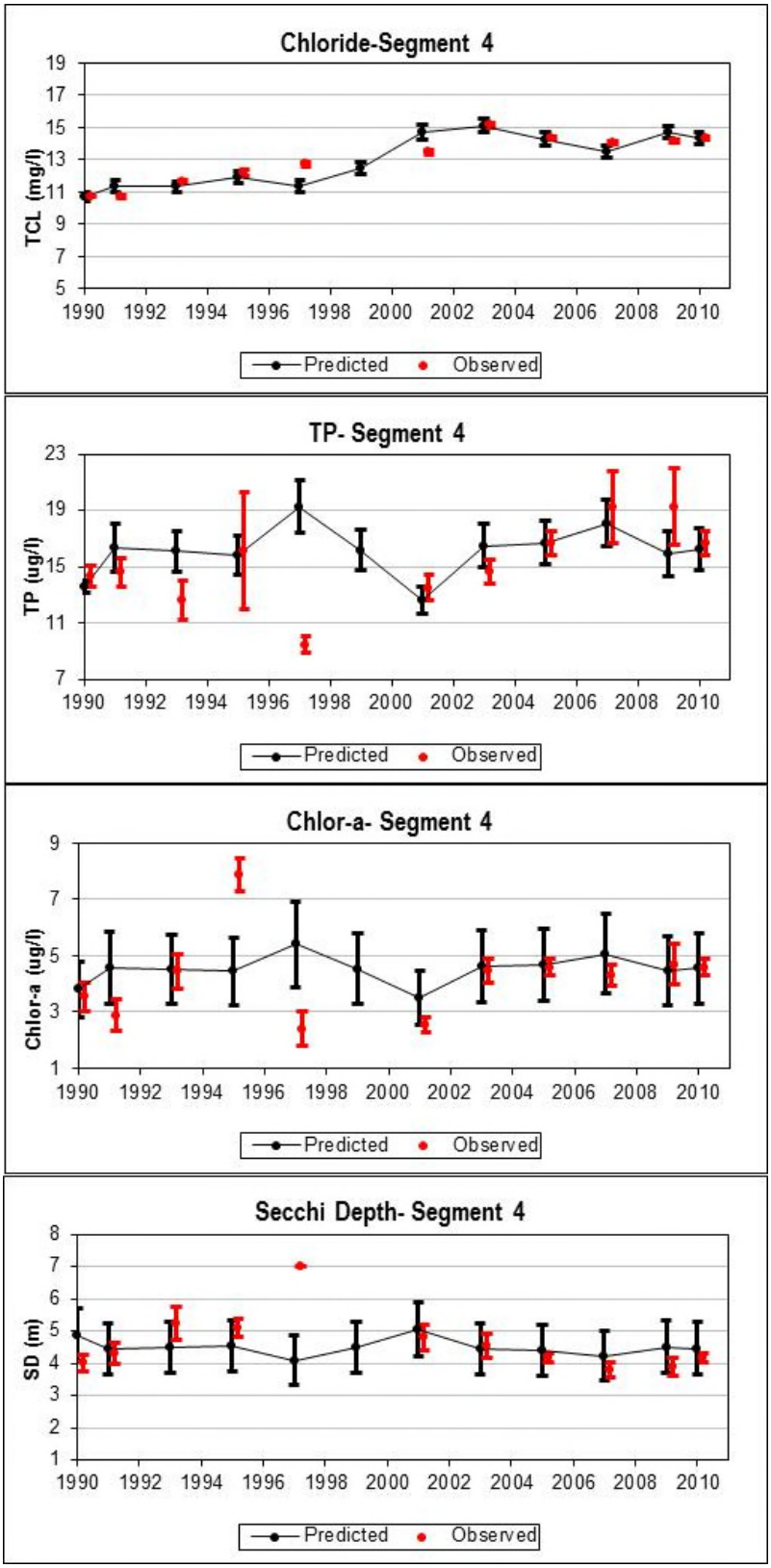


Figure C.5: BATHTUB Model Calibration Results – Segment 4 – Otter Creek

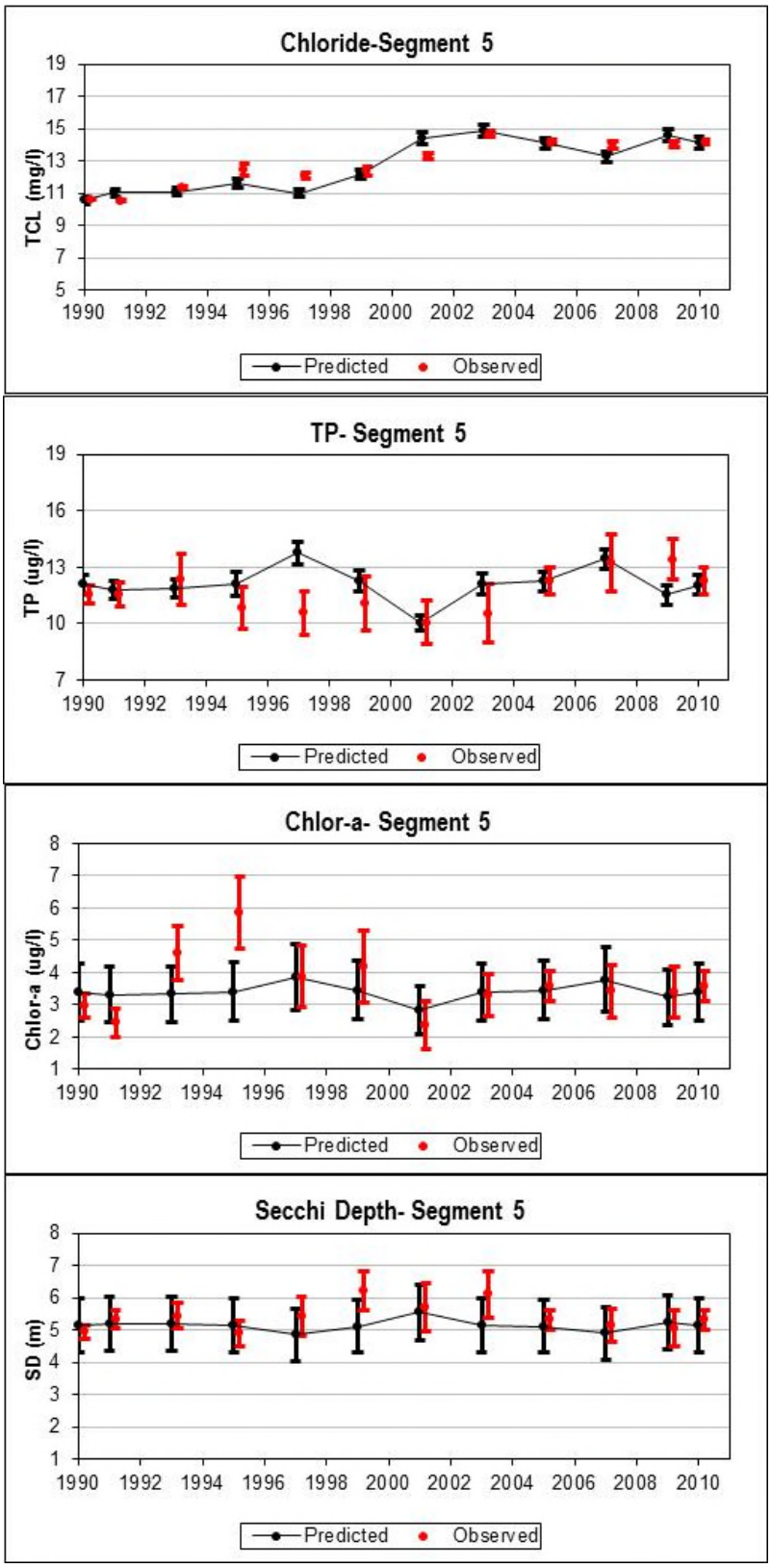


Figure C.6: BATHTUB Model Calibration Results – Segment 5 – Main Lake

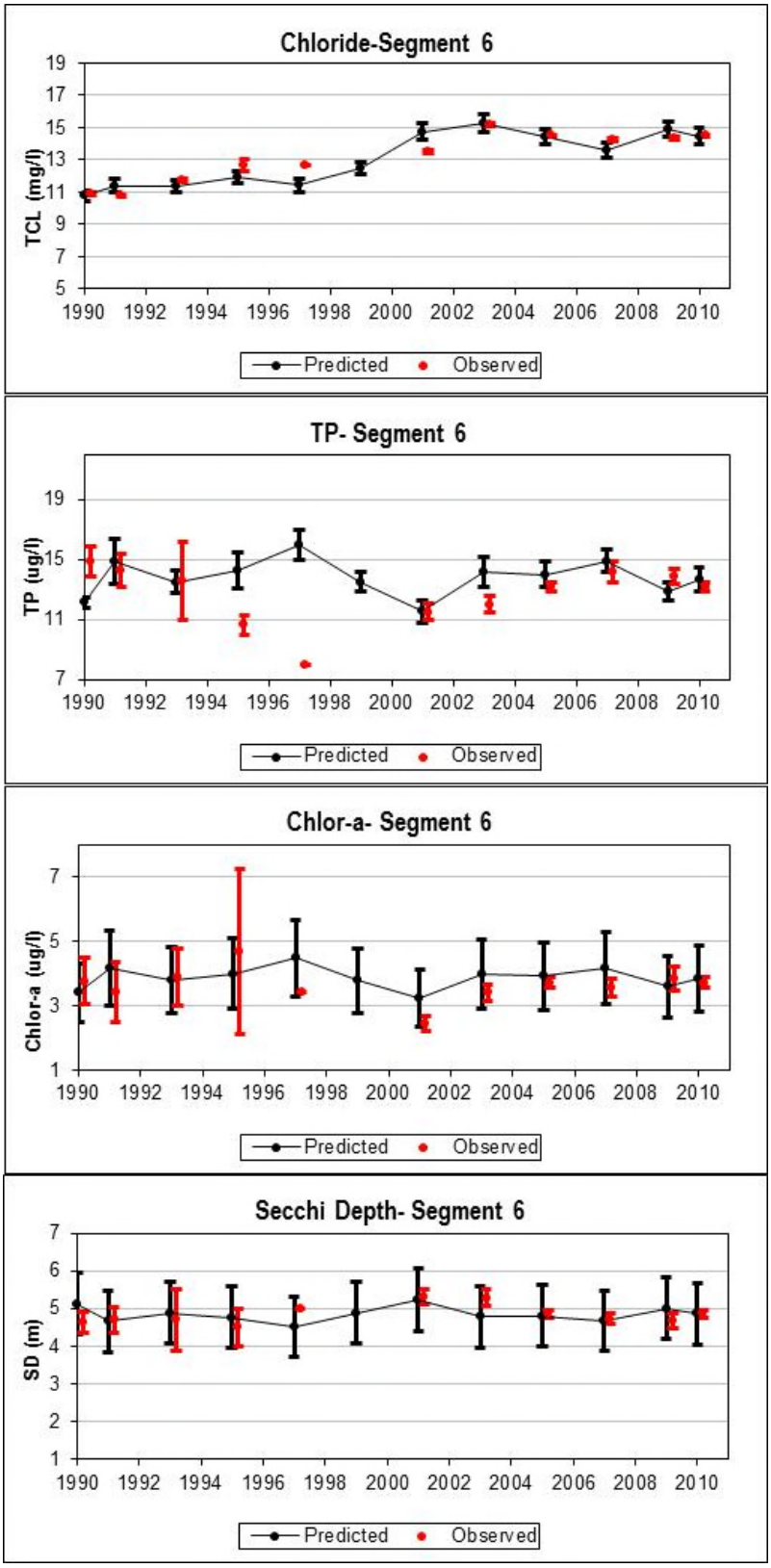


Figure C.7: BATHTUB Model Calibration Results – Segment 6 – Shelburne Bay

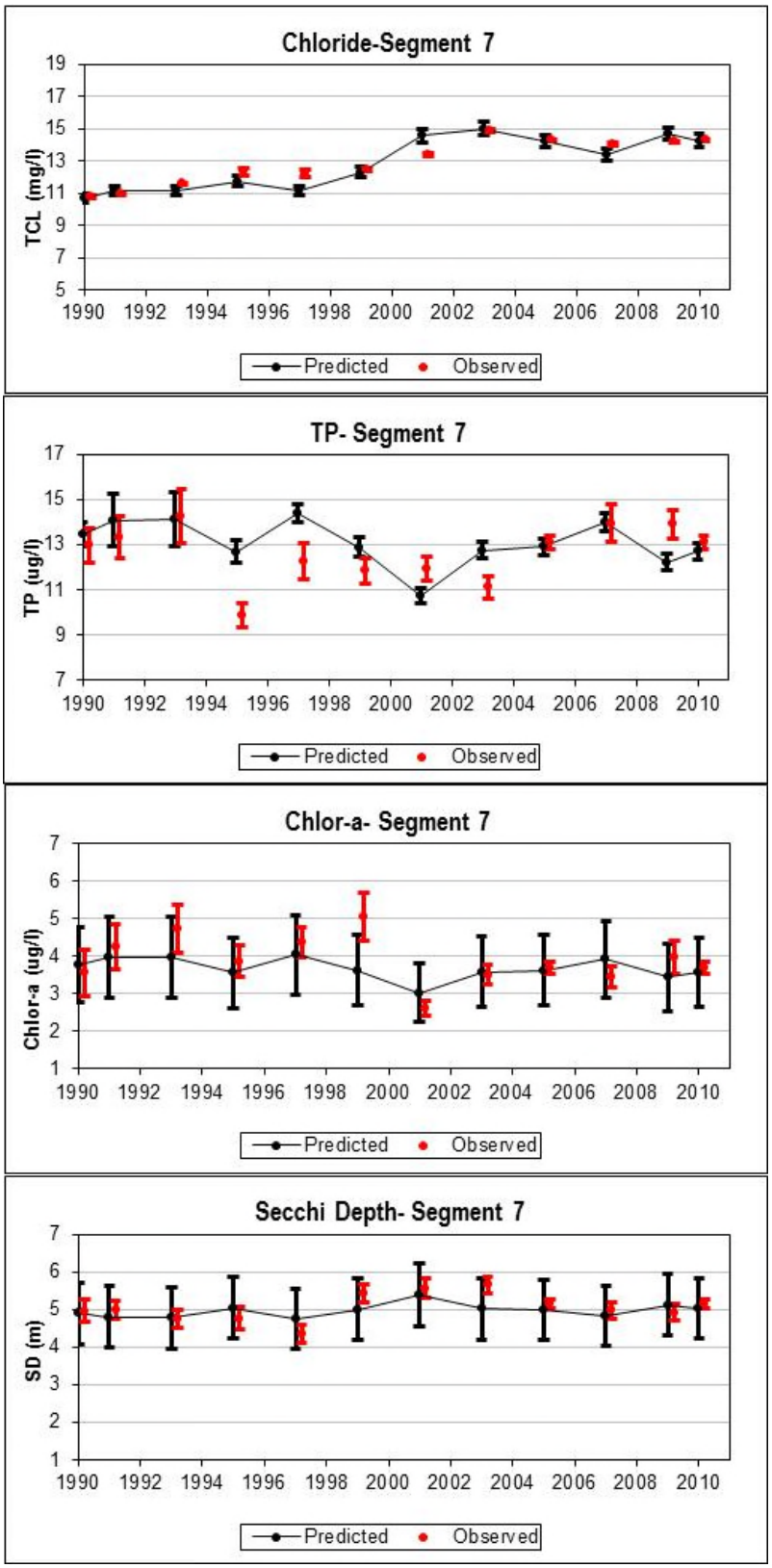


Figure C.8: BATHTUB Model Calibration Results – Segment 7 – Burlington Bay

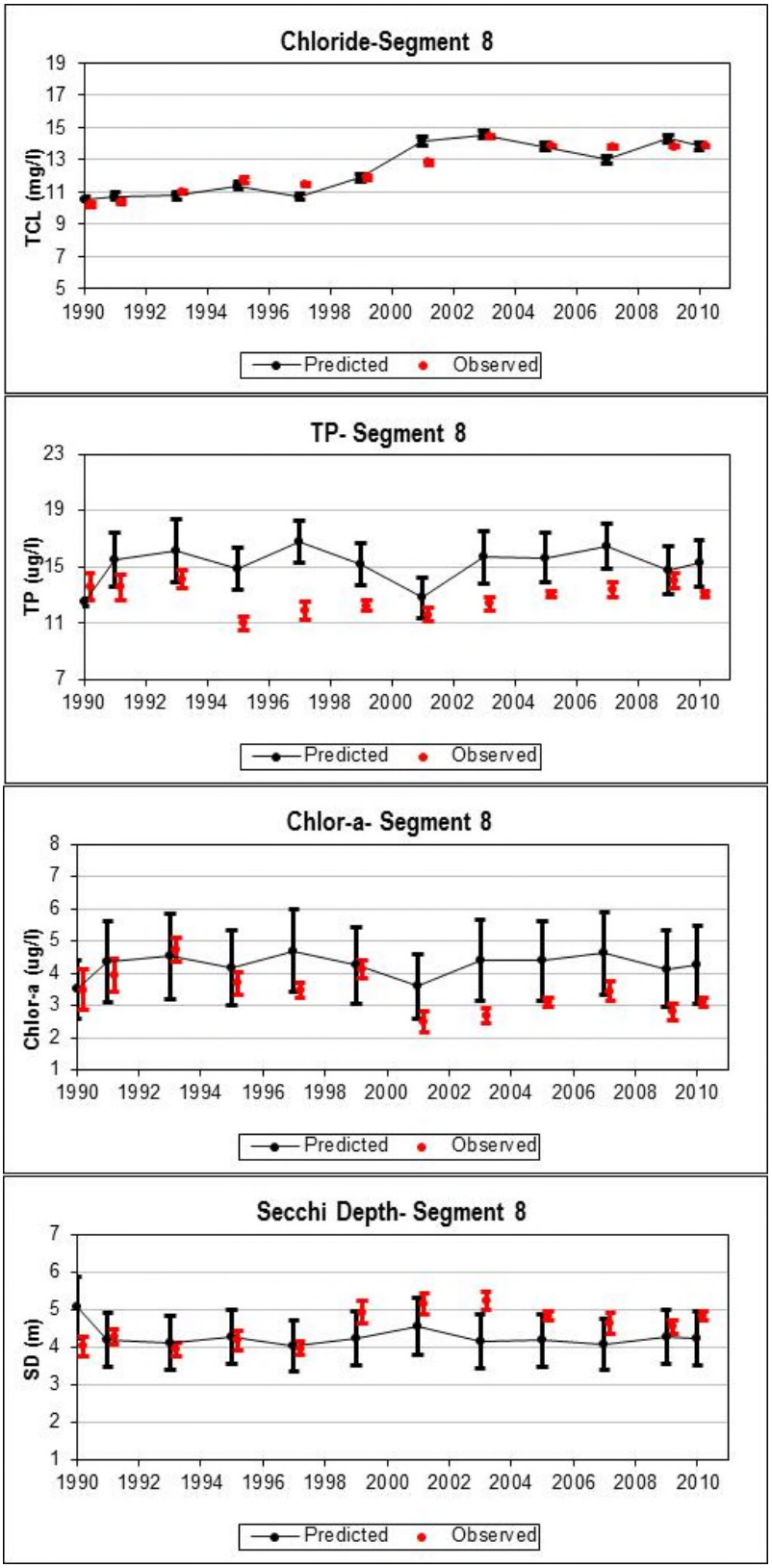


Figure C.9: BATHTUB Model Calibration Results – Segment 8 – Cumberland Bay

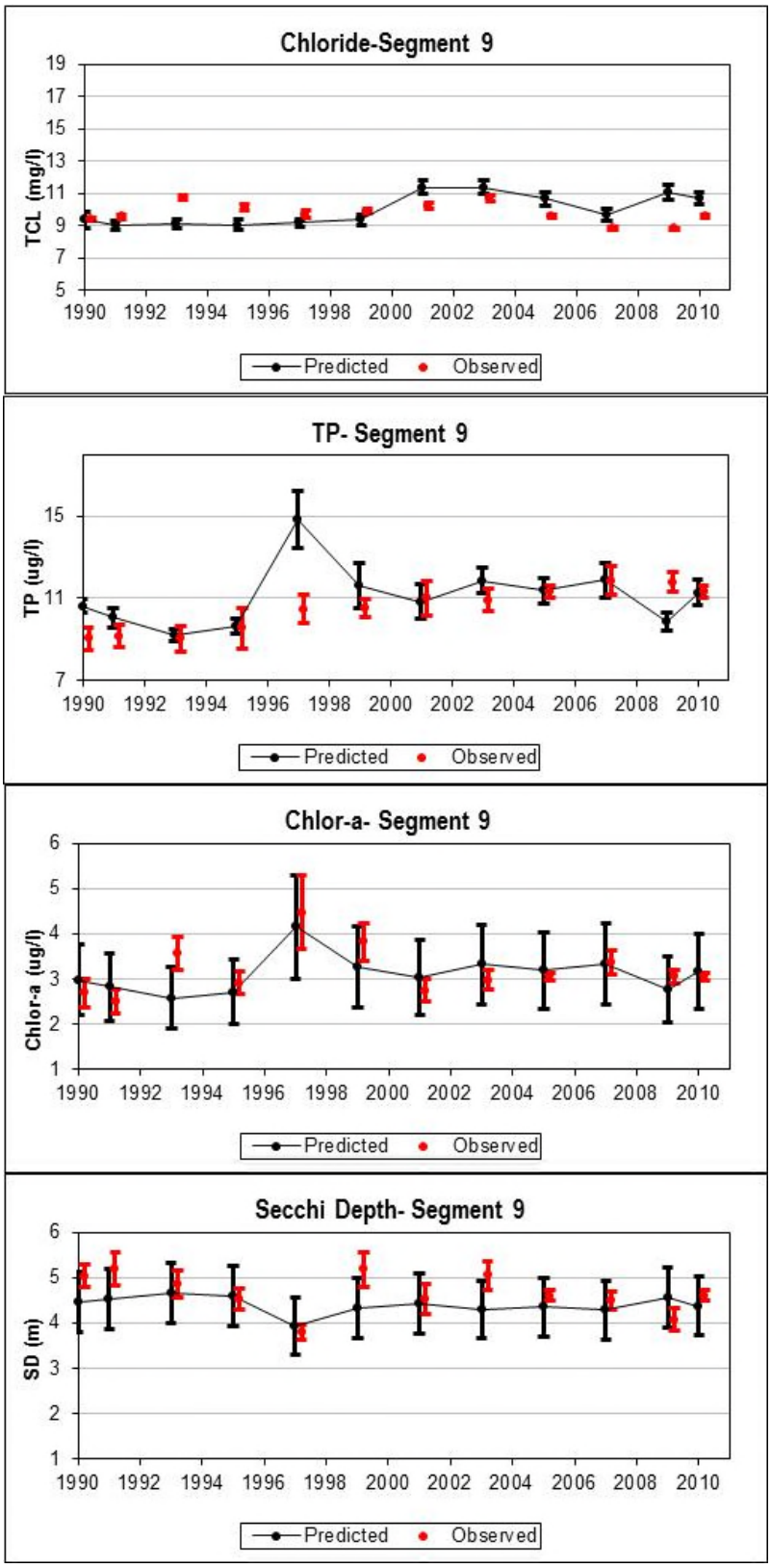


Figure C.10: BATHTUB Model Calibration Results – Segment 9 – Malletts Bay

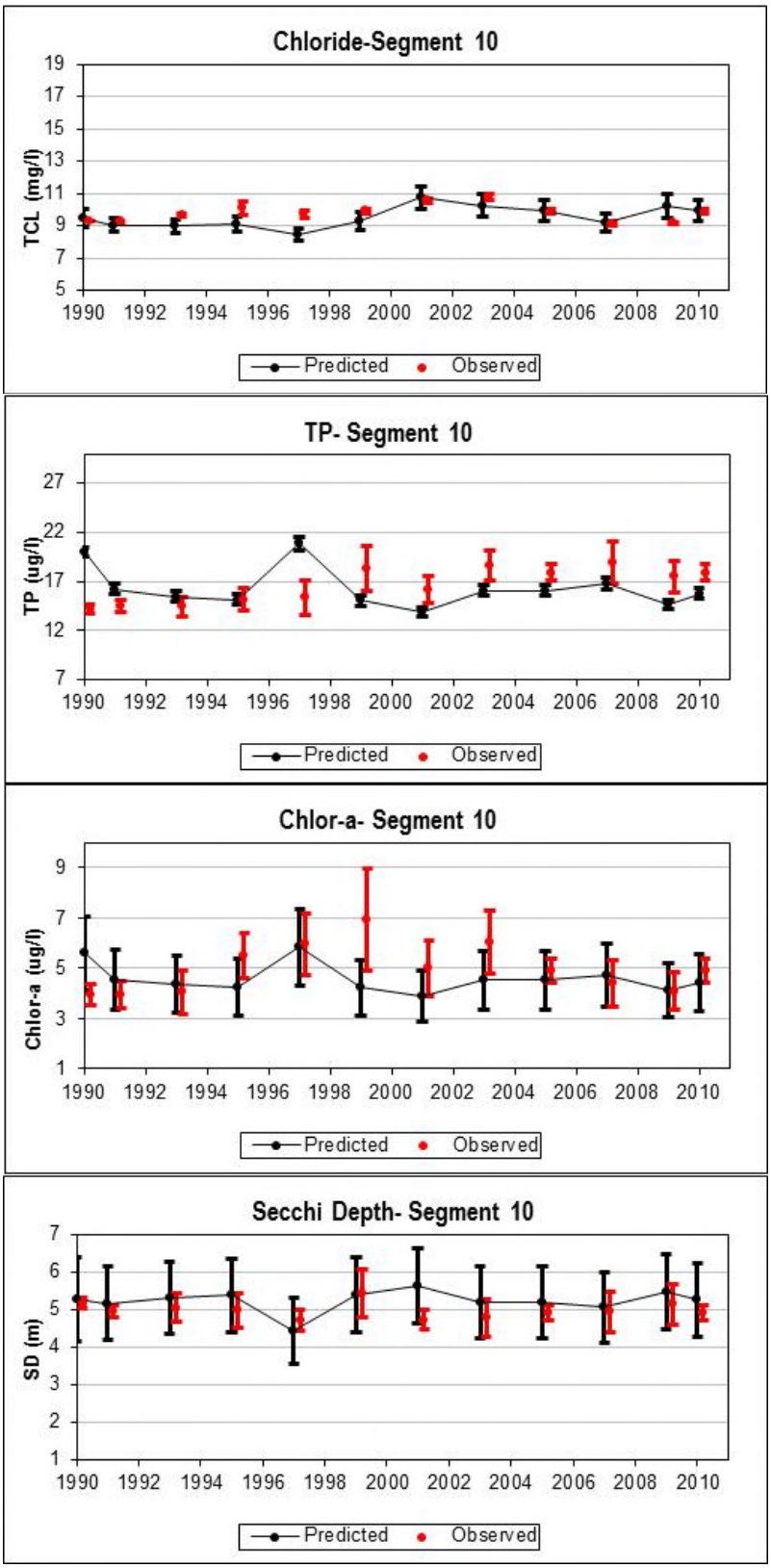


Figure C.11: BATHTUB Model Calibration Results – Segment 10 – Northeast Arm

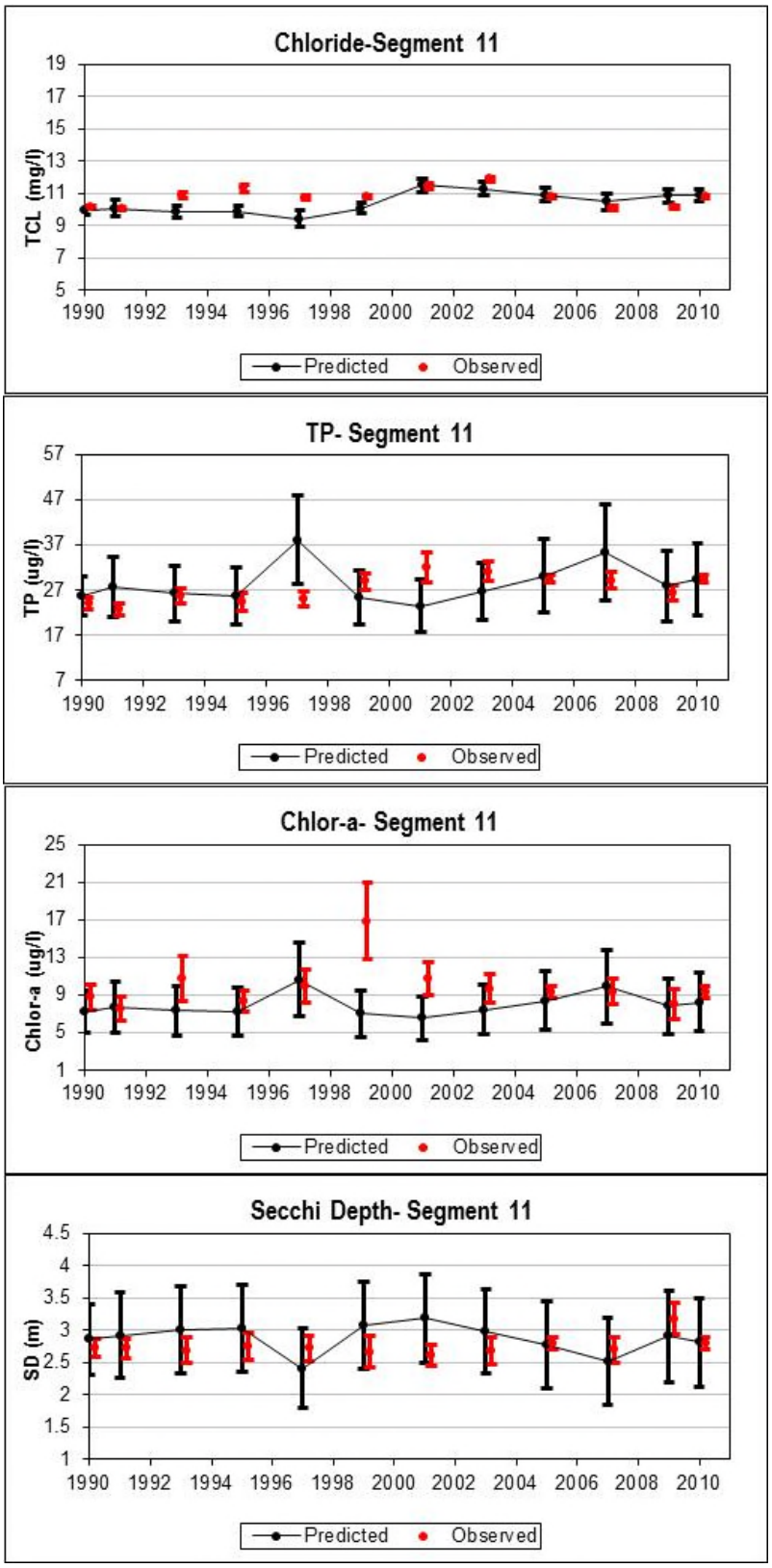


Figure C.12: BATHTUB Model Calibration Results – Segment 11 – St. Albans Bay

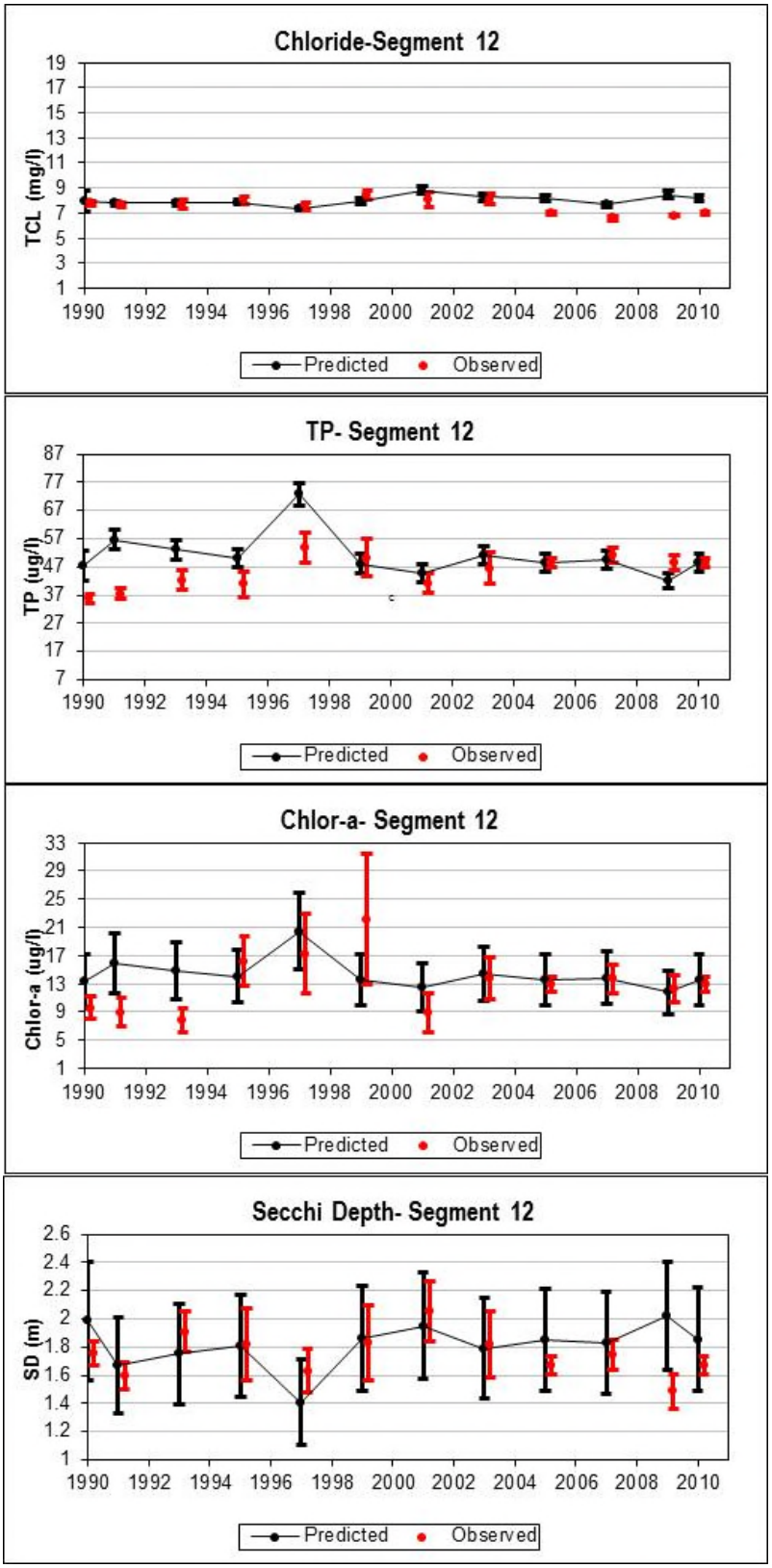


Figure C.13: BATHTUB Model Calibration Results – Segment 12 – Missisquoi Bay

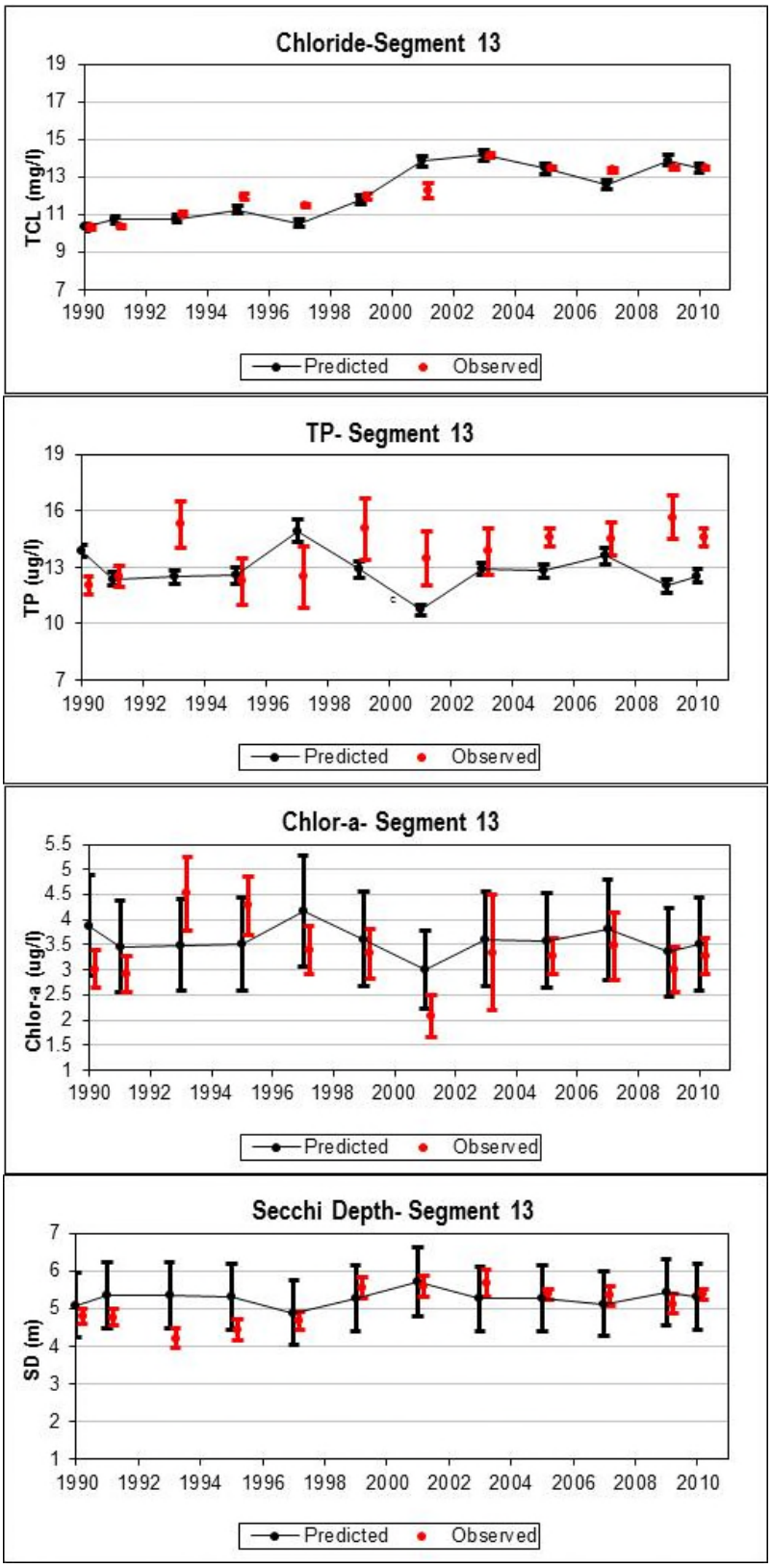


Figure C.14: BATHTUB Model Calibration Results – Segment 13 – Isle LaMotte

APPENDIX D

SENSITIVITY ANALYSIS PLOTS

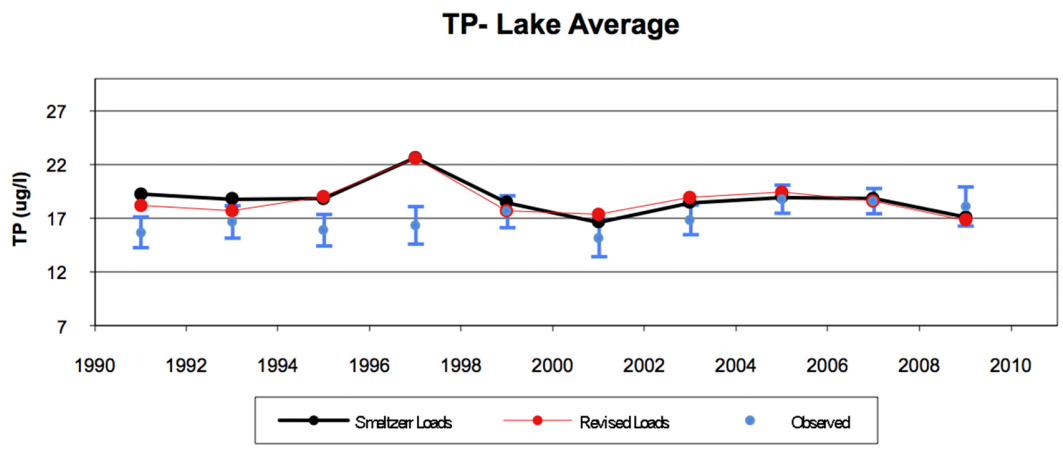


Figure C.1: BATHTUB Sensitivity to TP Load Calculation Method – Lake Average

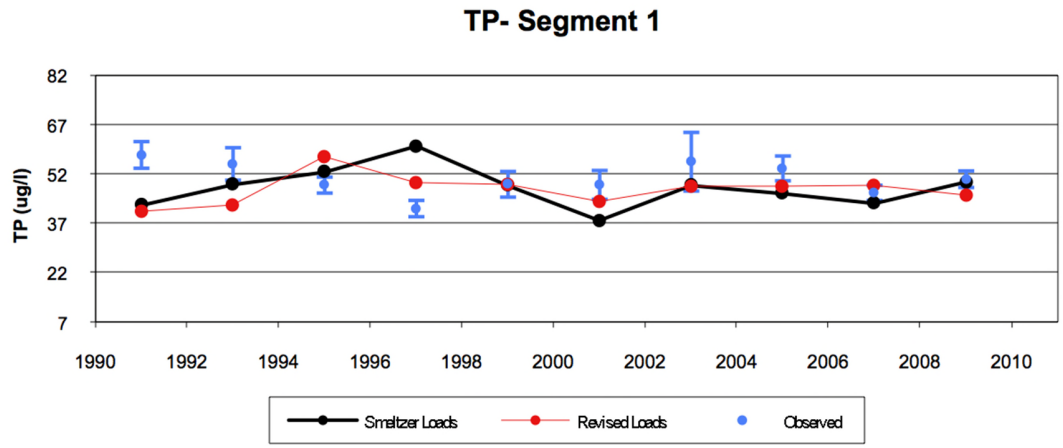


Figure C.2: BATHTUB Sensitivity to TP Load Calculation Method – Segment 1

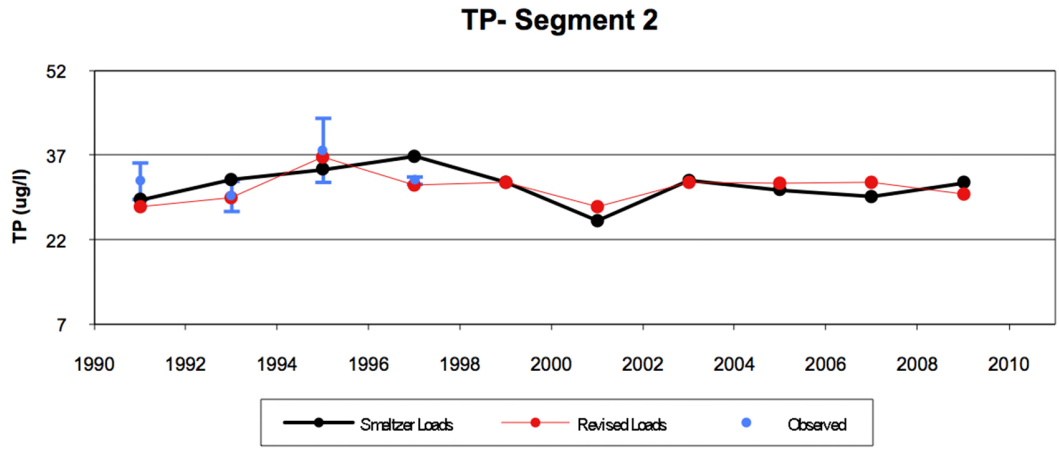


Figure C.3: BATHTUB Sensitivity to TP Load Calculation Method – Segment 2

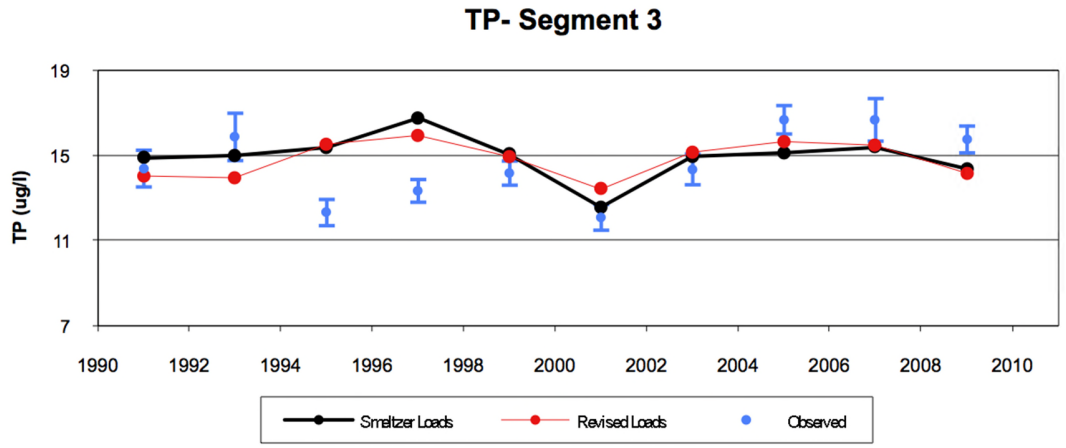


Figure C.4: BATHTUB Sensitivity to TP Load Calculation Method – Segment 3

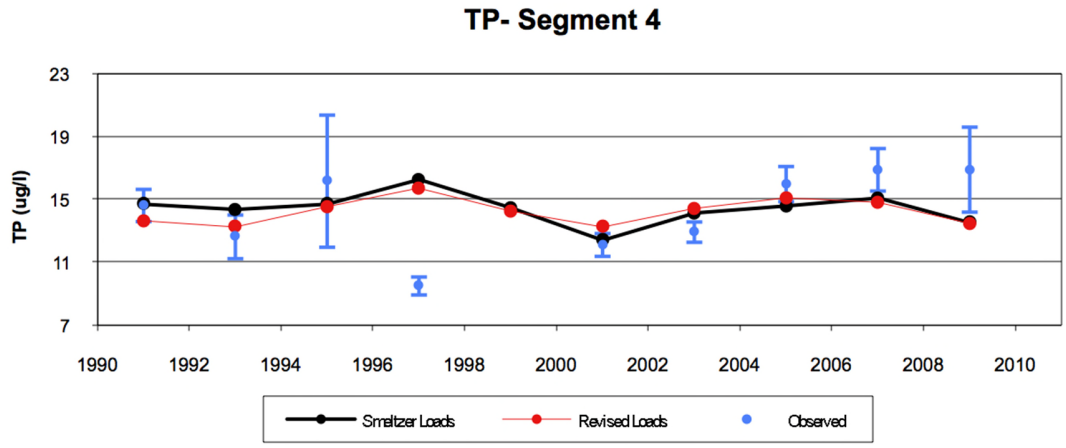


Figure C.5: BATHTUB Sensitivity to TP Load Calculation Method – Segment 4

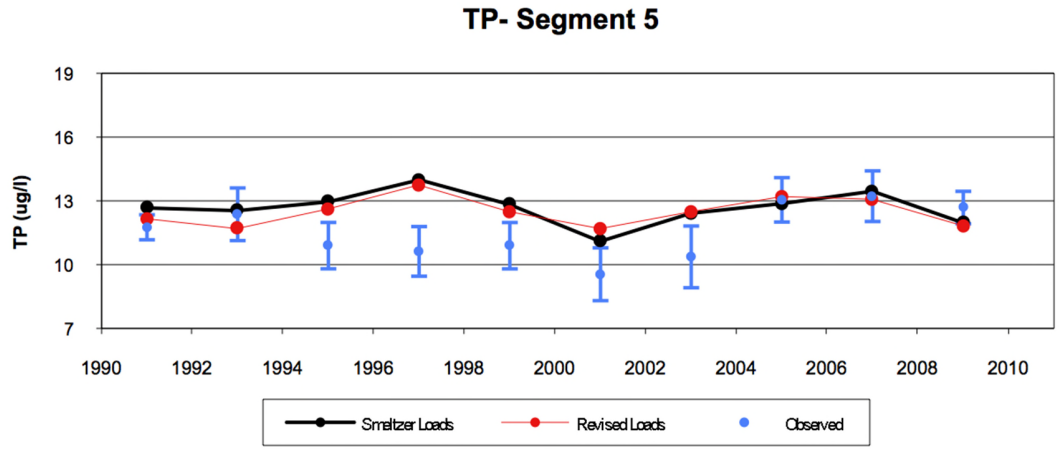


Figure C.6: BATHTUB Sensitivity to TP Load Calculation Method – Segment 5

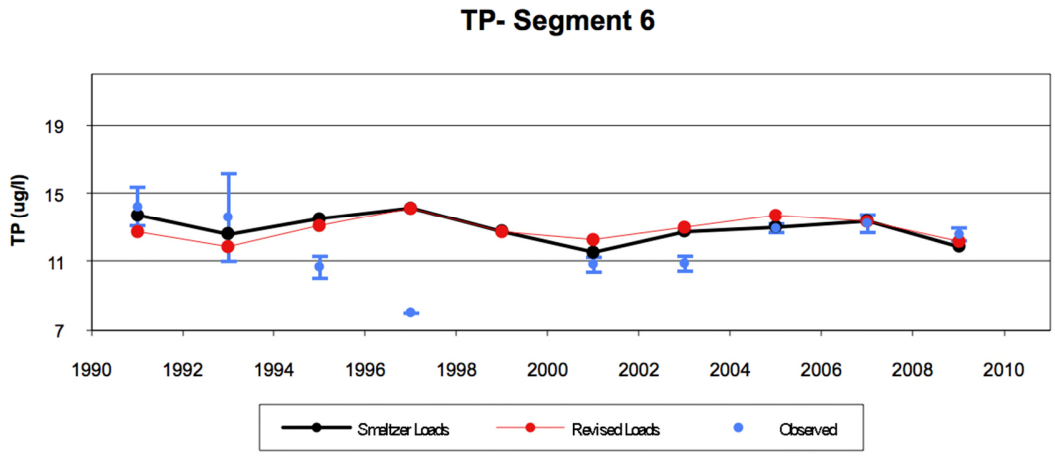


Figure C.7: BATHTUB Sensitivity to TP Load Calculation Method – Segment 6

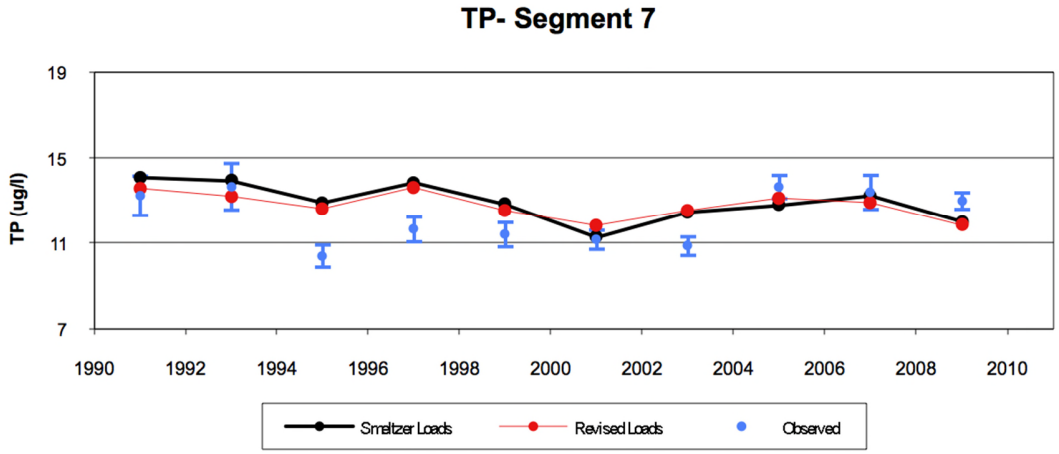


Figure C.8: BATHTUB Sensitivity to TP Load Calculation Method – Segment 7

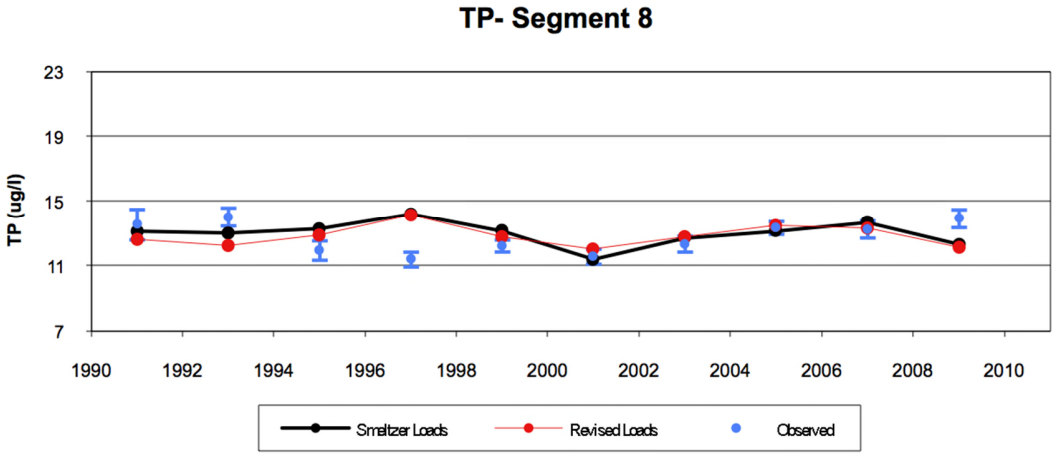


Figure C.9: BATHTUB Sensitivity to TP Load Calculation Method – Segment 8

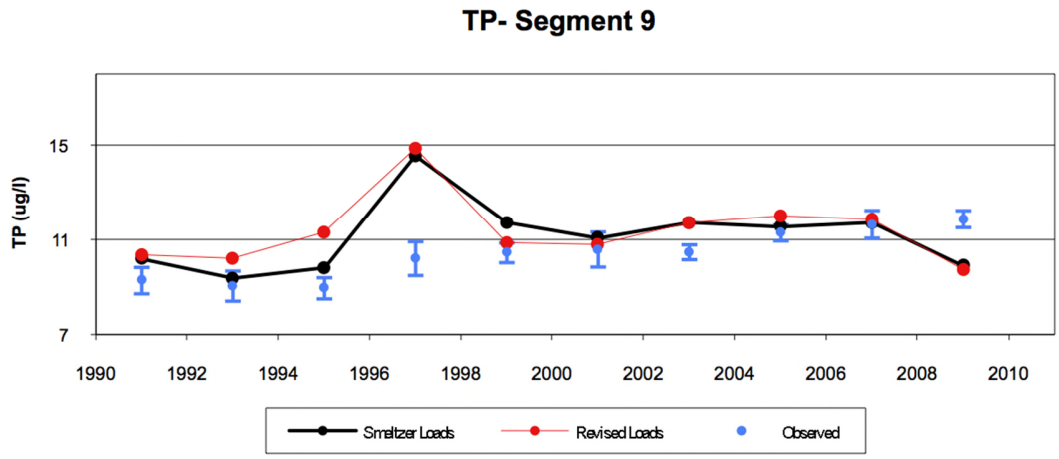


Figure C.10: BATHTUB Sensitivity to TP Load Calculation Method – Segment 9

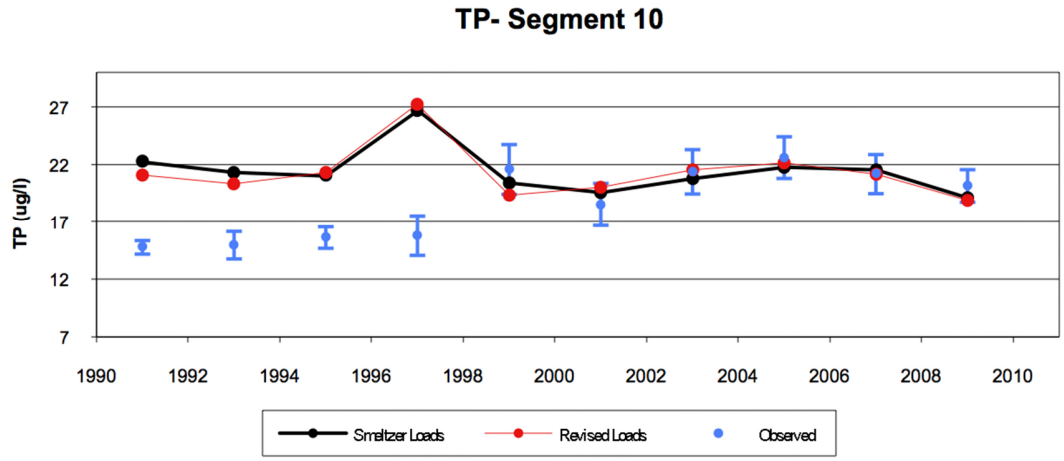


Figure C.11: BATHTUB Sensitivity to TP Load Calculation Method – Segment 10

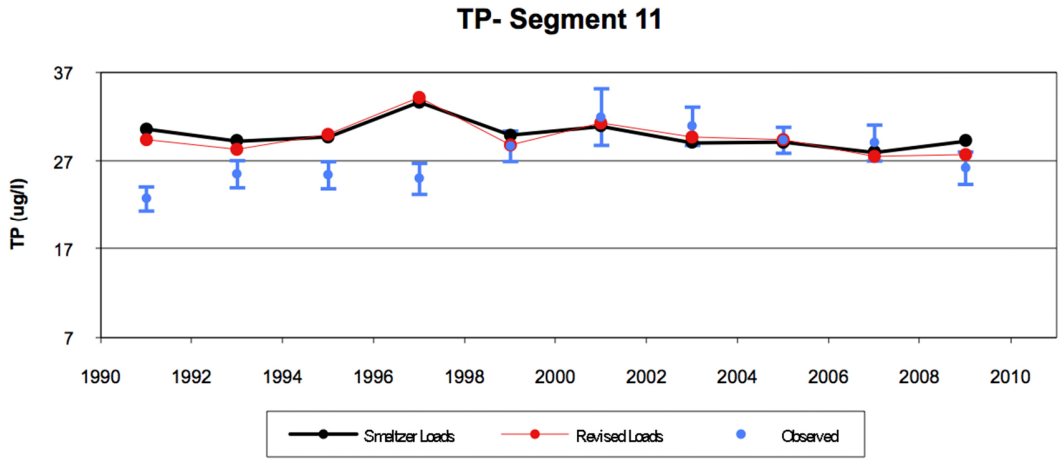


Figure C.12: BATHTUB Sensitivity to TP Load Calculation Method – Segment 11

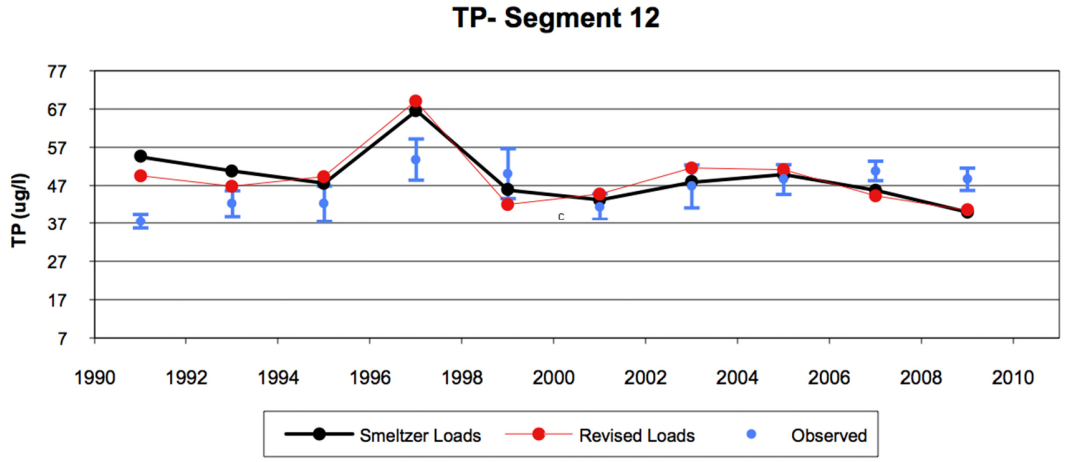


Figure C.13: BATHTUB Sensitivity to TP Load Calculation Method – Segment 12

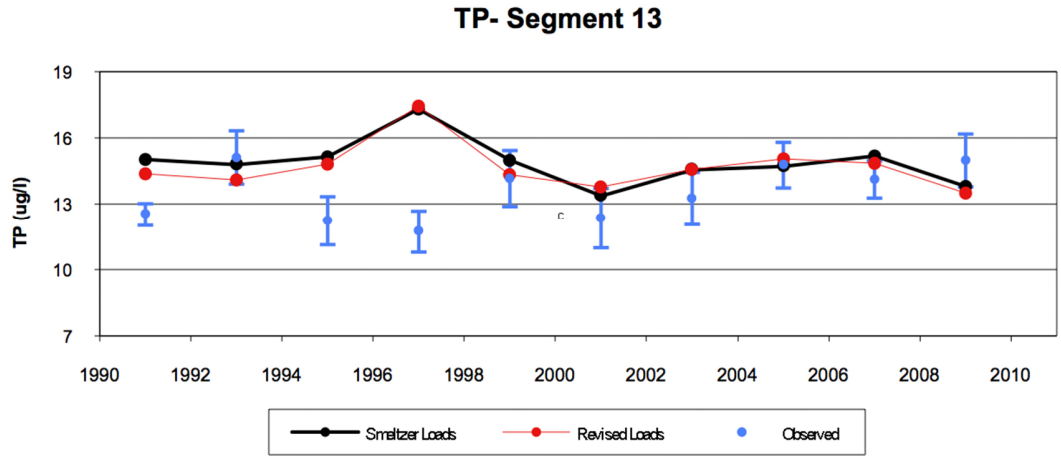


Figure C.14: BATHTUB Sensitivity to TP Load Calculation Method – Segment 13