APPENDIX A

Maps

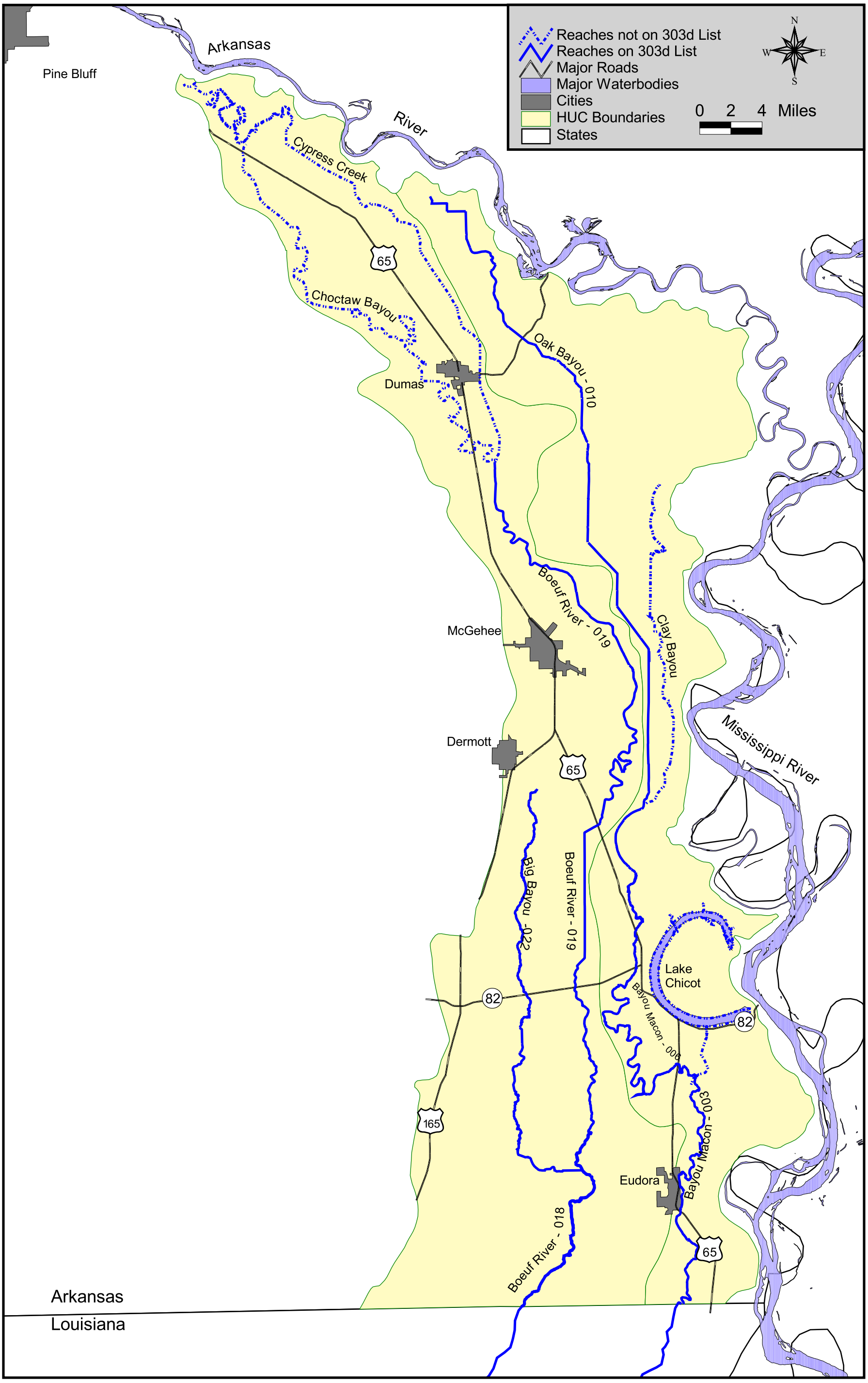
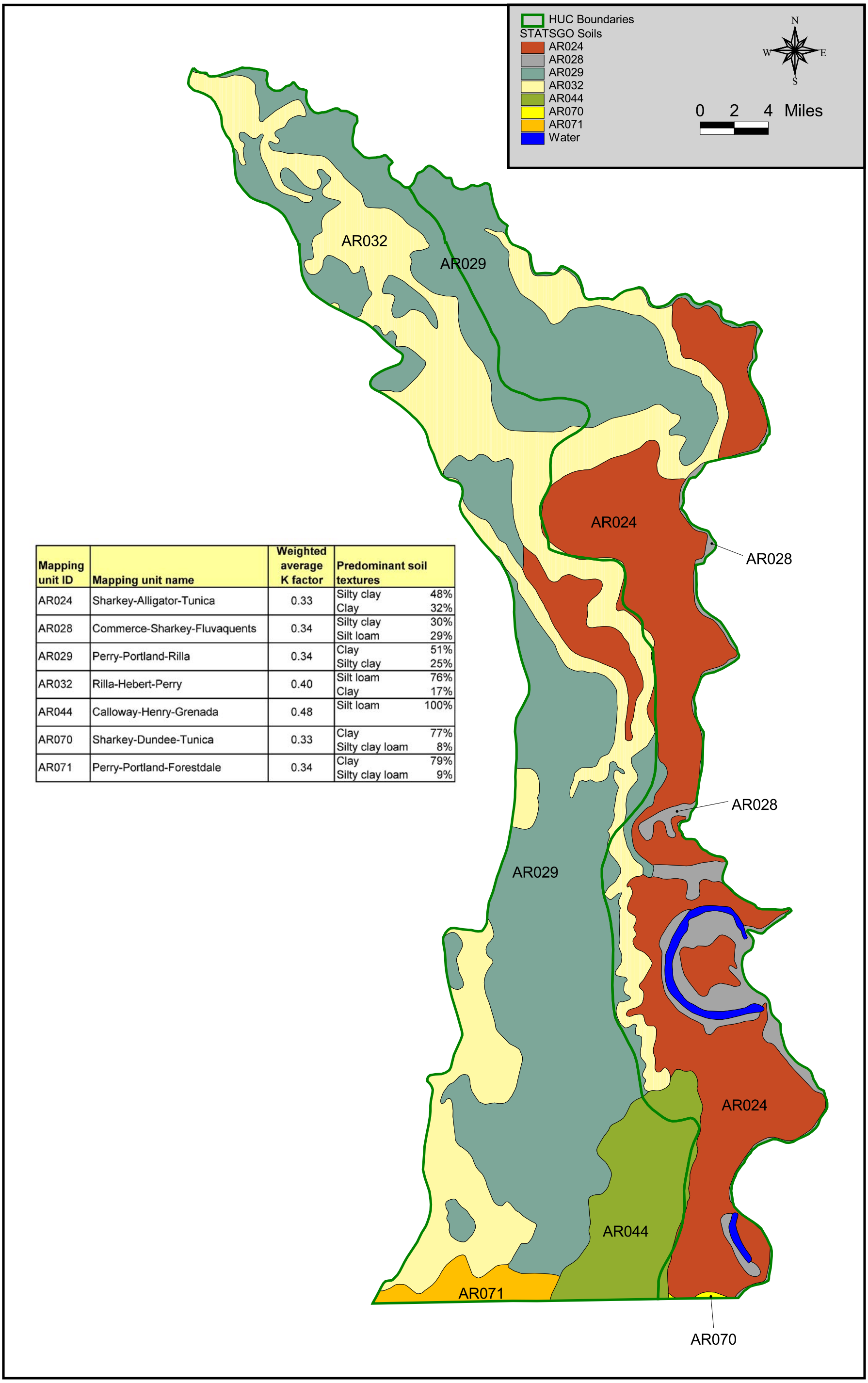


Figure A.1. Map of study area.



Mapping unit ID	Mapping unit name	Weighted average K factor	Predominant soil textures
AR024	Sharkey-Alligator-Tunica	0.33	Silty clay 48% Clay 32%
AR028	Commerce-Sharkey-Fluvaquents	0.34	Silty clay 30% Silt loam 29%
AR029	Perry-Portland-Rilla	0.34	Clay 51% Silty clay 25%
AR032	Rilla-Hebert-Perry	0.40	Silt loam 76% Clay 17%
AR044	Calloway-Henry-Grenada	0.48	Silt loam 100%
AR070	Sharkey-Dundee-Tunica	0.33	Clay 77% Silty clay loam 8%
AR071	Perry-Portland-Forestdale	0.34	Clay 79% Silty clay loam 9%

Figure A.2. Map of STATSGO soils data.

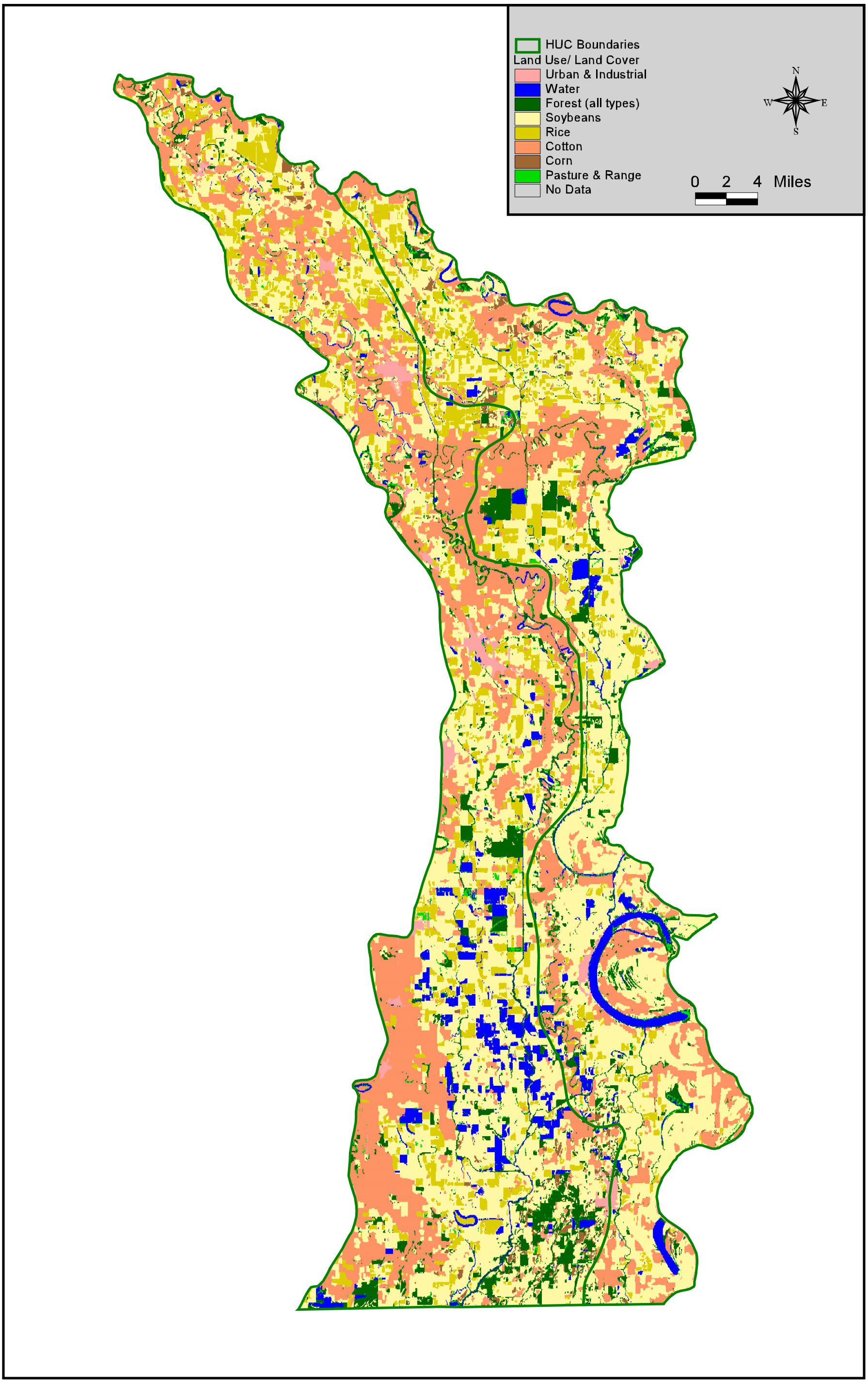


Figure A.3. Land use map.

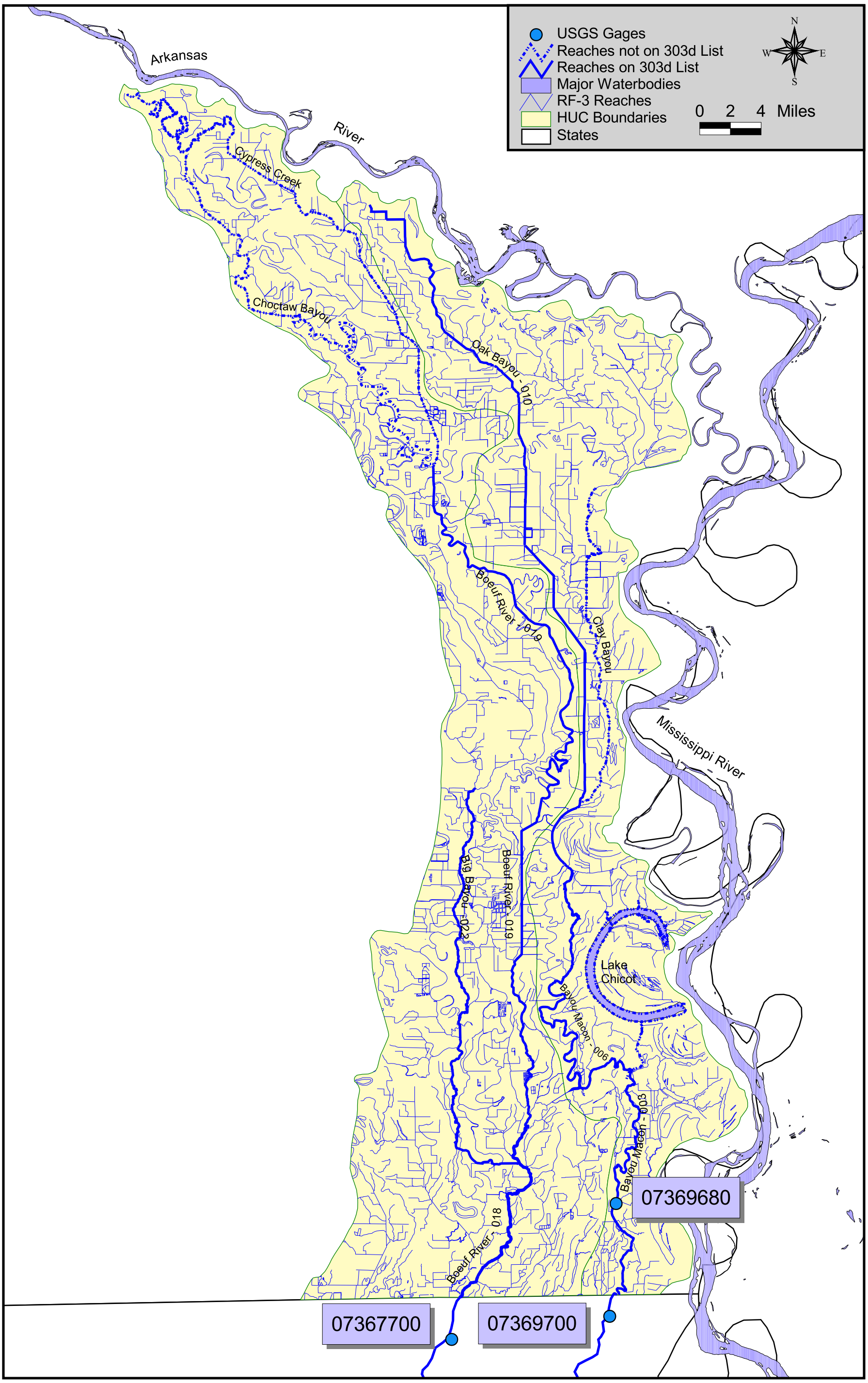


Figure A.4. USGS flow gages and stream channel network.

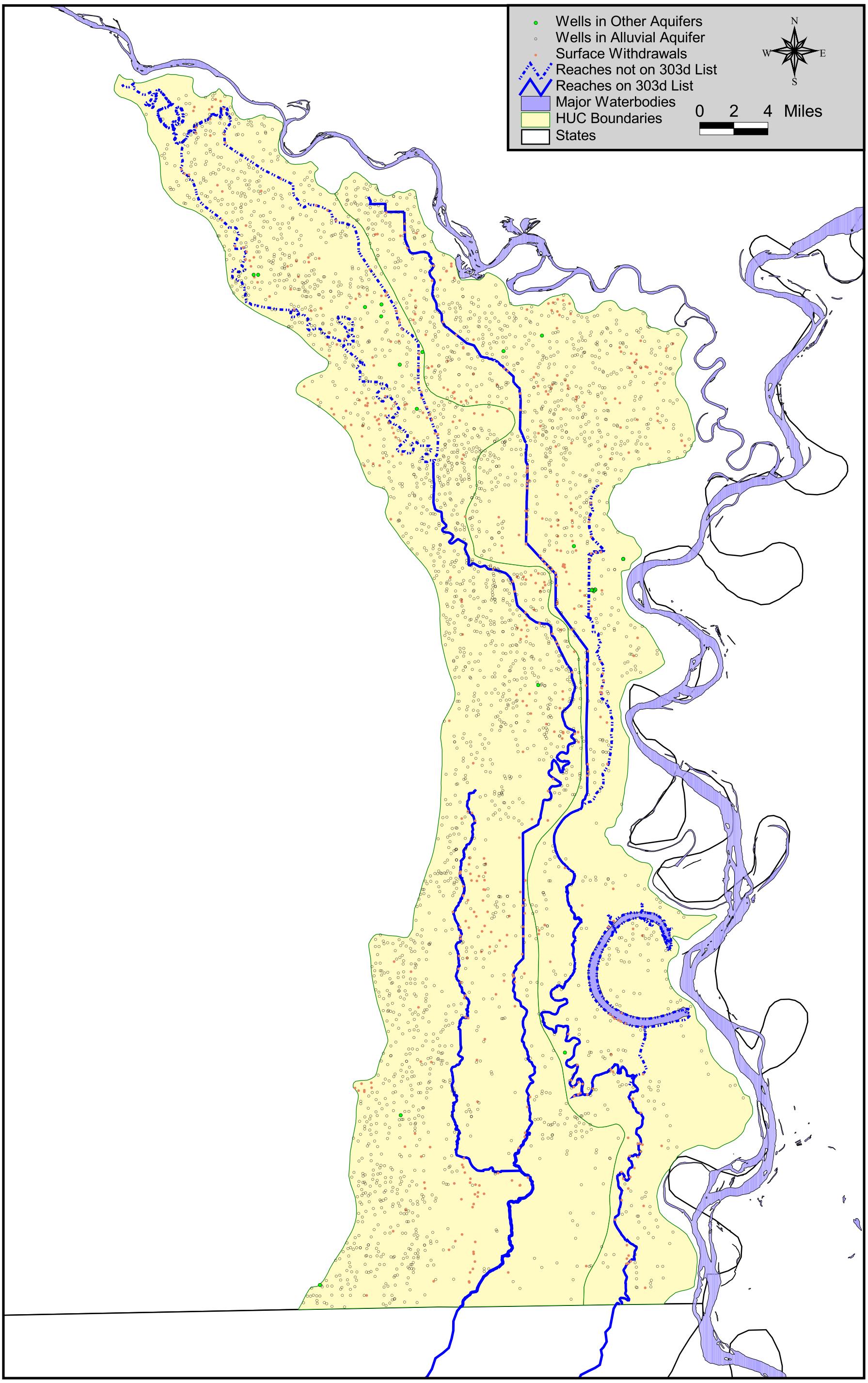
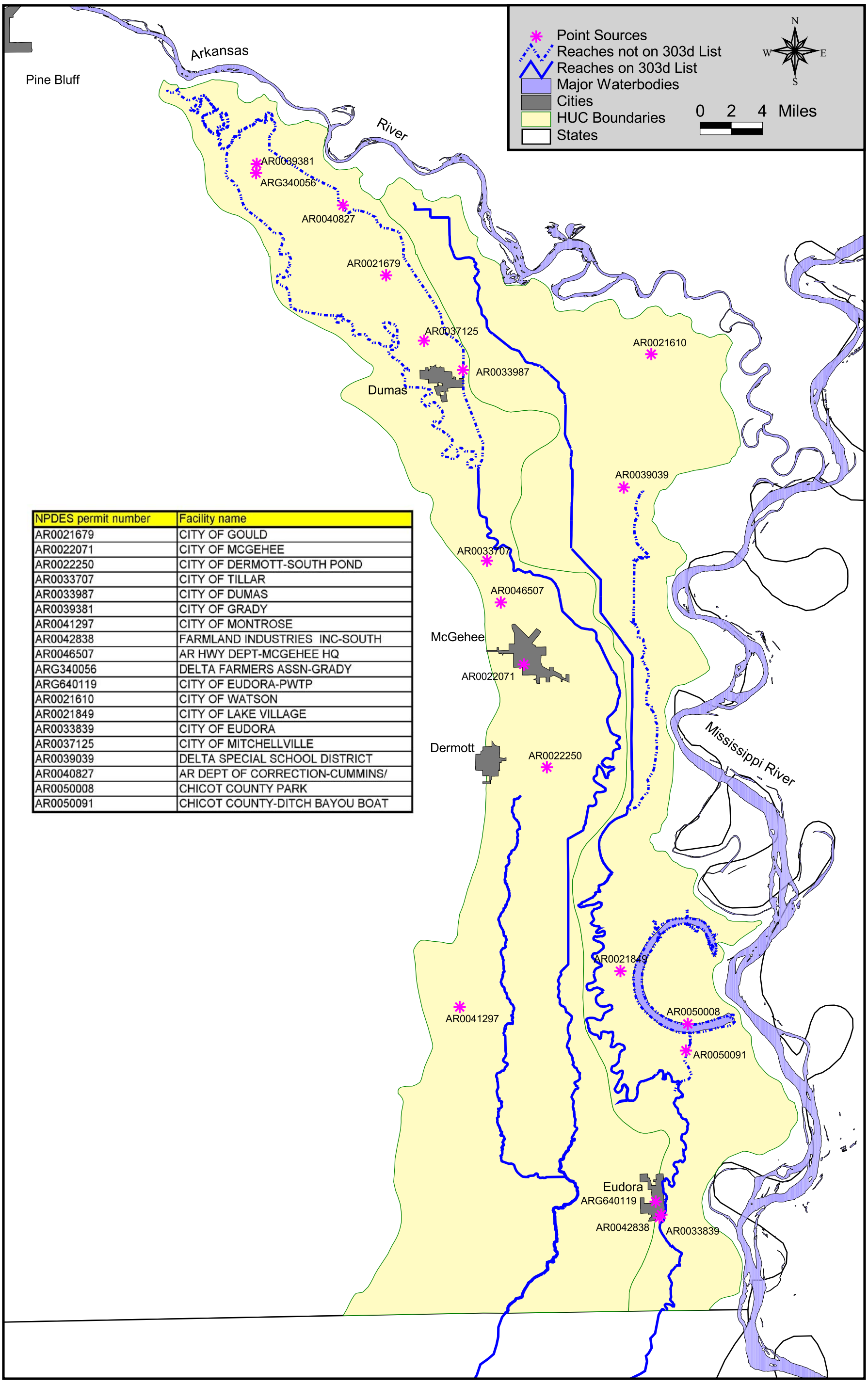


Figure A.5. Locations of water withdrawals.



NPDES permit number	Facility name
AR0021679	CITY OF GOULD
AR0022071	CITY OF MCGEHEE
AR0022250	CITY OF DERMOTT-SOUTH POND
AR0033707	CITY OF TILLAR
AR0033987	CITY OF DUMAS
AR0039381	CITY OF GRADY
AR0041297	CITY OF MONTROSE
AR0042838	FARMLAND INDUSTRIES INC-SOUTH
AR0046507	AR HWY DEPT-MCGEHEE HQ
ARG340056	DELTA FARMERS ASSN-GRADY
ARG640119	CITY OF EUDORA-PWTP
AR0021610	CITY OF WATSON
AR0021849	CITY OF LAKE VILLAGE
AR0033839	CITY OF EUDORA
AR0037125	CITY OF MITCHELLVILLE
AR0039039	DELTA SPECIAL SCHOOL DISTRICT
AR0040827	AR DEPT OF CORRECTION-CUMMINS/
AR0050008	CHICOT COUNTY PARK
AR0050091	CHICOT COUNTY-DITCH BAYOU BOAT

Figure A.6. Locations of point sources.

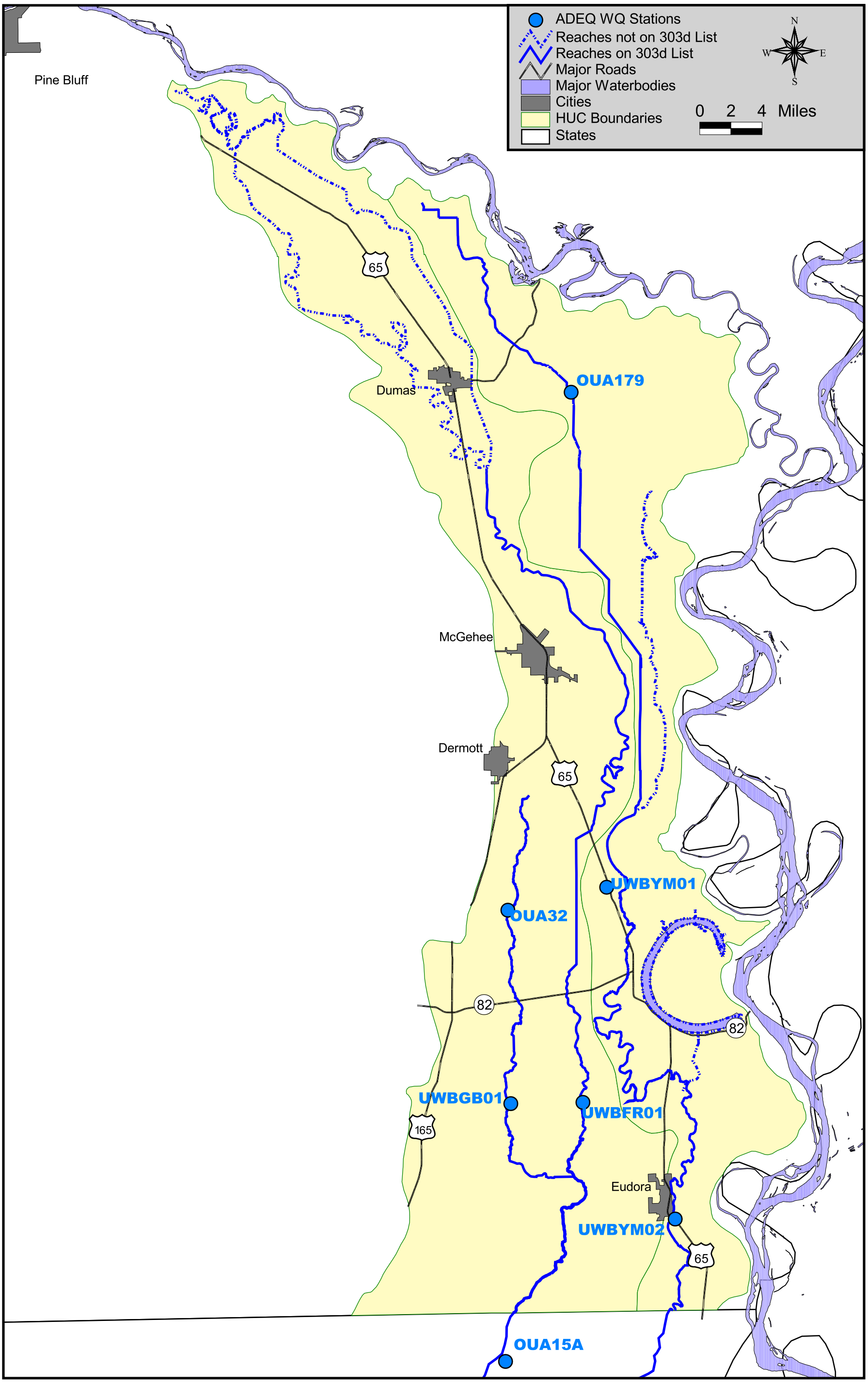


Figure A.7. Water quality monitoring stations.

APPENDIX B

Long Term Plots of Turbidity and TSS

Figure B.1. Long Term Plot of Turbidity for Boeuf River at OUA0015A

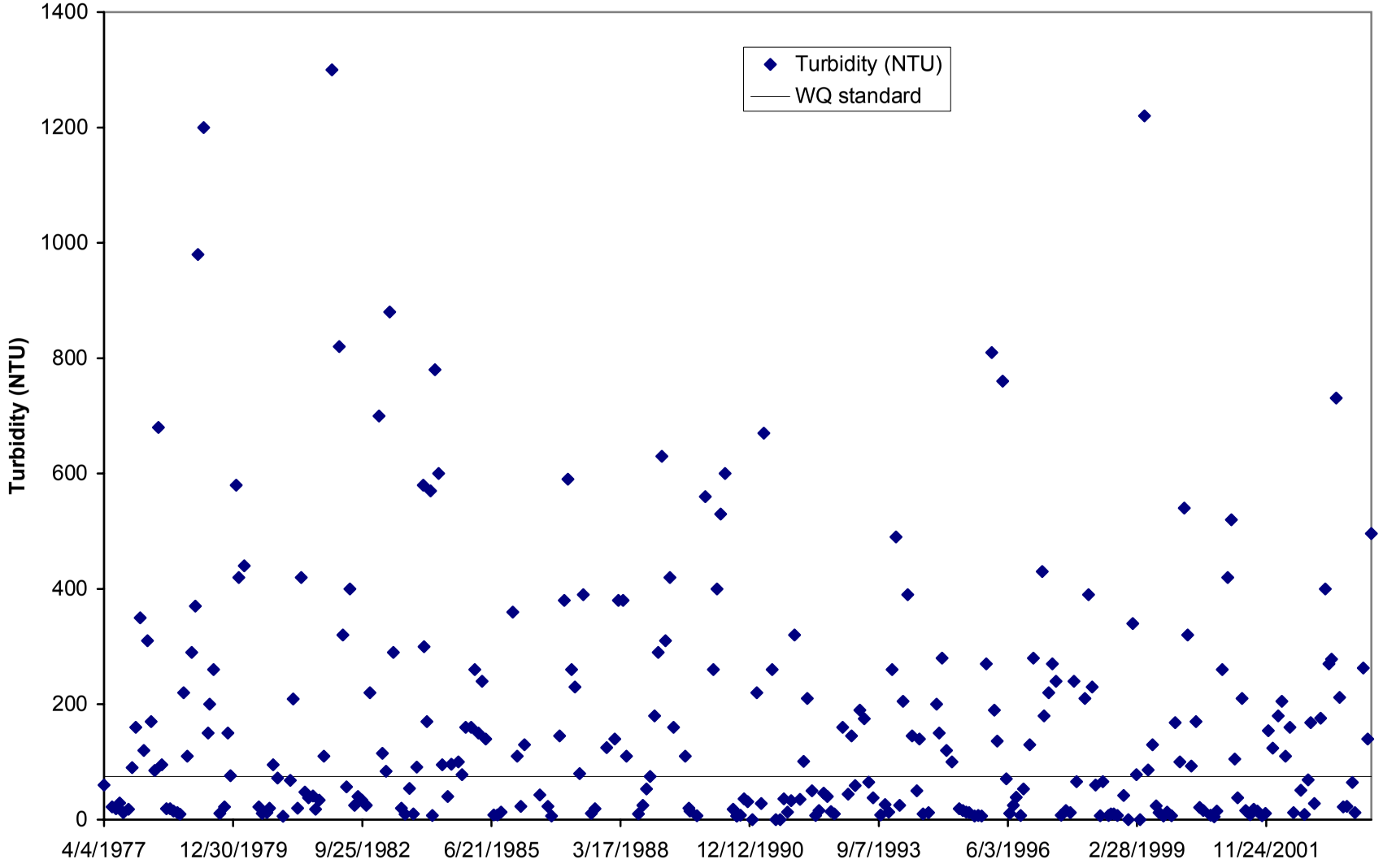
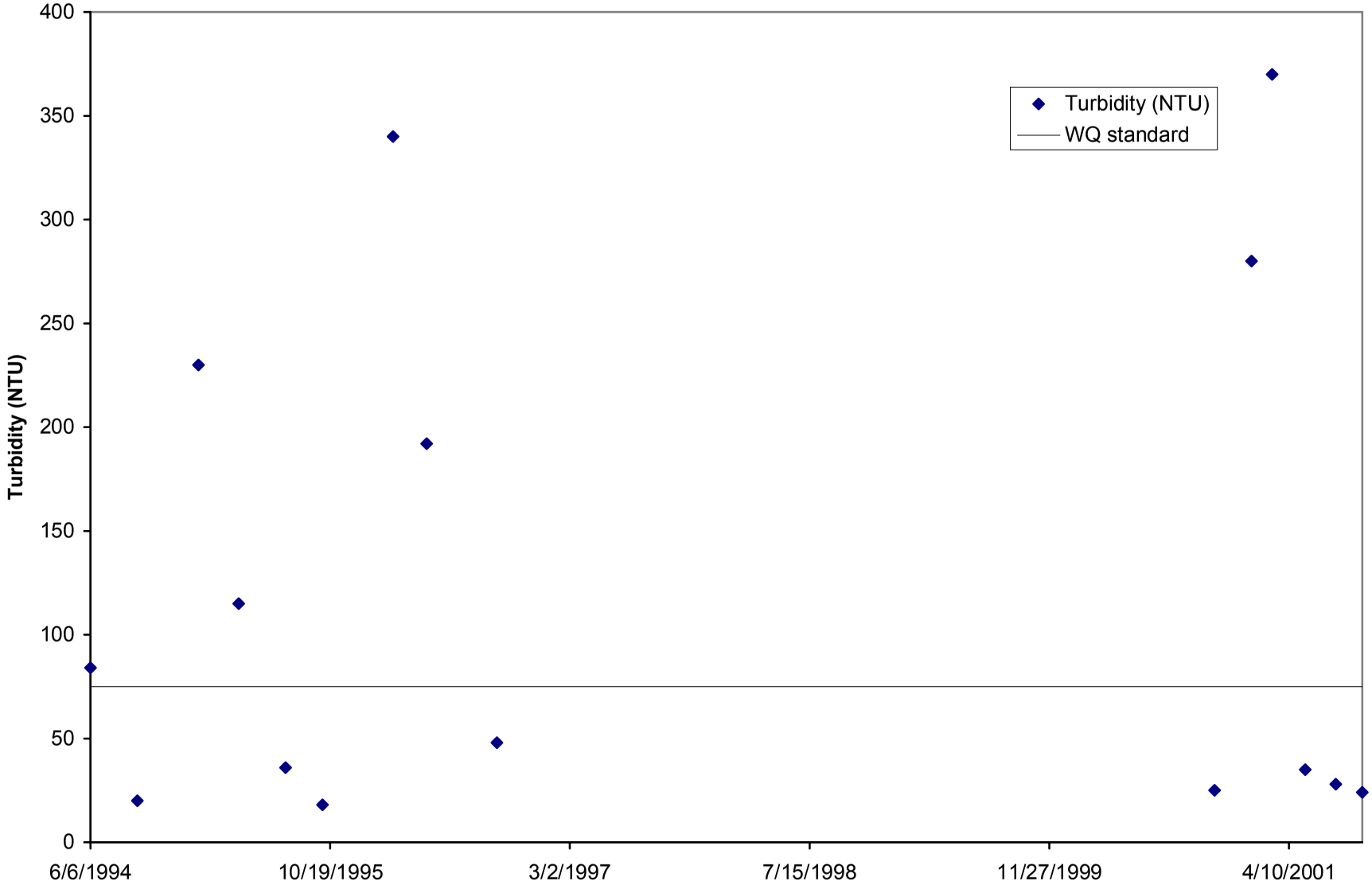


Figure B.2. Long Term Plot of Turbidity at Boeuf River at UWBFR01



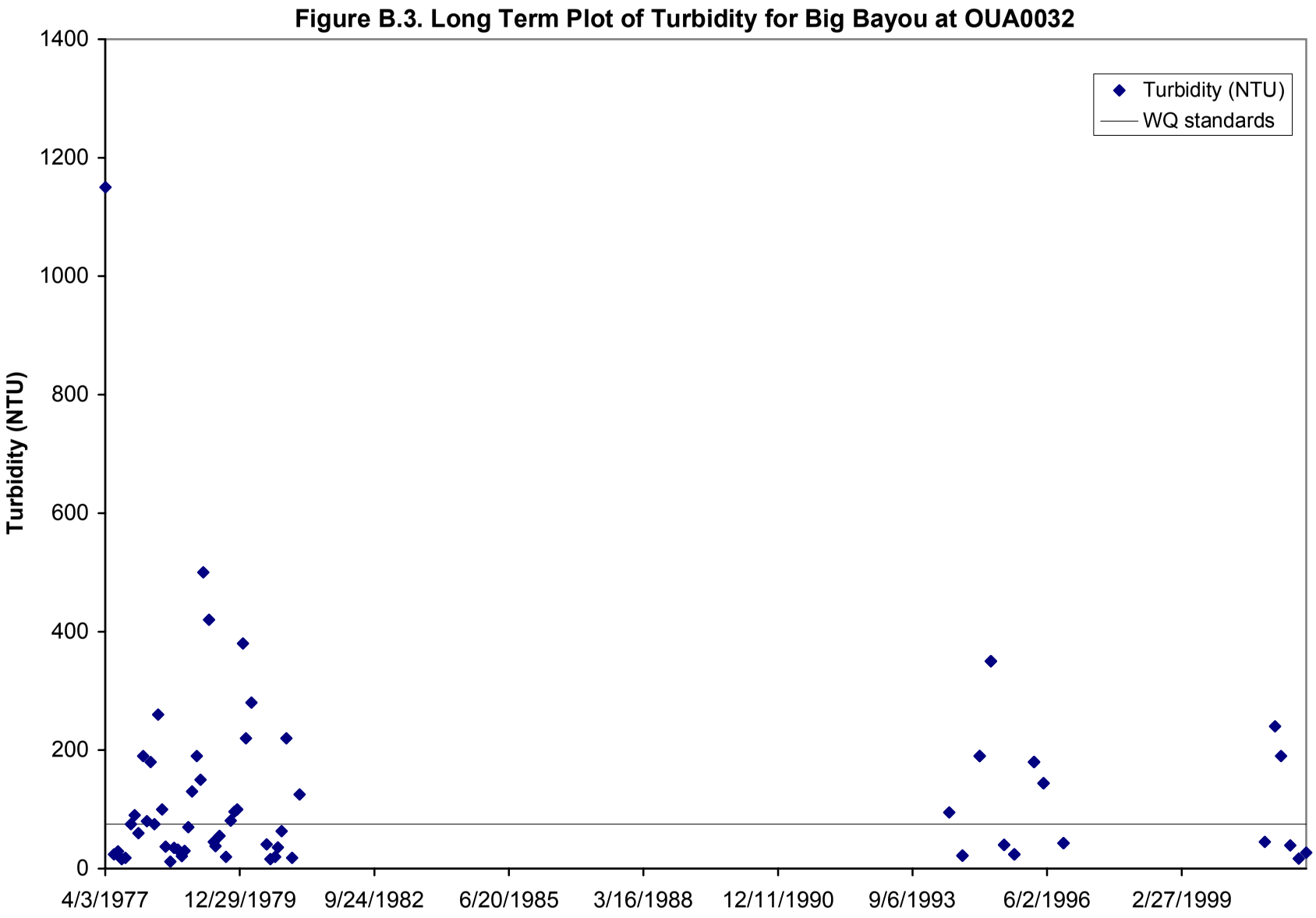


Figure B.3. Long Term Plot of Turbidity for Big Bayou at OUA0032
Turbidity (NTU)
WQ standards
Turbidity (NTU)
1400
1200
1000
800
600
400
200
0
4/3/1977
12/29/1979
9/24/1982
6/20/1985
3/16/1988
12/11/1990
9/6/1993
6/2/1996
2/27/1999

Figure B.4. Long Term Plot of Turbidity on Big Bayou at UWBGB01

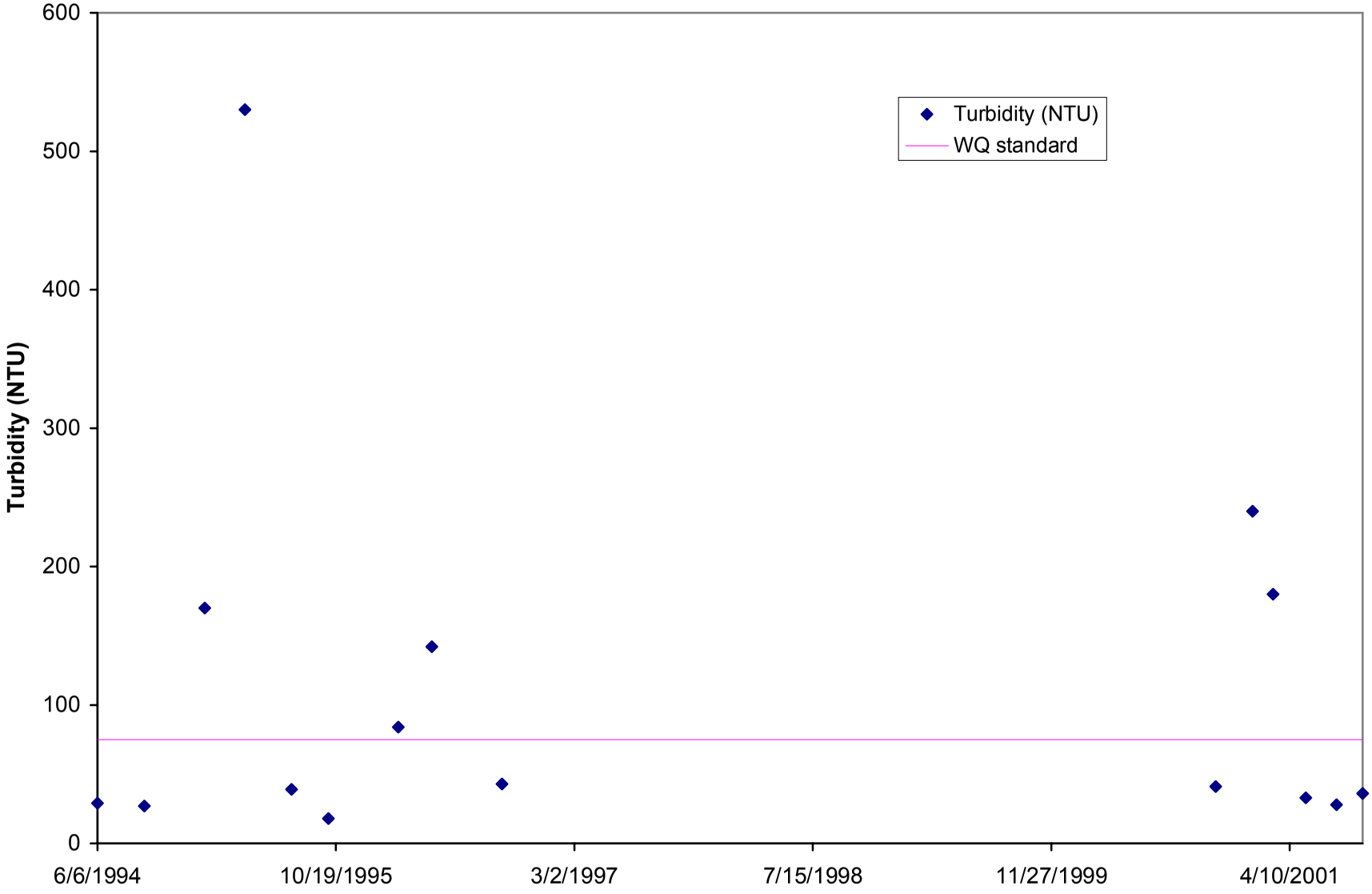


Figure B.5. Long Term Plot of Turbidity for Oak Bayou at OUA0179

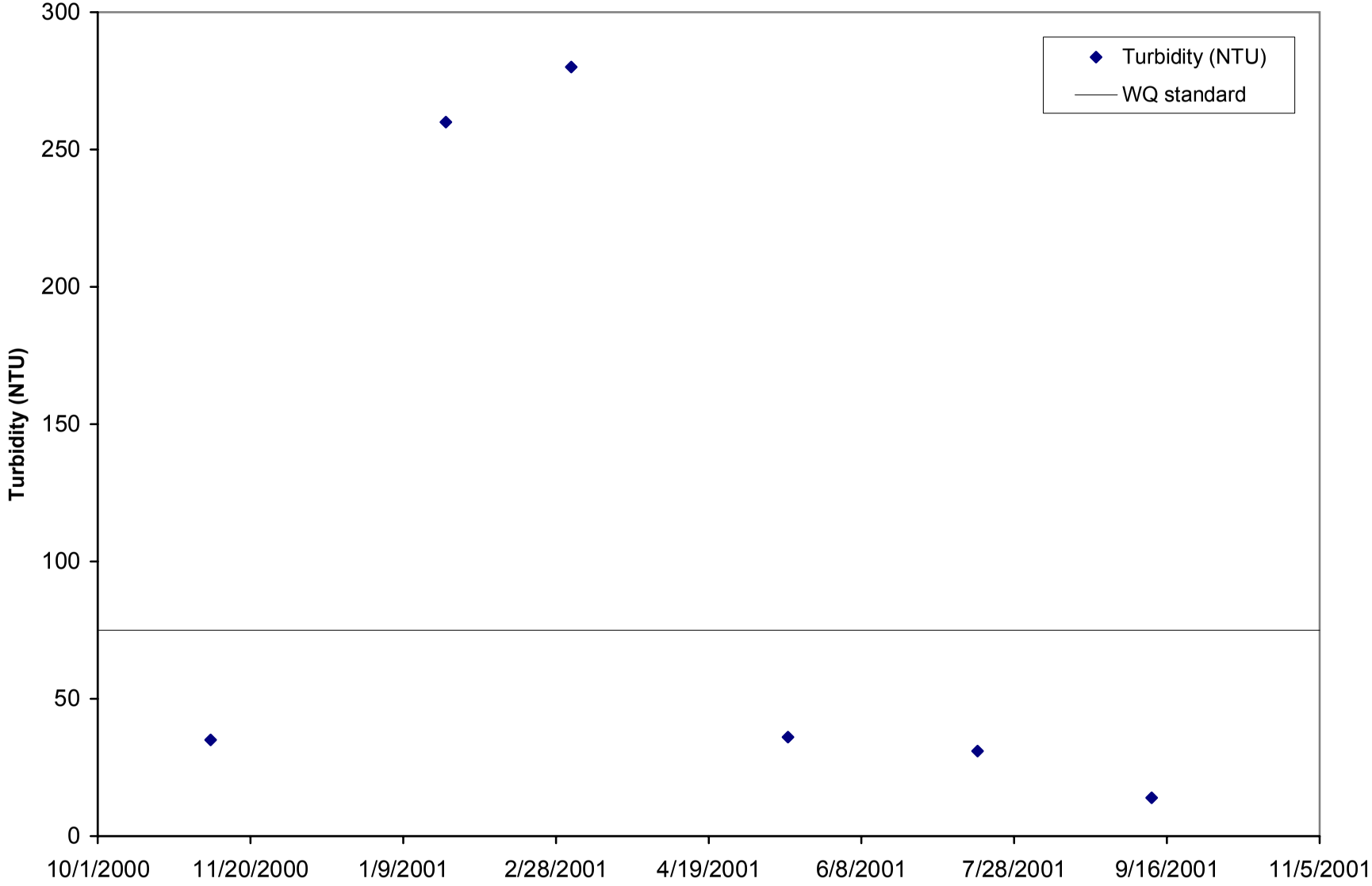


Figure B.6. Long Term Plots of Turbidity for Bayou Macon at UWBYM01

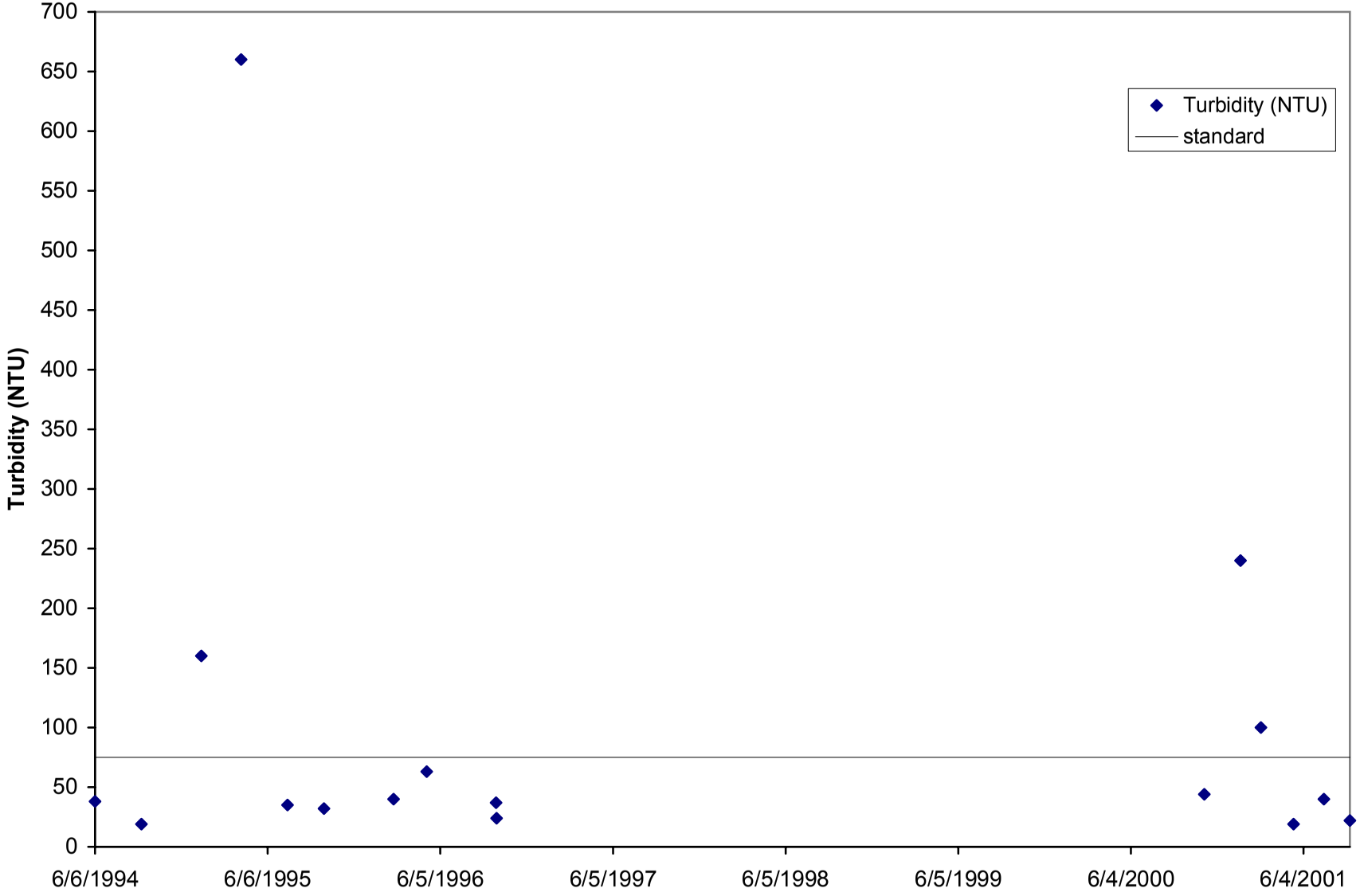


Figure B.7. Long Term Plot of Turbidity for Bayou Macon at UWBYM02

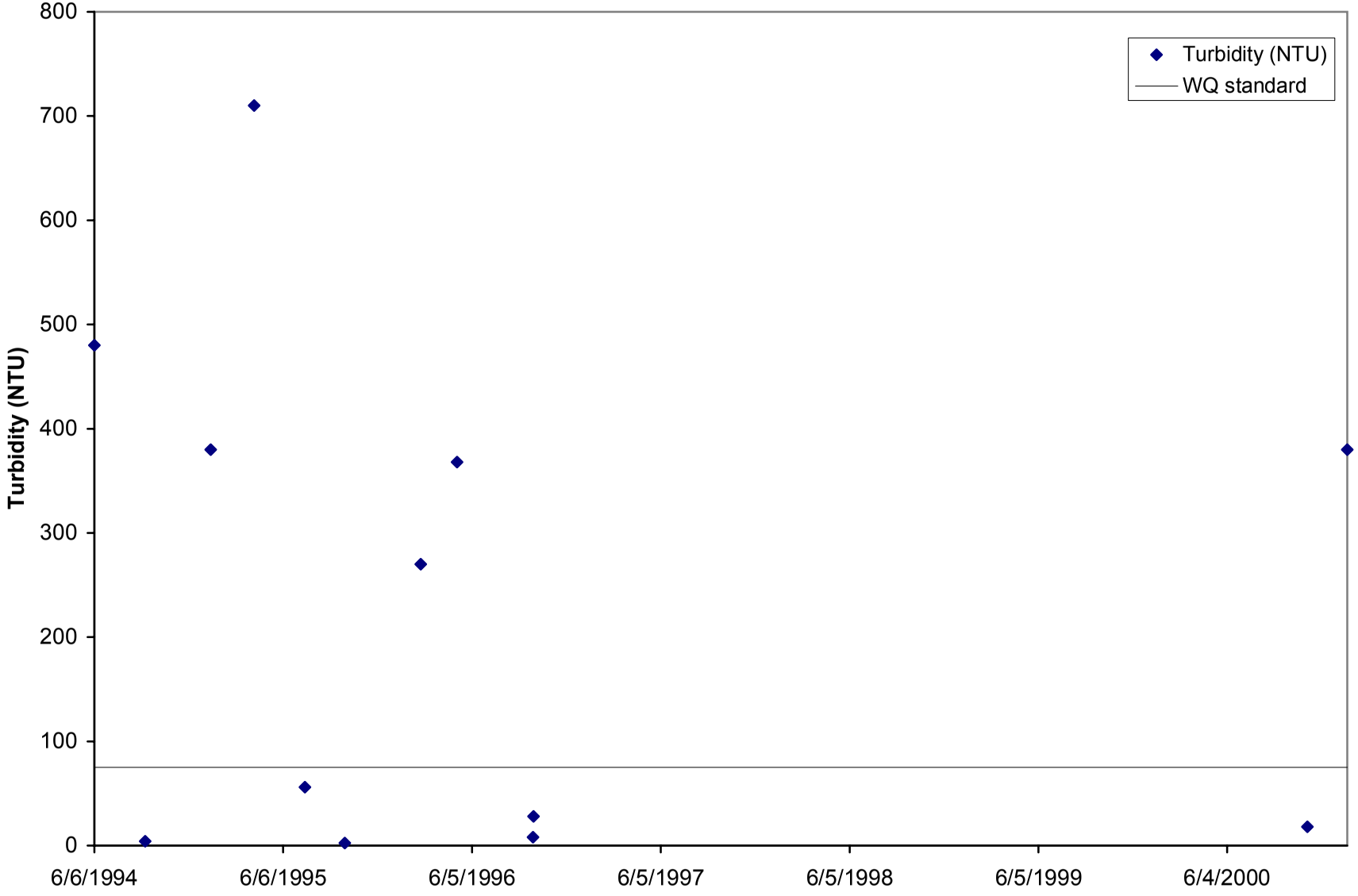
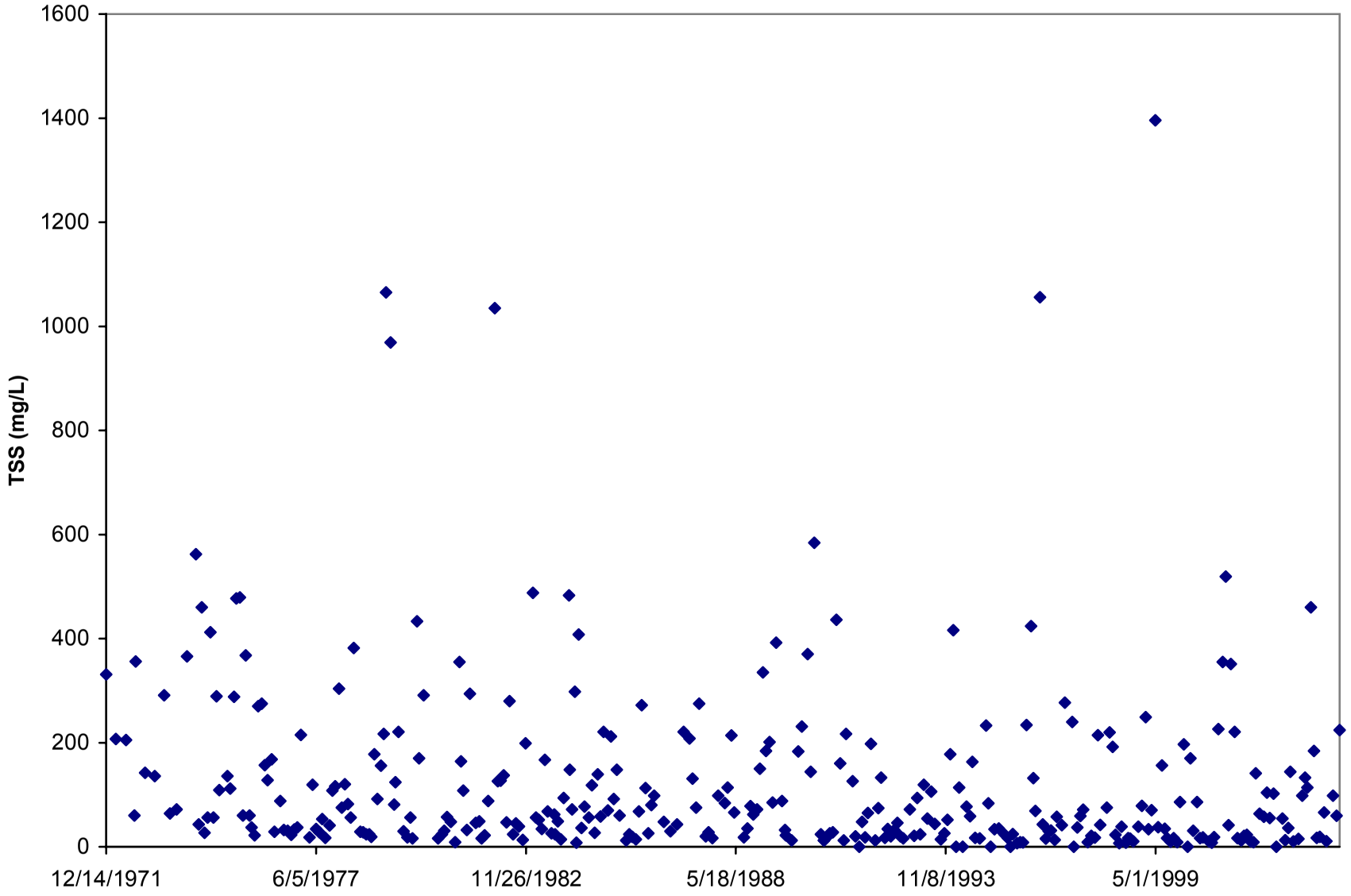


Figure B.8. Long Term Plot of TSS for Boeuf River at OUA0015A



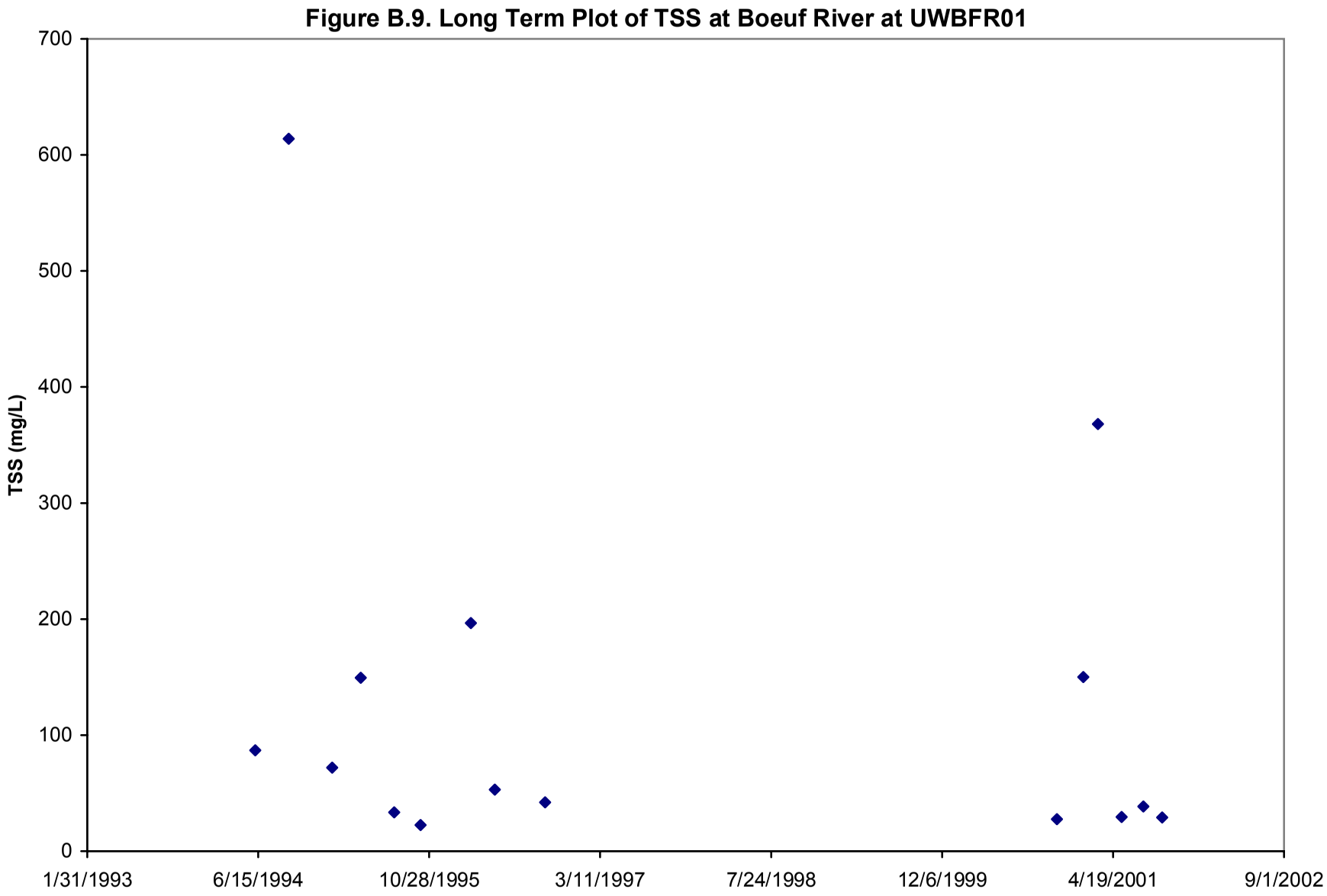
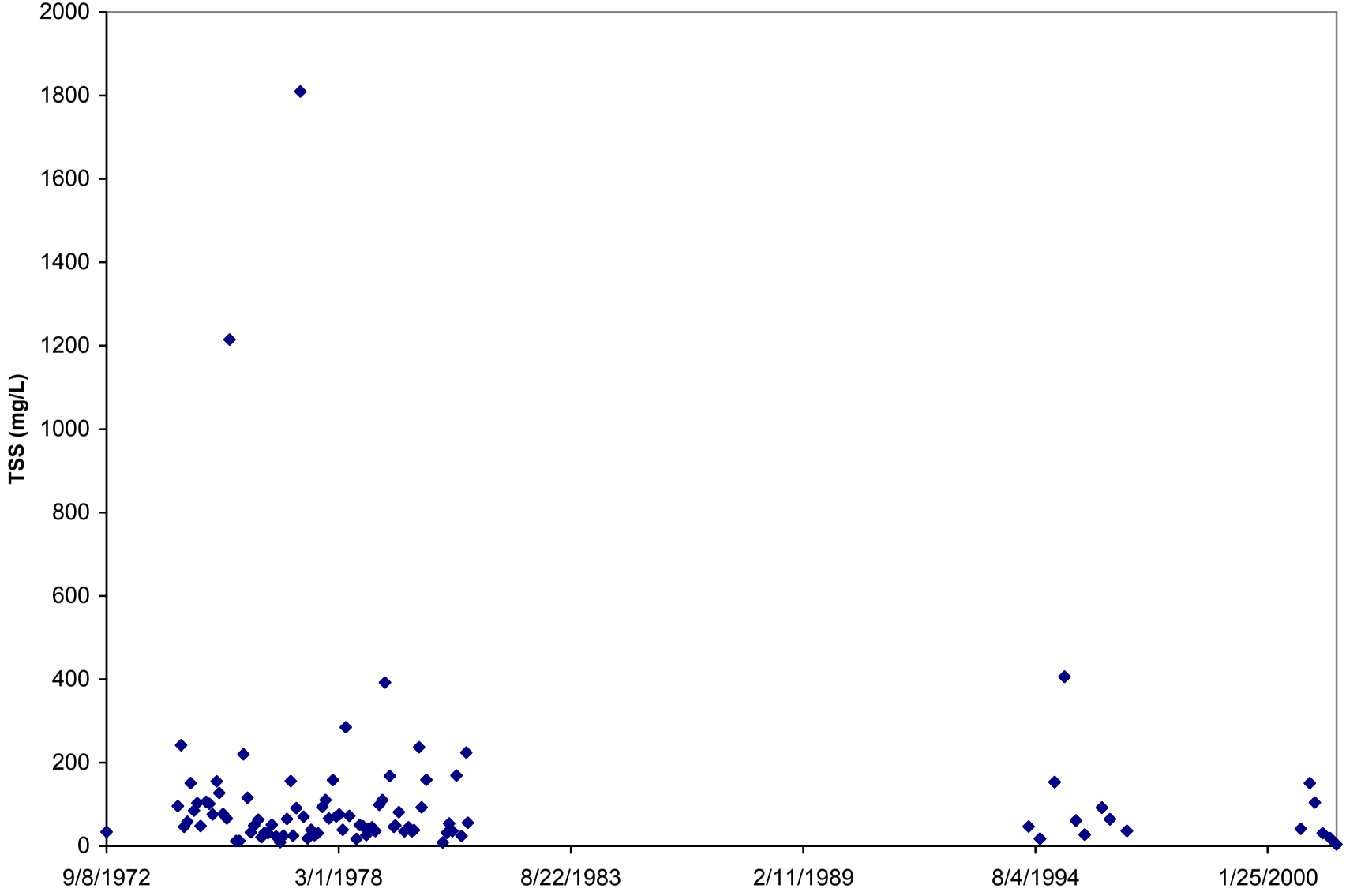


Figure B.9. Long Term Plot of TSS at Boeuf River at UWBFR01
TSS (mg/L)
700
600
500
400
300
200
100
0
1/31/1993
6/15/1994
10/28/1995
3/11/1997
7/24/1998
12/6/1999
4/19/2001
9/1/2002

Figure B.10.Long Term Plot of TSS for Big Bayou at OUA0032



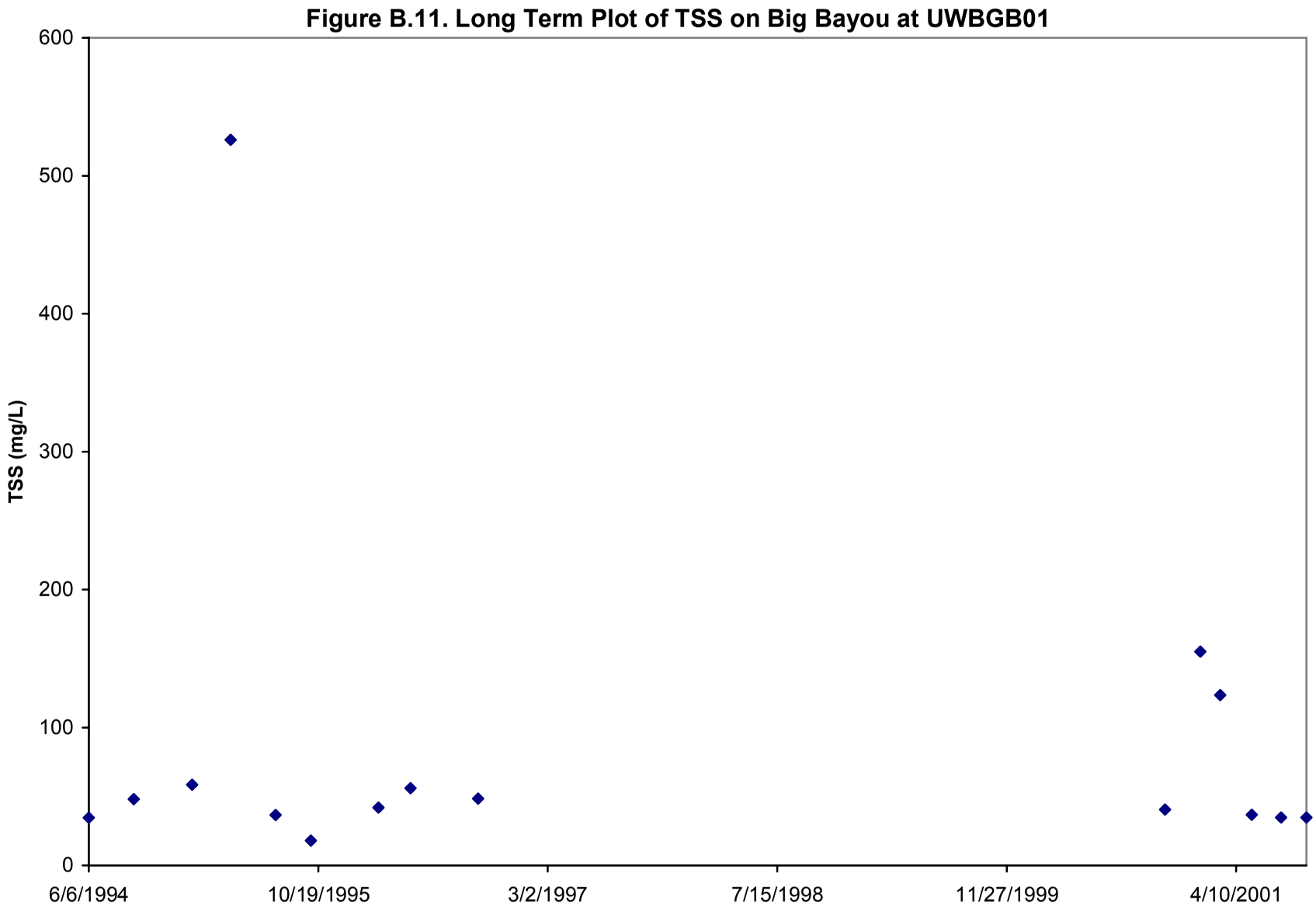


Figure B.11. Long Term Plot of TSS on Big Bayou at UWBGB01
TSS (mg/L)
600
500
400
300
200
100
0
6/6/1994
10/19/1995
3/2/1997
7/15/1998
11/27/1999
4/10/2001

Figure B.12. Long Term Plot of TSS for Oak Bayou at OUA0179

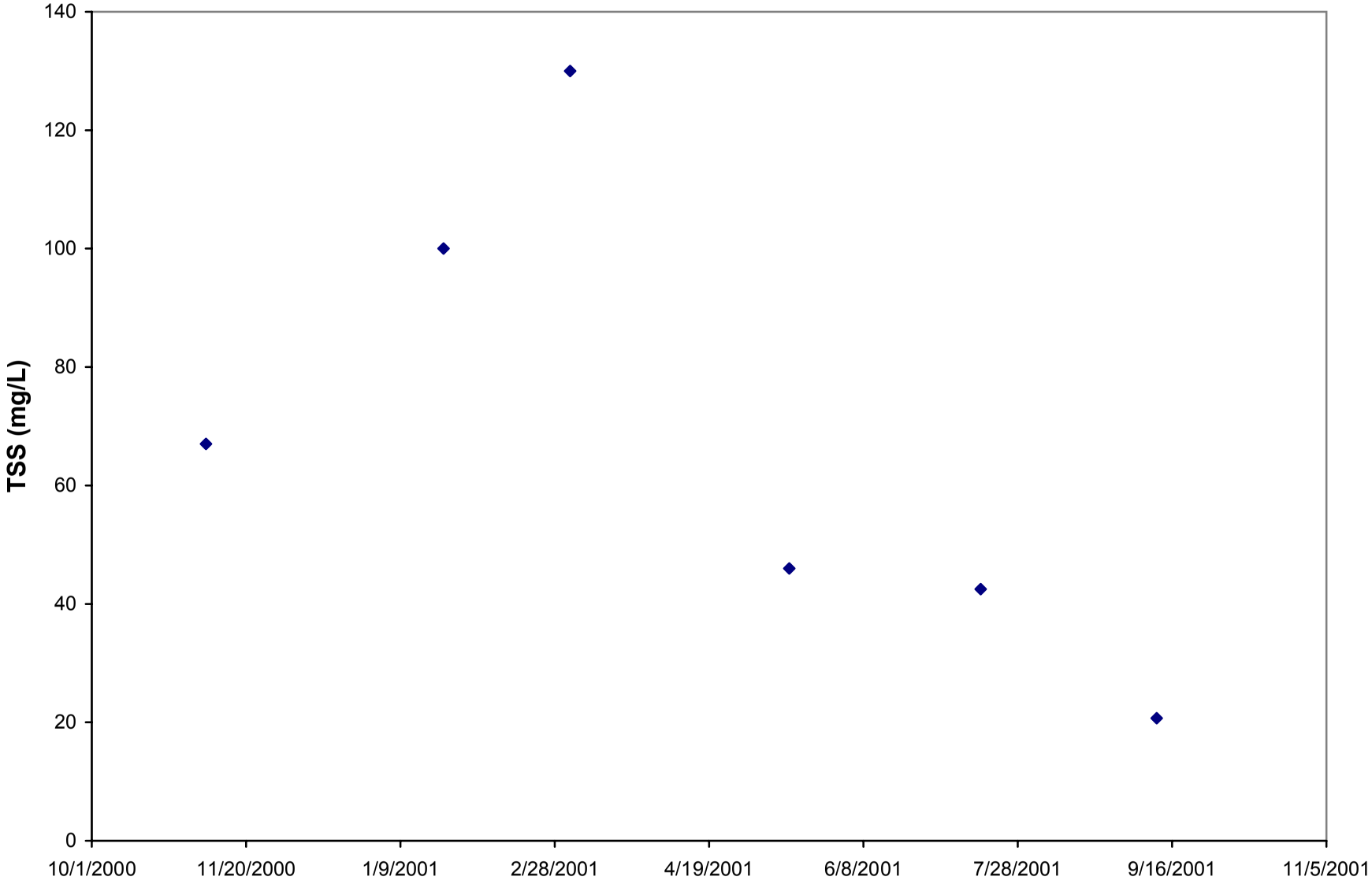
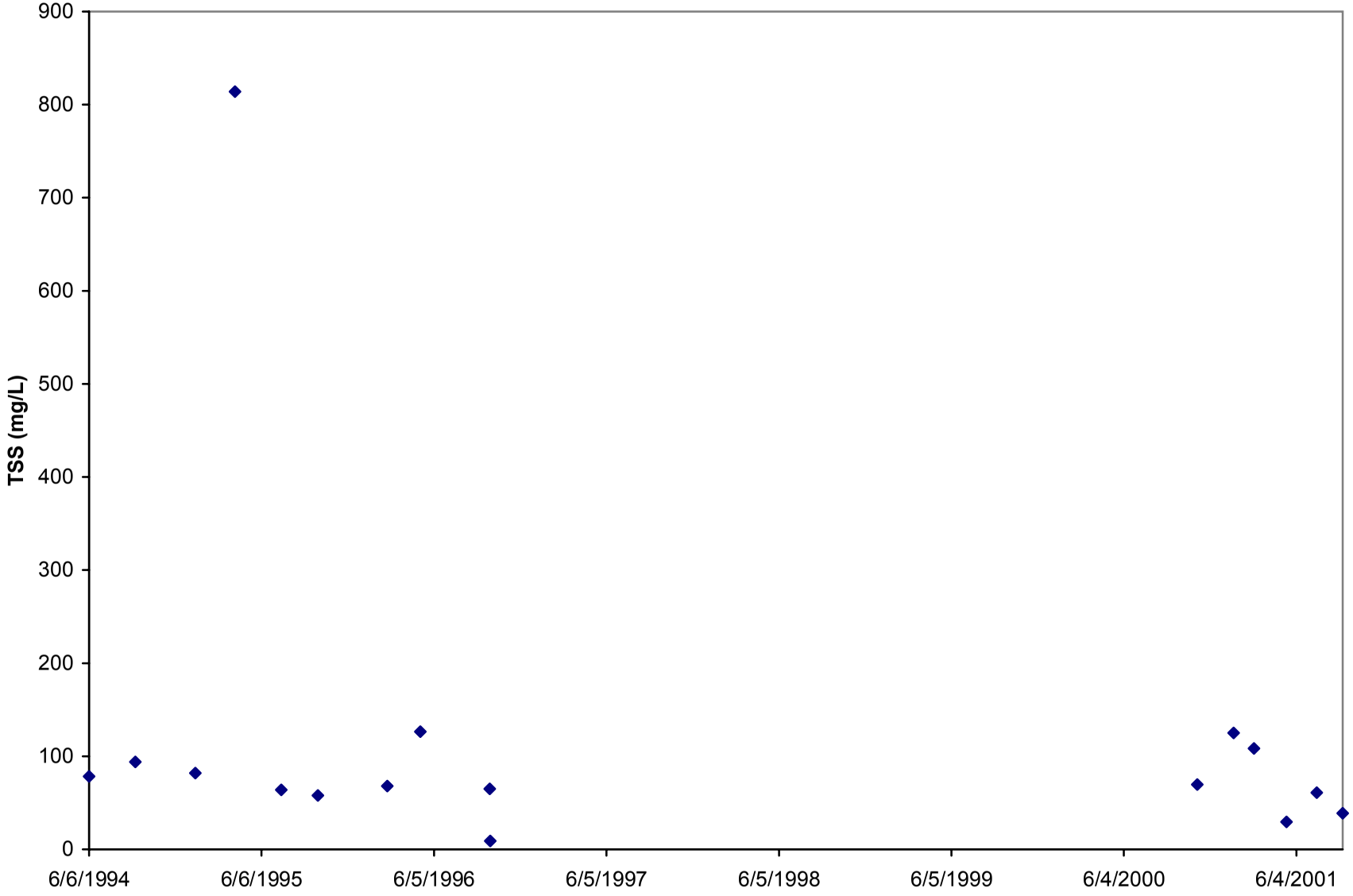


Figure B.13. Long Term Plot of TSS for Bayou Macon at UWBYM01



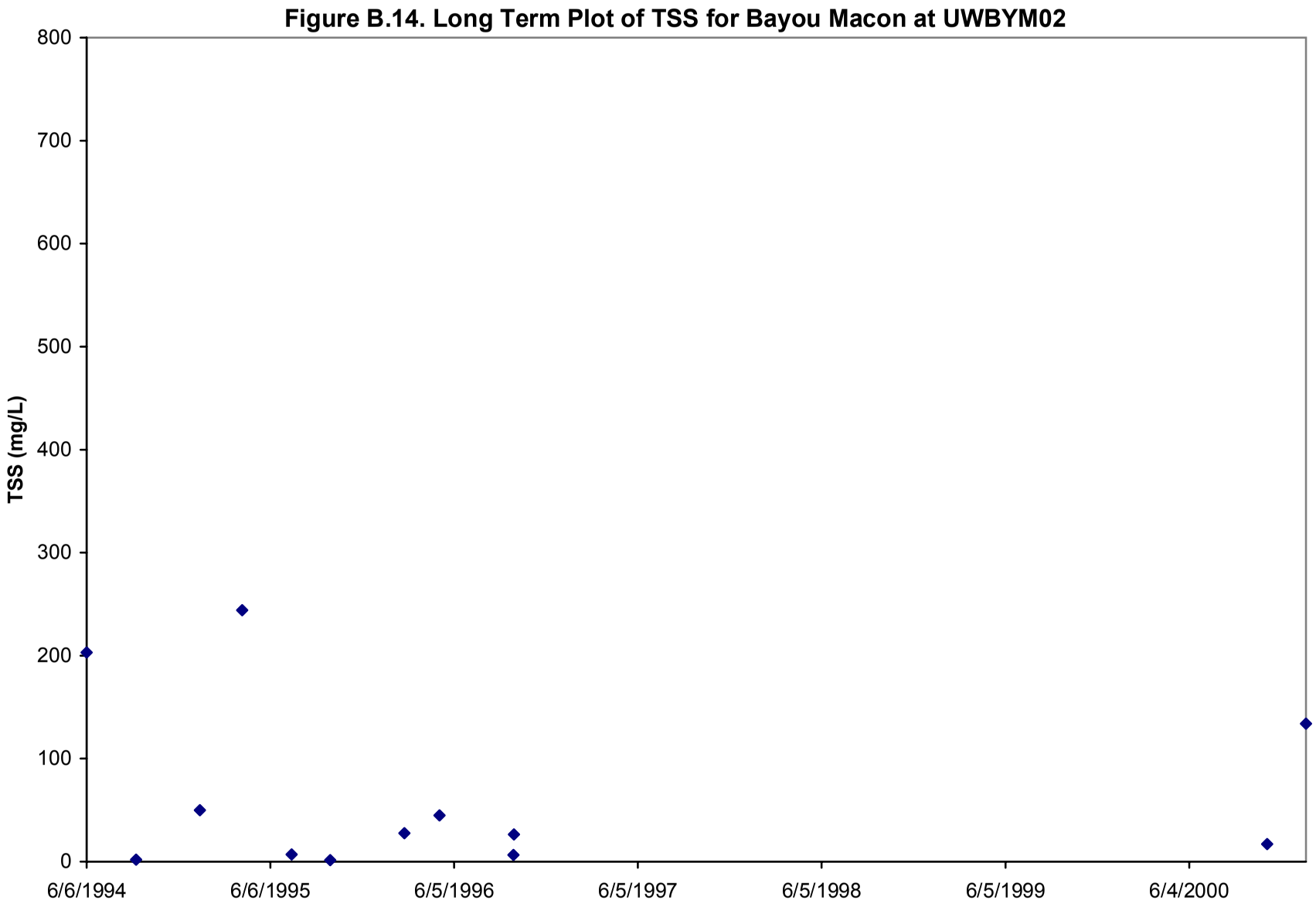


Figure B.14. Long Term Plot of TSS for Bayou Macon at UWBYM02
TSS (mg/L)
800
700
600
500
400
300
200
100
0
6/6/1994
6/6/1995
6/5/1996
6/5/1997
6/5/1998
6/5/1999
6/4/2000

APPENDIX C

Seasonal Plots of Turbidity and TSS

Figure C.1. Seasonal Plot of Turbidity for Boeuf River at OUA0015A

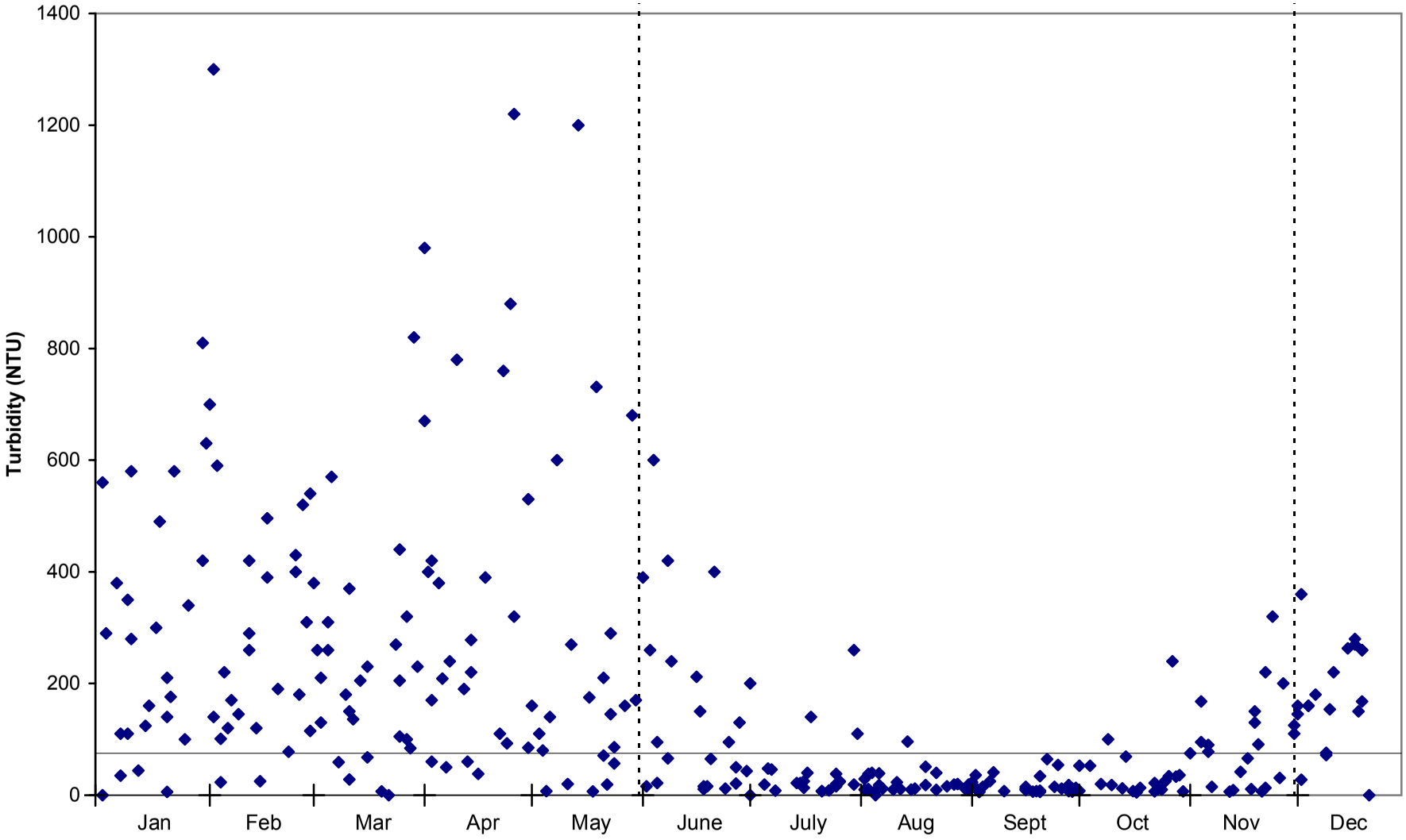
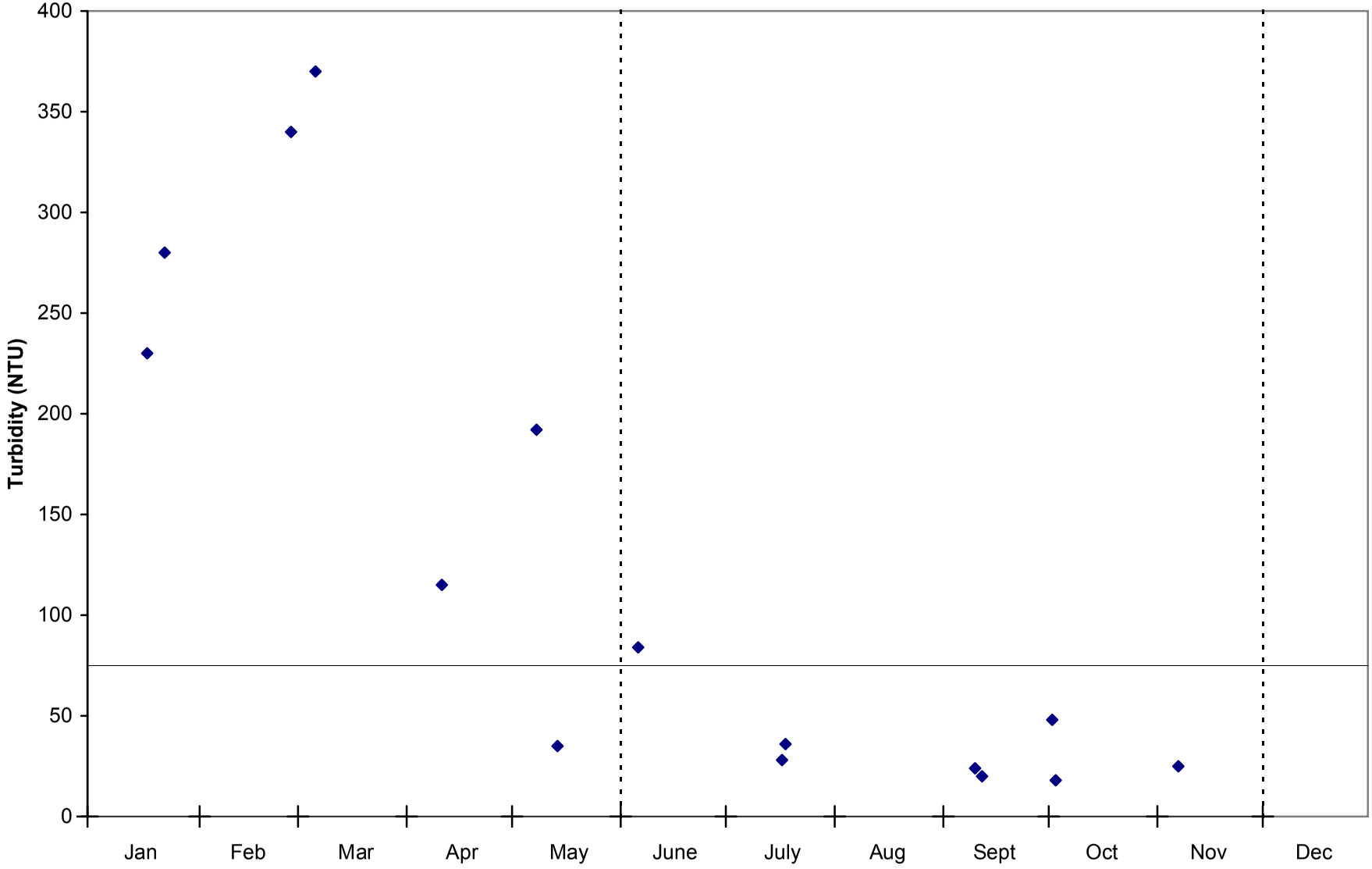


Figure C.2. Seasonal Plot of Turbidity on Boeuf River at UWBFR01



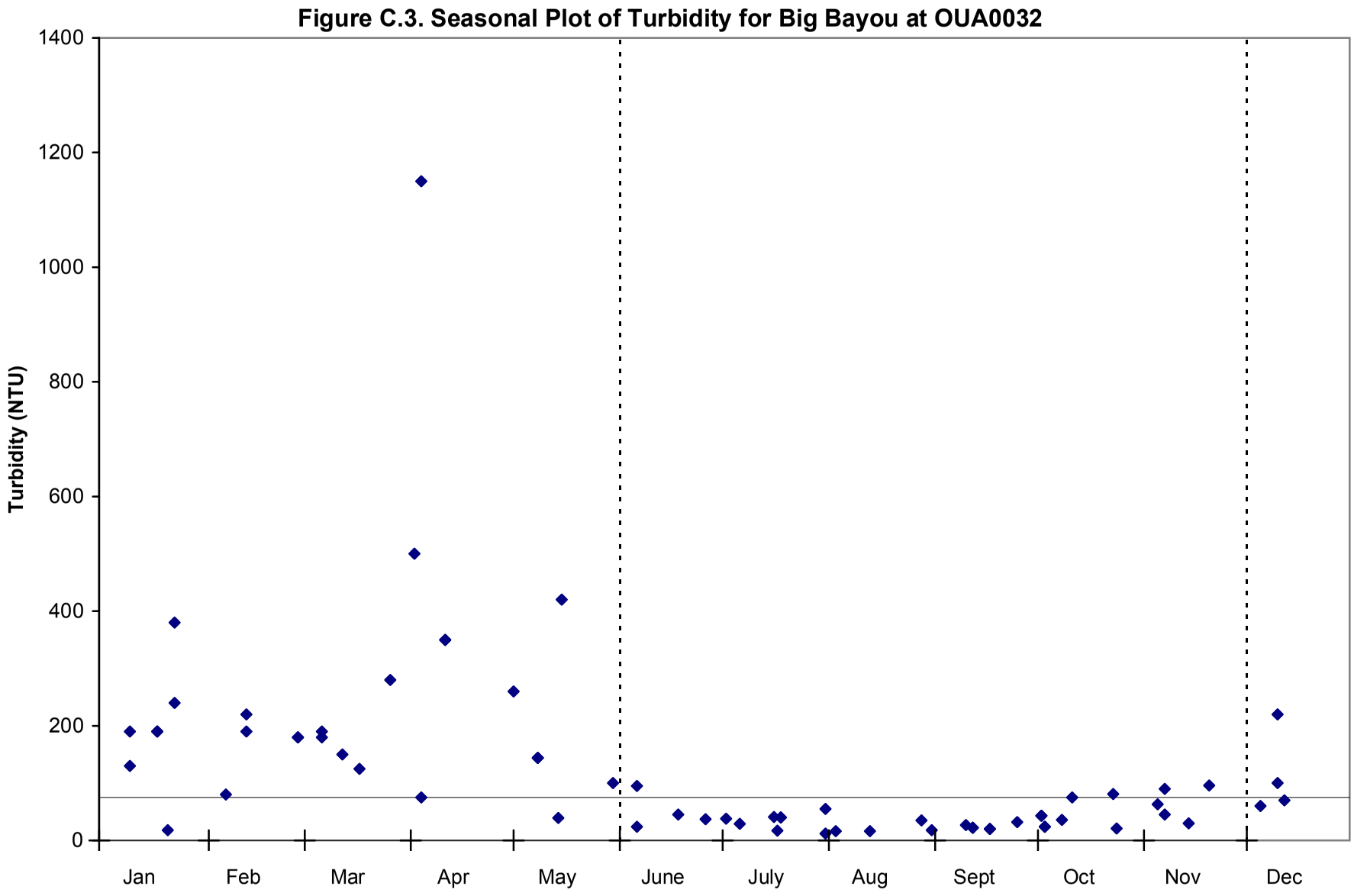


Figure C.3. Seasonal Plot of Turbidity for Big Bayou at OUA0032
Turbidity (NTU)
1400
1200
1000
800
600
400
200
0
Jan
Feb
Mar
Apr
May
June
July
Aug
Sept
Oct
Nov
Dec

Figure C.4. Seasonal Plot of Turbidity on Big Bayou at UWBGB01

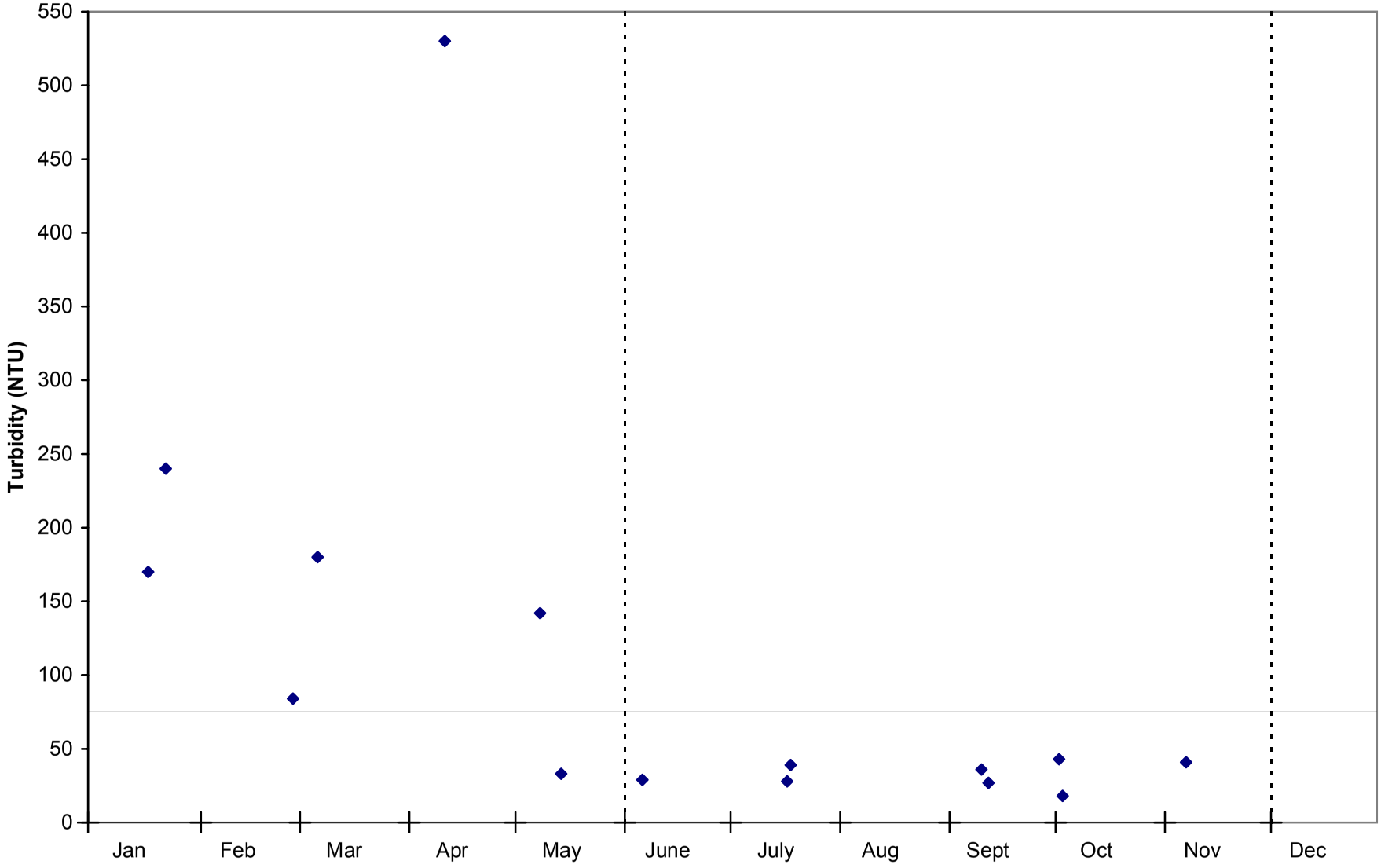
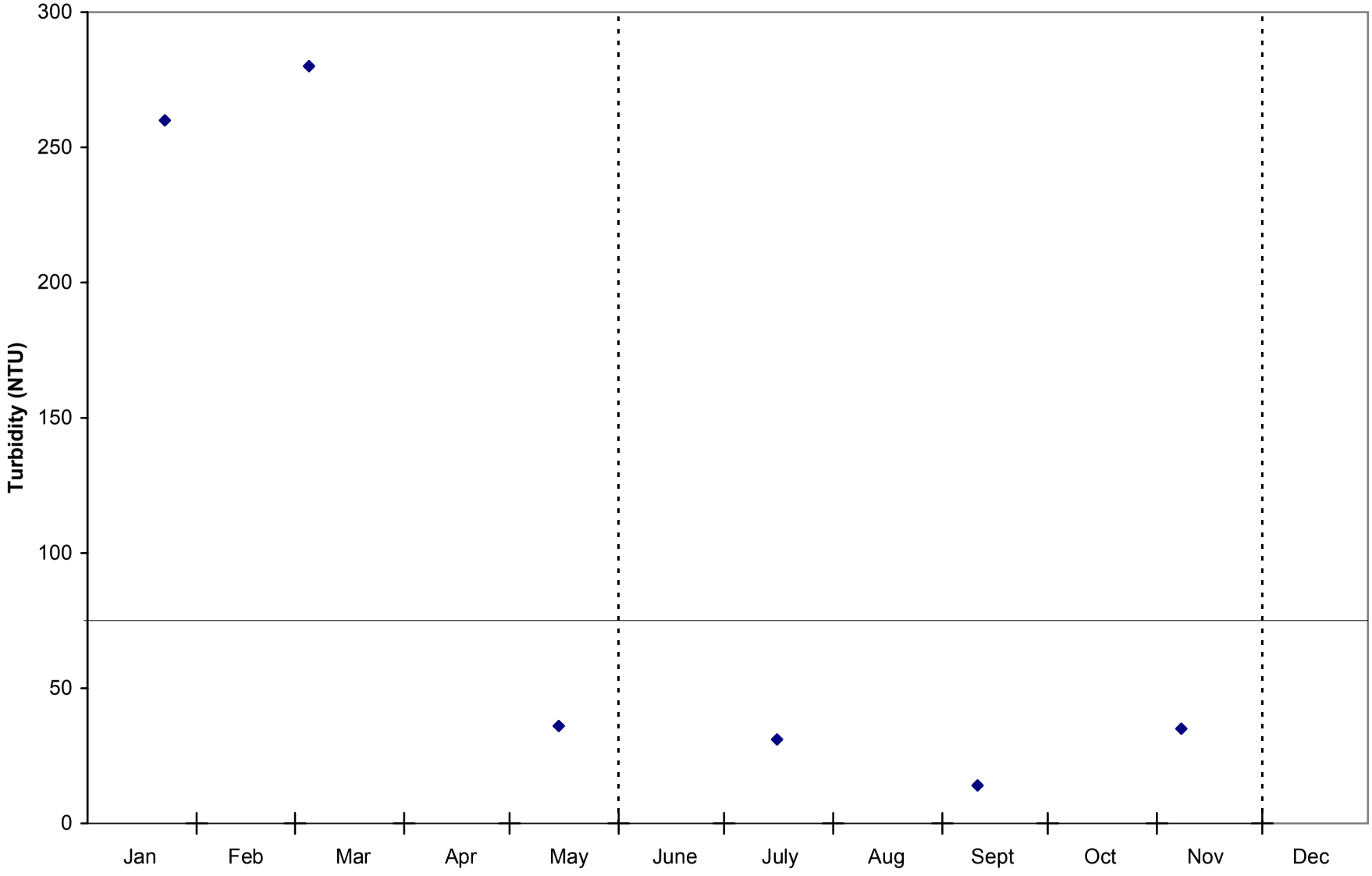


Figure C.5. Seasonal plot of Turbidity for Oak Bayou at OUA0179



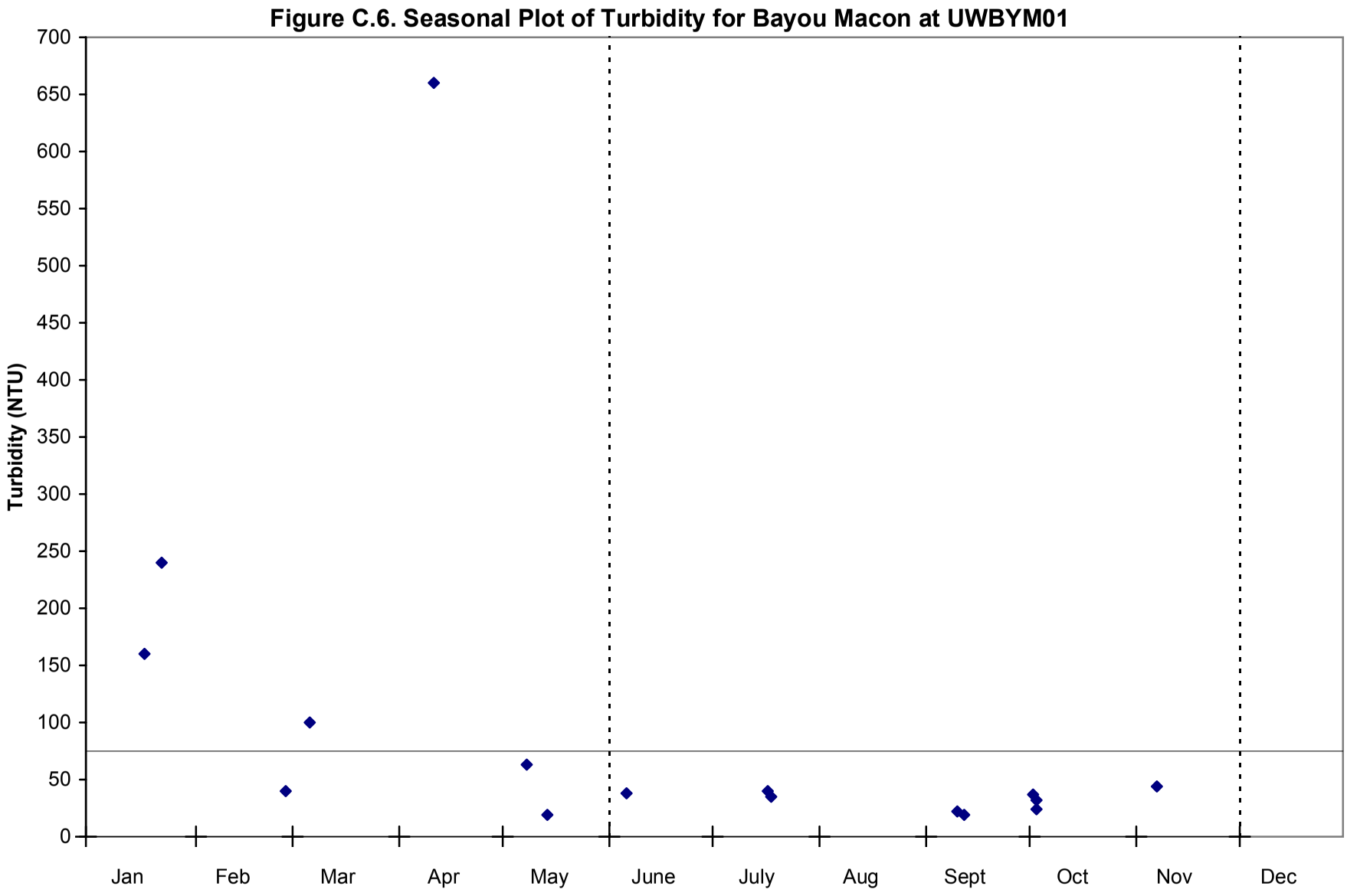


Figure C.6. Seasonal Plot of Turbidity for Bayou Macon at UWBYM01
Turbidity (NTU)
700
650
600
550
500
450
400
350
300
250
200
150
100
50
0
Jan
Feb
Mar
Apr
May
June
July
Aug
Sept
Oct
Nov
Dec

Figure C.7. Seasonal Plot of Turbidity for Bayou Macon at UWBYM02

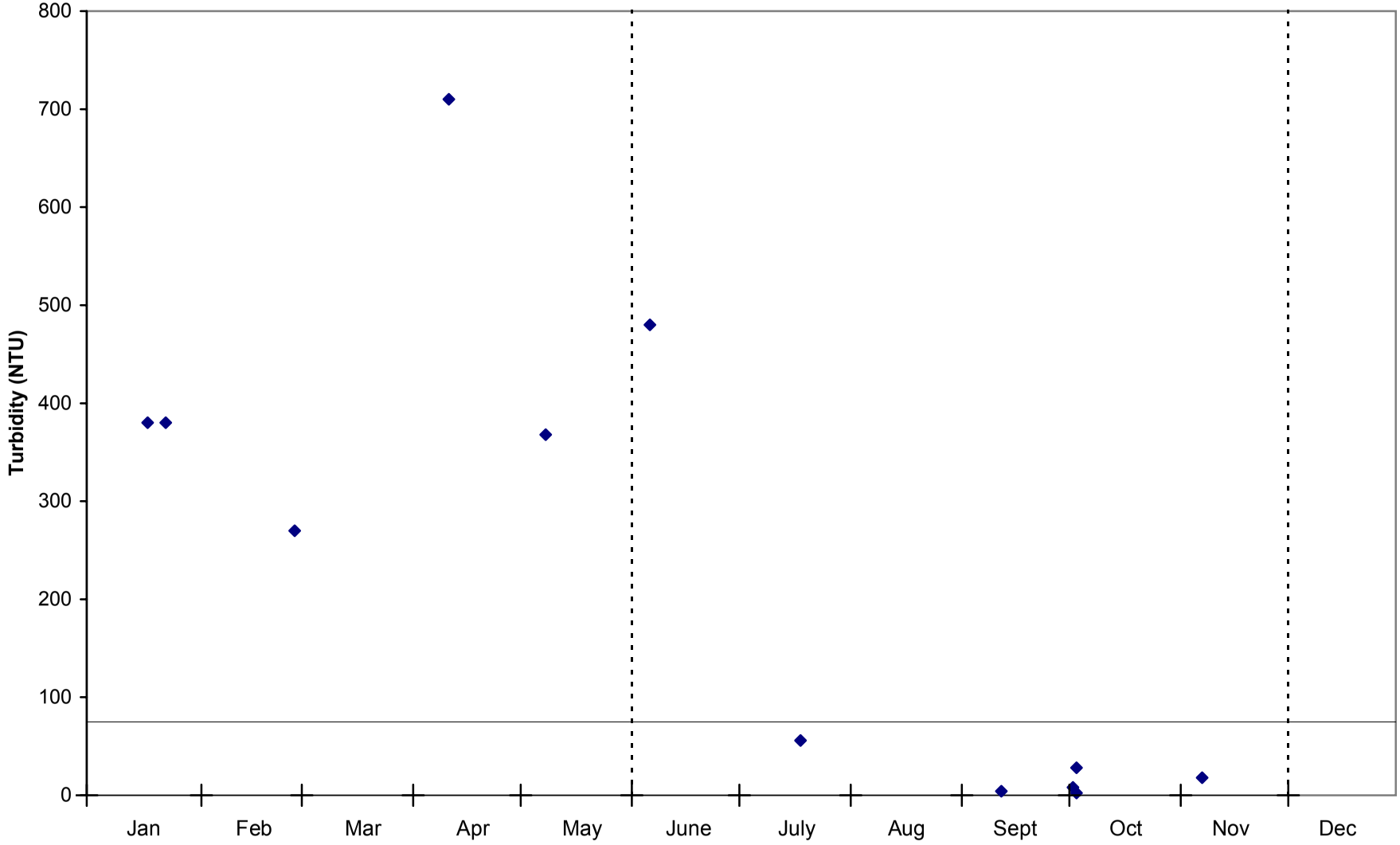
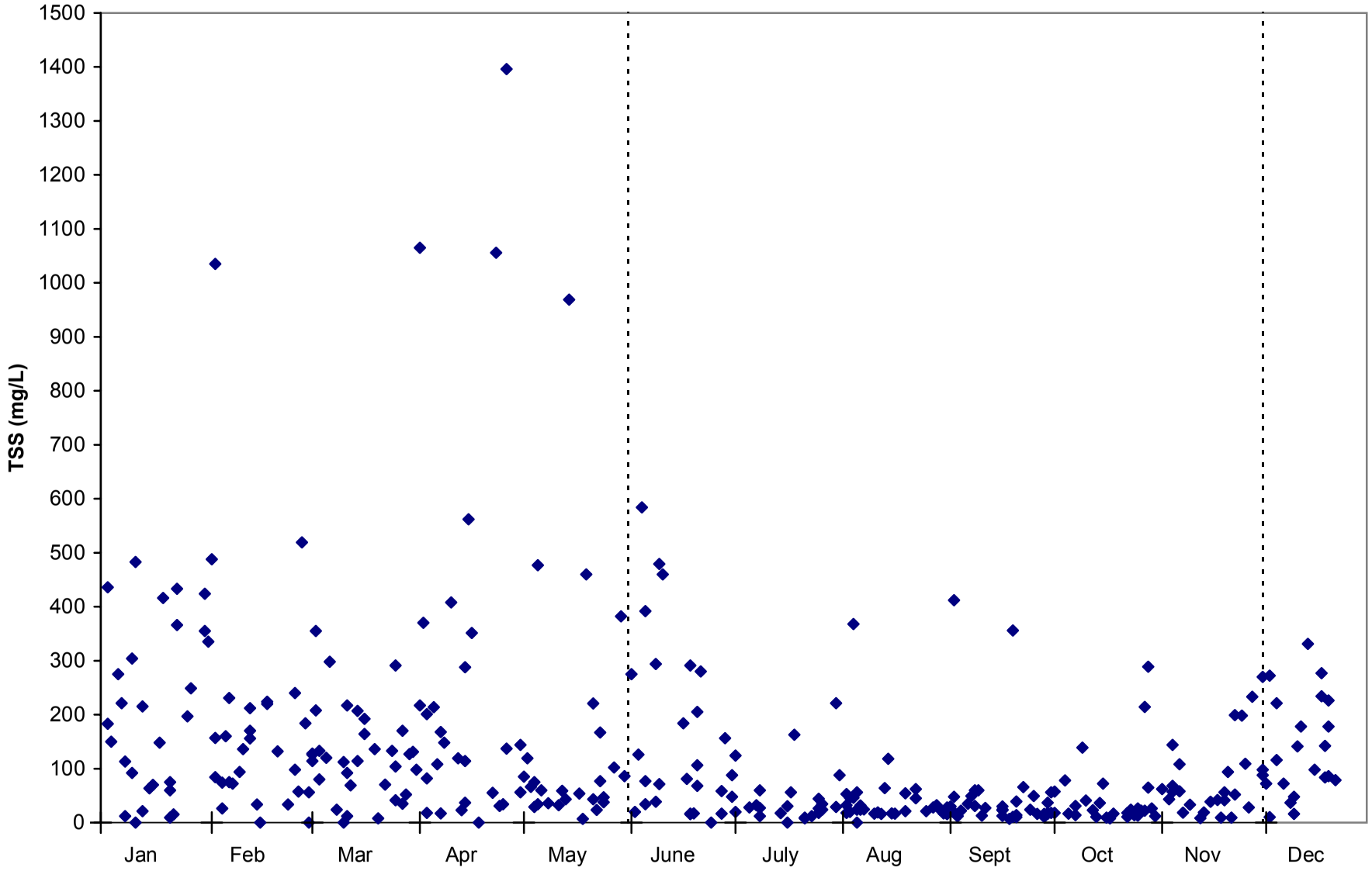


Figure C.8. Seasonal Plot of TSS for Boeuf River at OUA0015A



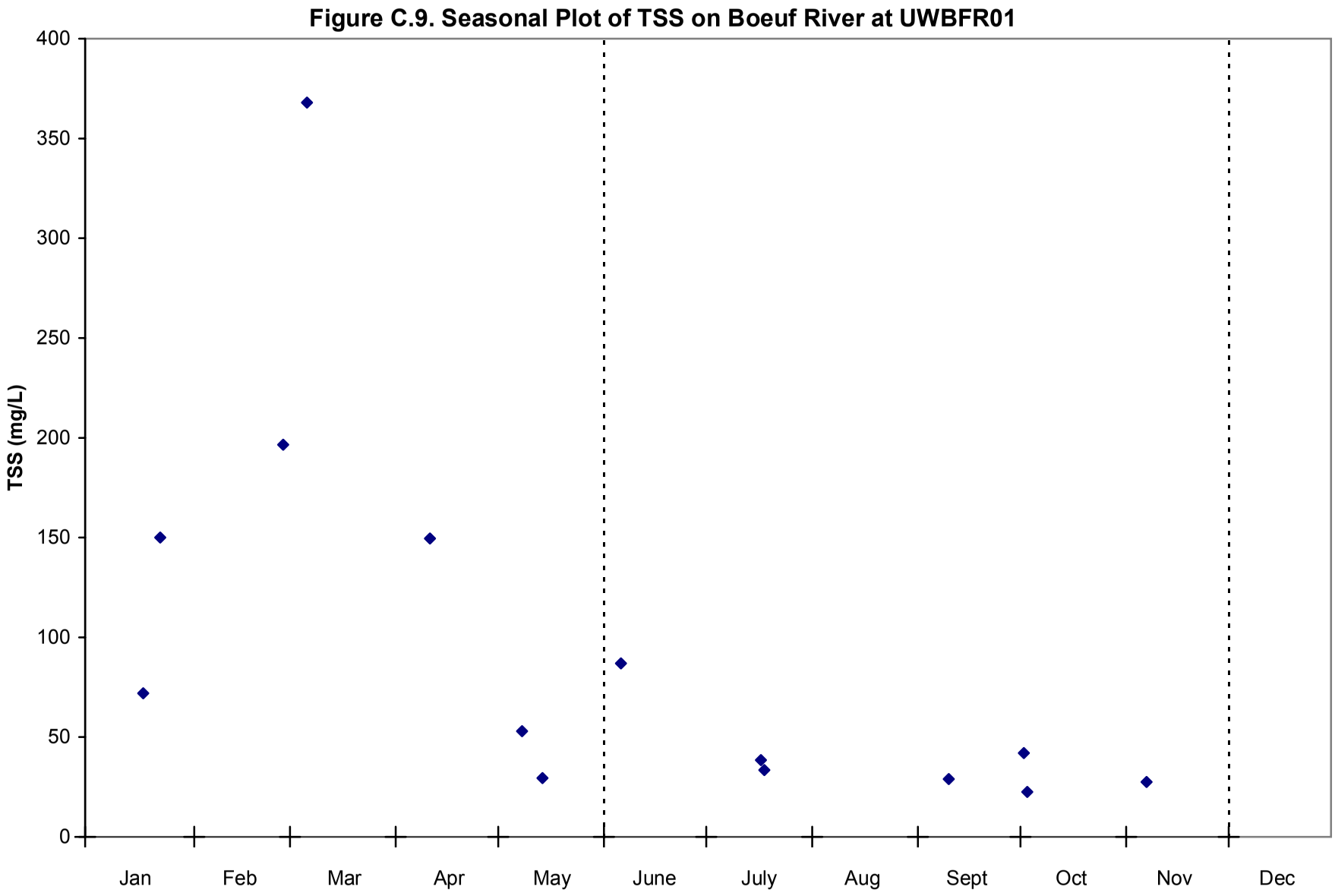


Figure C.9. Seasonal Plot of TSS on Boeuf River at UWBFR01
TSS (mg/L)
400
350
300
250
200
150
100
50
0
Jan
Feb
Mar
Apr
May
June
July
Aug
Sept
Oct
Nov
Dec

Figure C.10. Seasonal Plot of TSS for Big Bayou at OUA0032

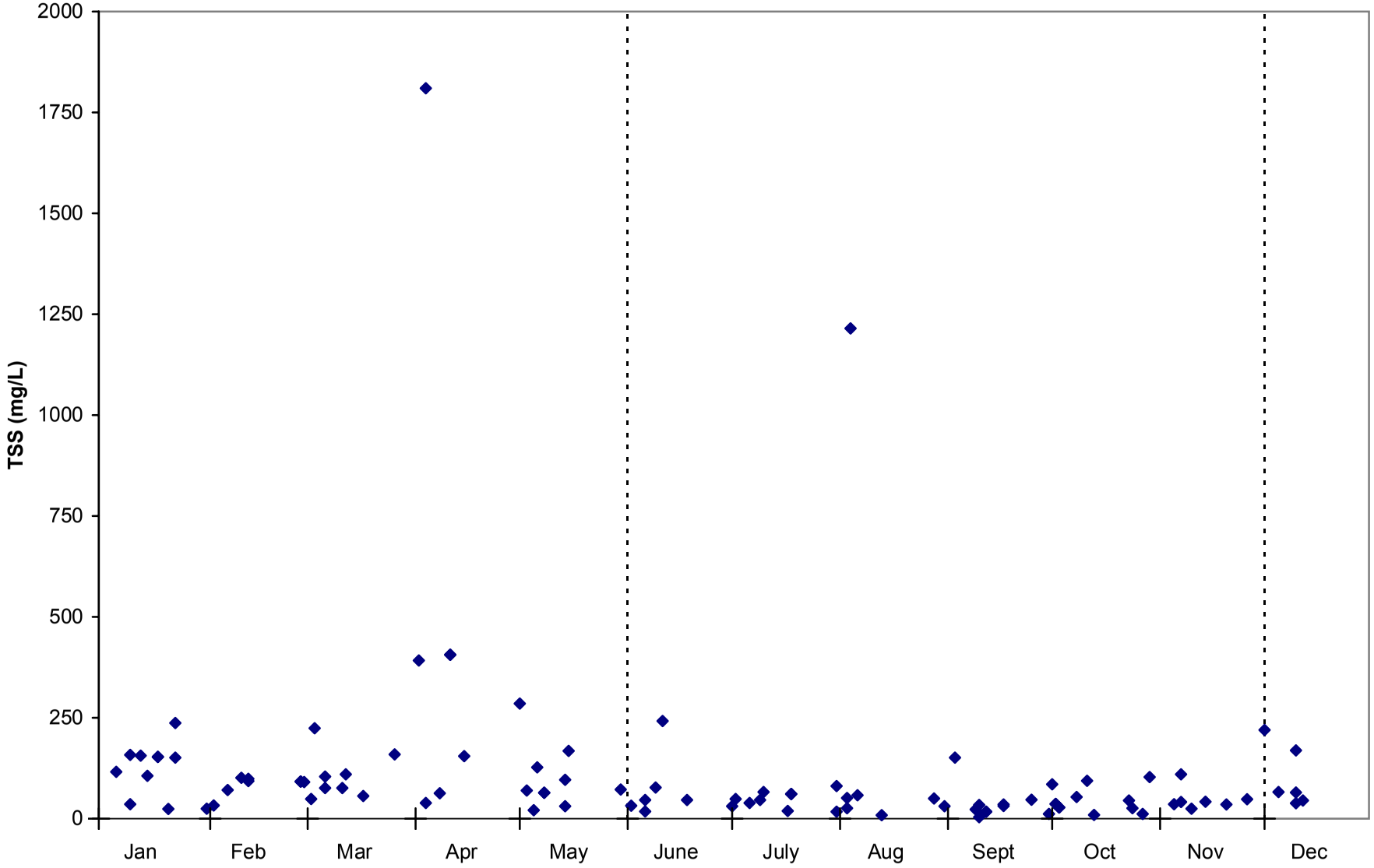
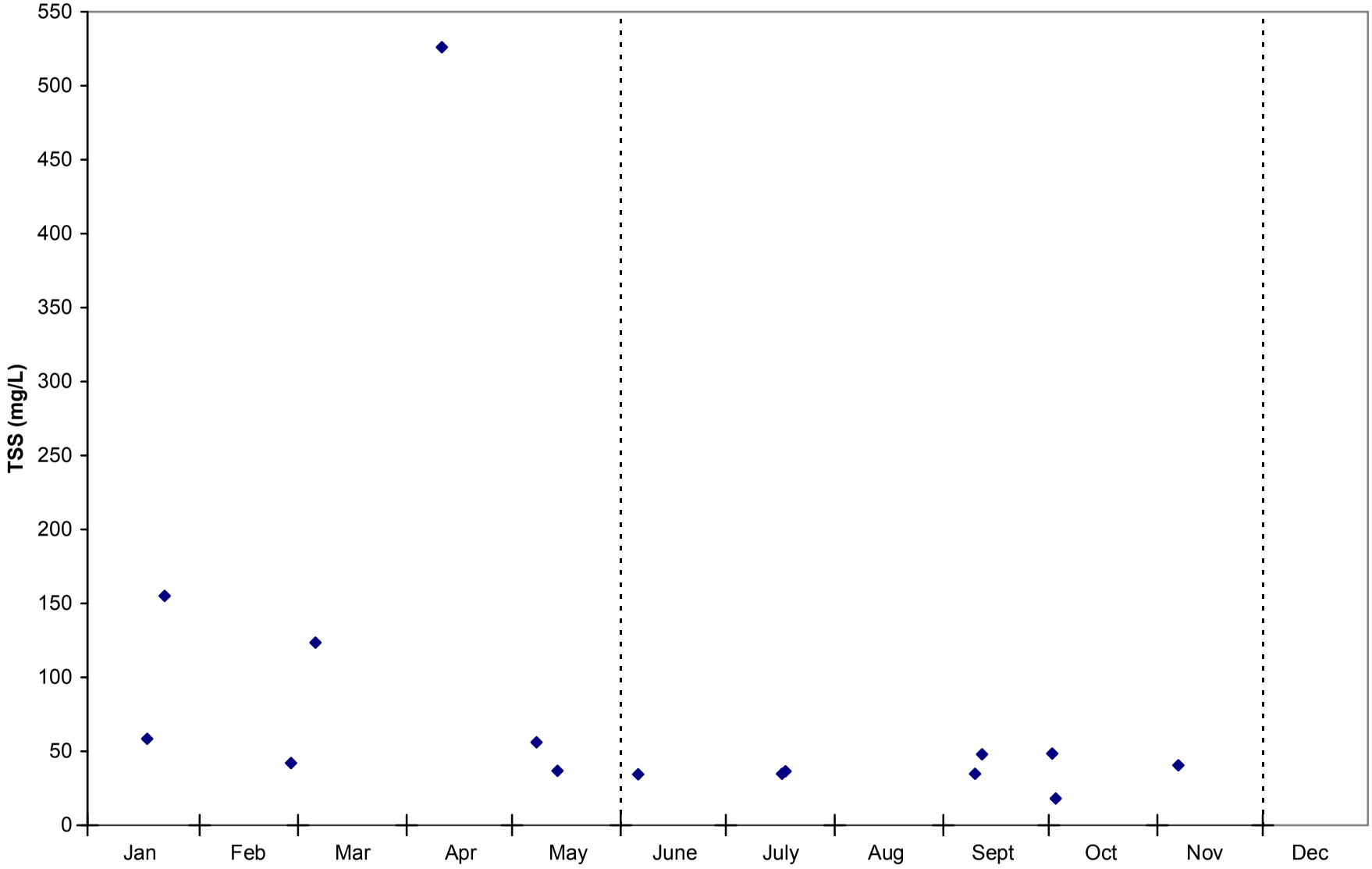


Figure C.11. Seasonal Plot of TSS on Big Bayou at UWBGB01



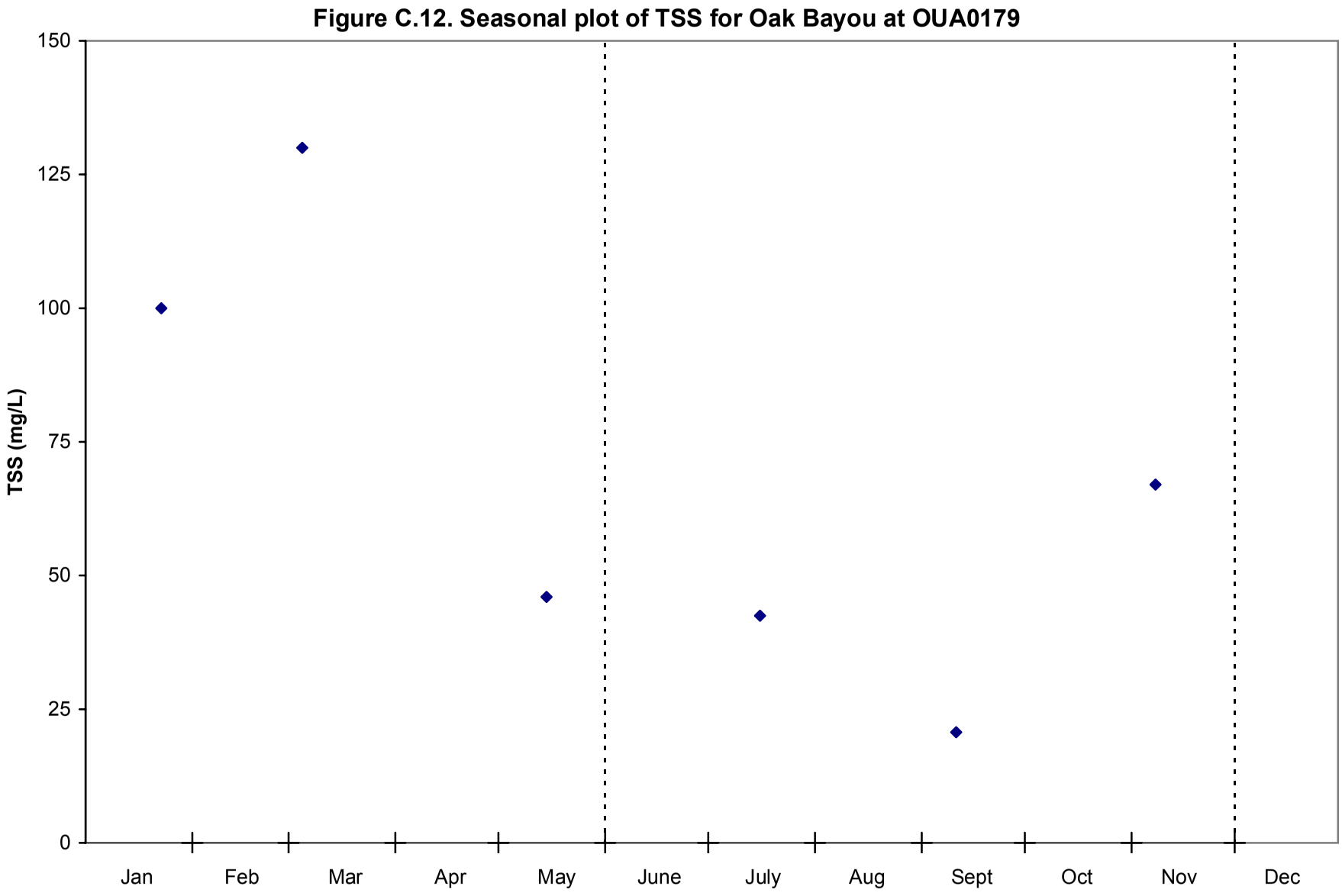


Figure C.12. Seasonal plot of TSS for Oak Bayou at OUA0179
TSS (mg/L)
150
125
100
75
50
25
0
Jan
Feb
Mar
Apr
May
June
July
Aug
Sept
Oct
Nov
Dec

Figure C.13. Seasonal Plot of TSS for Bayou Macon at UWBYM01

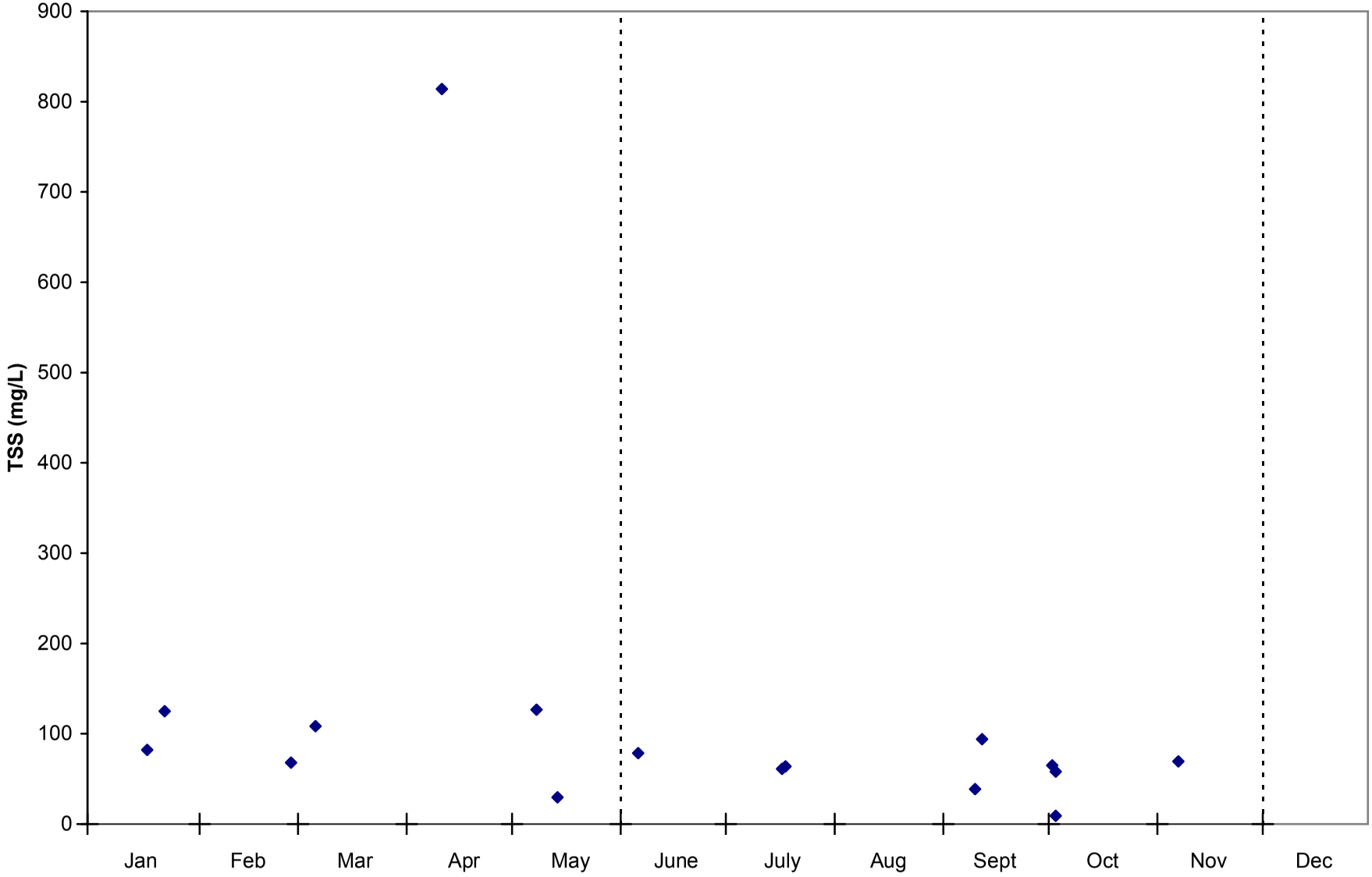
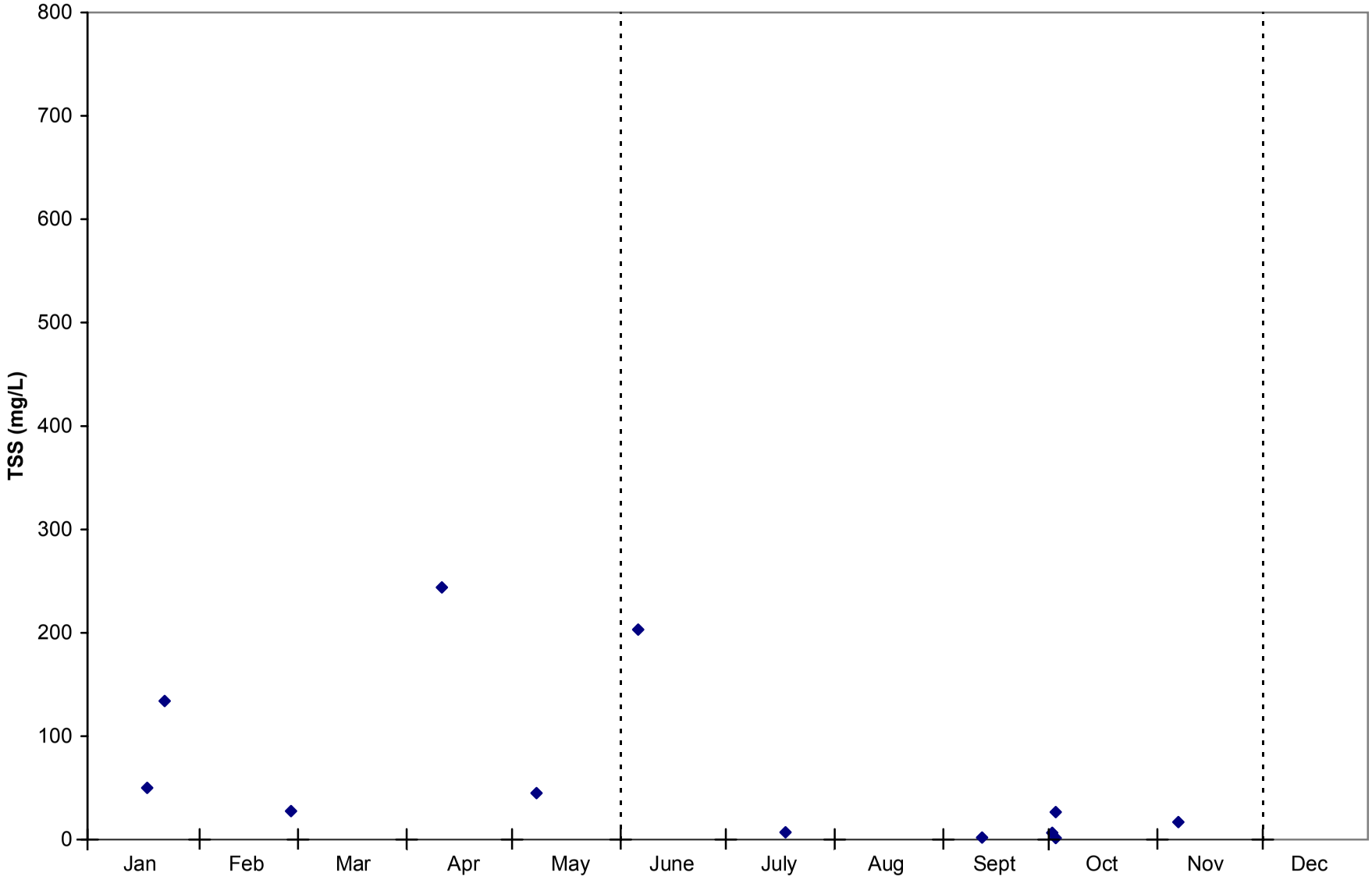


Figure C.14. Seasonal Plot of TSS for Bayou Macon at UWBYM02



APPENDIX D

Plots of Turbidity vs. Flow and TSS

Figure D.1. Turbidity vs. flow for Boeuf River at OUA0015A

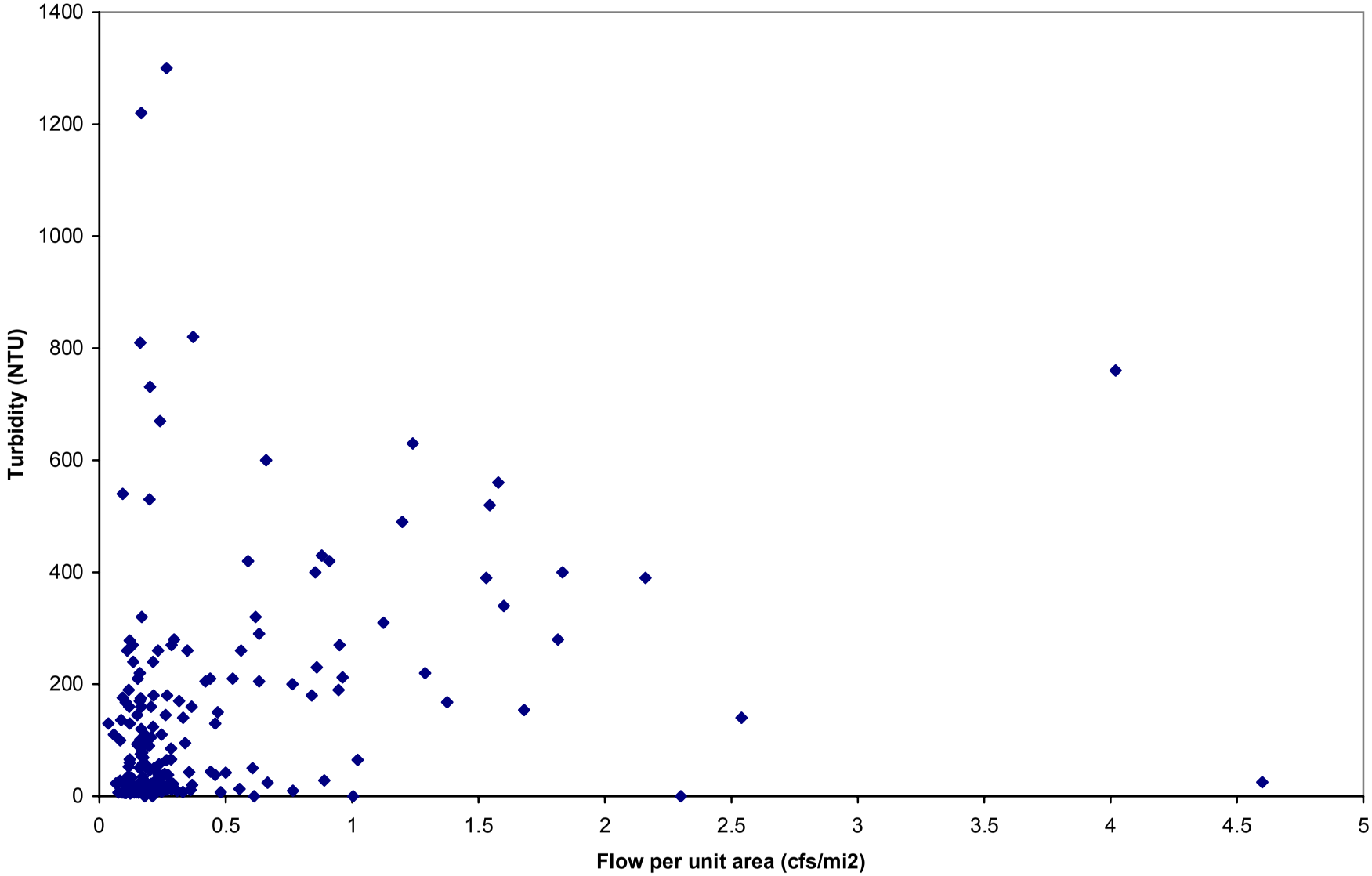


Figure D.2. Turbidity vs. Flow for Boeuf River at UWBFR01

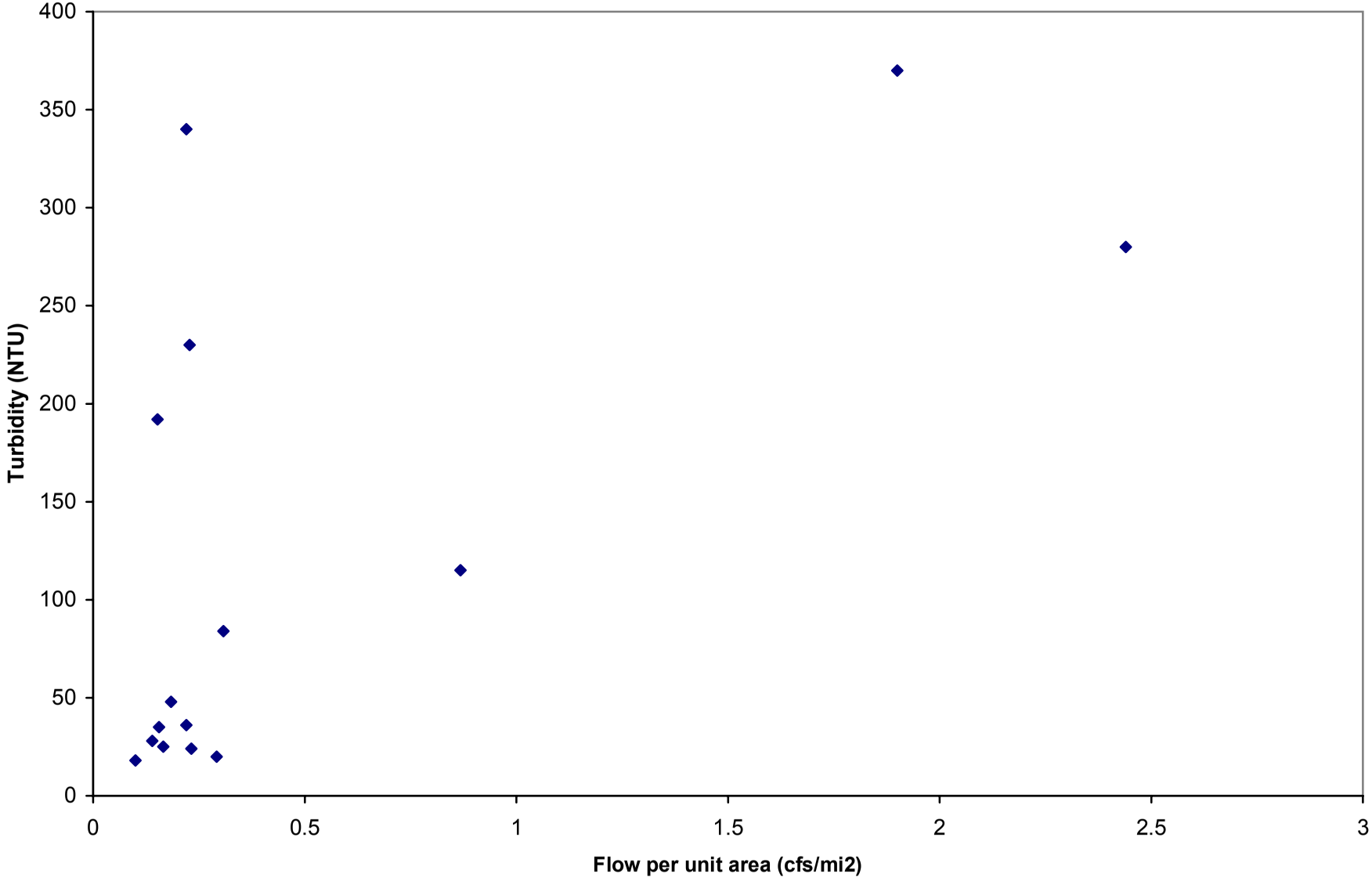


Figure D.3. Turbidity vs. Flow for Big Bayou at OUA0032

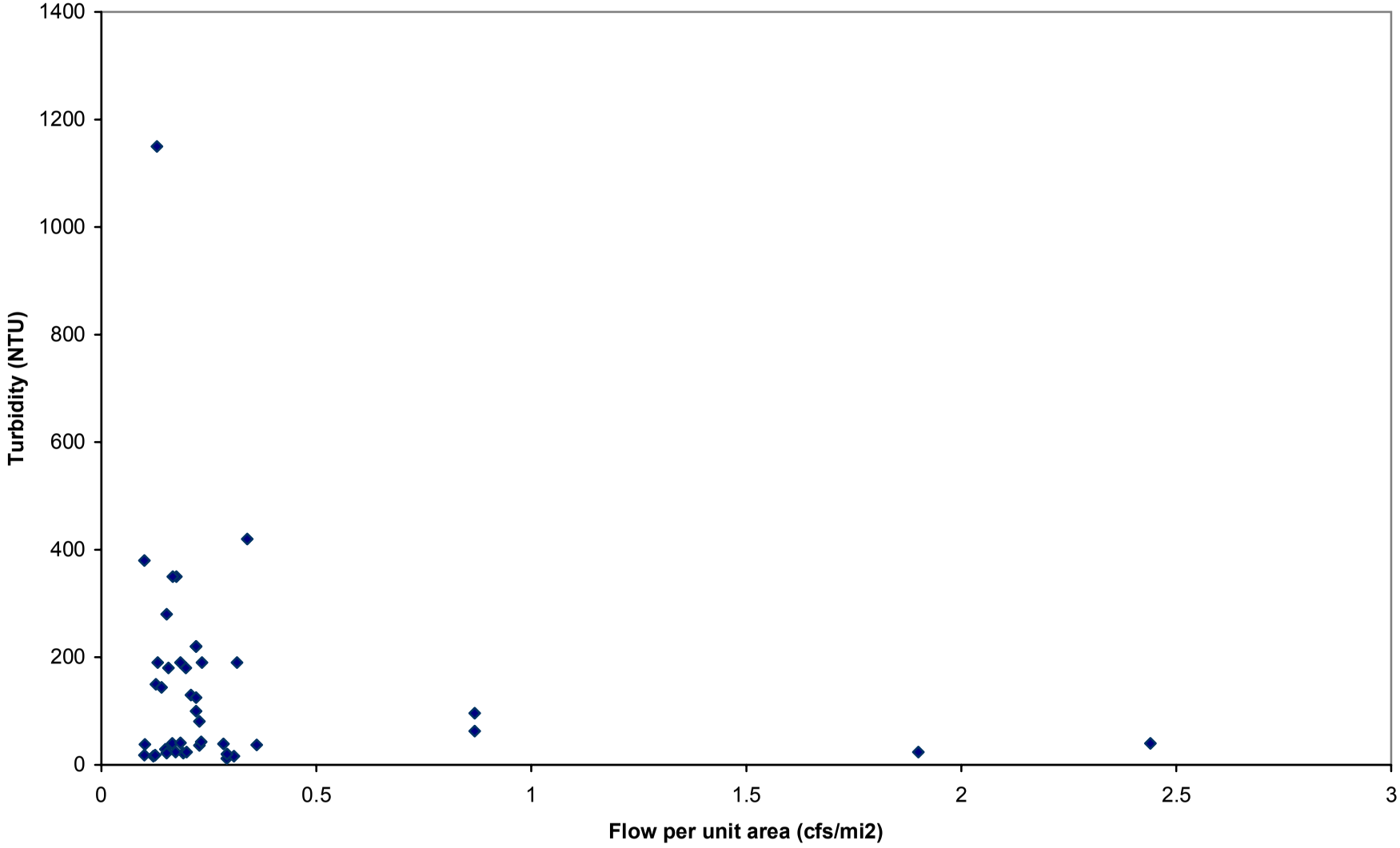


Figure D.4. Turbidity vs. Flow for Big Bayou at UWBGB01

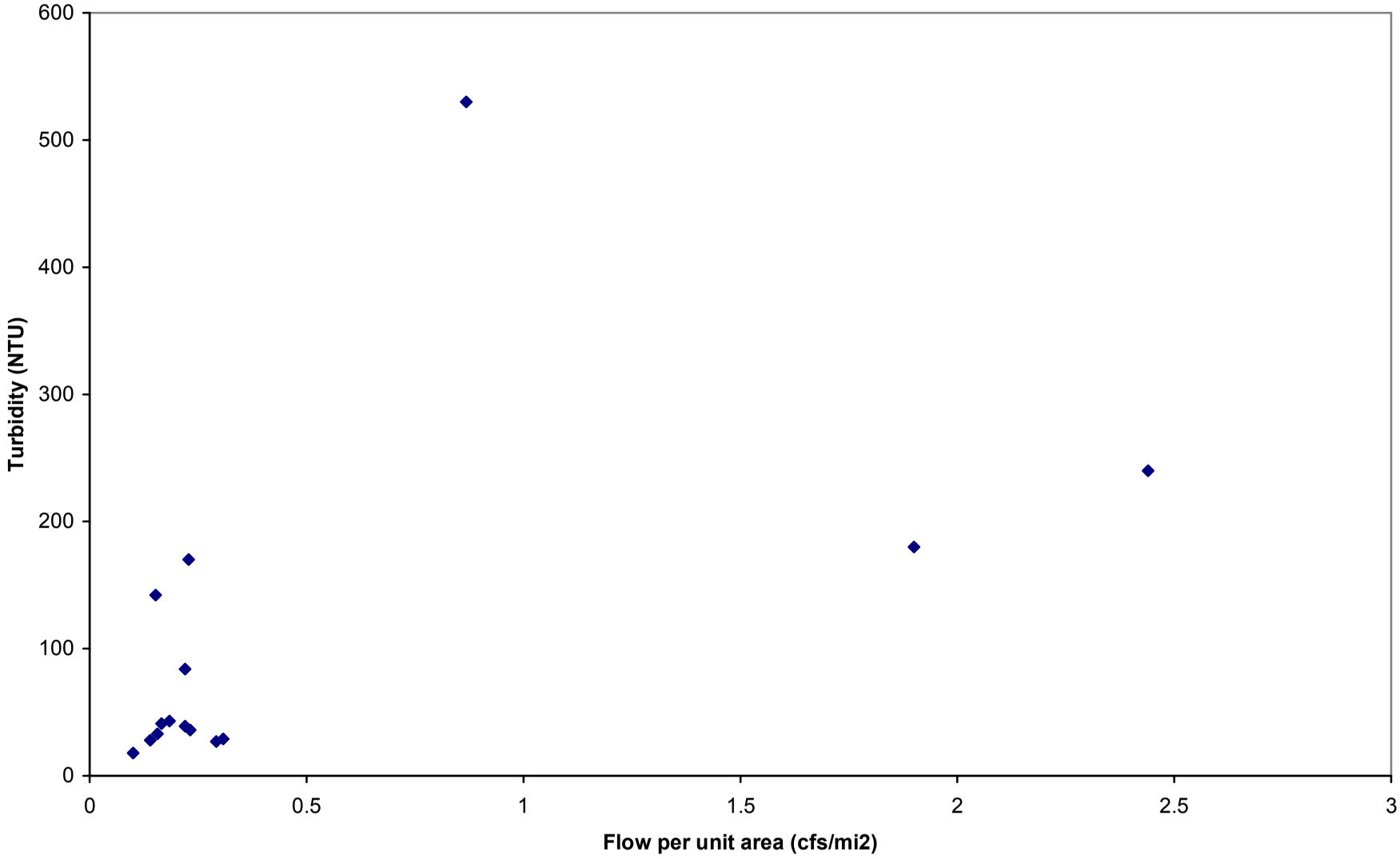


Figure D.5. Turbidity vs. Flow for Oak Bayou at OUA0179

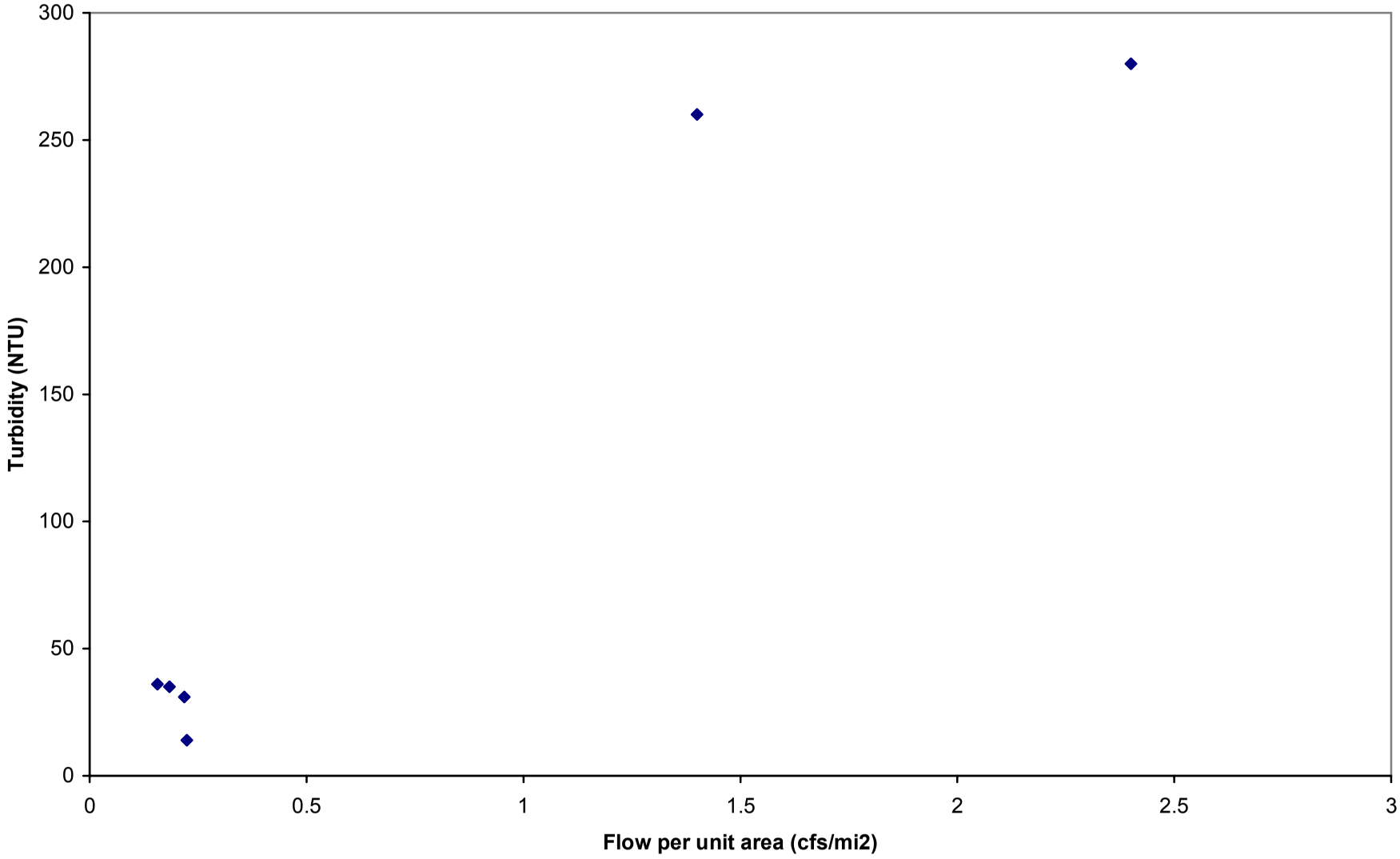


Figure D.6. Turbidity vs. Flow for Bayou Macon at UWBYM01

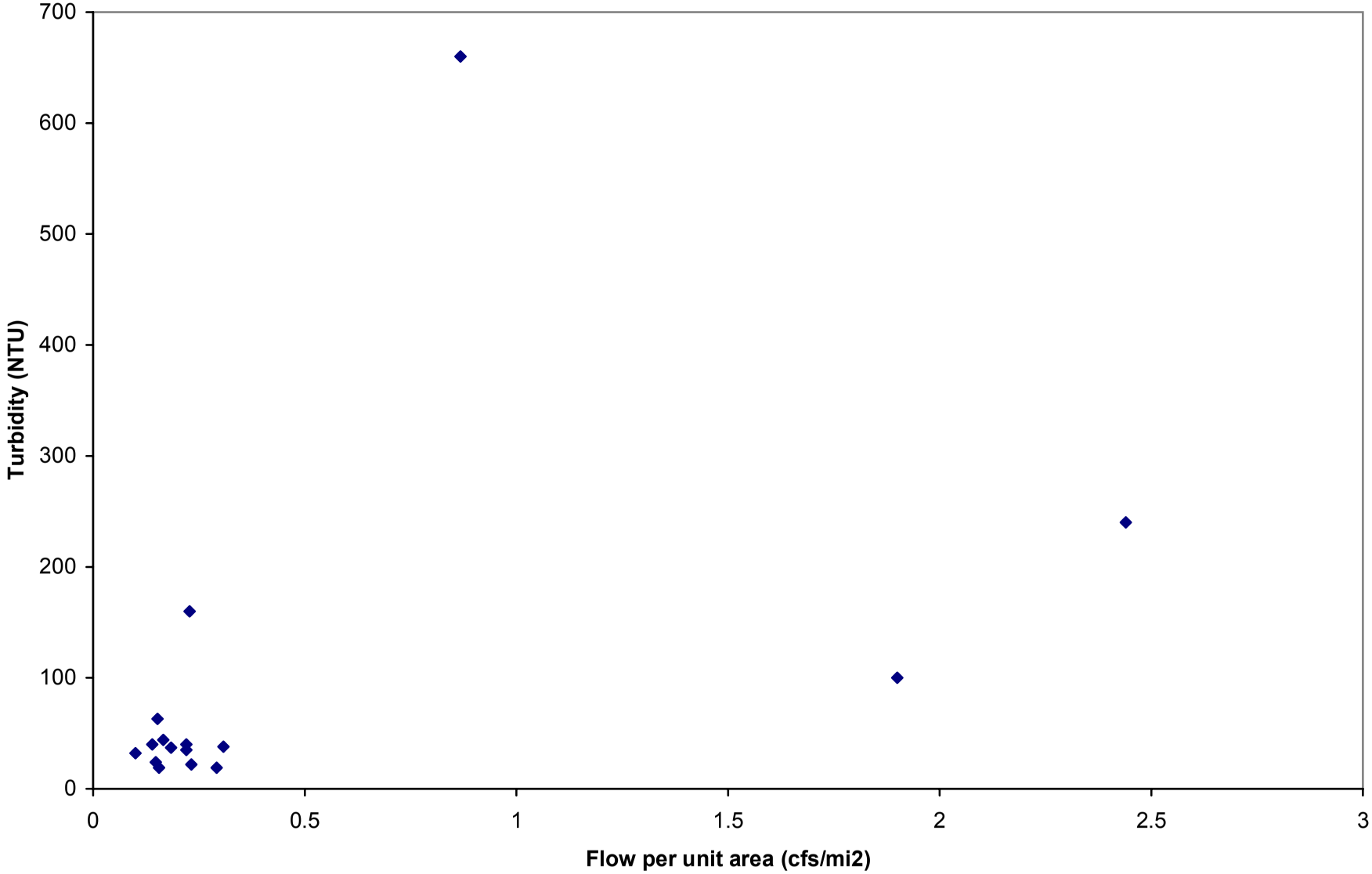


Figure D.7. Turbidity vs. Flow for Bayou Macon at UWBYM02

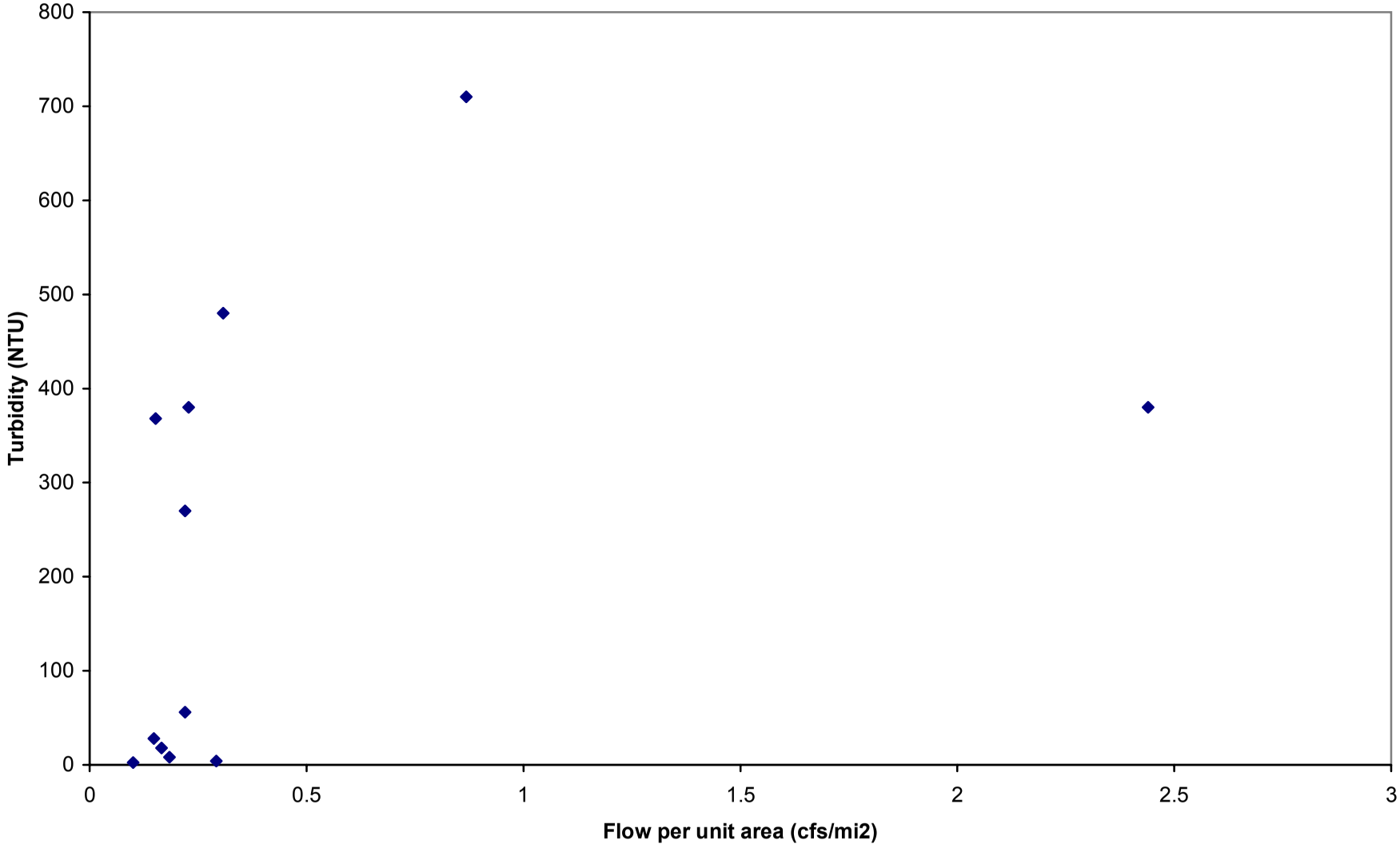


Figure D.8. TSS vs. Turbidity for Boeuf River at OUA0015A

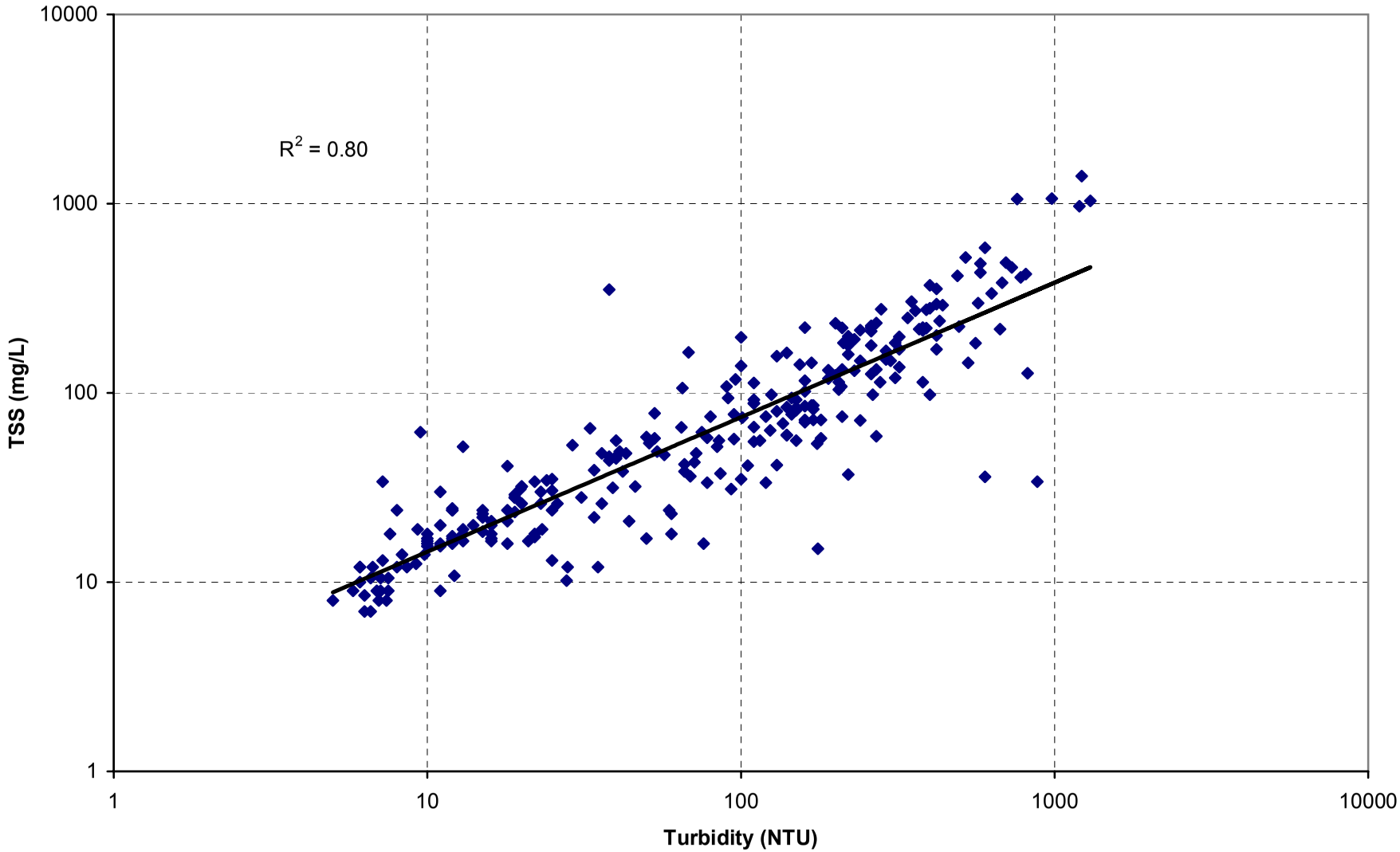


Figure D.9. TSS vs. Turbidity for Boeuf River at UWBFR01

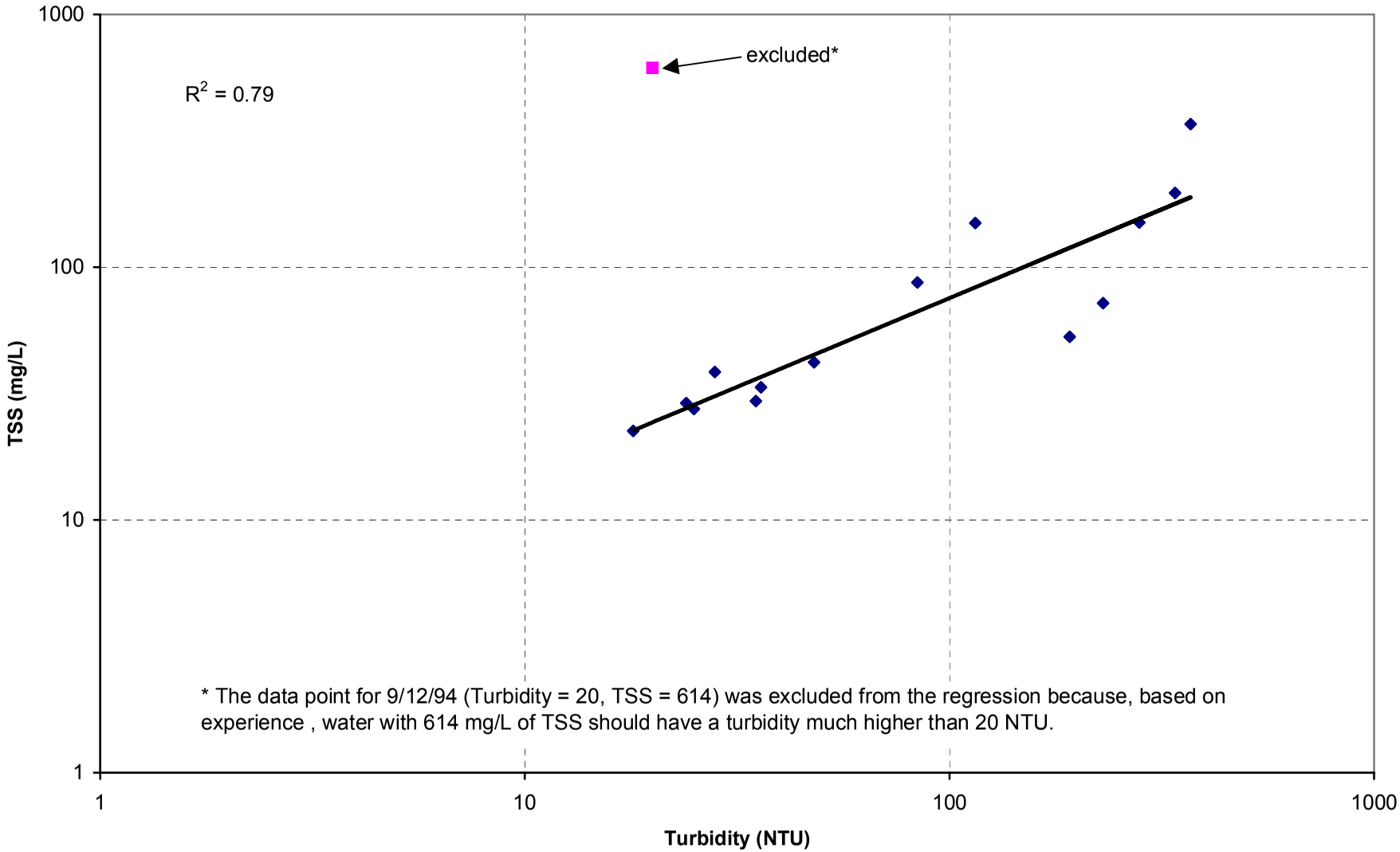


Figure D.10. TSS vs. Turbidity TSS for Big Bayou at OUA0032

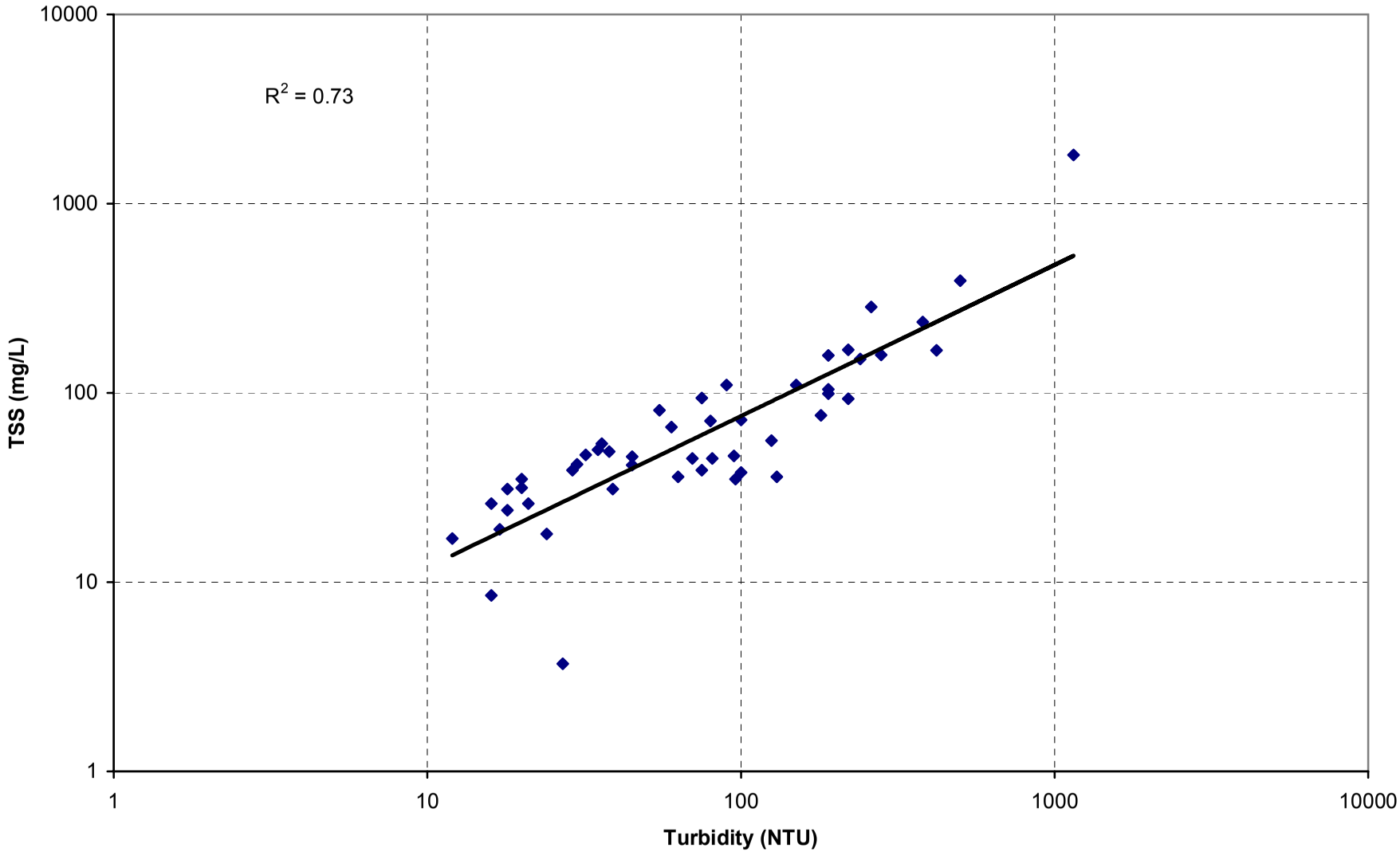


Figure D.11. TSS vs. Turbidity on Big Bayou at UWBGB01

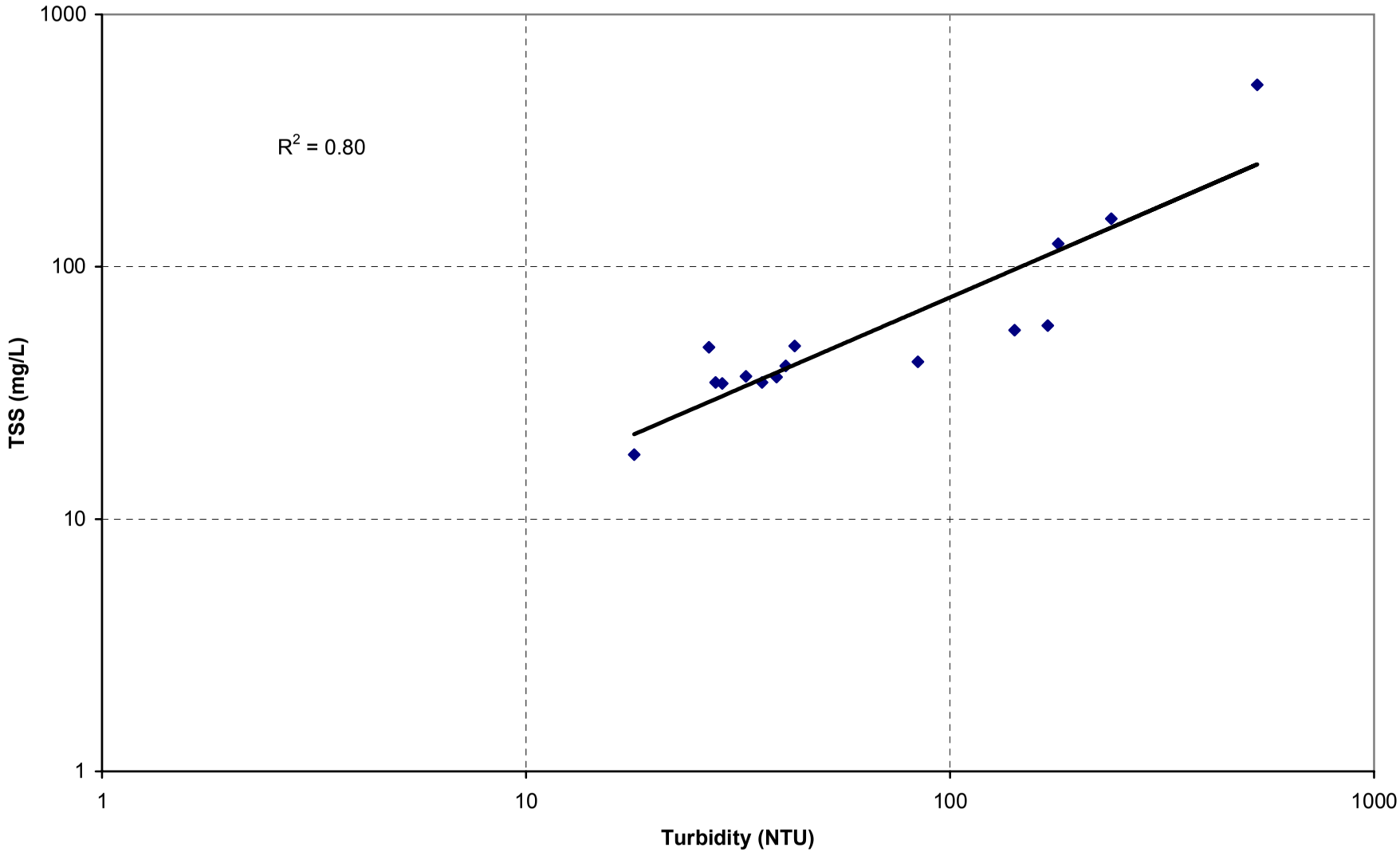


Figure D.12. TSS vs. Turbidity for Oak Bayou at OUA0179

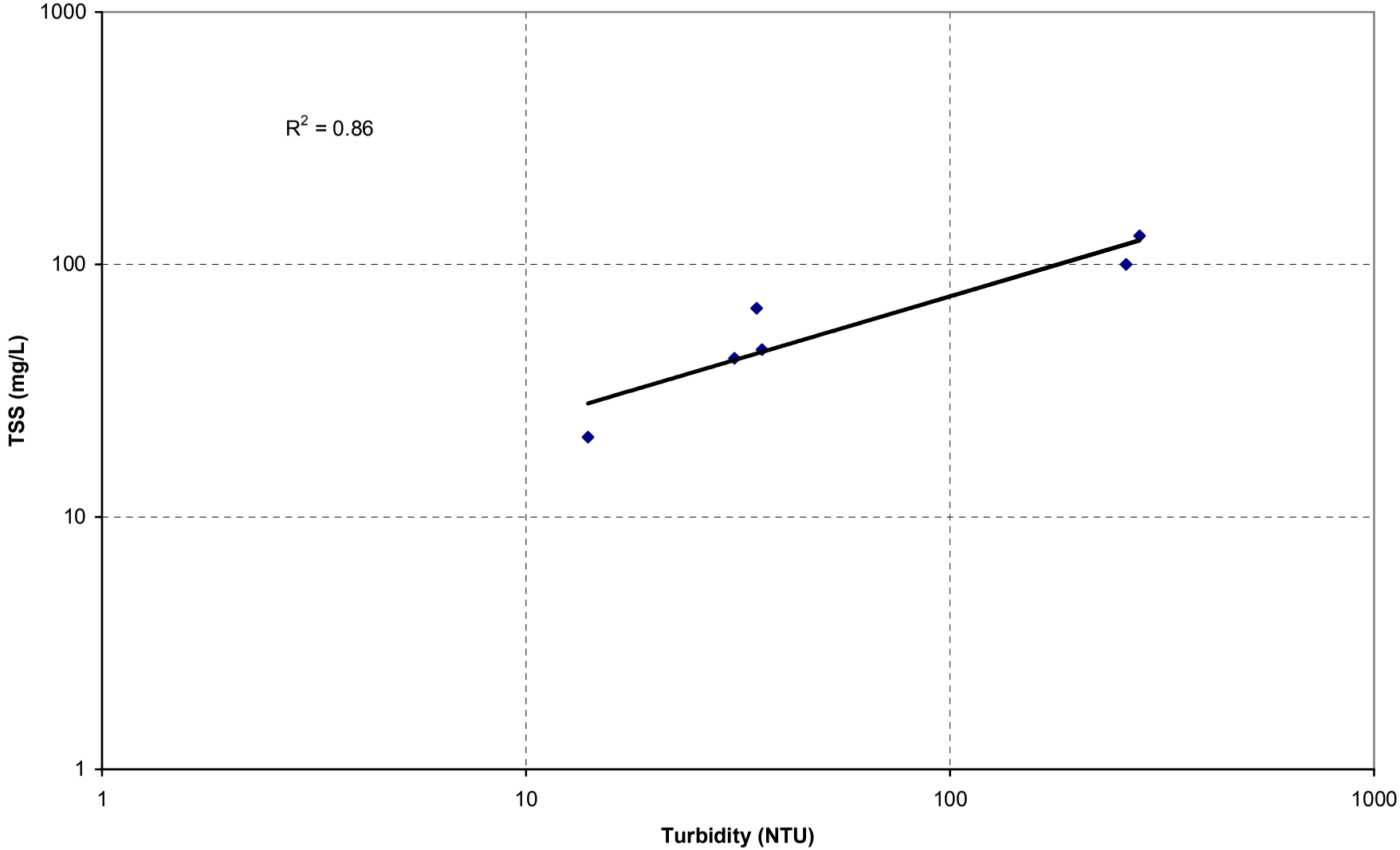


Figure D.13. TSS vs. Turbidity on Bayou Macon at UWBYM01

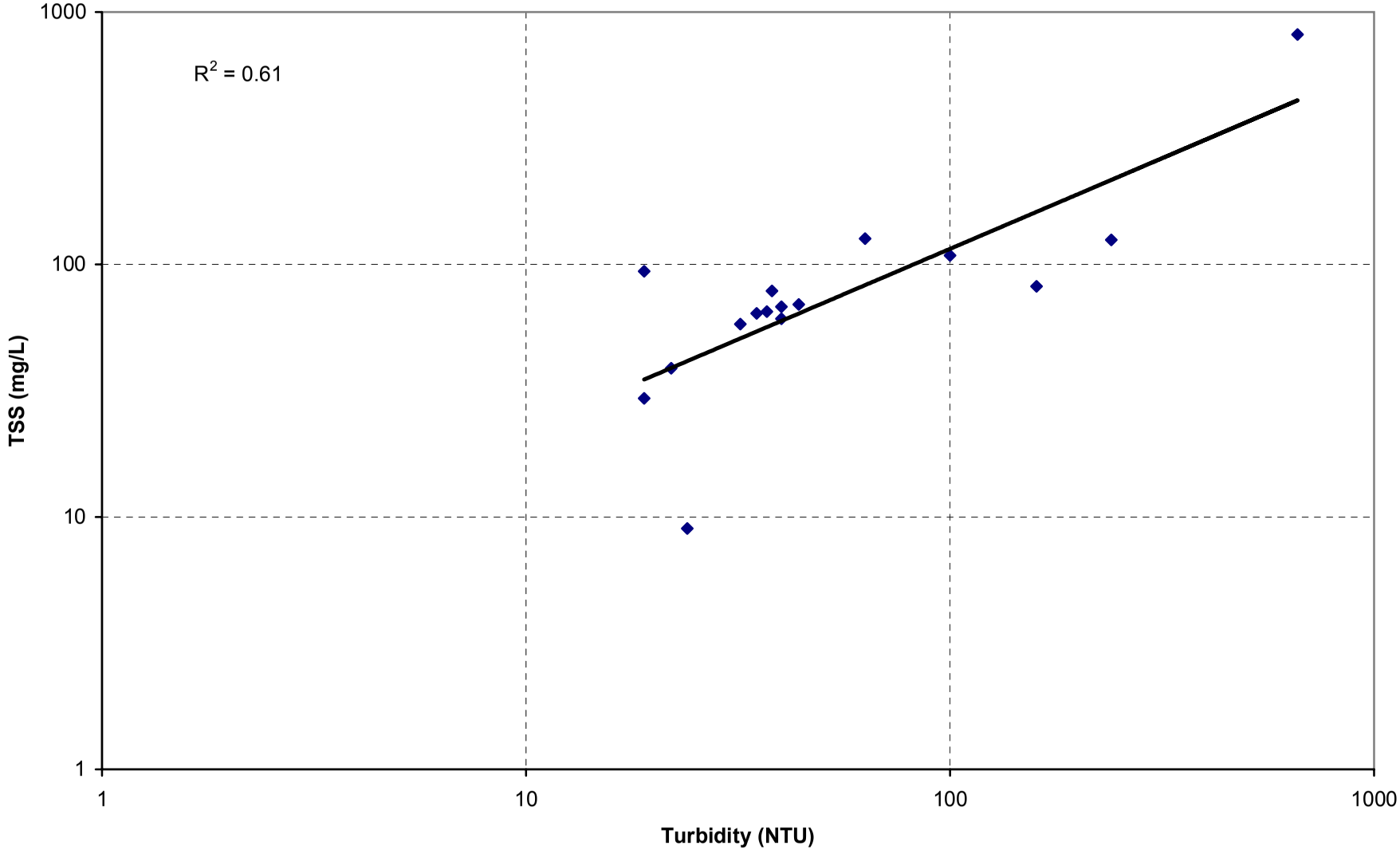


Figure D.14. TSS vs. Turbidity for Bayou Macon at UWBYM02

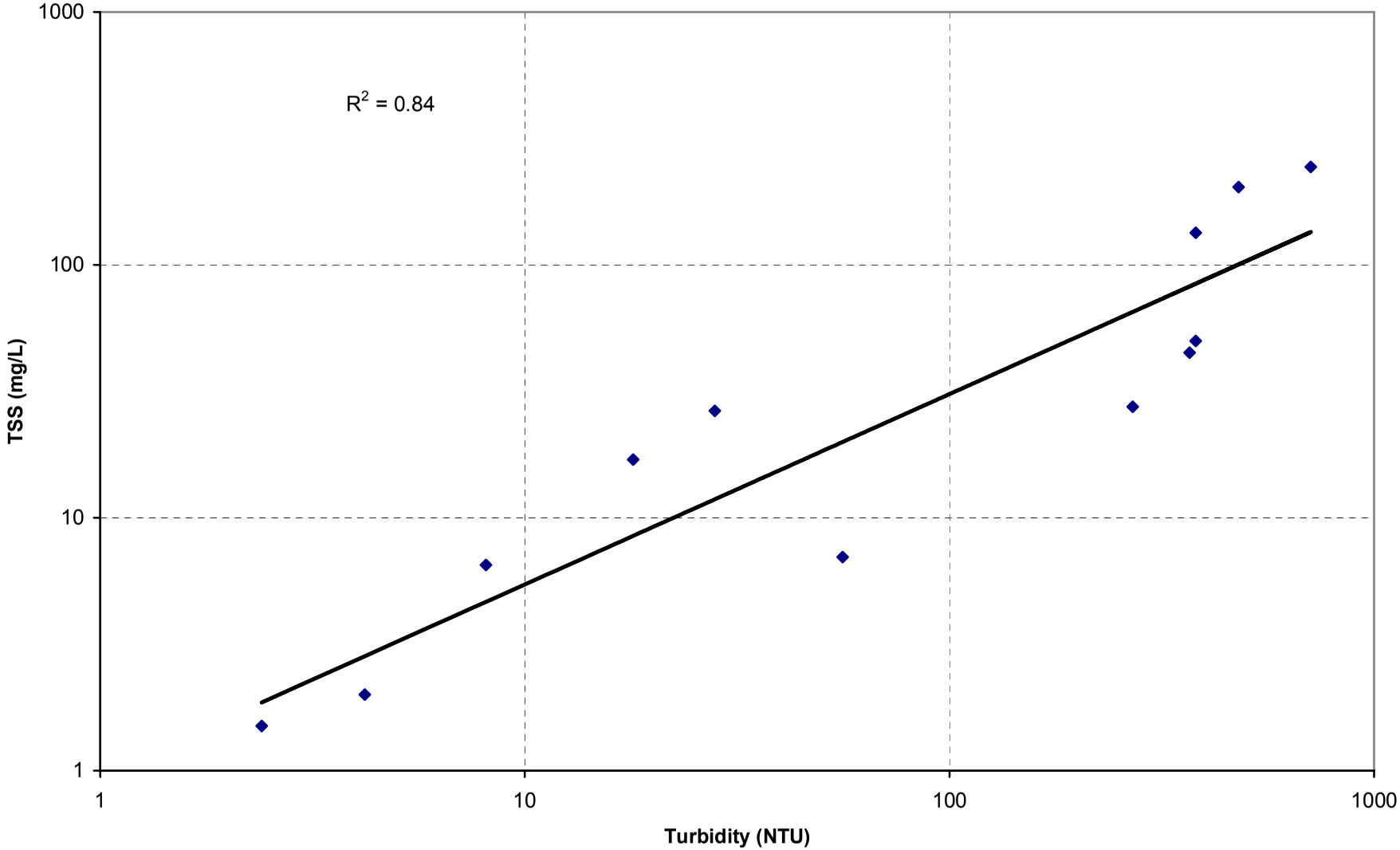


Figure D.15. Summer TSS vs. Turbidity for All Stations in Basin

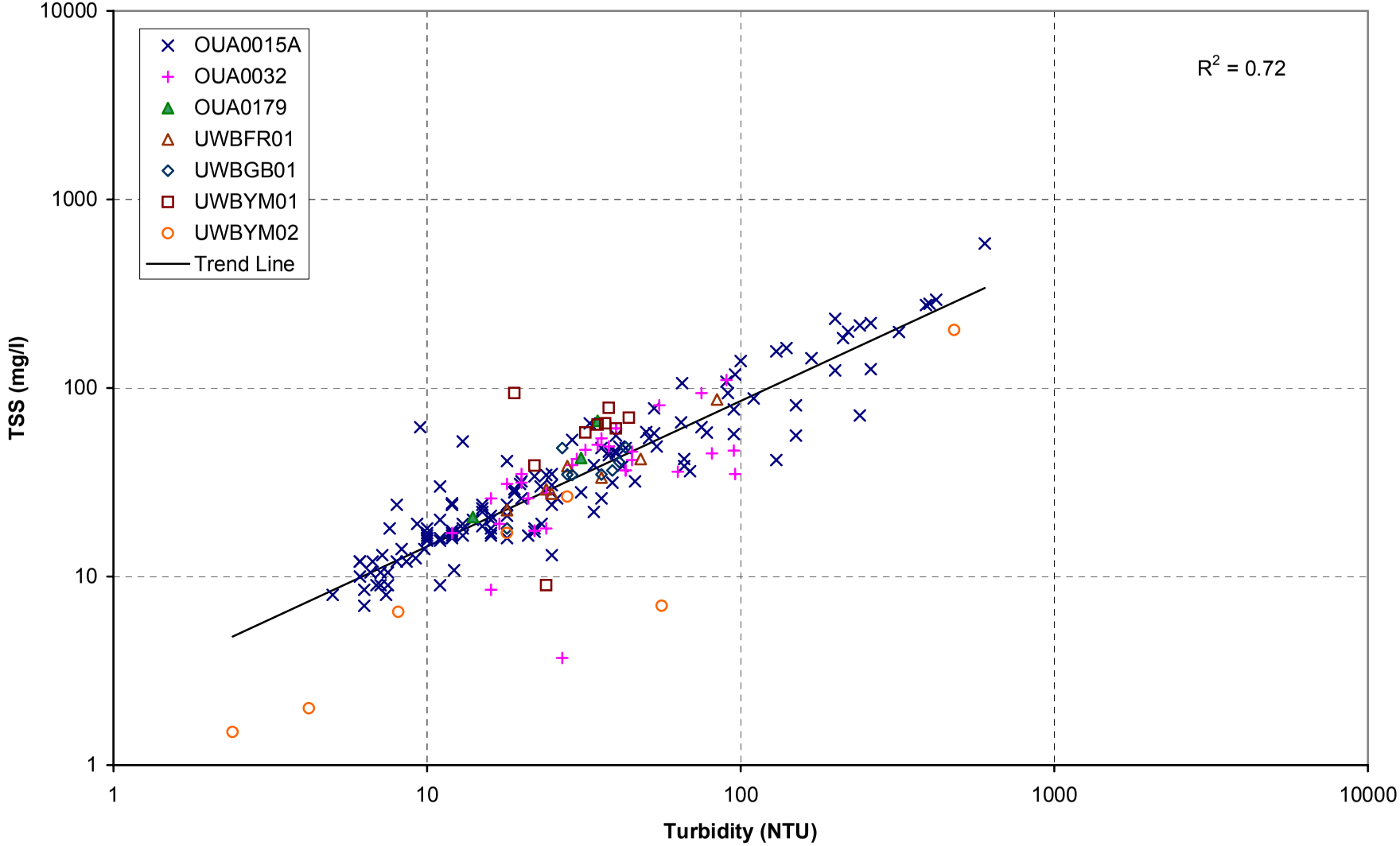
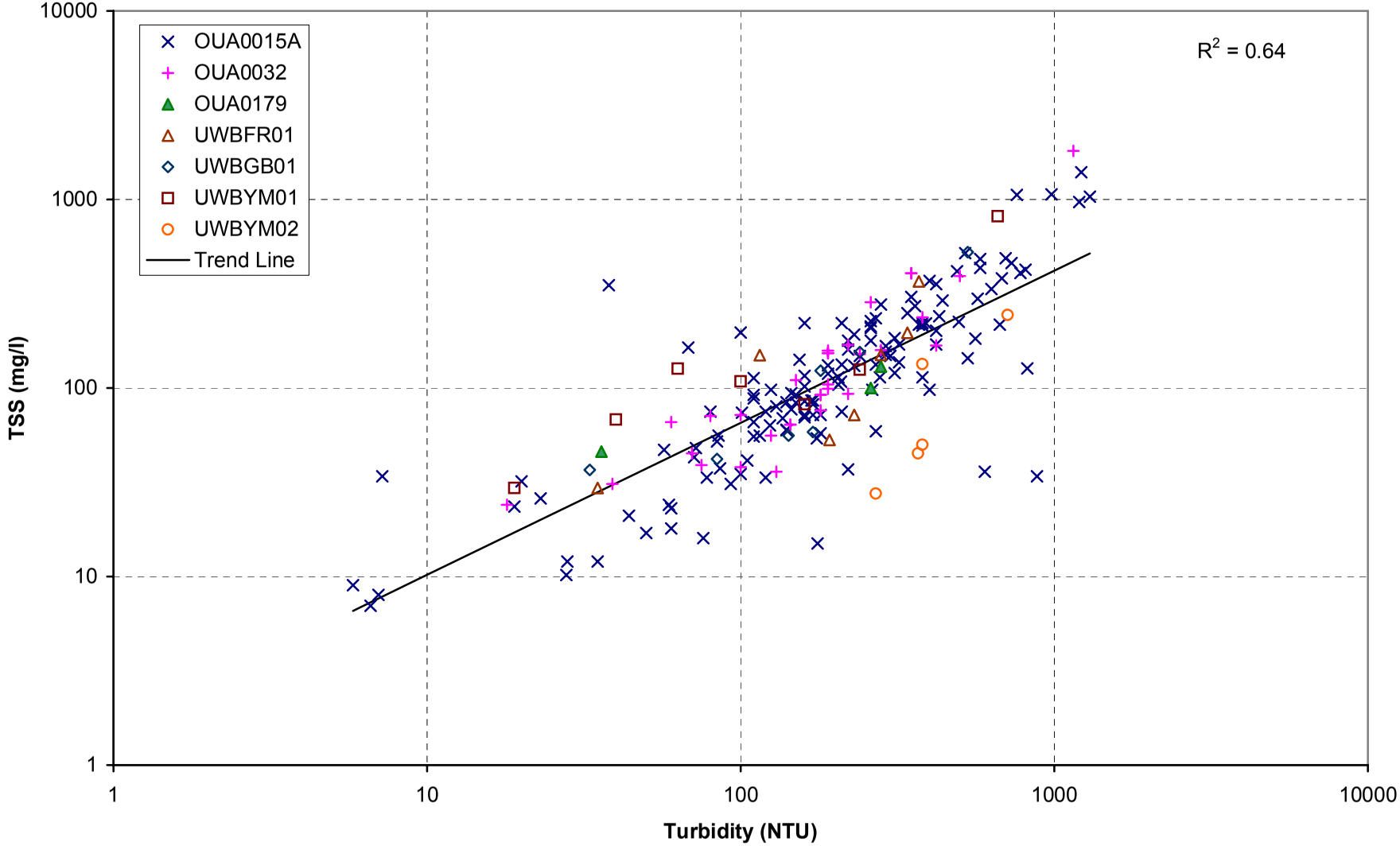


Figure D.16. Winter TSS vs. Turbidity for All Stations in Basin



APPENDIX E

Long Term Plots of Chloride and TDS

Figure E.1. Long Term Plot of Chloride for Boeuf River at OUA0015A

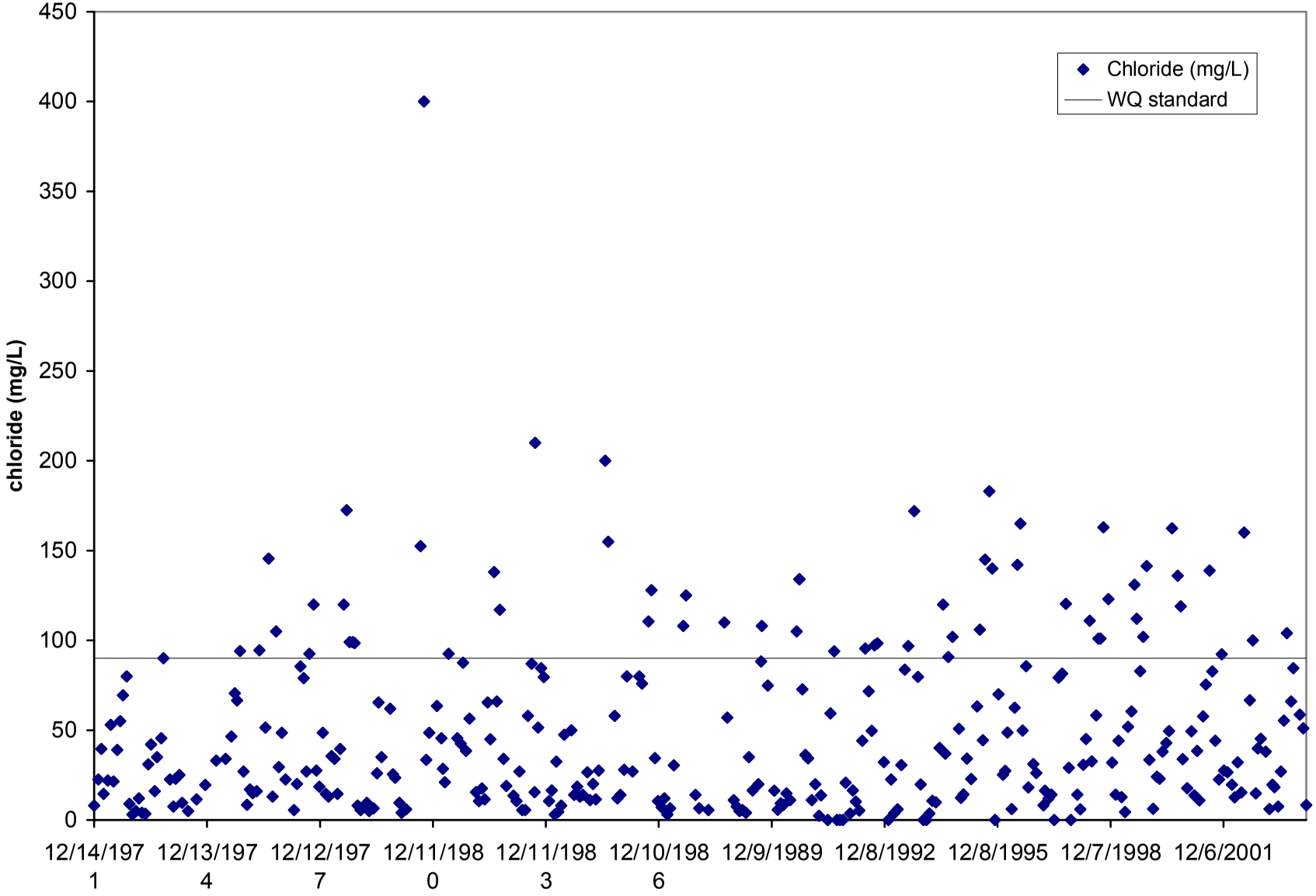


Figure E.2. Long Term Plot of Chloride for Boeuf River at UWBFR01

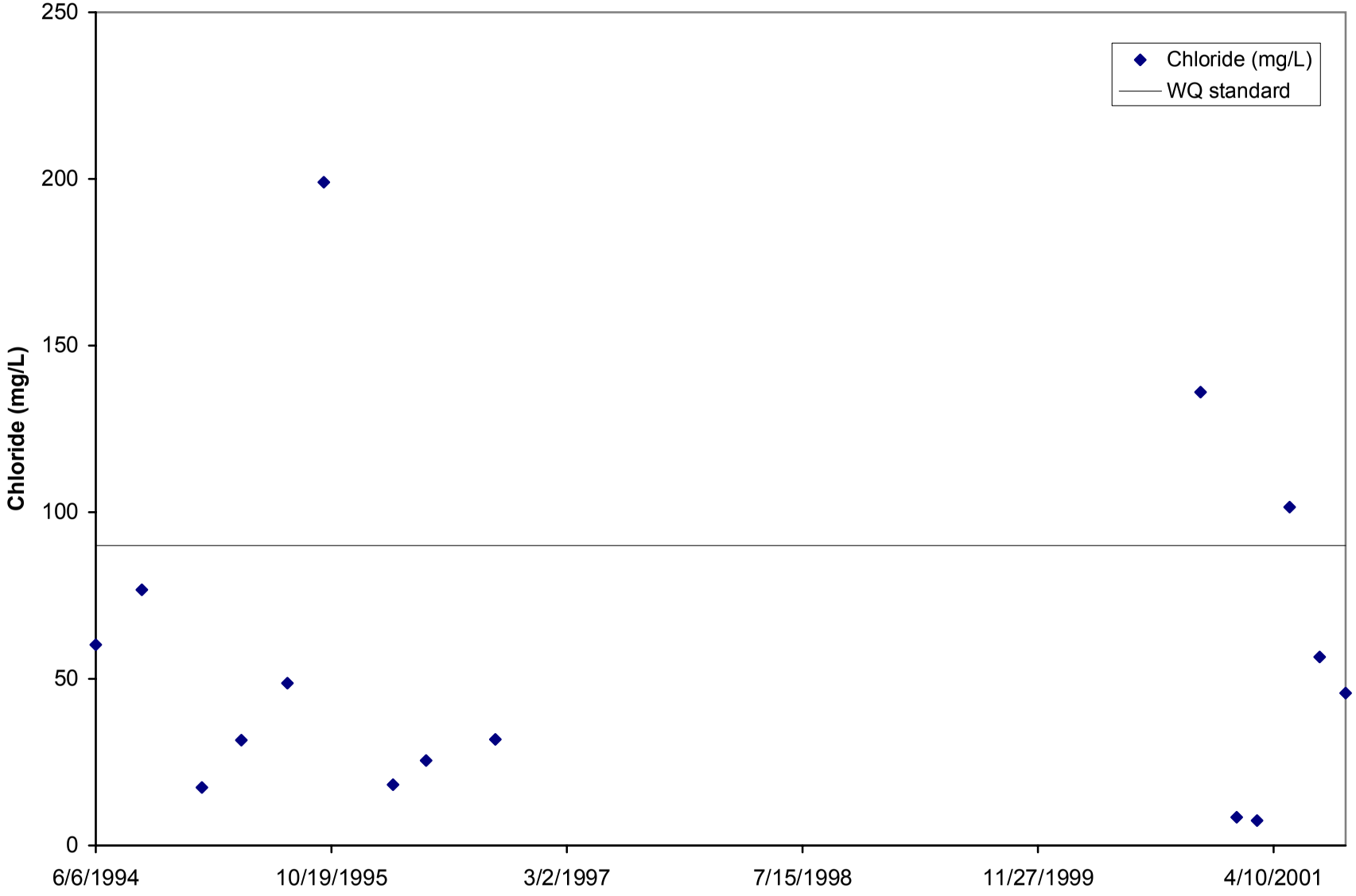
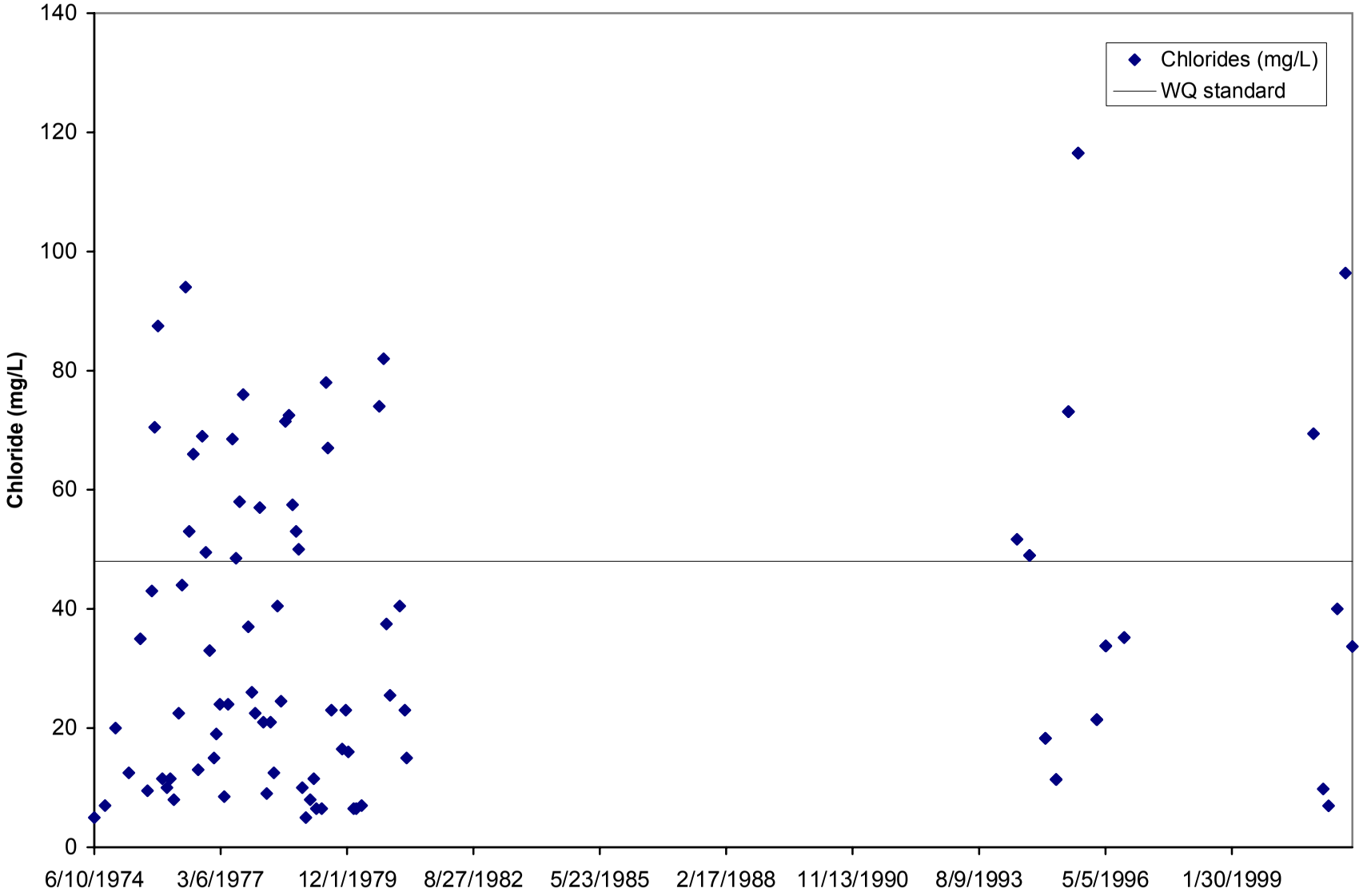


Figure E.3. Long Term Plot of Chloride for Big Bayou at OUA0032



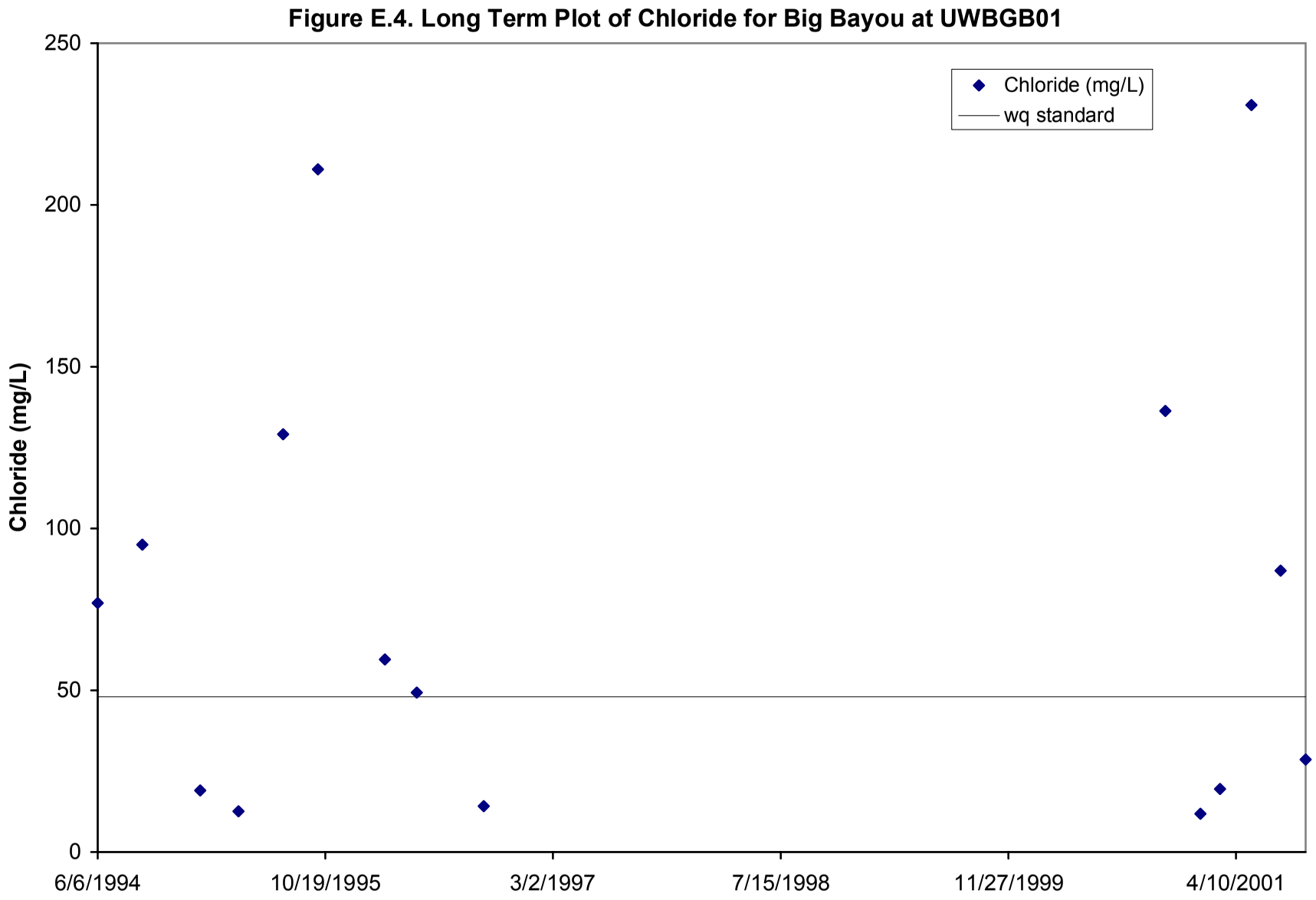


Figure E.4. Long Term Plot of Chloride for Big Bayou at UWBGB01
Chloride (mg/L)
wq standard
Chloride (mg/L)
250
200
150
100
50
0
6/6/1994
10/19/1995
3/2/1997
7/15/1998
11/27/1999
4/10/2001

Figure E.5. Long Term Plot of Chloride for Oak Bayou at OUA0179

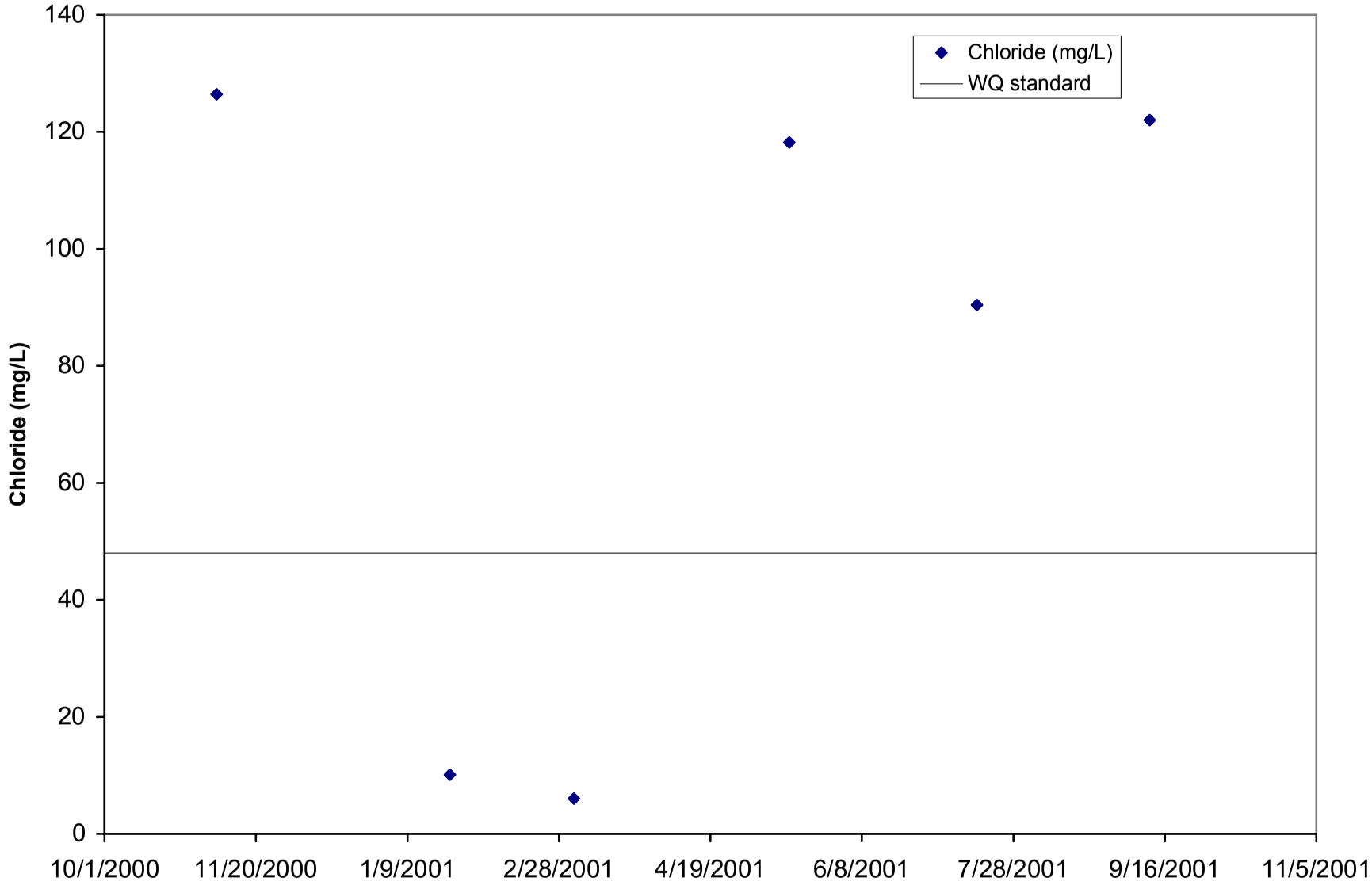


Figure E.6. Long Term Plot of TDS for Oak Bayou at OUA0179

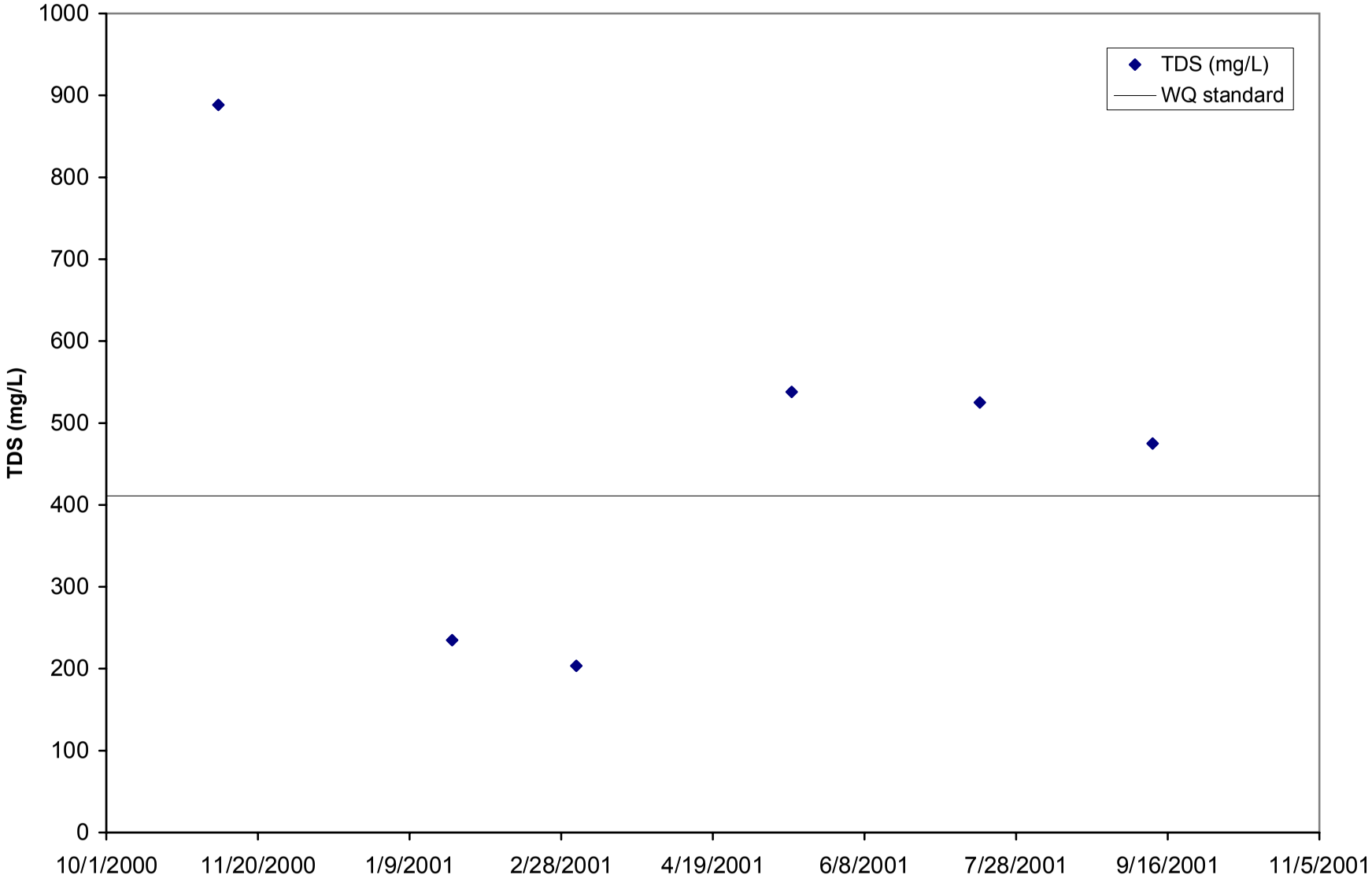


Figure E.7. Long Term Plot of TDS for Beouf River at OUA0015A

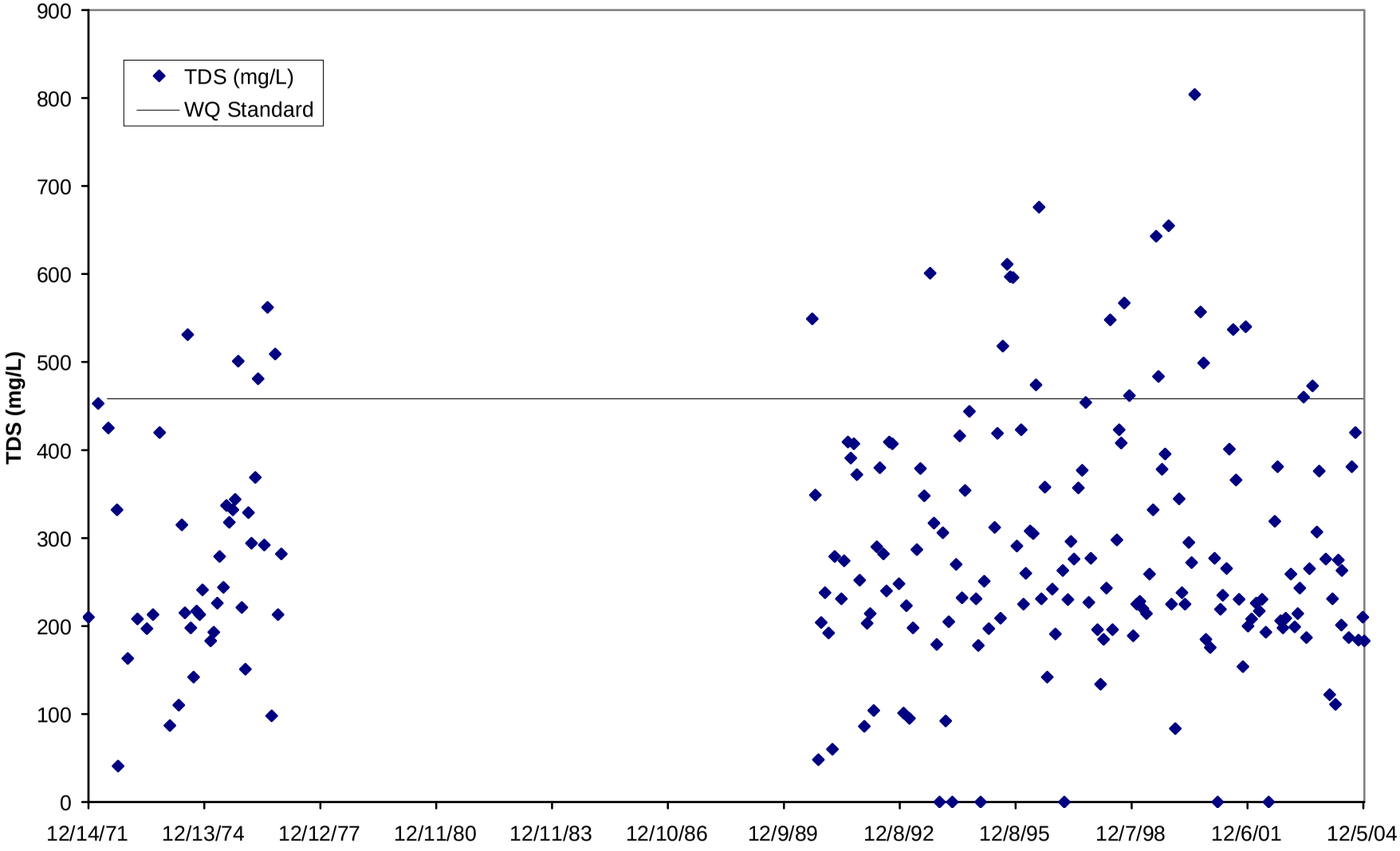
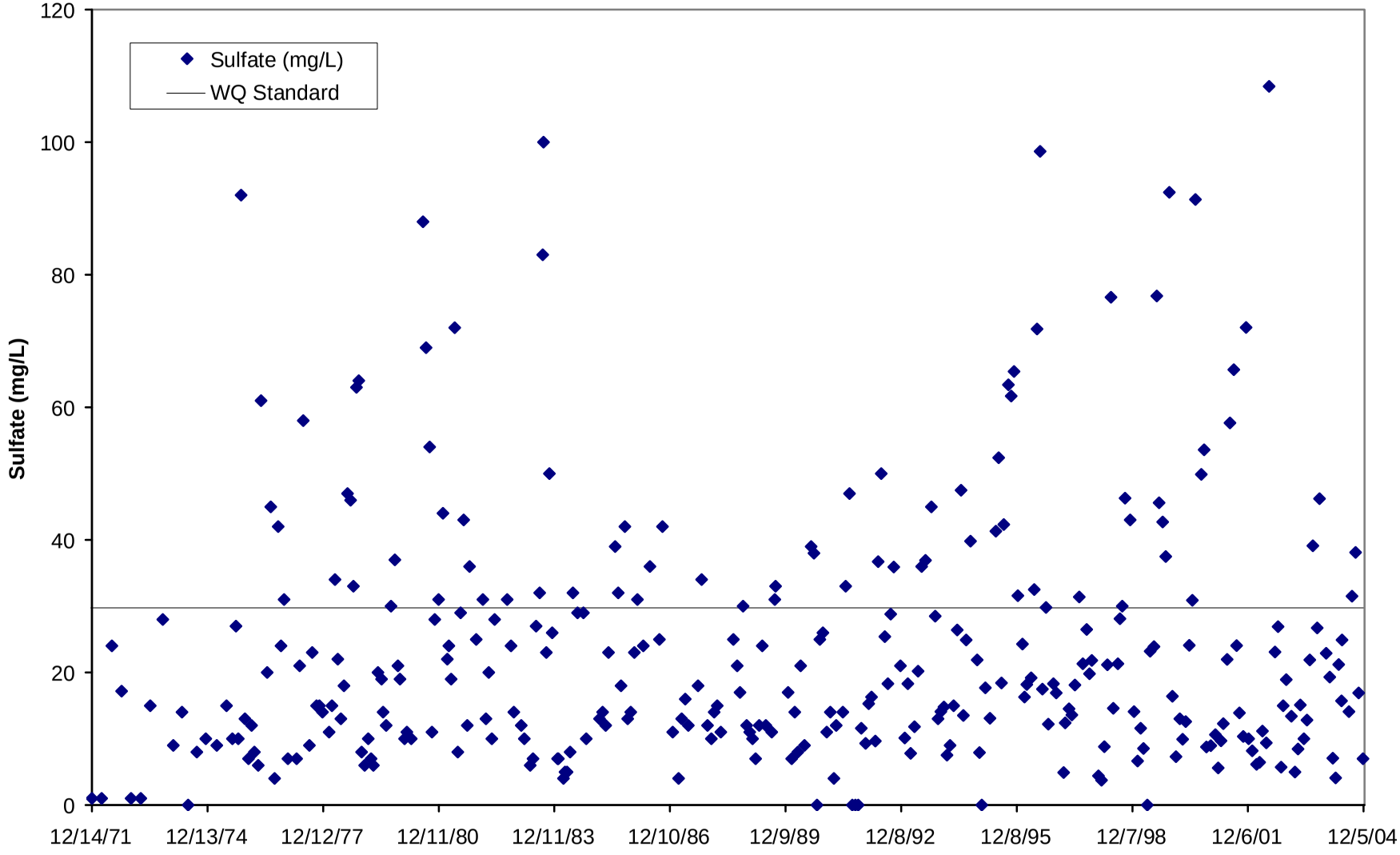


Figure E.8. Long Term Plot of Sulfate for Boeuf River at OUA0015A



APPENDIX F

Seasonal Plots of Chloride and TDS

Figure F.1. Seasonal Plot of Chlorides for Boeuf River at OUA0015A

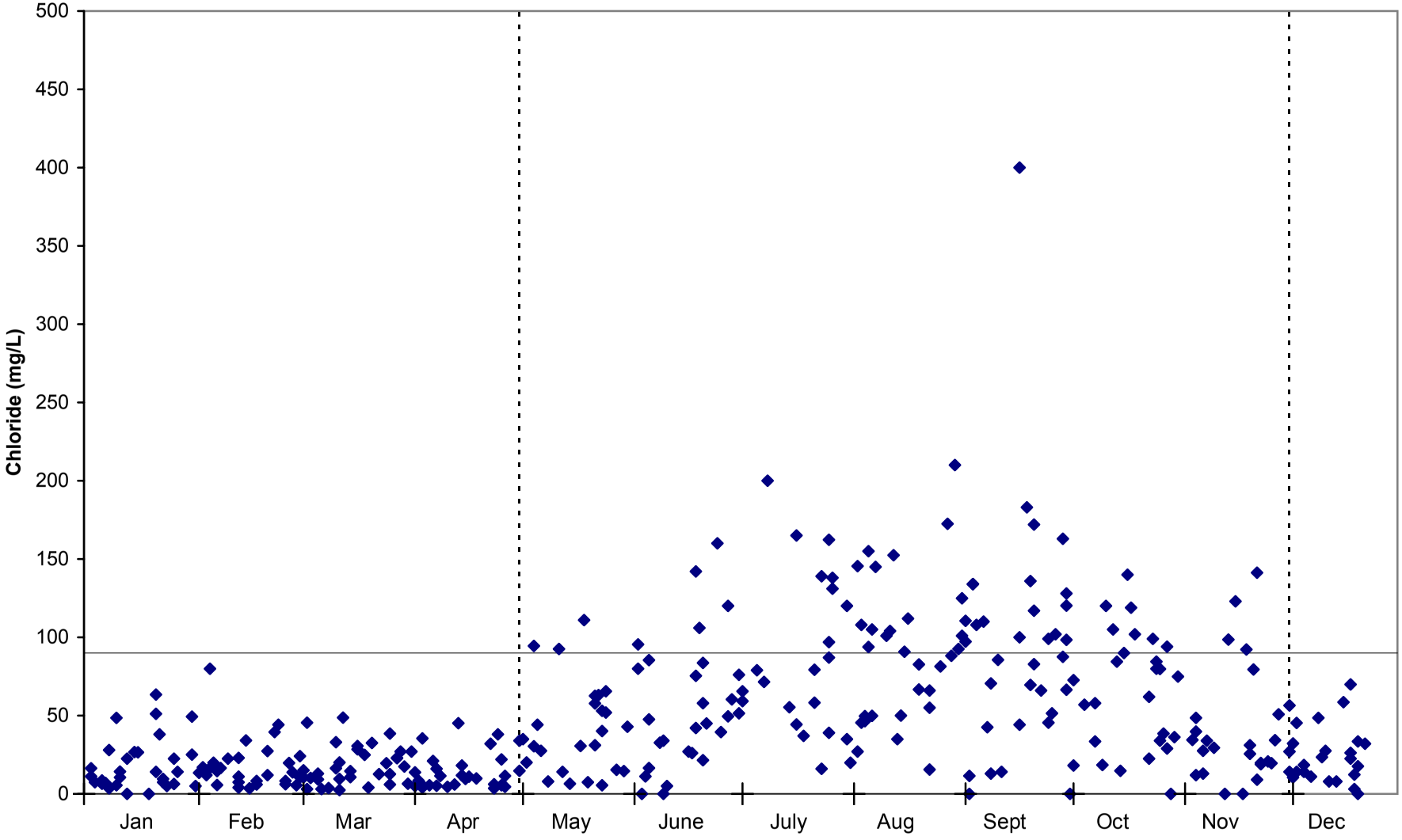


Figure F.2. Seasonal Plot of Chloride for Boeuf River at UWBFR01

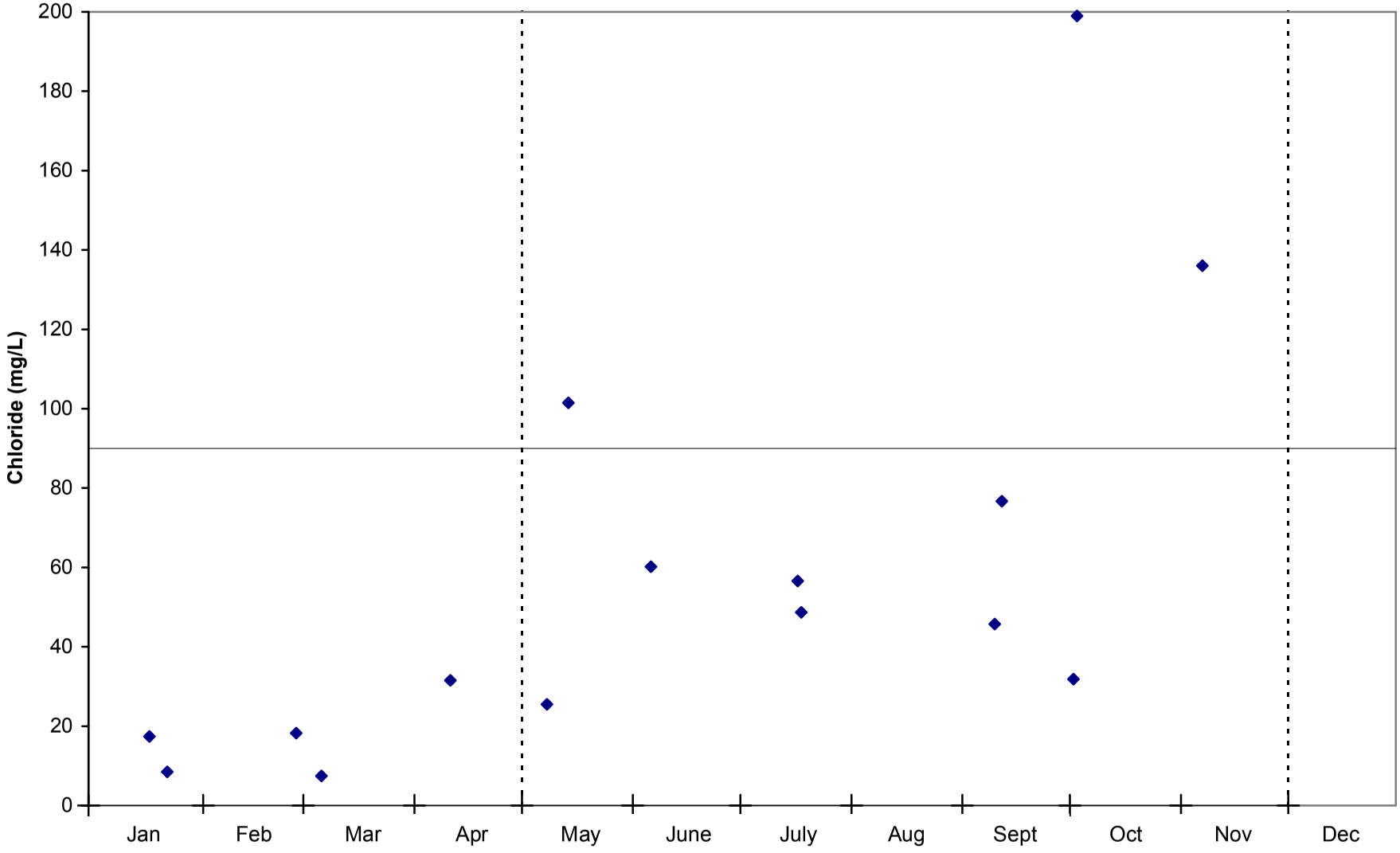


Figure F.3. Seasonal Plot of Chloride for Big Bayou at OUA0032

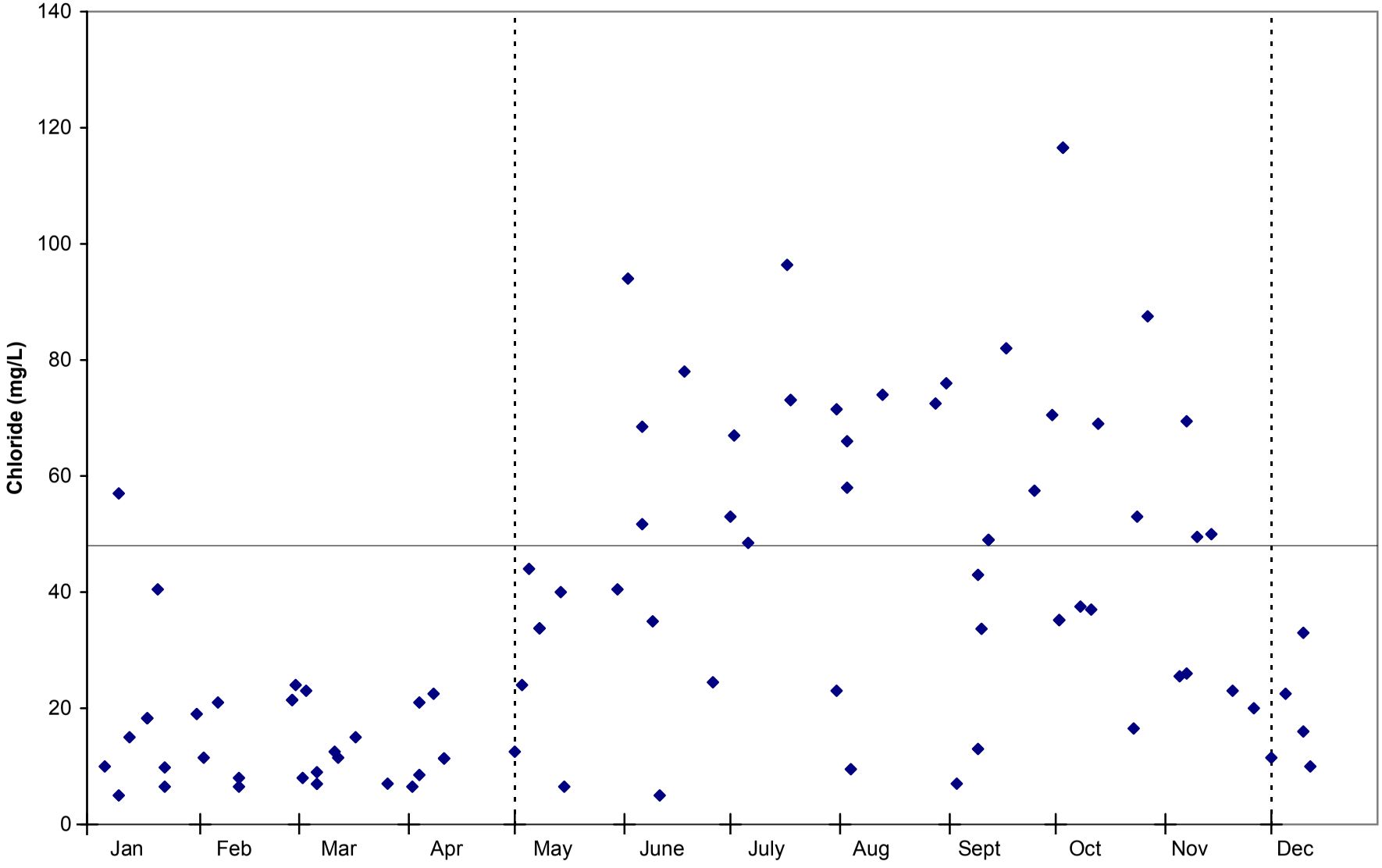


Figure F.4. Seasonal Plot of Chloride For Big Bayou at UWBGB01

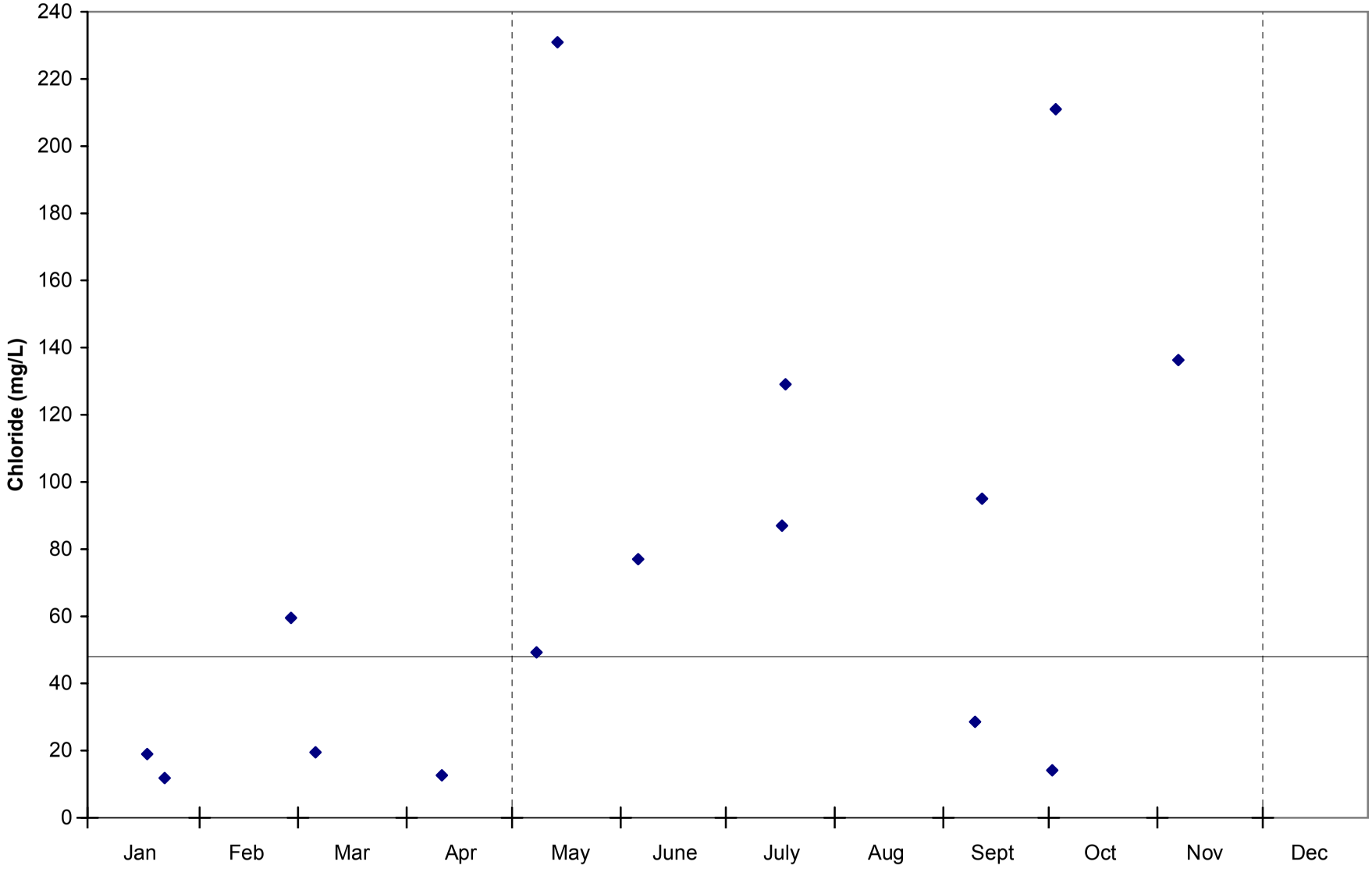


Figure F.5. Seasonal plot of Chloride for Oak Bayou at OUA0179

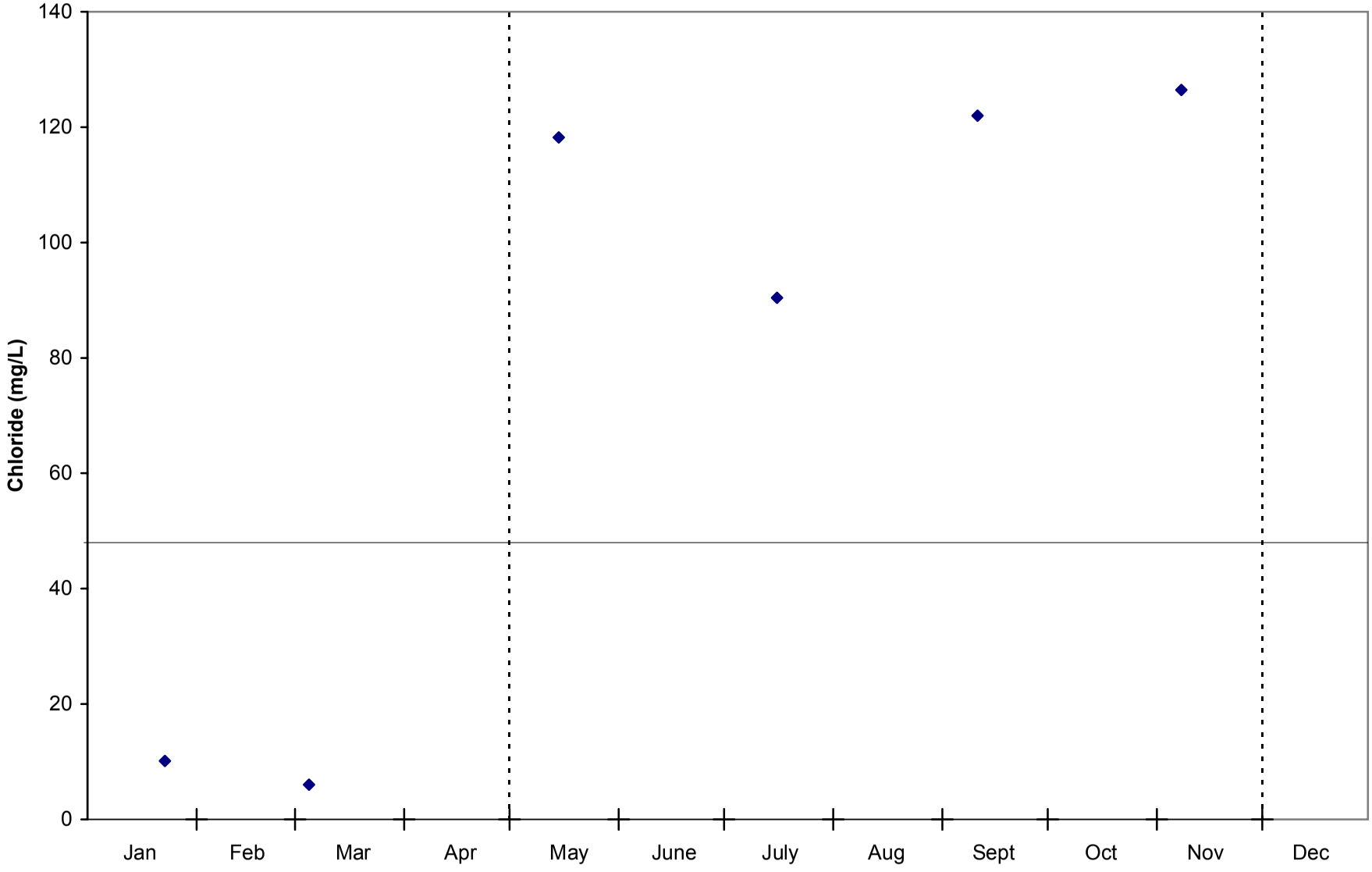


Figure F.6. Seasonal plot of TDS for Oak Bayou at OUA0179

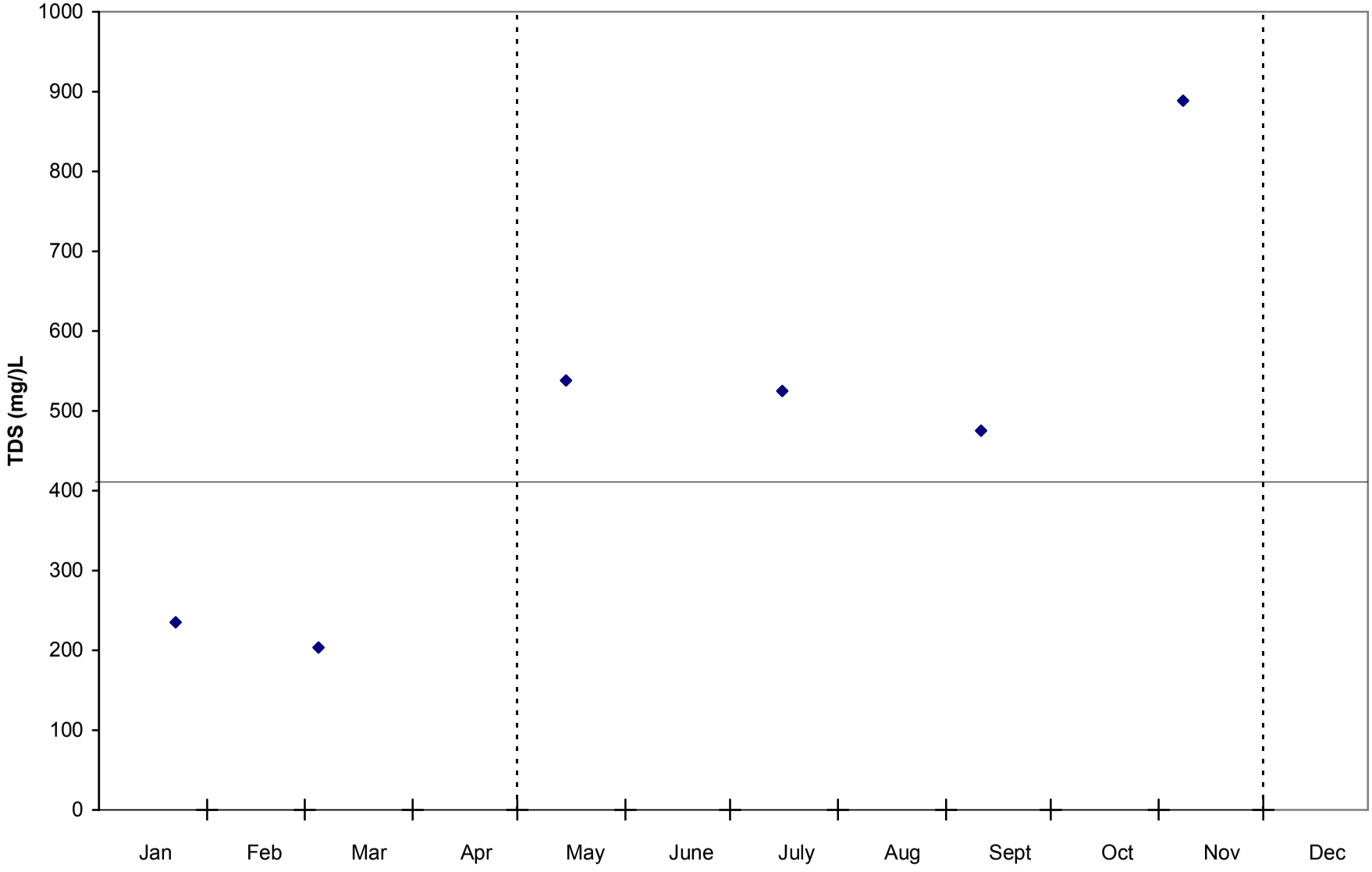


Figure F.7. Seasonal plot of TDS for Beouf River at OUA0015A

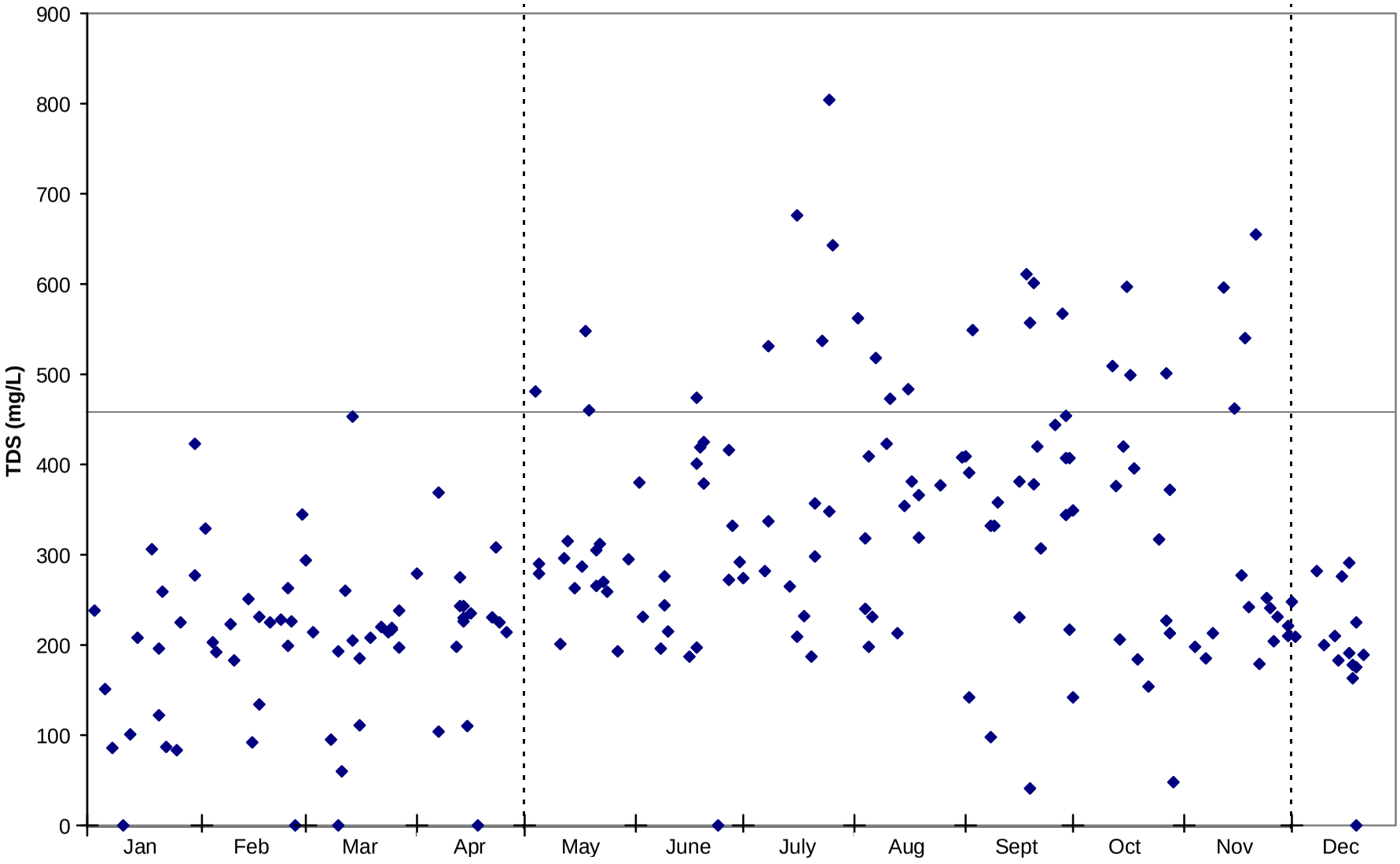
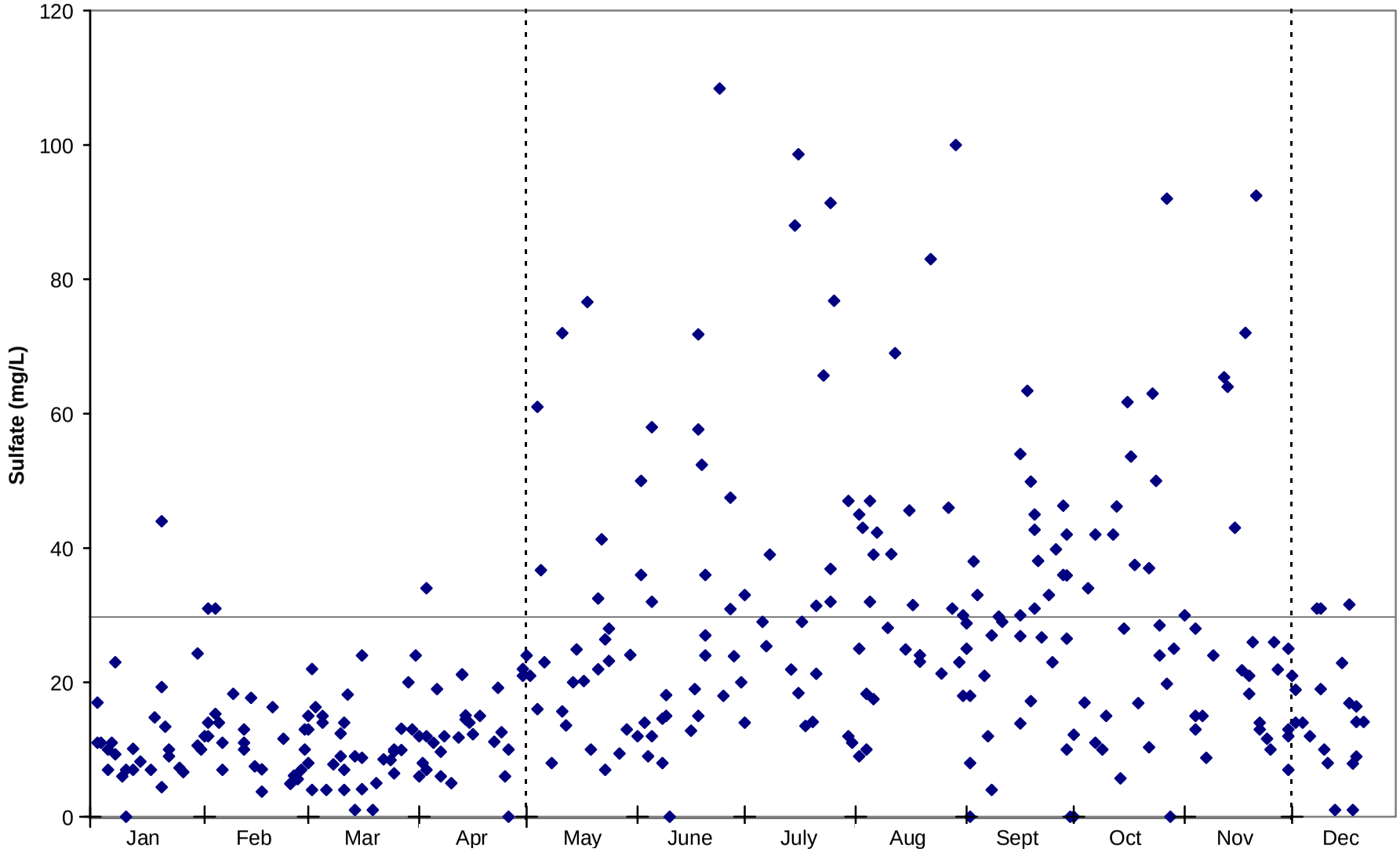


Figure F.8. Seasonal plot of Sulfate for Beouf River at OUA0015A



APPENDIX G

Plots of Chloride and TDS vs Flow

Figure G.1. Chloride vs. Flow for Boeuf River at OUA0015A

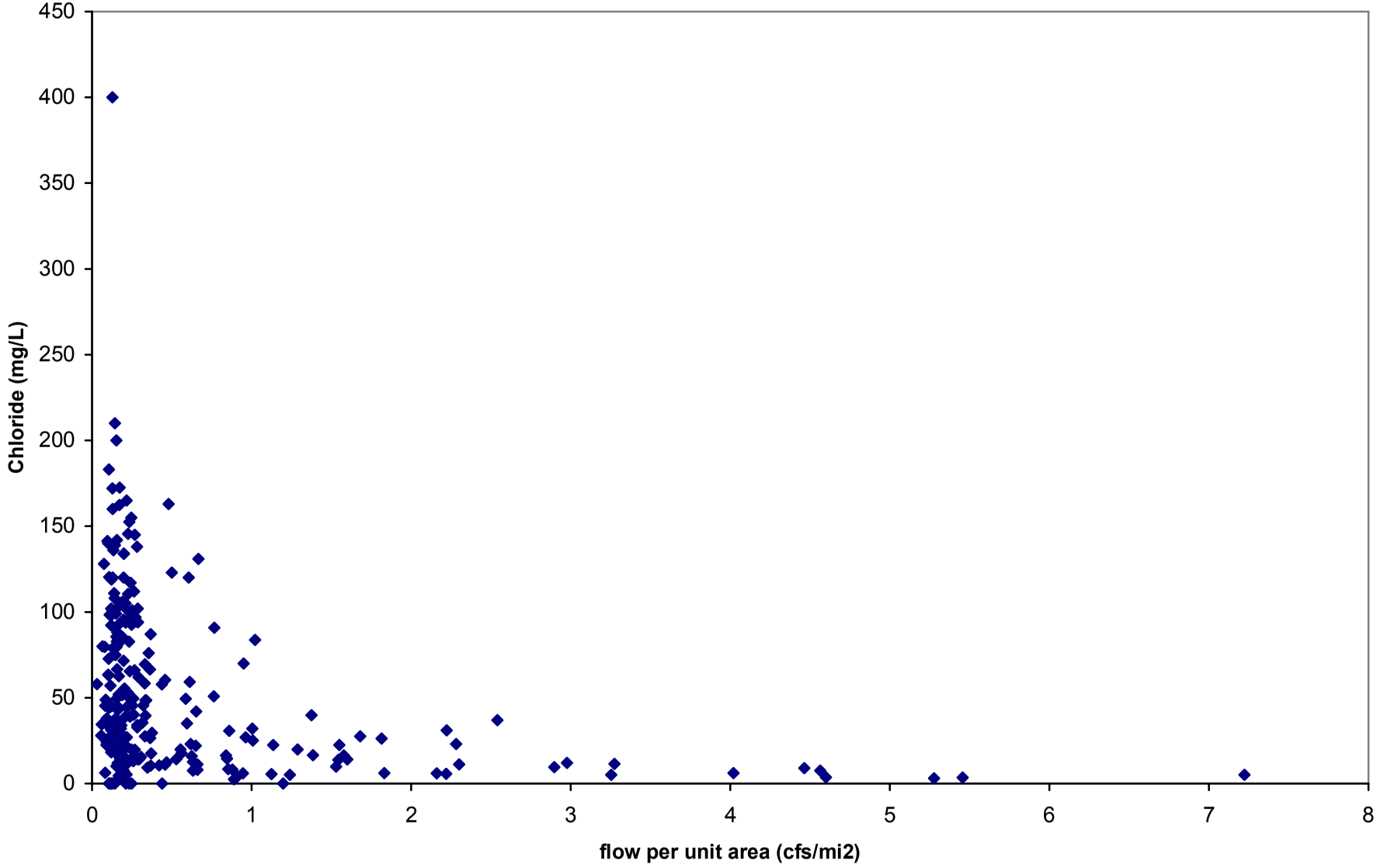


Figure G.2. Chloride vs. Flow for Boeuf River at UWBFR01

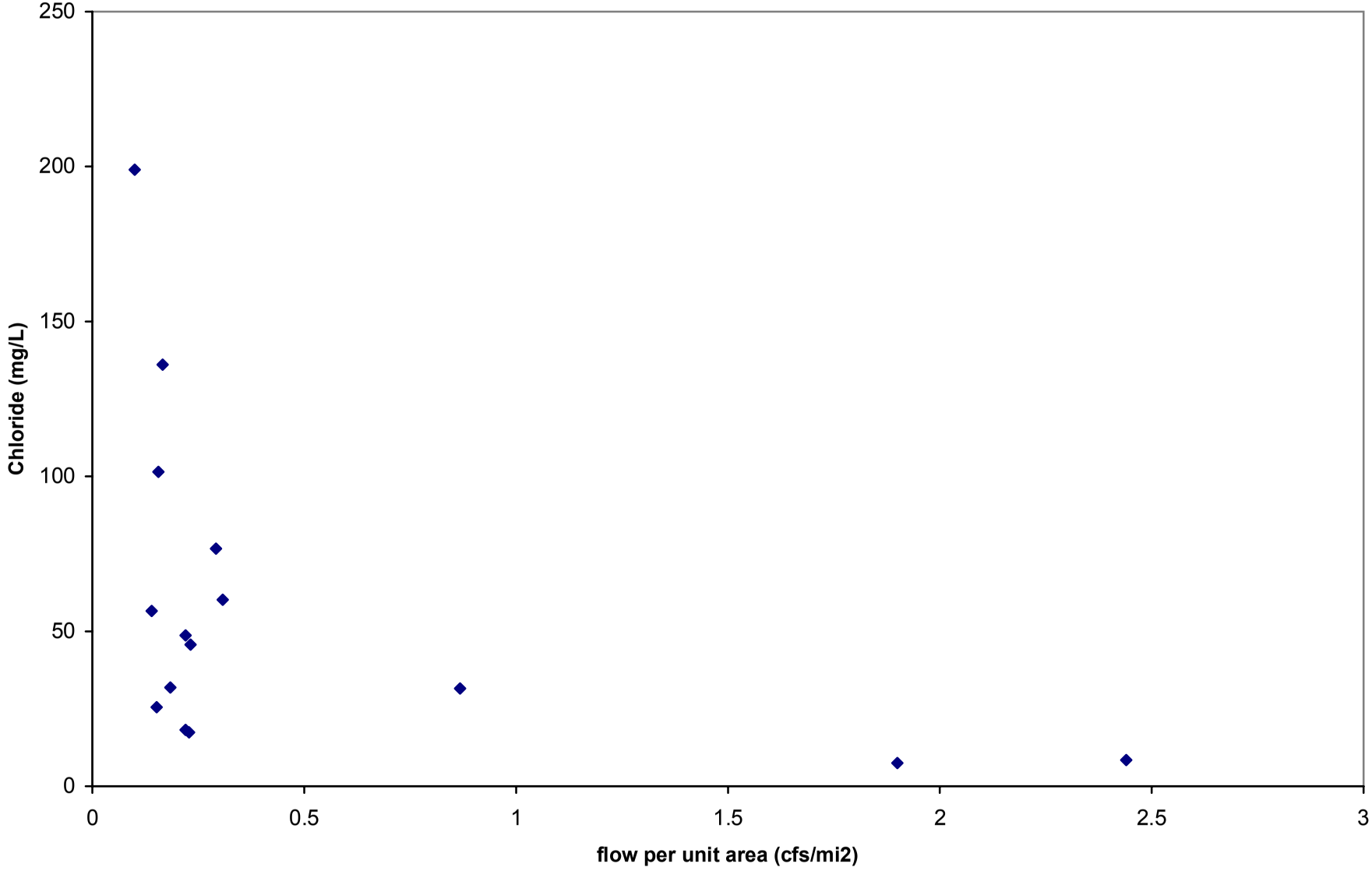


Figure G.3. Chloride vs. Flow for Big Bayou at OUA0032

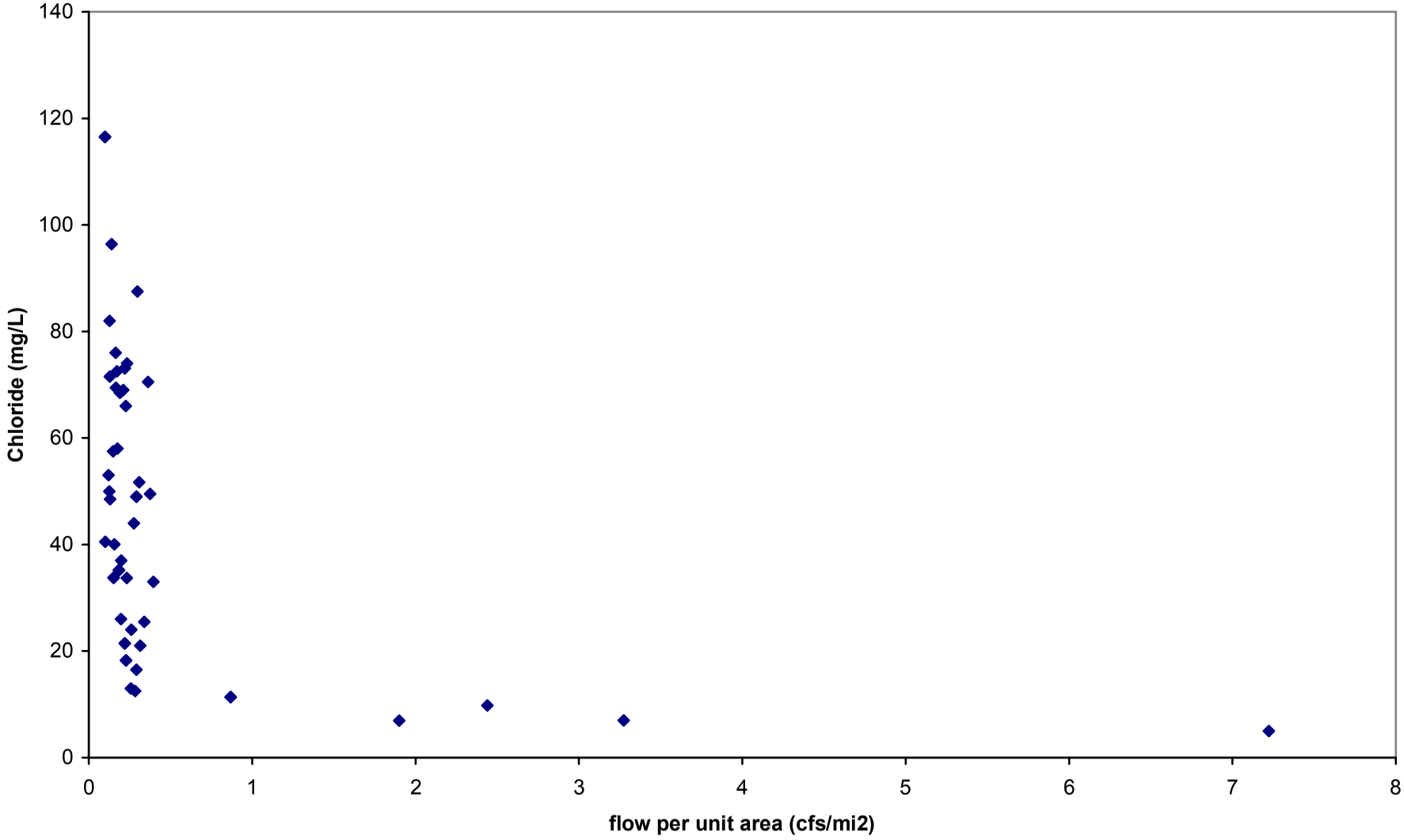
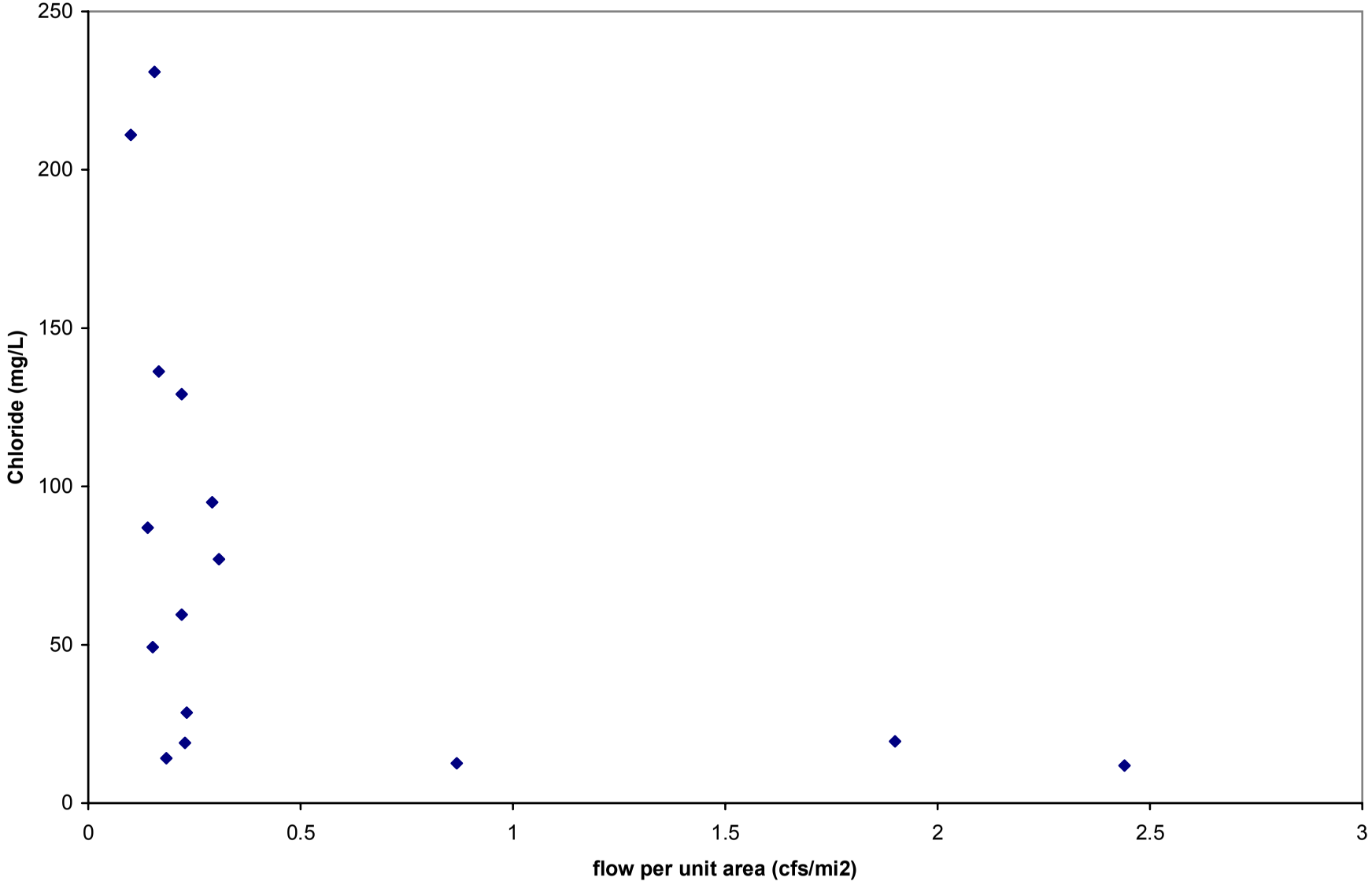


Figure G.4. Chloride vs. Flow for Big Bayou at UWBGB01



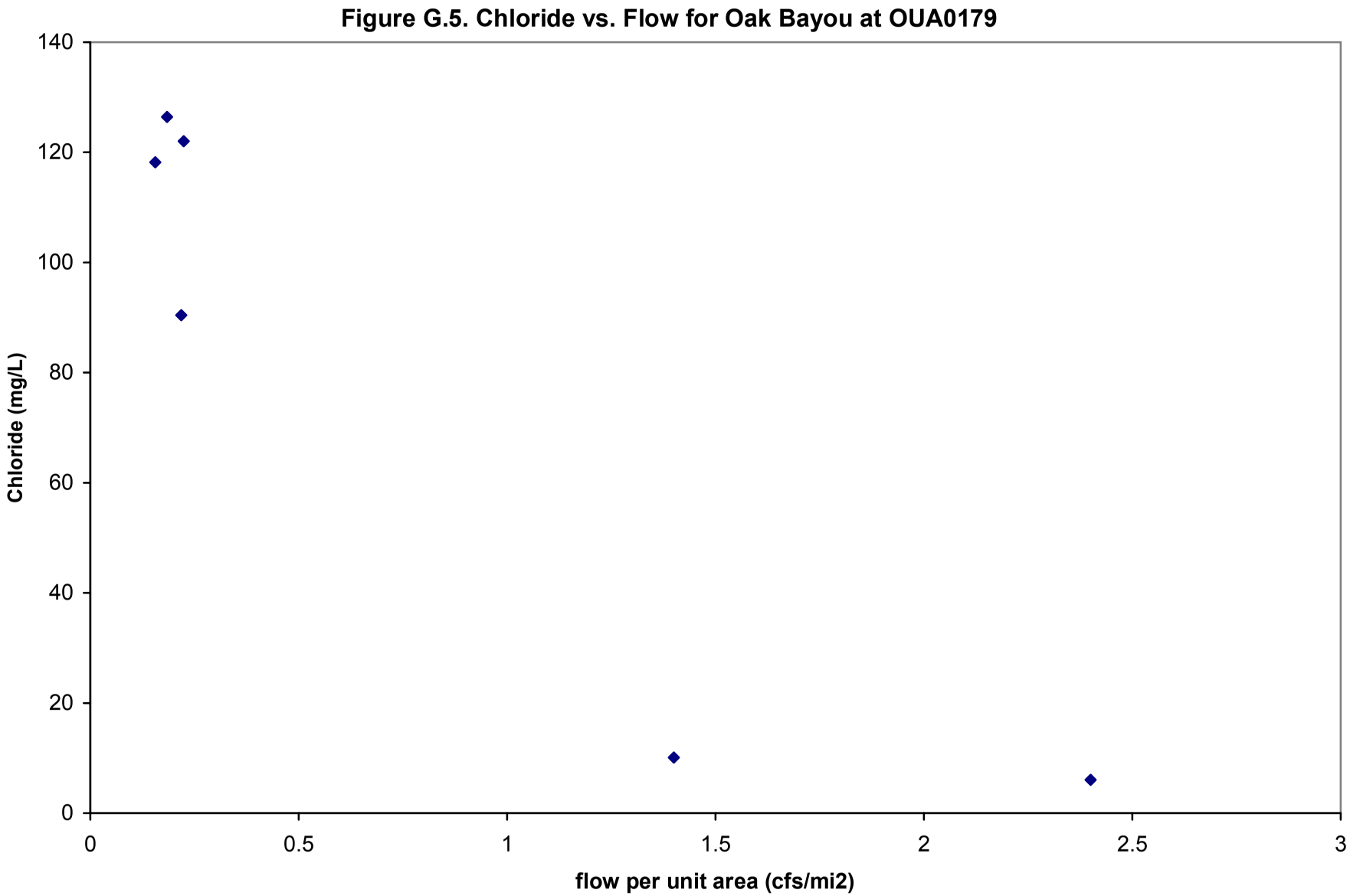


Figure G.5. Chloride vs. Flow for Oak Bayou at OUA0179
Chloride (mg/L)
140
120
100
80
60
40
20
0
0
0.5
1
1.5
2
2.5
3
flow per unit area (cfs/mi2)

Figure G.6. TDS vs. Flow for Oak Bayou at OUA0179

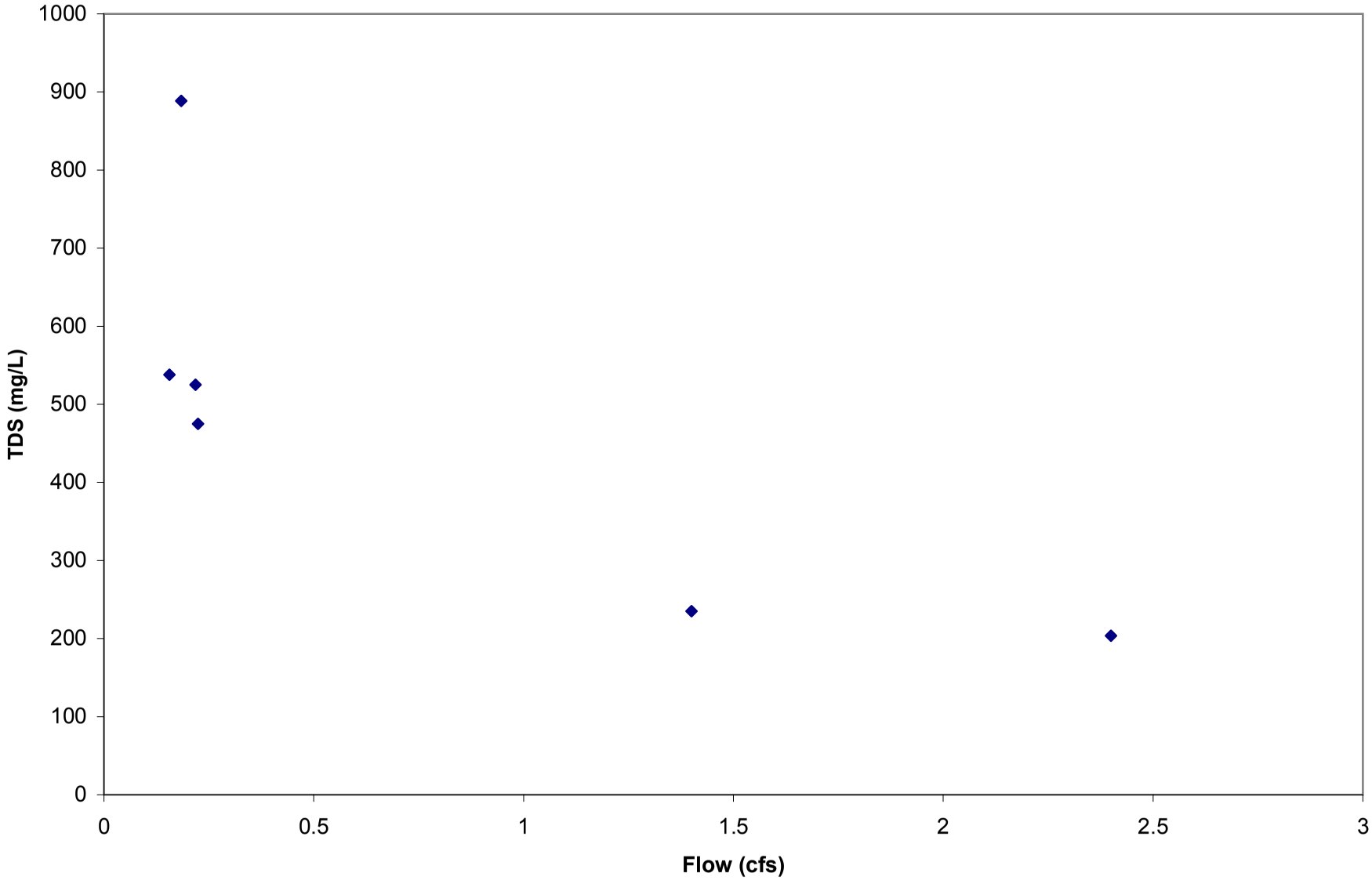


Figure G.7. TDS vs. flow for Beouf River at OUA0015A

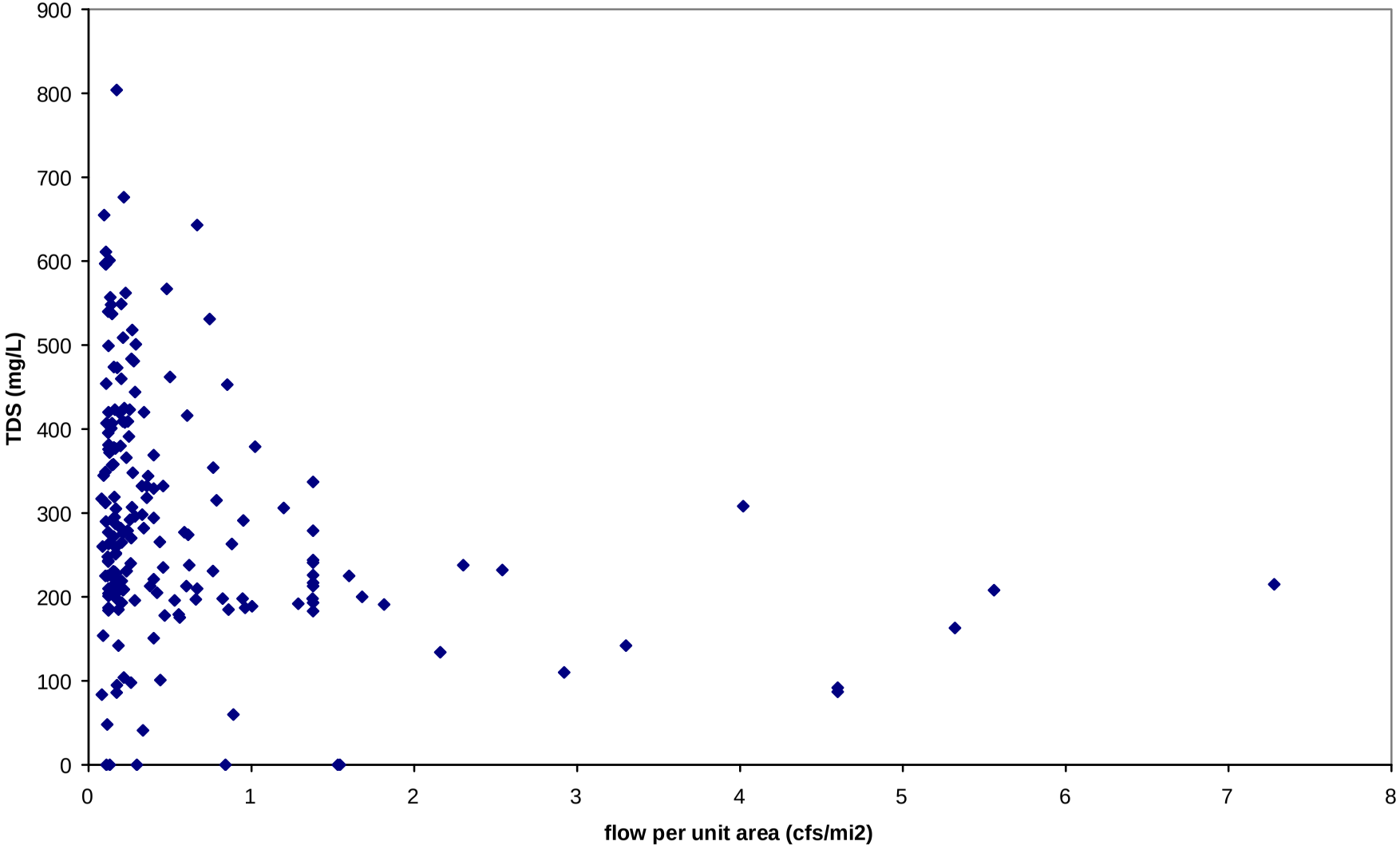
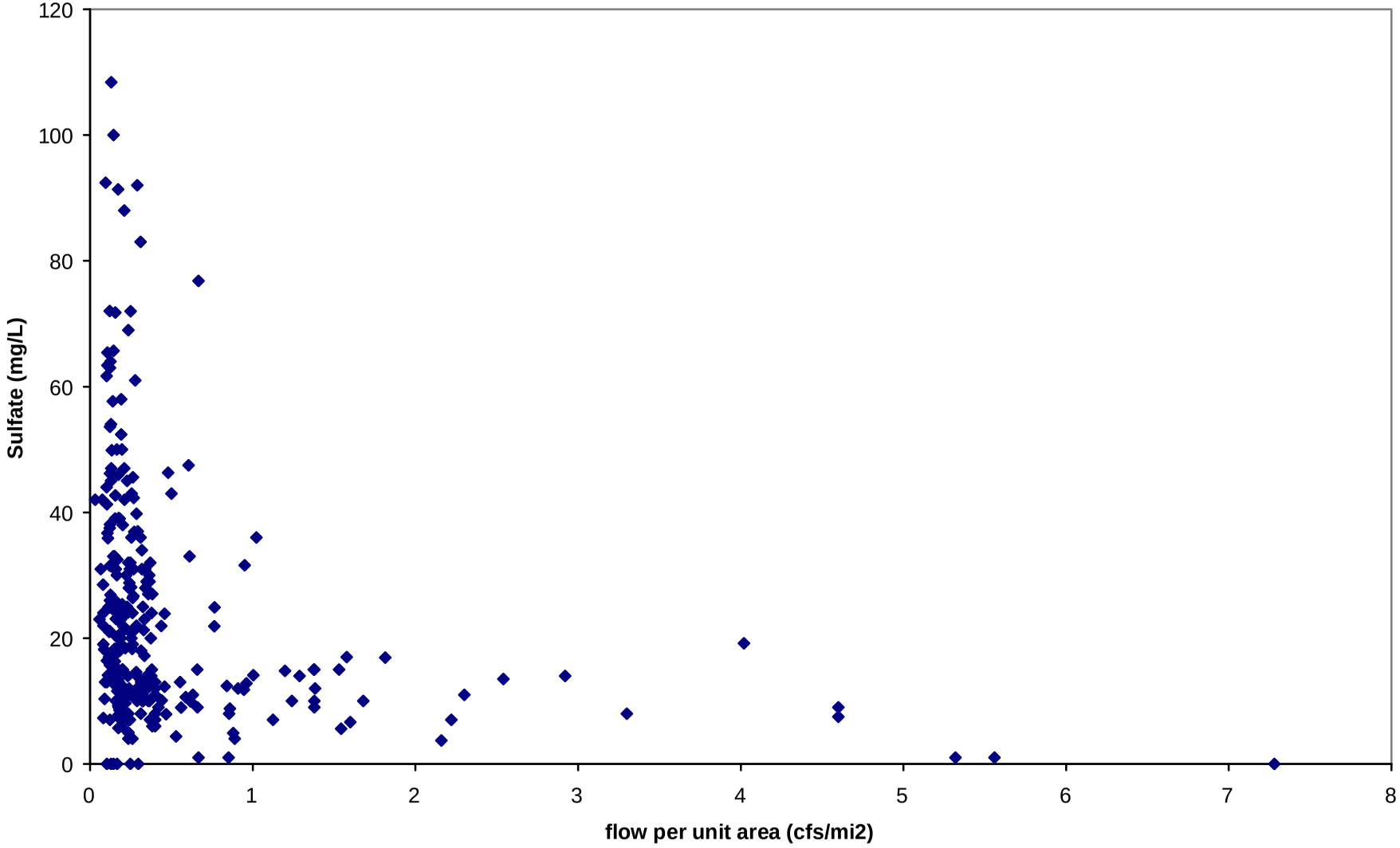


Figure G.8. Sulfate vs. Flow for Beouf River at OUA0015A



APPENDIX H

Calculations for Summer Turbidity TMDLs

TABLE H.1. TURBIDITY TMDL CALCULATIONS FOR SUMMER

Percentage of total flow in basin represented by Bayou Macon:

USGS gage number and name	Avg. annual flow 1958-67 (cfs)	Percent of combined flow	Drainage area (mi2)
07367700 Boeuf River near AR/LA state line	875	65.2%	785
07369700 Bayou Macon near Kilbourne, LA	467	34.8%	504
	1,342	100.0%	1,289

Turbidity standard = 75 NTU
TSS target = 68 mg/L

Season	Date	Observed flow at Eudora (cfs)	Percent exceedance for observed flow	Adjusted flow for entire basin cfs	cfs/mi2	cms/mi2	"Width" for area under curves	Allowable TSS load to meet standard (tons/day)/mi2	"Area under TMDL curve" (tons/day)/mi2
A	B	C	D	E = C / 34.8%	F = E / 1289 mi2	G = E / 35.32	H = D1 - D2	I = G * 68 mg/L * conversion	J = H * I
SUMMER	6/22/02	24	99.98%	69.0	0.054	0.0015	0.04%	0.01	3.58E-06
SUMMER	6/20/02	25	99.95%	71.8	0.056	0.0016	0.04%	0.01	3.73E-06
SUMMER	6/21/02	26	99.91%	74.7	0.058	0.0016	0.04%	0.01	3.88E-06
SUMMER	6/19/02	31	99.87%	89.1	0.069	0.0020	0.04%	0.01	4.63E-06
SUMMER	10/10/01	32	99.84%	92.0	0.071	0.0020	0.04%	0.01	4.78E-06
SUMMER	10/31/01	35	99.80%	100.6	0.078	0.0022	0.04%	0.01	5.22E-06
SUMMER	11/25/01	36	99.76%	103.4	0.080	0.0023	0.04%	0.01	5.37E-06
SUMMER	6/23/02	36	99.73%	103.4	0.080	0.0023	0.04%	0.01	5.37E-06

For brevity, most of the rows in this spreadsheet have been hidden (between the 10.29% and the 99.73% exceedances).

SUMMER	10/19/91	276	10.29%	793.1	0.615	0.0174	0.04%	0.11	4.12E-05
SUMMER	11/23/93	277	10.26%	796.0	0.618	0.0175	0.04%	0.11	4.13E-05
SUMMER	7/7/94	277	10.22%	796.0	0.618	0.0175	0.04%	0.11	4.13E-05
SUMMER	7/29/96	278	10.18%	798.9	0.620	0.0175	0.04%	0.11	4.15E-05
SUMMER	10/18/91	279	10.15%	801.7	0.622	0.0176	0.04%	0.11	4.16E-05
SUMMER	11/27/88	280	10.11%	804.6	0.624	0.0177	0.04%	0.11	4.18E-05
SUMMER	6/11/89	280	10.07%	804.6	0.624	0.0177	0.04%	0.11	4.18E-05
SUMMER	6/28/93	280	10.04%	804.6	0.624	0.0177	0.04%	0.11	4.18E-05
SUMMER	7/5/91	281	10.00%	807.5	0.626	0.0177	0.04%	0.12	4.19E-05
						TOTALS:	**89.98%**		**3.55E-02**

FILE: R:\PROJECTS\2110-613\TECH\TMDL\TMDL TSS-SUMMER.XLS

TABLE H.2. CALCULATIONS FOR TSS LOADS AND PERCENT REDUCTION
FOR SUMMER FOR BOEUF RIVER AT OUA0015A (REACH 08050001-018)

Summer target TSS conc. = 68 mg/L
Percent reduction needed = 0%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Season	Date	Observed TSS at OUA0015A (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current TSS load (tons/day)/mi2	Reduced TSS load (tons/day)/mi2	Allowable TSS load (tons/day)/mi2	Reduced load less than or equal to allow. load?
SUMMER	10/26/93	26.0	0.0025	98.4%	0.006	0.0063	0.0164	Yes
SUMMER	10/23/01	10.5	0.0028	96.8%	0.003	0.0028	0.0184	Yes
SUMMER	11/22/99	9.0	0.0030	94.8%	0.003	0.0026	0.0197	Yes
SUMMER	10/17/95	9.0	0.0032	92.9%	0.003	0.0028	0.0209	Yes
SUMMER	10/2/90	18.0	0.0033	92.0%	0.006	0.0056	0.0213	Yes
SUMMER	9/19/95	7.0	0.0033	90.5%	0.002	0.0022	0.0217	Yes
SUMMER	11/13/95	8.5	0.0033	90.4%	0.003	0.0027	0.0217	Yes
SUMMER	9/30/97	17.5	0.0034	88.5%	0.006	0.0057	0.0221	Yes
SUMMER	9/29/92	16.0	0.0035	88.2%	0.005	0.0053	0.0225	Yes
SUMMER	10/30/90	26.0	0.0036	85.6%	0.009	0.0089	0.0234	Yes
SUMMER	10/4/88	78.0	0.0037	84.8%	0.027	0.0272	0.0238	No
SUMMER	11/19/96	41.5	0.0038	82.2%	0.015	0.0150	0.0246	Yes
SUMMER	11/18/97	42.0	0.0038	82.0%	0.015	0.0151	0.0246	Yes
SUMMER	10/19/99	16.5	0.0038	81.3%	0.006	0.0060	0.0246	Yes
SUMMER	11/19/01	9.0	0.0038	80.9%	0.003	0.0032	0.0246	Yes
SUMMER	11/27/90	28.0	0.0039	80.2%	0.010	0.0103	0.0250	Yes
SUMMER	10/17/00	8.0	0.0039	79.5%	0.003	0.0029	0.0250	Yes
SUMMER	9/17/02	12.5	0.0040	76.4%	0.005	0.0047	0.0258	Yes
SUMMER	10/29/91	65.0	0.0040	76.0%	0.025	0.0250	0.0262	Yes
SUMMER	9/21/93	14.0	0.0040	75.9%	0.005	0.0054	0.0262	Yes
SUMMER	10/28/97	214.5	0.0042	72.4%	0.086	0.0864	0.0274	No
SUMMER	9/19/00	10.5	0.0042	72.2%	0.004	0.0042	0.0274	Yes
SUMMER	6/19/01	16.5	0.0044	69.3%	0.007	0.0069	0.0287	Yes

Season	Date	Observed TSS at OUA0015A (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current TSS load (tons/day)/mi2	Reduced TSS load (tons/day)/mi2	Allowable TSS load (tons/day)/mi2	Reduced load less than or equal to allow. load?
SUMMER	9/5/89	22.0	0.0045	68.9%	0.009	0.0094	0.0291	Yes
SUMMER	10/1/91	18.0	0.0045	67.4%	0.008	0.0078	0.0295	Yes
SUMMER	7/22/97	9.0	0.0045	66.9%	0.004	0.0039	0.0295	Yes
SUMMER	7/24/01	12.0	0.0045	66.6%	0.005	0.0052	0.0295	Yes
SUMMER	10/31/89	12.0	0.0046	66.1%	0.005	0.0053	0.0299	Yes
SUMMER	9/10/96	13.0	0.0048	62.3%	0.006	0.0059	0.0311	Yes
SUMMER	9/17/01	23.0	0.0048	61.9%	0.011	0.0105	0.0311	Yes
SUMMER	6/27/00	16.5	0.0049	60.6%	0.008	0.0076	0.0315	Yes
SUMMER	6/18/96	15.5	0.0049	59.9%	0.007	0.0073	0.0320	Yes
SUMMER	9/21/99	10.0	0.0049	59.7%	0.005	0.0047	0.0320	Yes
SUMMER	8/29/89	32.0	0.0050	59.5%	0.015	0.0152	0.0324	Yes
SUMMER	8/20/02	54.3	0.0050	59.1%	0.026	0.0258	0.0324	Yes
SUMMER	11/1/88	62.0	0.0052	57.5%	0.031	0.0306	0.0336	Yes
SUMMER	8/26/97	21.0	0.0052	57.2%	0.010	0.0104	0.0336	Yes
SUMMER	11/25/91	198.0	0.0053	55.8%	0.100	0.1000	0.0344	No
SUMMER	7/25/00	18.0	0.0054	53.9%	0.009	0.0093	0.0352	Yes
SUMMER	10/15/02	36.2	0.0055	53.2%	0.019	0.0189	0.0356	Yes
SUMMER	8/12/03	19.0	0.0056	52.5%	0.010	0.0101	0.0361	Yes
SUMMER	10/1/96	57.5	0.0058	50.0%	0.032	0.0318	0.0377	Yes
SUMMER	11/7/00	18.5	0.0058	49.9%	0.010	0.0102	0.0377	Yes
SUMMER	6/20/95	17.0	0.0061	46.1%	0.010	0.0098	0.0393	Yes
SUMMER	6/2/92	20.0	0.0062	44.6%	0.012	0.0118	0.0402	Yes
SUMMER	7/7/92	32.0	0.0062	43.7%	0.019	0.0190	0.0406	Yes
SUMMER	9/4/90	12.0	0.0063	42.8%	0.007	0.0072	0.0410	Yes
SUMMER	7/15/03	17.3	0.0064	40.7%	0.011	0.0106	0.0418	Yes
SUMMER	6/10/97	71.5	0.0067	37.8%	0.046	0.0456	0.0434	No
SUMMER	7/16/96	30.5	0.0068	36.3%	0.020	0.0198	0.0442	Yes
SUMMER	9/1/98	15.5	0.0070	33.7%	0.010	0.0103	0.0455	Yes
SUMMER	6/4/91	126.0	0.0073	31.1%	0.088	0.0879	0.0475	No

Season	Date	Observed TSS at OUA0015A (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current TSS load (tons/day)/mi2	Reduced TSS load (tons/day)/mi2	Allowable TSS load (tons/day)/mi2	Reduced load less than or equal to allow. load?
SUMMER	8/20/01	21.0	0.0073	30.8%	0.015	0.0146	0.0475	Yes
SUMMER	8/6/96	31.5	0.0074	30.5%	0.022	0.0222	0.0479	Yes
SUMMER	9/1/92	20.0	0.0076	28.9%	0.015	0.0145	0.0496	Yes
SUMMER	8/1/89	88.0	0.0078	28.1%	0.065	0.0651	0.0504	No
SUMMER	9/3/91	48.0	0.0078	27.3%	0.036	0.0358	0.0508	Yes
SUMMER	8/11/98	16.5	0.0080	26.7%	0.012	0.0125	0.0516	Yes
SUMMER	8/4/92	46.0	0.0081	26.1%	0.036	0.0357	0.0529	Yes
SUMMER	8/17/99	16.5	0.0083	25.3%	0.013	0.0131	0.0541	Yes
SUMMER	9/23/03	65.8	0.0084	24.9%	0.053	0.0526	0.0545	Yes
SUMMER	8/8/95	24.5	0.0085	24.7%	0.020	0.0197	0.0549	Yes
SUMMER	7/26/93	44.0	0.0086	24.1%	0.036	0.0360	0.0557	Yes
SUMMER	6/9/98	38.5	0.0090	22.1%	0.033	0.0329	0.0582	Yes
SUMMER	9/27/94	16.0	0.0090	21.9%	0.014	0.0138	0.0586	Yes
SUMMER	7/22/98	8.0	0.0104	17.5%	0.008	0.0079	0.0676	Yes
SUMMER	6/29/99	156.5	0.0145	12.5%	0.215	0.2154	0.0938	No
SUMMER	9/29/98	10.5	0.0151	11.6%	0.015	0.0151	0.0983	Yes
SUMMER	11/16/98	38.5	0.0158	11.3%	0.058	0.0579	0.1024	Yes
SUMMER	11/23/93	52.0	0.0175	10.3%	0.087	0.0866	0.1135	Yes
SUMMER	6/28/94	58.5*	0.0191*	9.0%	*	*	*	*
SUMMER	7/2/91	20.0*	0.0193*	8.9%	*	*	*	*
SUMMER	7/27/99	34.5*	0.0210*	7.8%	*	*	*	*
SUMMER	11/28/94	233.0*	0.0241*	5.3%	*	*	*	*
SUMMER	8/16/94	17.0*	0.0242*	5.2%	*	*	*	*
SUMMER	6/17/03	184.0*	0.0304*	4.2%	*	*	*	*
SUMMER	6/21/93	106.0*	0.0323*	3.7%	*	*	*	*

Season	Date	Observed TSS at OUA0015A (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current TSS load (tons/day)/mi2	Reduced TSS load (tons/day)/mi2	Allowable TSS load (tons/day)/mi2	Reduced load less than or equal to allow. load?
SUMMER	11/5/02	144.0*	0.0434*	2.7%	*	*	*	*
SUMMER	6/6/89	392.0*	0.0437*	2.6%	*	*	*	*
SUMMER	7/19/94	163.0*	0.0802*	1.1%	*	*	*	*
		TOTALS =	0.4224		1.560			

Total number of values =	70
Allowable % of exceedances =	25%
Allowable no. of exceedances =	18
No. of exceedances before reductions =	7
No. of exceedances after reductions =	7

** Values with asterisks not used in any computations*

Flow weighted average TSS (mg/L) = (1.560 / 0.4224) / conversion =	39	mg/L
Average flow per unit area for summer (excluding top 10%) =	0.0055	cms/mi2
Estimated drainage area for reach 18 =	180	mi2
Average flow for summer for reach 18 = 0.0055 * 180 =	0.984	cms
Existing total TSS load for summer for reach 18 = 39 mg/L * 0.984 cms * conversions =	3.65	tons/day
Existing point source load of inorganic suspended solids for reach 18 =	0.00	tons/day
Existing NPS TSS load for summer for reach 18 = 3.65 - 0.00 =	3.65	tons/day
Total allowable TSS loading per unit area to meet stds (from Table H.1) =	3.55E-02	tons/day/mi2
Total allowable TSS loading for reach 18 = 3.55E-2 * 180 mi2 =	6.39	tons/day
Explicit MOS = zero (only implicit MOS is used)	0.00	tons/day
WLA for TSS for summer for reach 18 =	0.00	tons/day
LA for TSS for summer for reach 18 = TMDL - explicit MOS - WLA =	6.39	tons/day

FILE: R:\PROJECTS\2110-613\TECH\TMDL\TMDL TSS-SUMMER.XLS

Table H.2

TABLE H.3. CALCULATIONS FOR TSS LOADS AND PERCENT REDUCTION
FOR SUMMER FOR BOEUF RIVER AT UWBFR01 (REACH 08050001-019)

Summer target TSS conc. = 68 mg/L
Percent reduction needed = 0%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Season	Date	Observed TSS at UWBFR01 (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current TSS load (tons/day)/mi2	Reduced TSS load (tons/day)/mi2	Allowable TSS load (tons/day)/mi2	Reduced load less than or equal to allow. load?
SUMMER	10/3/95	22.5	0.0032	93.6%	0.007	0.0068	0.0205	Yes
SUMMER	7/17/01	38.5	0.0044	69.2%	0.016	0.0162	0.0287	Yes
SUMMER	11/6/00	27.5	0.0052	56.1%	0.014	0.0137	0.0340	Yes
SUMMER	10/1/96	42.0	0.0058	50.0%	0.023	0.0232	0.0377	Yes
SUMMER	7/18/95	33.5	0.0069	34.7%	0.022	0.0222	0.0451	Yes
SUMMER	9/10/01	29.0	0.0073	30.8%	0.020	0.0202	0.0475	Yes
SUMMER	9/12/94	614.0*	0.0092*	20.6%	0.539*	0.5389	0.0598	No
SUMMER	6/6/94	87.0	0.0097	19.3%	0.081	0.0805	0.0631	No
		TOTALS =	0.0426		0.183			

Total number of values = 8
Allowable % of exceedances = 25%
Allowable no. of exceedances = 2
No. of exceedances before reductions = 2
No. of exceedances after reductions = 2

** Values with asterisks not used to calculate flow-wtd avg TSS*

Flow weighted average TSS (mg/L) = (0.183 / 0.0426) / conversion = 45 mg/L

Average flow per unit area for summer (excluding top 10%) = 0.0055 cms/mi2
Estimated drainage area for reach 19 = 176 mi2
Average flow for summer for reach 19 = 0.0055 * 176 = 0.966 cms

Existing total TSS load for summer for reach 19
= 45 mg/L * 0.966 cms * conversions = 4.14 tons/day

Existing point source load of inorganic suspended solids for reach 19 =	0.00	tons/day
Existing NPS TSS load for summer for reach 19 = 4.14 - 0.00 =	4.14	tons/day
Total allowable TSS loading per unit area to meet stds (from Table H.1) =	3.55E-02	tons/day/mi2
Total allowable TSS loading for reach 19 = 3.55E-2 * 176 mi2 =	6.27	tons/day
Explicit MOS = zero (only implicit MOS is used)	0.00	tons/day
WLA for TSS for summer for reach 19 =	0.00	tons/day
LA for TSS for summer for reach 19 = TMDL - explicit MOS - WLA =	6.27	tons/day

FILE: R:\PROJECTS\2110-613\TECH\TMDL\TMDL TSS-SUMMER.XLS

TABLE H.4. CALCULATIONS FOR TSS LOADS AND PERCENT REDUCTION
FOR SUMMER FOR BIG BAYOU AT OUA0032 (REACH 08050001-022)

Summer target TSS conc. = 68 mg/L
Percent reduction needed = 0%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Season	Date	Observed TSS at OUA0032 (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current TSS load (tons/day)/mi2	Reduced TSS load (tons/day)/mi2	Allowable TSS load (tons/day)/mi2	Reduced load less than or equal to allow. load?
SUMMER	10/3/95	27.5	0.0032	93.6%	0.008	0.0083	0.0205	Yes
SUMMER	7/17/01	19.0	0.0044	69.2%	0.008	0.0080	0.0287	Yes
SUMMER	11/6/00	41.5	0.0052	56.1%	0.021	0.0207	0.0340	Yes
SUMMER	10/1/96	36.5	0.0058	50.0%	0.020	0.0202	0.0377	Yes
SUMMER	7/18/95	61.0	0.0069	34.7%	0.040	0.0403	0.0451	Yes
SUMMER	9/10/01	3.7	0.0073	30.8%	0.003	0.0026	0.0475	Yes
SUMMER	9/12/94	17.5	0.0092	20.6%	0.015	0.0154	0.0598	Yes
SUMMER	6/6/94	46.5	0.0097	19.3%	0.043	0.0430	0.0631	Yes
		TOTALS =	0.0518		0.158			

Total number of values =	8
Allowable % of exceedances =	25%
Allowable no. of exceedances =	2
No. of exceedances before reductions =	0
No. of exceedances after reductions =	0

Flow weighted average TSS (mg/L) = (0.158 / 0.0518) / conversion = 32 mg/L

Average flow per unit area for summer (excluding top 10%) = 0.0055 cms/mi2
Estimated drainage area for reach 22 = 189 mi2
Average flow for summer for reach 22 = 0.0055 * 189 = 1.035 cms

Existing total TSS load for summer for reach 22
= 32 mg/L * 1.035 cms * conversions = 3.15 tons/day

Existing point source load of inorganic suspended solids for reach 22 =	0.00	tons/day
Existing NPS TSS load for summer for reach 22 = 3.15 - 0.00 =	3.15	tons/day
Total allowable TSS loading per unit area to meet stds (from Table H.1) =	3.55E-02	tons/day/mi2
Total allowable TSS loading for reach 22 = 3.55E-2 * 189 mi2 =	6.72	tons/day
Explicit MOS = zero (only implicit MOS is used)	0.00	tons/day
WLA for TSS for summer for reach 22 =	0.00	tons/day
LA for TSS for summer for reach 22 = TMDL - explicit MOS - WLA =	6.72	tons/day

FILE: R:\PROJECTS\2110-613\TECH\TMDL\TMDL TSS-SUMMER.XLS

TABLE H.5. CALCULATIONS FOR TSS LOADS AND PERCENT REDUCTION
FOR SUMMER FOR BIG BAYOU AT UWBGB01 (REACH 08050001-022)

Summer target TSS conc. = 68 mg/L
Percent reduction needed = 0%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Season	Date	Observed TSS at UWBGB01 (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current TSS load (tons/day)/mi2	Reduced TSS load (tons/day)/mi2	Allowable TSS load (tons/day)/mi2	Reduced load less than or equal to allow. load?
SUMMER	10/3/95	18.0	0.0032	93.6%	0.005	0.0054	0.0205	Yes
SUMMER	7/17/01	34.8	0.0044	69.2%	0.015	0.0146	0.0287	Yes
SUMMER	11/6/00	40.5	0.0052	56.1%	0.020	0.0202	0.0340	Yes
SUMMER	10/1/96	48.5	0.0058	50.0%	0.027	0.0268	0.0377	Yes
SUMMER	7/18/95	36.5	0.0069	34.7%	0.024	0.0241	0.0451	Yes
SUMMER	9/10/01	34.8	0.0073	30.8%	0.024	0.0243	0.0475	Yes
SUMMER	9/12/94	48.0	0.0092	20.6%	0.042	0.0421	0.0598	Yes
SUMMER	6/6/94	34.5	0.0097	19.3%	0.032	0.0319	0.0631	Yes
		TOTALS =	0.0518		0.190			

Total number of values =	8
Allowable % of exceedances =	25%
Allowable no. of exceedances =	2
No. of exceedances before reductions =	0
No. of exceedances after reductions =	0

Flow weighted average TSS (mg/L) = (0.190 / 0.0518) / conversion = 38 mg/L

Average flow per unit area for summer (excluding top 10%) = 0.0055 cms/mi2
Estimated drainage area for reach 22 = 189 mi2
Average flow for summer for reach 22 = 0.0055 * 189 = 1.035 cms

Existing total TSS load for summer for reach 22
= 38 mg/L * 1.035 cms * conversions = 3.74 tons/day

Existing point source load of inorganic suspended solids for reach 22 =	0.00	tons/day
Existing NPS TSS load for summer for reach 22 = 3.74 - 0.00 =	3.74	tons/day
Total allowable TSS loading per unit area to meet stds (from Table H.1) =	3.55E-02	tons/day/mi2
Total allowable TSS loading for reach 22 = 3.55E-2 * 189 mi2 =	6.72	tons/day
Explicit MOS = zero (only implicit MOS is used)	0.00	tons/day
WLA for TSS for summer for reach 22 =	0.00	tons/day
LA for TSS for summer for reach 22 = TMDL - explicit MOS - WLA =	6.72	tons/day

FILE: R:\PROJECTS\2110-613\TECH\TMDL\TMDL TSS-SUMMER.XLS

Table H.5

TABLE H.6. CALCULATIONS FOR TSS LOADS AND PERCENT REDUCTION
FOR SUMMER FOR OAK BAYOU AT OUA0179 (REACH 08050002-010)

Summer target TSS conc. = 68 mg/L
Percent reduction needed = 0%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Season	Date	Observed TSS at OUA0179 (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current TSS load (tons/day)/mi2	Reduced TSS load (tons/day)/mi2	Allowable TSS load (tons/day)/mi2	Reduced load less than or equal to allow. load?
SUMMER	11/7/00	67.0	0.0058	49.9%	0.037	0.0371	0.0377	Yes
SUMMER	7/16/01	42.5	0.0069	35.0%	0.028	0.0278	0.0447	Yes
SUMMER	9/11/01	20.7	0.0071	32.8%	0.014	0.0139	0.0459	Yes
		TOTALS =	0.0198		0.079			

Total number of values =	3
Allowable % of exceedances =	25%
Allowable no. of exceedances =	1
No. of exceedances before reductions =	0
No. of exceedances after reductions =	0

Flow weighted average TSS (mg/L) = (0.079 / 0.0198) / conversion= 42 mg/L

Average flow per unit area for summer (excluding top 10%) = 0.0055 cms/mi2
Estimated drainage area for reach 10 = 136 mi2
Average flow for summer for reach 10 = 0.0055 * 136 = 0.746 cms

Existing total TSS load for summer for reach 10
= 42 mg/L * 0.746 cms * conversions = 2.98 tons/day

Existing point source load of inorganic suspended solids for reach 10 = 0.00 tons/day

Existing NPS TSS load for summer for reach 10 = 2.98 - 0.00 = 2.98 tons/day

Total allowable TSS loading per unit area to meet stds (from Table H.1) =	3.55E-02	tons/day/mi2
Total allowable TSS loading for reach 10 = 3.55E-2 * 136 mi2 =	4.84	tons/day
Explicit MOS = zero (only implicit MOS is used)	0.00	tons/day
WLA for TSS for summer for reach 10 =	0.00	tons/day
LA for TSS for summer for reach 10 = TMDL - explicit MOS - WLA =	4.84	tons/day

FILE: R:\PROJECTS\2110-613\TECH\TMDL\TMDL TSS-SUMMER.XLS

TABLE H.7. CALCULATIONS FOR TSS LOADS AND PERCENT REDUCTION
FOR SUMMER FOR BAYOU MACON AT UWBYM01 (REACH 08050002-006)

Summer target TSS conc. = 68 mg/L
Percent reduction needed = 0%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Season	Date	Observed TSS at UWBYM01 (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current TSS load (tons/day)/mi2	Reduced TSS load (tons/day)/mi2	Allowable TSS load (tons/day)/mi2	Reduced load less than or equal to allow. load?
SUMMER	10/3/95	58.0	0.0032	93.6%	0.017	0.0174	0.0205	Yes
SUMMER	7/17/01	61.0	0.0044	69.2%	0.026	0.0257	0.0287	Yes
SUMMER	10/2/96	9.0	0.0047	64.7%	0.004	0.0040	0.0303	Yes
SUMMER	11/6/00	69.5	0.0052	56.1%	0.035	0.0347	0.0340	No
SUMMER	10/1/96	65.0	0.0058	50.0%	0.036	0.0359	0.0377	Yes
SUMMER	7/18/95	64.0	0.0069	34.7%	0.042	0.0423	0.0451	Yes
SUMMER	9/10/01	38.8	0.0073	30.8%	0.027	0.0271	0.0475	Yes
SUMMER	9/12/94	94.0	0.0092	20.6%	0.082	0.0825	0.0598	No
SUMMER	6/6/94	78.5	0.0097	19.3%	0.073	0.0727	0.0631	No
		TOTALS =	0.0565		0.342			

Total number of values =	9
Allowable % of exceedances =	25%
Allowable no. of exceedances =	3
No. of exceedances before reductions =	3
No. of exceedances after reductions =	3

Flow weighted average TSS (mg/L) = (0.342 / 0.0565) / conversion= 64 mg/L

Average flow per unit area for summer (excluding top 10%) = 0.0055 cms/mi2
Estimated drainage area for reach 6 = 73 mi2
Average flow for summer for reach 6 = 0.0055 * 73 = 0.397 cms

Existing total TSS load for summer for reach 6 = 64 mg/L * 0.397 cms * conversions =	2.42	tons/day
Existing point source load of inorganic suspended solids for reach 6 =	0.00	tons/day
Existing NPS TSS load for summer for reach 6 = 2.42 - 0.00 =	2.42	tons/day
Total allowable TSS loading per unit area to meet stds (from Table H.1) =	3.55E-02	tons/day/mi2
Total allowable TSS loading for reach 6 = 3.55E-2 * 73 mi2 =	2.58	tons/day
Explicit MOS = zero (only implicit MOS is used)	0.00	tons/day
WLA for TSS for summer for reach 6 =	0.00	tons/day
LA for TSS for summer for reach 6 = TMDL - explicit MOS - WLA =	2.58	tons/day

FILE: R:\PROJECTS\2110-613\TECH\TMDL\TMDL TSS-SUMMER.XLS

Table H.7

TABLE H.8. CALCULATIONS FOR TSS LOADS AND PERCENT REDUCTION
FOR SUMMER FOR BAYOU MACON AT UWBYM02 (REACH 08050002-003)

Summer target TSS conc. = 68 mg/L
Percent reduction needed = 0%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Season	Date	Observed TSS at UWBYM02 (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current TSS load (tons/day)/mi2	Reduced TSS load (tons/day)/mi2	Allowable TSS load (tons/day)/mi2	Reduced load less than or equal to allow. load?
SUMMER	10/3/95	1.5	0.0032	93.6%	0.000	0.0005	0.0205	Yes
SUMMER	10/2/96	26.5	0.0047	64.7%	0.012	0.0118	0.0303	Yes
SUMMER	11/6/00	17.0	0.0052	56.1%	0.008	0.0085	0.0340	Yes
SUMMER	10/1/96	6.5	0.0058	50.0%	0.004	0.0036	0.0377	Yes
SUMMER	7/18/95	7.0	0.0069	34.7%	0.005	0.0046	0.0451	Yes
SUMMER	9/12/94	2.0	0.0092	20.6%	0.002	0.0018	0.0598	Yes
SUMMER	6/6/94	203.0*	0.0097*	19.3%	0.188*	0.1879	0.0631	No
		TOTALS =	0.0350		0.0307			

Total number of values =	7
Allowable % of exceedances =	25%
Allowable no. of exceedances =	2
No. of exceedances before reductions =	1
No. of exceedances after reductions =	1

** Values with asterisks not used to calculate flow wtd avg TSS*

Flow weighted average TSS (mg/L) = (0.031 / 0.0350) / conversion= 9 mg/L

Average flow per unit area for summer (excluding top 10%) = 0.0055 cms/mi2
Estimated drainage area for reach 3 = 88 mi2
Average flow for summer for reach 3 = 0.0055 * 88 = 0.482 cms

Existing total TSS load for summer for reach 3
= 9 mg/L * 0.482 cms * conversions = 0.41 tons/day

Existing point source load of inorganic suspended solids for reach 3 = 0.00 tons/day

Existing NPS TSS load for summer for reach 3 = 0.41 - 0.00 =	0.41	tons/day
Total allowable TSS loading per unit area to meet stds (from Table H.1) =	3.55E-02	tons/day/mi2
Total allowable TSS loading for reach 3 = 3.55E-2 * 88 mi2 =	3.13	tons/day
Explicit MOS = zero (only implicit MOS is used)	0.00	tons/day
WLA for TSS for summer for reach 3 =	0.00	tons/day
LA for TSS for summer for reach 3 = TMDL - explicit MOS - WLA =	3.13	tons/day

FILE: R:\PROJECTS\2110-613\TECH\TMDL\TMDL TSS-SUMMER.XLS

Figure H.1. Summer Flow Duration Curve for USGS 07369680 Bayou Macon near Eudora

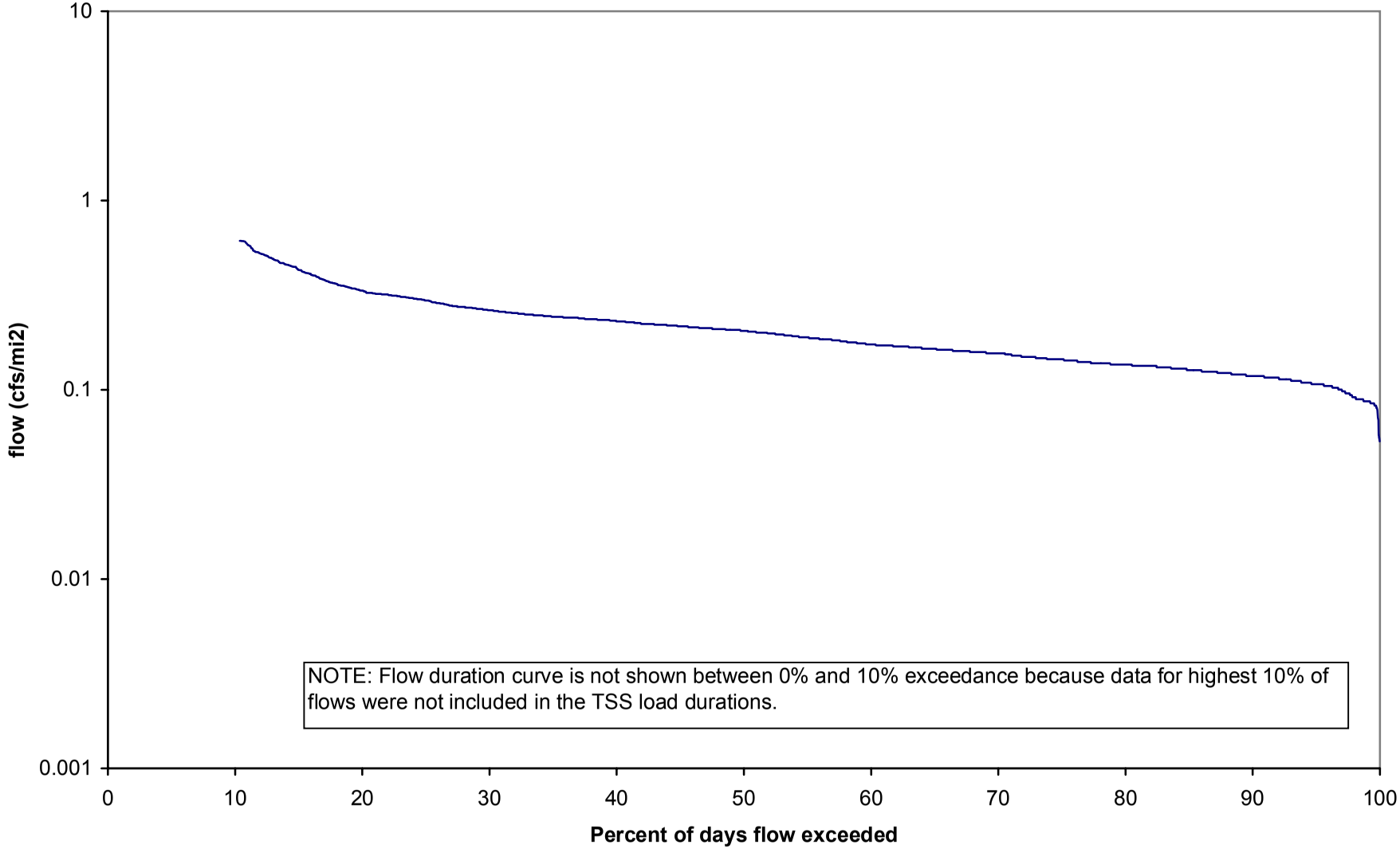


Figure H.2. Summer TSS Load Duration Curve for Boeuf River at OUA0015A

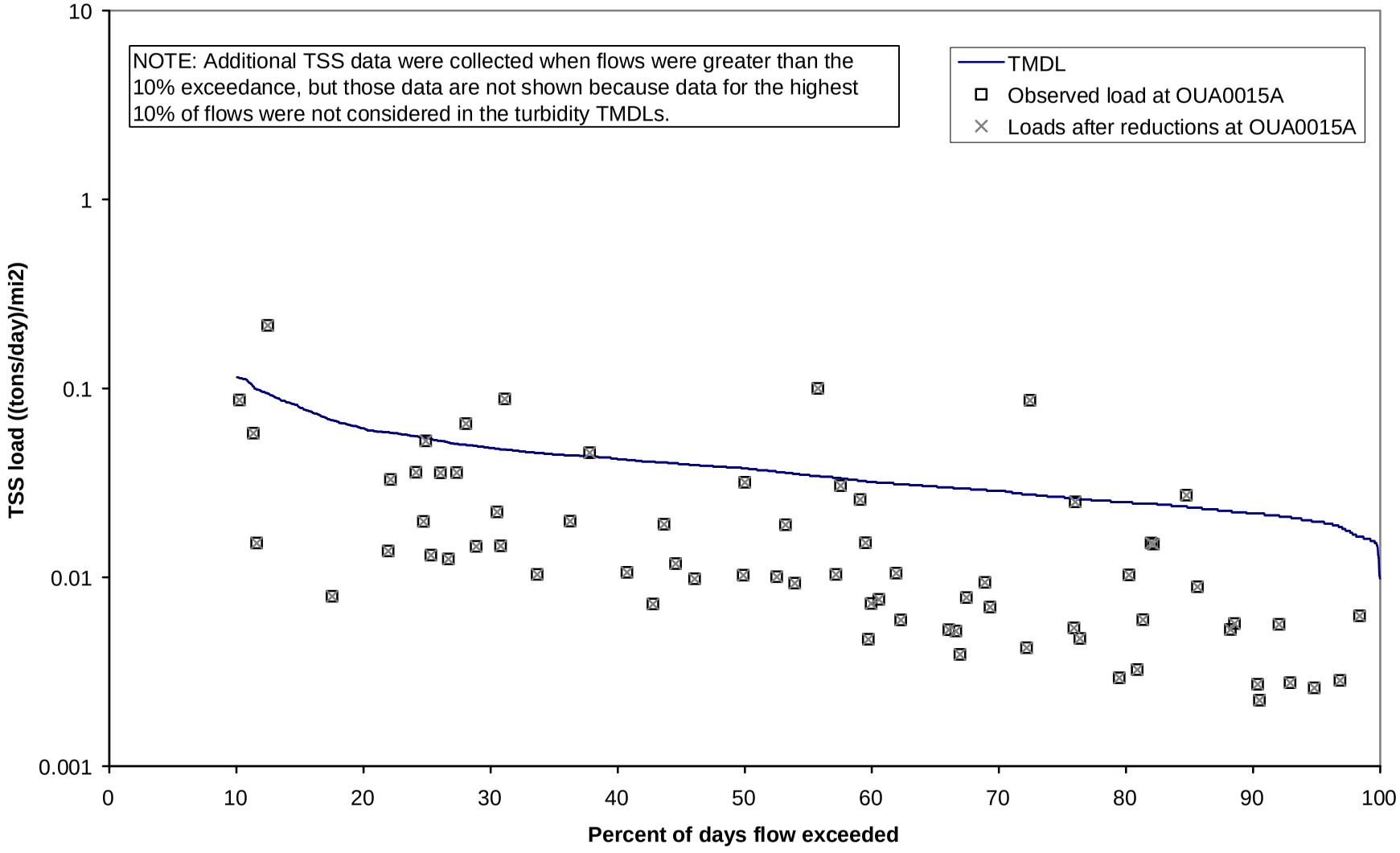


Figure H.3. Summer TSS Load Duration Curve for Boeuf River at UWBFR01

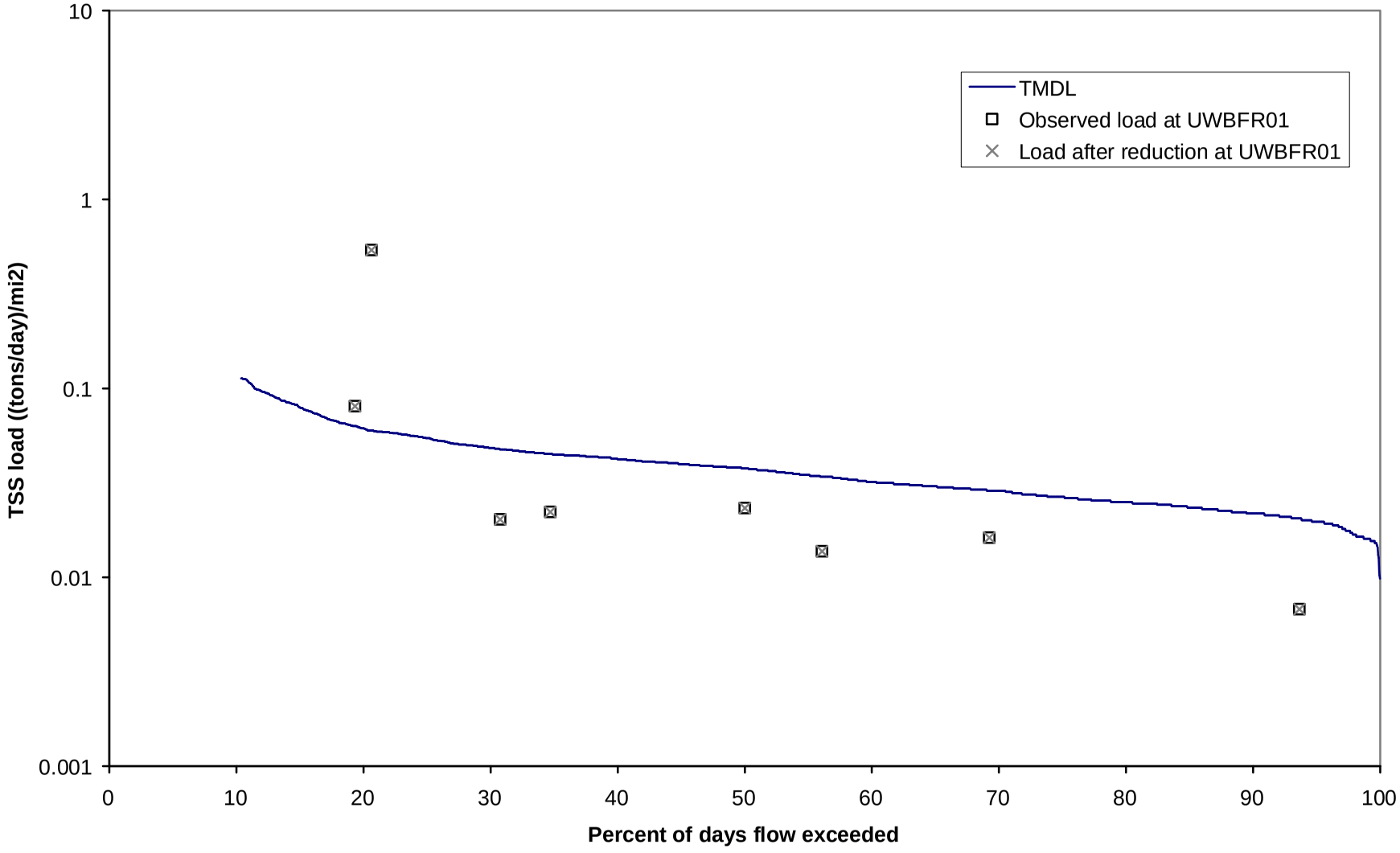


Figure H.4. Summer TSS Load Duration Curve for Big Bayou at OUA032

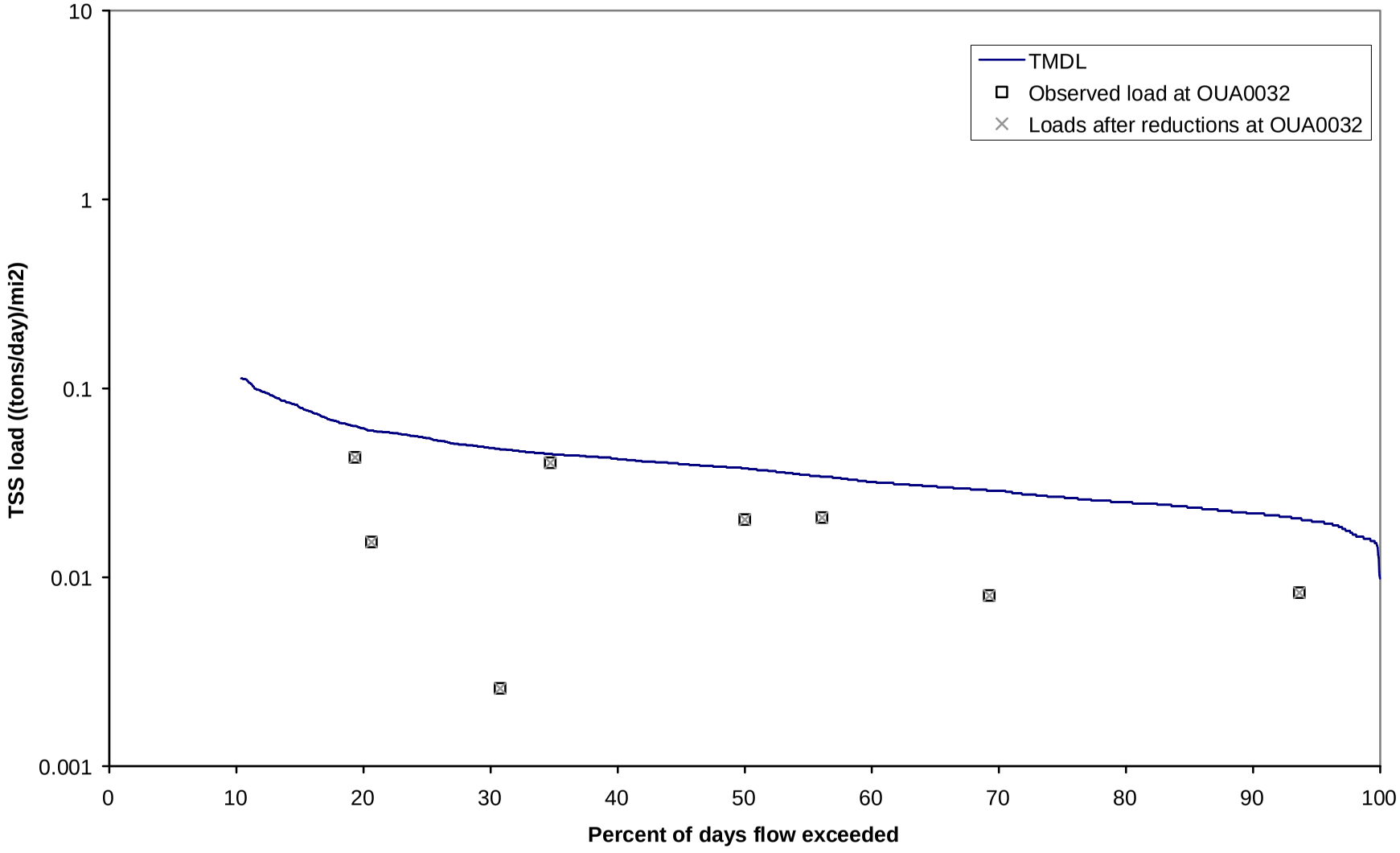


Figure H.5. Summer TSS Load Duration Curve for Big Bayou at UWBGB01

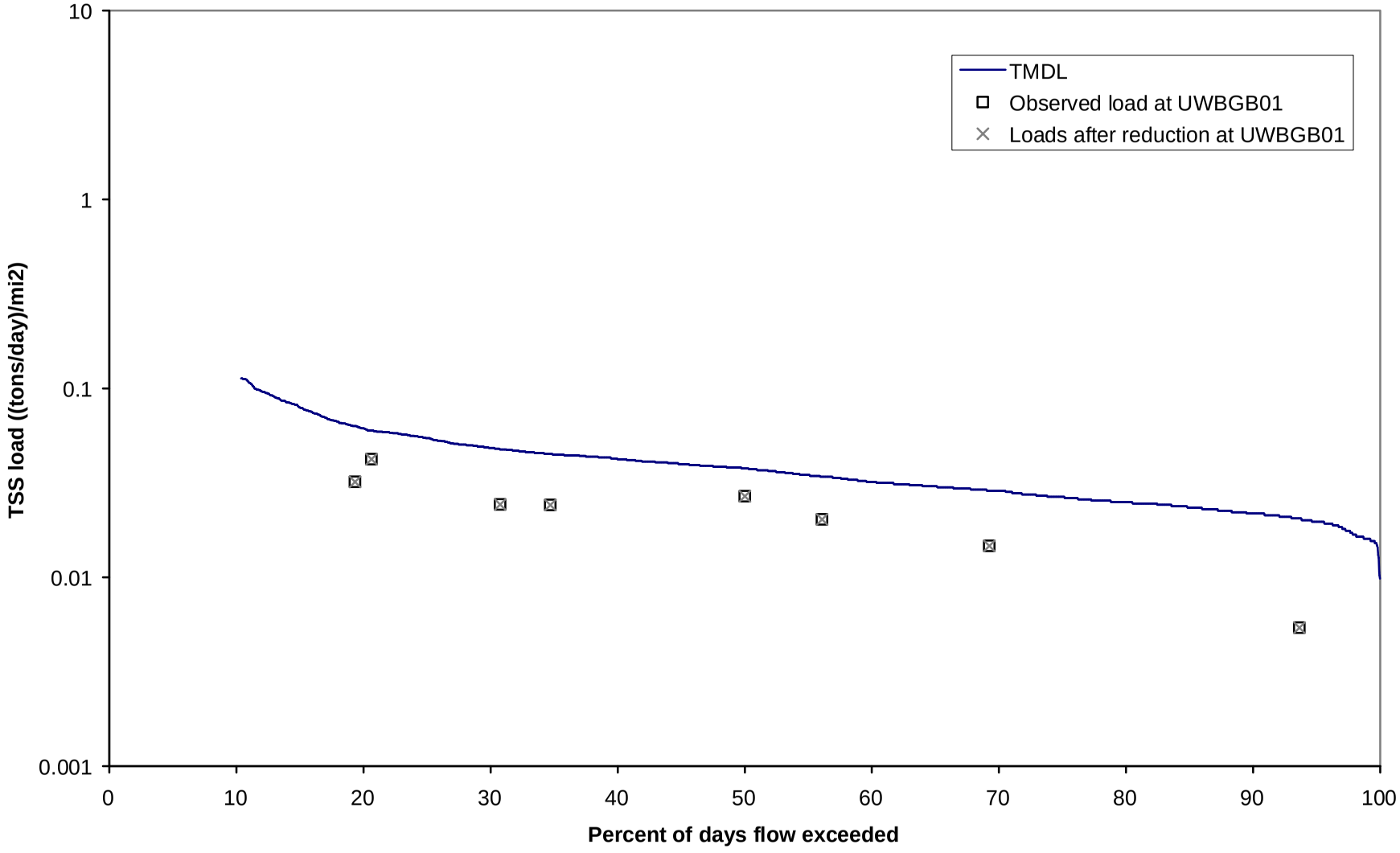


Figure H.6. Summer TSS Load Duration Curve for Oak Bayou at OUA0179

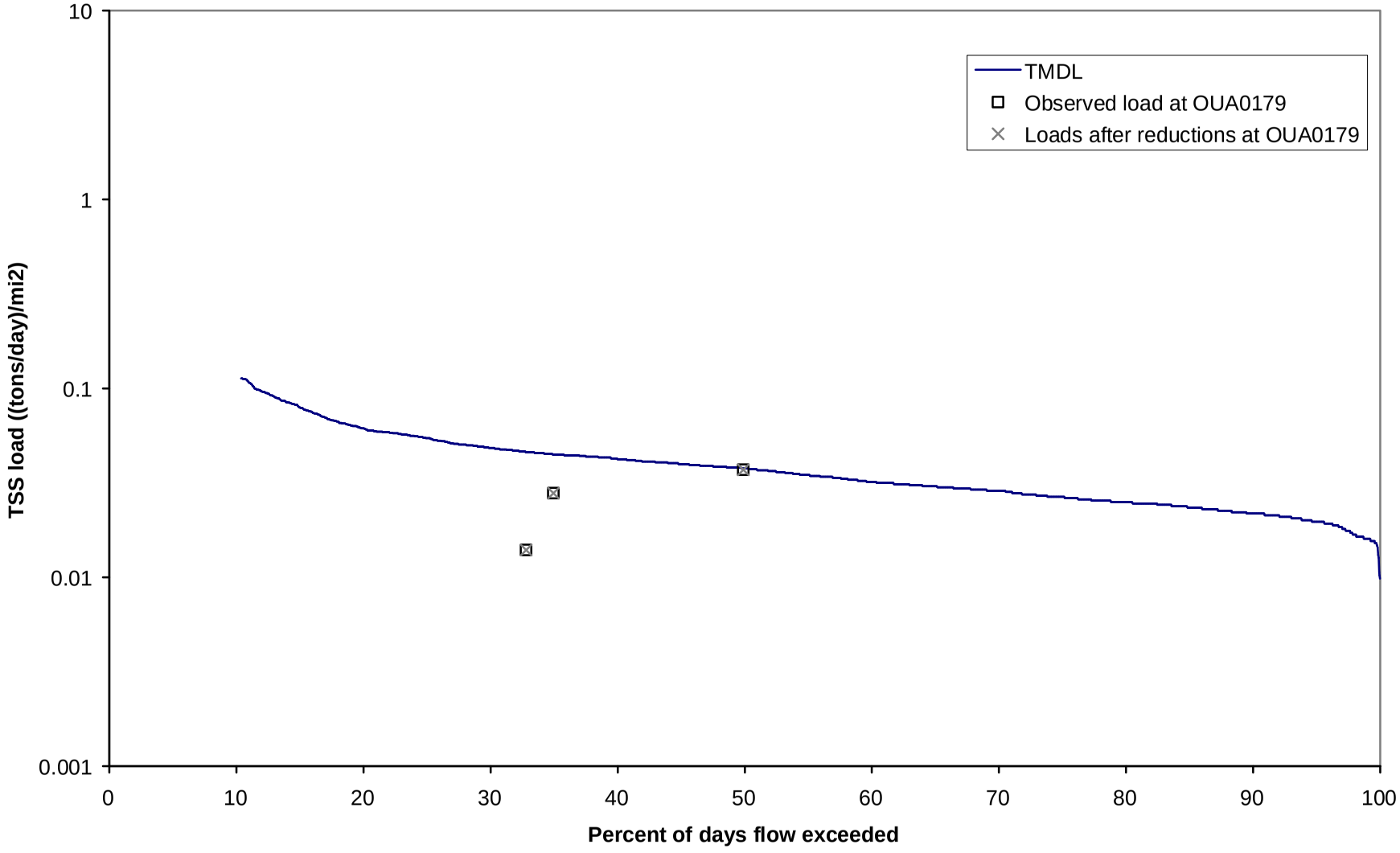


Figure H.7. Summer TSS Load Duration Curve for Bayou Macon at UWBYM01

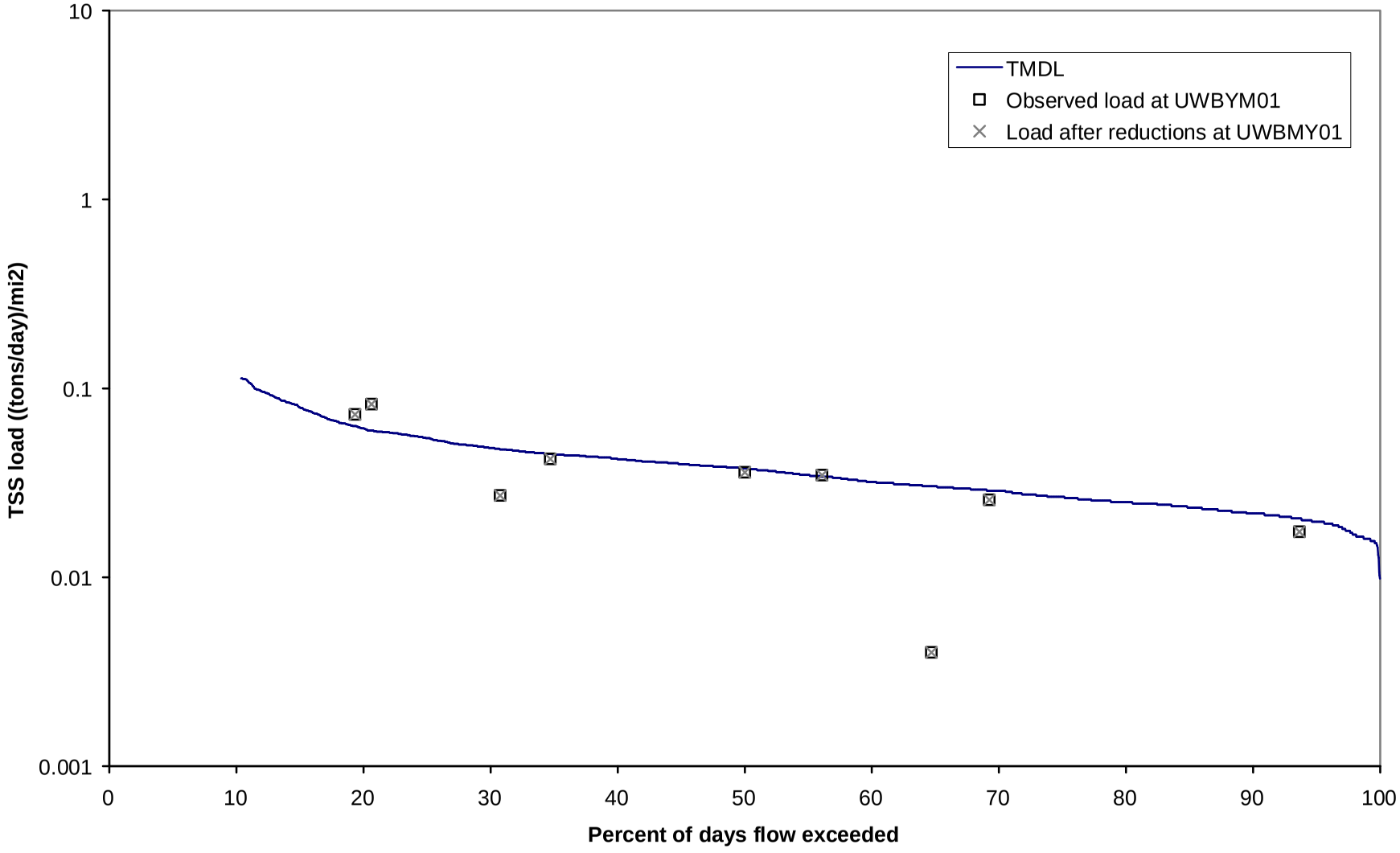
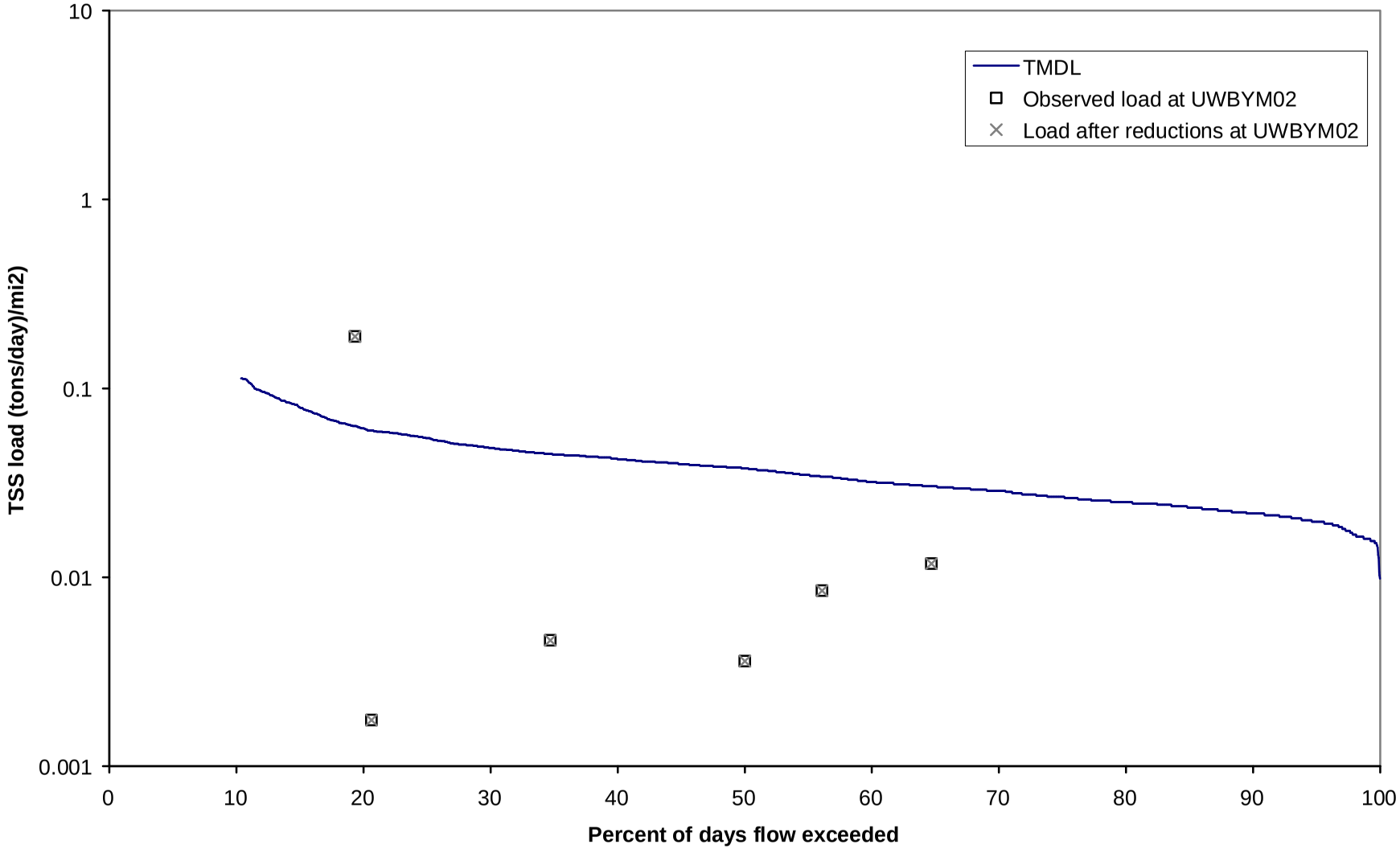


Figure H.8. Summer TSS Load Duration Curve for Bayou Macon at UWBYM02



APPENDIX I

Calculations for Winter Turbidity TMDLs

TABLE I.1. TURBIDITY TMDL CALCULATIONS FOR WINTER

Percentage of total flow in basin represented by Bayou Macon:

USGS gage number and name	Avg. annual flow 1958-67 (cfs)	Percent of combined flow	Drainage area (mi2)
07367700 Boeuf River near AR/LA state line	875	65.2%	785
07369700 Bayou Macon near Kilbourne, LA	467	34.8%	504
	1,342	100.0%	1,289

Turbidity standard = 75 NTU
TSS target = 52 mg/L

Season	Date	Observed flow at Eudora (cfs)	Percent exceedance for observed flow	Adjusted flow for entire basin cfs	cfs/mi2	cms/mi2	"Width" for area under curves	Allowable TSS load to meet standard (tons/day)/mi2	"Area under TMDL curve" (tons/day)/mi2
A	B	C	D	E = C / 34.8%	F = E / 1289 mi2	G = E / 35.32	H = D1 - D2	I = G * 52 mg/L * conversion	J = H * I
WINTER	05/21/95	32	99.98%	92.0	0.071	0.0020	0.04%	0.01	3.64E-06
WINTER	05/22/95	32	99.95%	92.0	0.071	0.0020	0.04%	0.01	3.64E-06
WINTER	05/20/95	33	99.91%	94.8	0.074	0.0021	0.04%	0.01	3.76E-06
WINTER	02/22/00	35	99.87%	100.6	0.078	0.0022	0.04%	0.01	3.99E-06
WINTER	02/23/00	35	99.84%	100.6	0.078	0.0022	0.04%	0.01	3.99E-06
WINTER	05/19/95	36	99.80%	103.4	0.080	0.0023	0.04%	0.01	4.10E-06
WINTER	02/21/00	36	99.76%	103.4	0.080	0.0023	0.04%	0.01	4.10E-06
WINTER	02/20/00	37	99.73%	106.3	0.082	0.0023	0.04%	0.01	4.21E-06
WINTER	02/24/00	37	99.69%	106.3	0.082	0.0023	0.04%	0.01	4.21E-06

For brevity, most of the rows in this spreadsheet have been hidden (between the 10.30% and the 99.69% exceedances).

WINTER	05/06/89	1040	10.30%	2988.5	2.318	0.0656	0.04%	0.32	1.18E-04
WINTER	02/08/97	1050	10.26%	3017.2	2.341	0.0663	0.04%	0.33	1.20E-04
WINTER	12/22/01	1050	10.23%	3017.2	2.341	0.0663	0.04%	0.33	1.20E-04
WINTER	03/22/02	1050	10.19%	3017.2	2.341	0.0663	0.04%	0.33	1.20E-04
WINTER	02/20/94	1060	10.15%	3046.0	2.363	0.0669	0.04%	0.33	1.21E-04
WINTER	02/19/01	1060	10.12%	3046.0	2.363	0.0669	0.04%	0.33	1.21E-04
WINTER	01/18/90	1070	10.08%	3074.7	2.385	0.0675	0.04%	0.33	1.22E-04
WINTER	01/24/90	1080	10.04%	3103.4	2.408	0.0682	0.04%	0.34	1.23E-04
WINTER	02/14/92	1080	10.01%	3103.4	2.408	0.0682	0.04%	0.34	1.23E-04
						TOTALS:	**90.01%**		**6.08E-02**

FILE: R:\PROJECTS\2110-613\TECH\TMDL\TMDL TSS-WINTER.XLS

TABLE I.2. CALCULATIONS FOR TSS LOADS AND PERCENT REDUCTION
FOR WINTER FOR BOEUF RIVER AT OUA0015A (REACH 08050001-018)

Winter target TSS conc. = 52 mg/L
Percent reduction needed = 72%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Season	Date	Observed TSS at OUA0015A (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current TSS load (tons/day)/mi2	Reduced TSS load (tons/day)/mi2	Allowable TSS load (tons/day)/mi2	Reduced load less than or equal to allow. load?
WINTER	1/25/00	197.0	0.0026	99.0%	0.049	0.0136	0.0128	No
WINTER	12/3/02	10.2	0.0026	98.8%	0.003	0.0007	0.0128	Yes
WINTER	3/12/96	69.0	0.0027	98.2%	0.018	0.0050	0.0134	Yes
WINTER	1/21/03	15.0	0.0029	96.1%	0.004	0.0012	0.0143	Yes
WINTER	5/23/95	23.5	0.0033	94.0%	0.007	0.0021	0.0162	Yes
WINTER	12/20/99	86.0	0.0033	93.9%	0.027	0.0075	0.0162	Yes
WINTER	5/5/92	34.0	0.0033	93.9%	0.011	0.0030	0.0165	Yes
WINTER	12/20/93	178.0	0.0035	92.4%	0.059	0.0165	0.0171	Yes
WINTER	2/20/96	132.0	0.0037	90.0%	0.046	0.0129	0.0181	Yes
WINTER	12/1/92	72.0	0.0037	89.5%	0.026	0.0072	0.0184	Yes
WINTER	4/14/98	23.0	0.0038	88.3%	0.008	0.0023	0.0187	Yes
WINTER	4/15/03	114.0	0.0038	88.1%	0.041	0.0115	0.0187	Yes
WINTER	3/25/03	133.0	0.0042	84.7%	0.053	0.0148	0.0205	Yes
WINTER	5/19/98	7.0	0.0044	83.6%	0.003	0.0008	0.0215	Yes
WINTER	2/9/93	94.0	0.0047	79.7%	0.042	0.0119	0.0233	Yes
WINTER	4/24/00	31.0	0.0047	79.3%	0.014	0.0039	0.0233	Yes
WINTER	3/3/92	133.0	0.0048	79.1%	0.061	0.0170	0.0237	Yes
WINTER	4/15/97	37.0	0.0050	75.6%	0.018	0.0050	0.0249	Yes
WINTER	5/30/00	86.0	0.0050	75.4%	0.041	0.0116	0.0249	Yes
WINTER	2/4/92	74.0	0.0051	75.1%	0.036	0.0101	0.0252	Yes
WINTER	1/30/96	424.0	0.0051	75.0%	0.206	0.0578	0.0252	No
WINTER	5/18/93	54.0	0.0052	74.3%	0.027	0.0075	0.0255	Yes
WINTER	5/2/89	85.0	0.0052	73.7%	0.042	0.0119	0.0258	Yes

Season	Date	Observed TSS at OUA0015A (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current TSS load (tons/day)/mi2	Reduced TSS load (tons/day)/mi2	Allowable TSS load (tons/day)/mi2	Reduced load less than or equal to allow. load?
WINTER	2/14/95	33.5	0.0052	73.5%	0.017	0.0047	0.0258	Yes
WINTER	4/27/99	1396.0	0.0052	73.2%	0.697	0.1950	0.0258	No
WINTER	5/25/99	37.5	0.0052	73.2%	0.019	0.0052	0.0258	Yes
WINTER	5/21/96	43.0	0.0053	73.0%	0.022	0.0061	0.0261	Yes
WINTER	2/23/99	33.5	0.0054	72.2%	0.017	0.0048	0.0265	Yes
WINTER	1/7/92	12.0	0.0054	71.7%	0.006	0.0017	0.0268	Yes
WINTER	3/9/93	24.0	0.0055	70.5%	0.013	0.0035	0.0271	Yes
WINTER	3/28/95	35.0	0.0056	69.5%	0.019	0.0052	0.0274	Yes
WINTER	3/23/99	70.5	0.0057	68.0%	0.038	0.0107	0.0280	Yes
WINTER	4/23/02	55.3	0.0057	67.8%	0.030	0.0084	0.0280	Yes
WINTER	5/20/03	460.0	0.0063	62.4%	0.277	0.0774	0.0311	No
WINTER	3/26/01	41.3	0.0064	61.5%	0.025	0.0071	0.0317	Yes
WINTER	5/28/02	102.0	0.0064	61.4%	0.063	0.0175	0.0317	Yes
WINTER	1/14/02	63.3	0.0067	60.1%	0.040	0.0113	0.0330	Yes
WINTER	12/6/88	72.0	0.0068	60.0%	0.046	0.0130	0.0333	Yes
WINTER	4/7/92	17.0	0.0068	59.3%	0.011	0.0031	0.0336	Yes
WINTER	4/2/91	217.0	0.0076	54.9%	0.157	0.0438	0.0373	No
WINTER	5/24/94	77.0	0.0083	51.0%	0.061	0.0170	0.0408	Yes
WINTER	2/26/02	57.5	0.0085	50.4%	0.046	0.0130	0.0417	Yes
WINTER	5/13/97	59.0	0.0090	48.3%	0.051	0.0142	0.0445	Yes
WINTER	3/15/94	114.0	0.0133	37.9%	0.144	0.0403	0.0654	Yes
WINTER	5/22/01	220.9	0.0138	36.9%	0.291	0.0814	0.0682	No
WINTER	1/12/93	21.0	0.0139	36.9%	0.028	0.0078	0.0685	Yes
WINTER	4/17/01	351.1	0.0145	35.8%	0.483	0.1353	0.0713	No
WINTER	12/19/94	83.5	0.0148	35.2%	0.117	0.0329	0.0728	Yes
WINTER	1/20/98	75.0	0.0167	32.4%	0.119	0.0333	0.0822	Yes
WINTER	12/19/00	226.3	0.0177	31.2%	0.381	0.1067	0.0871	No
WINTER	1/30/01	355.0	0.0186	30.4%	0.627	0.1757	0.0915	No
WINTER	3/27/00	170.0	0.0195	29.2%	0.316	0.0884	0.0962	Yes

Table I.2

Season	Date	Observed TSS at OUA0015A (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current TSS load (tons/day)/mi2	Reduced TSS load (tons/day)/mi2	Allowable TSS load (tons/day)/mi2	Reduced load less than or equal to allow. load?
WINTER	1/3/89	150.0	0.0199	28.7%	0.285	0.0798	0.0983	Yes
WINTER	3/26/02	104.0	0.0199	28.7%	0.198	0.0553	0.0983	Yes
WINTER	3/17/98	192.0	0.0271	23.3%	0.496	0.1390	0.1338	No
WINTER	2/25/97	240.0	0.0278	23.0%	0.635	0.1777	0.1369	No
WINTER	3/12/91	12.0	0.0281	22.7%	0.032	0.0090	0.1385	Yes
WINTER	4/4/89	201.0	0.0287	22.4%	0.550	0.1539	0.1416	No
WINTER	4/13/93	119.0	0.0299	22.0%	0.338	0.0947	0.1472	Yes
WINTER	12/18/95	234.0	0.0300	21.9%	0.668	0.1871	0.1478	No
WINTER	12/22/98	78.5	0.0317	21.0%	0.237	0.0663	0.1562	Yes
WINTER	2/28/89	184.0	0.0355	18.9%	0.622	0.1741	0.1749	Yes
WINTER	1/18/94	416.0	0.0378	17.8%	1.498	0.4194	0.1864	No
WINTER	1/31/89	335.0	0.0391	17.2%	1.249	0.3496	0.1930	No
WINTER	2/5/91	160.0	0.0406	16.7%	0.619	0.1734	0.2004	Yes
WINTER	2/27/01	519.0	0.0487	13.9%	2.409	0.6744	0.2403	No
WINTER	1/26/99	249.0	0.0505	13.4%	1.197	0.3353	0.2490	No
WINTER	12/11/01	141.0	0.0530	12.7%	0.712	0.1994	0.2614	Yes
WINTER	12/17/96	277.0	0.0572	12.0%	1.510	0.4229	0.2823	No
WINTER	2/25/03	98.0	0.0578	11.8%	0.540	0.1511	0.2851	Yes
WINTER	2/17/98	220.0*	0.0682*	9.9%	*	*	*	*
WINTER	1/2/91	436.0*	0.0726*	9.2%	*	*	*	*
WINTER	4/23/96	1056.0*	0.1269*	3.9%	*	*	*	*
		TOTALS =	1.0257		18.794			

Total number of values =	70
Allowable % of exceedances =	25%
Allowable no. of exceedances =	18
No. of exceedances before reductions =	51
No. of exceedances after reductions =	18

** Values with asterisks not used in any computations*

Table I.2

Flow weighted average TSS (mg/L) = (18.794 / 1.0257) / conversion =	192	mg/L
Average flow per unit area for winter =	0.0123	cms/mi2
Estimated drainage area for reach 18 =	180	mi2
Average flow for winter for reach 18 = 0.0123 * 180 =	2.217	cms
Existing total TSS load for winter for reach 18 = 192 mg/L * 2.217 cms * conversions =	40.54	tons/day
Existing point source load of inorganic suspended solids for reach 18 =	0.00	tons/day
Existing NPS TSS load for winter for reach 18 = 40.54 - 0.00 =	40.54	tons/day
Total allowable TSS loading per unit area to meet stds (from Table I.1) =	6.08E-02	tons/day/mi2
Total allowable TSS loading for reach 18 = 6.08E-2 * 180 mi2 =	10.93	tons/day
Explicit MOS = zero (only implicit MOS is used)	0.00	tons/day
WLA for TSS for winter for reach 18 =	0.00	tons/day
LA for TSS for winter for reach 18 = TMDL - explicit MOS - WLA =	10.93	tons/day

FILE: R:\PROJECTS\2110-613\TECH\TMDL\TMDL TSS-WINTER.XLS

TABLE I.3. CALCULATIONS FOR TSS LOADS AND PERCENT REDUCTION
FOR WINTER FOR BOEUF RIVER AT UWBFR01 (REACH 08050001-019)

Winter target TSS conc. = 52 mg/L
Percent reduction needed = 66%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Season	Date	Observed TSS at UWBFR01 (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current TSS load (tons/day)/mi2	Reduced TSS load (tons/day)/mi2	Allowable TSS load (tons/day)/mi2	Reduced load less than or equal to allow. load?
WINTER	5/7/96	53.0	0.0048	78.6%	0.024	0.0082	0.0237	Yes
WINTER	5/14/01	29.5	0.0049	77.0%	0.014	0.0047	0.0243	Yes
WINTER	2/27/96	196.5	0.0069	58.2%	0.130	0.0442	0.0342	No
WINTER	1/17/95	72.0	0.0072	56.8%	0.049	0.0168	0.0355	Yes
WINTER	4/11/95	149.5	0.0274	23.3%	0.390	0.1326	0.1351	Yes
WINTER	3/6/01	368.0	0.0600	11.3%	2.102	0.7145	0.2957	No
WINTER	1/22/01	150.0*	0.0770*	8.5%	*	*	*	*
		TOTALS =	0.1112		2.709			

Total number of values = 6
Allowable % of exceedances = 25%
Allowable no. of exceedances = 2
No. of exceedances before reductions = 5
No. of exceedances after reductions = 2

** Values with asterisks not used in any computations*

Flow weighted average TSS (mg/L) = (2.709 / 0.1112) / conversion = 256 mg/L

Average flow per unit area for winter = 0.0123 cms/mi2
Estimated drainage area for reach 19 = 176 mi2
Average flow for winter for reach 19 = 0.0123 * 176 = 2.177 cms

Existing total TSS load for winter for reach 19
= 256 mg/L * 2.177 cms * conversions = 53.07 tons/day

Existing point source load of inorganic suspended solids for reach 19 = 0.00 tons/day

Existing NPS TSS load for winter for reach 19 = 53.07 - 0.00 =	53.07	tons/day
Total allowable TSS loading per unit area to meet stds (from Table I.1) =	6.08E-02	tons/day/mi2
Total allowable TSS loading for reach 19 = 6.08E-2 * 176 mi2 =	10.73	tons/day
Explicit MOS = zero (only implicit MOS is used)	0.00	tons/day
WLA for TSS for winter for reach 19 =	0.00	tons/day
LA for TSS for winter for reach 19 = TMDL - explicit MOS - WLA =	10.73	tons/day

FILE: R:\PROJECTS\2110-613\TECH\TMDL\TMDL TSS-WINTER.XLS

TABLE I.4. CALCULATIONS FOR TSS LOADS AND PERCENT REDUCTION
FOR WINTER FOR BIG BAYOU AT OUA0032 (REACH 08050001-022)

Winter target TSS conc. = 52 mg/L
Percent reduction needed = 51%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Season	Date	Observed TSS at OUA0032 (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current TSS load (tons/day)/mi2	Reduced TSS load (tons/day)/mi2	Allowable TSS load (tons/day)/mi2	Reduced load less than or equal to allow. load?
WINTER	5/7/96	64.0	0.0048	78.6%	0.029	0.0143	0.0237	Yes
WINTER	5/14/01	31.0	0.0049	77.0%	0.015	0.0071	0.0243	Yes
WINTER	2/27/96	92.0	0.0069	58.2%	0.061	0.0298	0.0342	Yes
WINTER	1/17/95	153.0	0.0072	56.8%	0.105	0.0514	0.0355	No
WINTER	4/11/95	406.0	0.0274	23.3%	1.059	0.5190	0.1351	No
WINTER	3/6/01	104.5	0.0600	11.3%	0.597	0.2924	0.2957	Yes
WINTER	1/22/01	151.0*	0.0770*	8.5%	*	*	*	*
		TOTALS =	0.1112		1.865			

Total number of values = 6
Allowable % of exceedances = 25%
Allowable no. of exceedances = 2
No. of exceedances before reductions = 5
No. of exceedances after reductions = 2

** Values with asterisks not used in any computations*

Flow weighted average TSS (mg/L) = (1.865 / 0.1112) / conversion = 176 mg/L

Average flow per unit area for winter = 0.0123 cms/mi2
Estimated drainage area for reach 22 = 189 mi2
Average flow for winter for reach 22 = 0.0123 * 189 = 2.331 cms

Existing total TSS load for winter for reach 22
= 176 mg/L * 2.331 cms * conversions = 39.08 tons/day

Existing point source load of inorganic suspended solids for reach 22 = 0.00 tons/day

Existing NPS TSS load for winter for reach 22 = 39.08 - 0.00 =	39.08	tons/day
Total allowable TSS loading per unit area to meet stds (from Table I.1) =	6.08E-02	tons/day/mi2
Total allowable TSS loading for reach 22 = 6.08E-2 * 189 mi2 =	11.50	tons/day
Explicit MOS = zero (only implicit MOS is used)	0.00	tons/day
WLA for TSS for winter for reach 22 =	0.00	tons/day
LA for TSS for winter for reach 22 = TMDL - explicit MOS - WLA =	11.50	tons/day

FILE: R:\PROJECTS\2110-613\TECH\TMDL\TMDL TSS-WINTER.XLS

TABLE I.5. CALCULATIONS FOR TSS LOADS AND PERCENT REDUCTION
FOR WINTER FOR BIG BAYOU AT UWBGB01 (REACH 08050001-022)

Winter target TSS conc. = 52 mg/L
Percent reduction needed = 12%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Season	Date	Observed TSS at UWBGB01 (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current TSS load (tons/day)/mi2	Reduced TSS load (tons/day)/mi2	Allowable TSS load (tons/day)/mi2	Reduced load less than or equal to allow. load?
WINTER	5/7/96	56.0	0.0048	78.6%	0.026	0.0225	0.0237	Yes
WINTER	5/14/01	36.8	0.0049	77.0%	0.017	0.0152	0.0243	Yes
WINTER	2/27/96	42.0	0.0069	58.2%	0.028	0.0244	0.0342	Yes
WINTER	1/17/95	58.5	0.0072	56.8%	0.040	0.0353	0.0355	Yes
WINTER	4/11/95	526.0	0.0274	23.3%	1.372	1.2076	0.1351	No
WINTER	3/6/01	123.5	0.0600	11.3%	0.705	0.6206	0.2957	No
WINTER	1/22/01	155.0*	0.0770*	8.5%	*	*	*	*
		TOTALS =	0.1112		2.188			

Total number of values = 6
Allowable % of exceedances = 25%
Allowable no. of exceedances = 2
No. of exceedances before reductions = 4
No. of exceedances after reductions = 2

** Values with asterisks not used in any computations*

Flow weighted average TSS (mg/L) = (2.188 / 0.1112) / conversion = 207 mg/L

Average flow per unit area for winter = 0.0123 cms/mi2
Estimated drainage area for reach 22 = 189 mi2
Average flow for winter for reach 22 = 0.0123 * 189 = 2.331 cms

Existing total TSS load for winter for reach 22
= 207 mg/L * 2.331 cms * conversions = 45.96 tons/day

Existing point source load of inorganic suspended solids for reach 22 = 0.00 tons/day

Existing NPS TSS load for winter for reach 22 = 45.96 - 0.00 =	45.96	tons/day
Total allowable TSS loading per unit area to meet stds (from Table I.1) =	6.08E-02	tons/day/mi2
Total allowable TSS loading for reach 22 = 6.08E-2 * 189 mi2 =	11.50	tons/day
Explicit MOS = zero (only implicit MOS is used)	0.00	tons/day
WLA for TSS for winter for reach 22 =	0.00	tons/day
LA for TSS for winter for reach 22 = TMDL - explicit MOS - WLA =	11.50	tons/day

FILE: R:\PROJECTS\2110-613\TECH\TMDL\TMDL TSS-WINTER.XLS

Table I.5

TABLE I.6. CALCULATIONS FOR TSS LOADS AND PERCENT REDUCTION
FOR WINTER FOR OAK BAYOU AT OUA0179 (REACH 08050002-010)

Winter target TSS conc. = 52 mg/L
Percent reduction needed = 0%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Season	Date	Observed TSS at OUA0179 (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current TSS load (tons/day)/mi2	Reduced TSS load (tons/day)/mi2	Allowable TSS load (tons/day)/mi2	Reduced load less than or equal to allow. load?
WINTER	5/15/01	46.0	0.0049	76.9%	0.022	0.0216	0.0243	Yes
WINTER	1/23/01	100.0	0.0442	15.1%	0.421	0.4208	0.2179	No
WINTER	3/5/01	130.0*	0.0757*	8.6%	*	*	*	*
		TOTALS =	0.0491		0.442			

Total number of values =	2
Allowable % of exceedances =	25%
Allowable no. of exceedances =	1
No. of exceedances before reductions =	1
No. of exceedances after reductions =	1

** Values with asterisks not used in any computations*

Flow weighted average TSS (mg/L) = (0.442 / 0.0491) / conversion= 95 mg/L

Average flow per unit area for winter = 0.0123 cms/mi2
Estimated drainage area for reach 10 = 136 mi2
Average flow for winter for reach 10 = 0.0123 * 136 = 1.681 cms

Existing total TSS load for winter for reach 10
= 95 mg/L * 1.681 cms * conversions = 15.20 tons/day

Existing point source load of inorganic suspended solids for reach 10 = 0.00 tons/day

Existing NPS TSS load for winter for reach 10 = 15.20 - 0.00 = 15.20 tons/day

Total allowable TSS loading per unit area to meet stds (from Table I.1) =	6.08E-02	tons/day/mi2
Total allowable TSS loading for reach 10 = 6.08E-2 * 136 mi2 =	8.29	tons/day
Explicit MOS = zero (only implicit MOS is used)	0.00	tons/day
WLA for TSS for winter for reach 10 =	0.00	tons/day
LA for TSS for winter for reach 10 = TMDL - explicit MOS - WLA =	8.29	tons/day

FILE: R:\PROJECTS\2110-613\TECH\TMDL\TMDL TSS-WINTER.XLS

TABLE I.7. CALCULATIONS FOR TSS LOADS AND PERCENT REDUCTION
FOR WINTER FOR BAYOU MACON AT UWBYM01 (REACH 08050002-006)

Winter target TSS conc. = 52 mg/L
Percent reduction needed = 53%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Season	Date	Observed TSS at UWBYM01 (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current TSS load (tons/day)/mi2	Reduced TSS load (tons/day)/mi2	Allowable TSS load (tons/day)/mi2	Reduced load less than or equal to allow. load?
WINTER	5/7/96	126.5	0.0048	78.6%	0.058	0.0272	0.0237	No
WINTER	5/14/01	29.5	0.0049	77.0%	0.014	0.0065	0.0243	Yes
WINTER	2/27/96	68.0	0.0069	58.2%	0.045	0.0211	0.0342	Yes
WINTER	1/17/95	82.0	0.0072	56.8%	0.056	0.0264	0.0355	Yes
WINTER	4/11/95	814.0	0.0274	23.3%	2.124	0.9981	0.1351	No
WINTER	3/6/01	108.5	0.0600	11.3%	0.620	0.2912	0.2957	Yes
WINTER	1/22/01	125.0*	0.0770*	8.5%	*	*	*	*
		TOTALS =	0.1112		2.916			

Total number of values =	6
Allowable % of exceedances =	25%
Allowable no. of exceedances =	2
No. of exceedances before reductions =	5
No. of exceedances after reductions =	2

** Values with asterisks not used in any computations*

Flow weighted average TSS (mg/L) = (2.916 / 0.1112) / conversion= 275 mg/L

Average flow per unit area for winter = 0.0123 cms/mi2
Estimated drainage area for reach 6 = 73 mi2
Average flow for winter for reach 6 = 0.0123 * 73 = 0.894 cms

Existing total TSS load for winter for reach 6
= 275 mg/L * 0.894 cms * conversions = 23.42 tons/day

Existing point source load of inorganic suspended solids for reach 6 = 0.00 tons/day

Existing NPS TSS load for winter for reach 6 = 23.42 - 0.00 =	23.42	tons/day
Total allowable TSS loading per unit area to meet stds (from Table I.1) =	6.08E-02	tons/day/mi2
Total allowable TSS loading for reach 6 = 6.08E-2 * 73 mi2 =	4.41	tons/day
Explicit MOS = zero (only implicit MOS is used)	0.00	tons/day
WLA for TSS for winter for reach 6 =	0.00	tons/day
LA for TSS for winter for reach 6 = TMDL - explicit MOS - WLA =	4.41	tons/day

FILE: R:\PROJECTS\2110-613\TECH\TMDL\TMDL TSS-WINTER.XLS

TABLE I.8. CALCULATIONS FOR TSS LOADS AND PERCENT REDUCTION
FOR WINTER FOR BAYOU MACON AT UWBYM02 (REACH 08050002-003)

Winter target TSS conc. = 52 mg/L
Percent reduction needed = 0%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Season	Date	Observed TSS at UWBYM02 (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current TSS load (tons/day)/mi2	Reduced TSS load (tons/day)/mi2	Allowable TSS load (tons/day)/mi2	Reduced load less than or equal to allow. load?
WINTER	5/7/96	45.0	0.0048	78.6%	0.021	0.0206	0.0237	Yes
WINTER	2/27/96	27.5	0.0069	58.2%	0.018	0.0182	0.0342	Yes
WINTER	1/17/95	50.0	0.0072	56.8%	0.034	0.0343	0.0355	Yes
WINTER	4/11/95	244.0	0.0274	23.3%	0.637	0.6366	0.1351	No
WINTER	1/22/01	134.0*	0.0770*	8.5%	*	*	*	*
		TOTALS =	0.0463		0.710			

Total number of values =	4
Allowable % of exceedances =	25%
Allowable no. of exceedances =	1
No. of exceedances before reductions =	1
No. of exceedances after reductions =	1

** Values with asterisks not used in any computations*

Flow weighted average TSS (mg/L) = (0.710 / 0.0463) / conversion= 161 mg/L

Average flow per unit area for winter = 0.0123 cms/mi2
Estimated drainage area for reach 3 = 88 mi2
Average flow for winter for reach 3 = 0.0123 * 88 = 1.087 cms

Existing total TSS load for summer for reach 3
= 161 mg/L * 1.087 cms * conversions = 16.66 tons/day

Existing point source load of inorganic suspended solids for reach 3 = 0.00 tons/day

Existing NPS TSS load for winter for reach 3 = 16.66 - 0.00 =	16.66	tons/day
Total allowable TSS loading per unit area to meet stds (from Table I.1) =	6.08E-02	tons/day/mi2
Total allowable TSS loading for reach 3 = 6.08E-2 * 88 mi2 =	5.36	tons/day
Explicit MOS = zero (only implicit MOS is used)	0.00	tons/day
WLA for TSS for winter for reach 3 =	0.00	tons/day
LA for TSS for winter for reach 3 = TMDL - explicit MOS - WLA =	5.36	tons/day

FILE: R:\PROJECTS\2110-613\TECH\TMDL\TMDL TSS-WINTER.XLS

Figure I.1. Winter Flow Duration Curve for USGS 07369680 Bayou Macon near Eudora

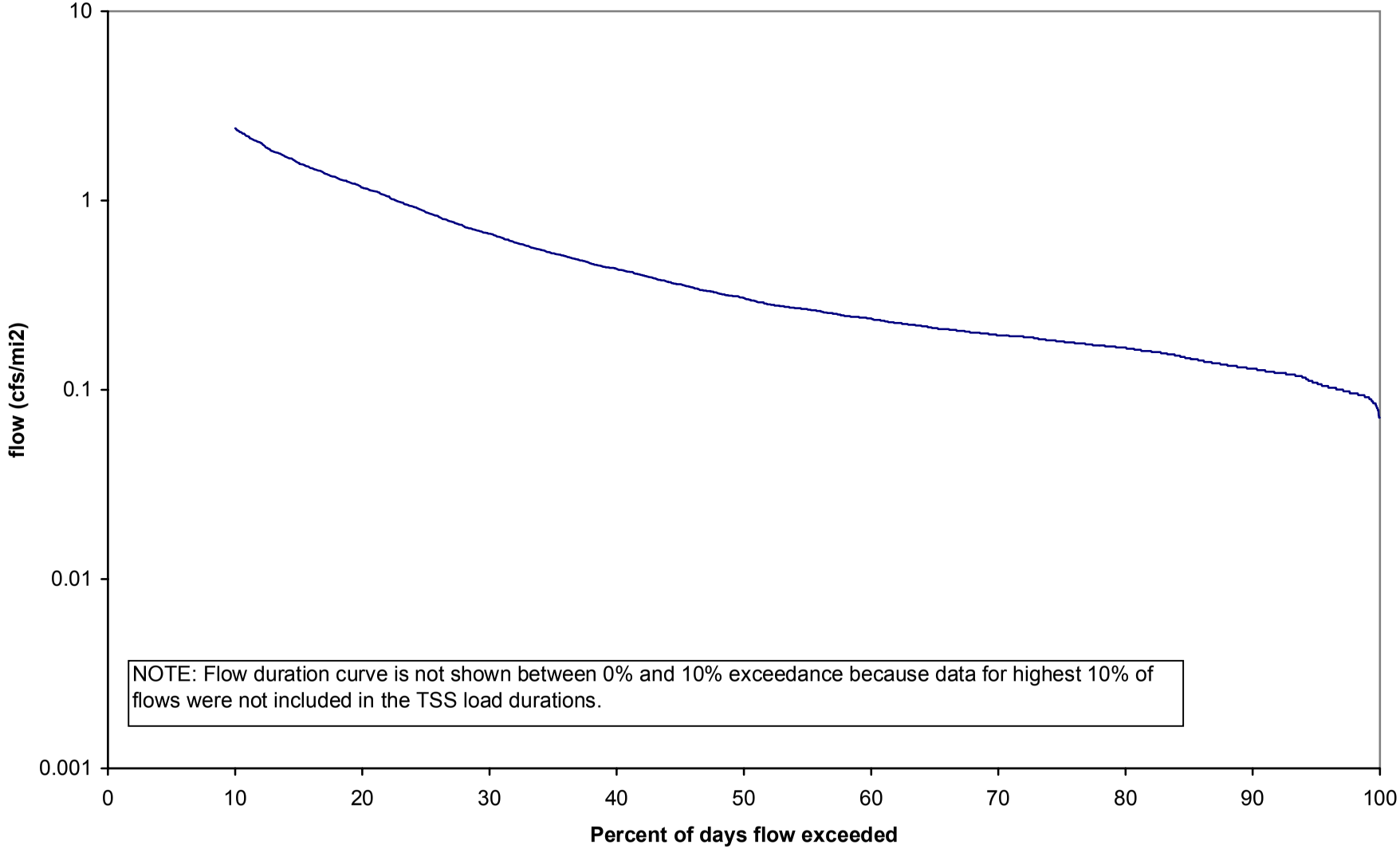


Figure I.2. Winter TSS Load Duration Curve for Boeuf River at OUA0015A

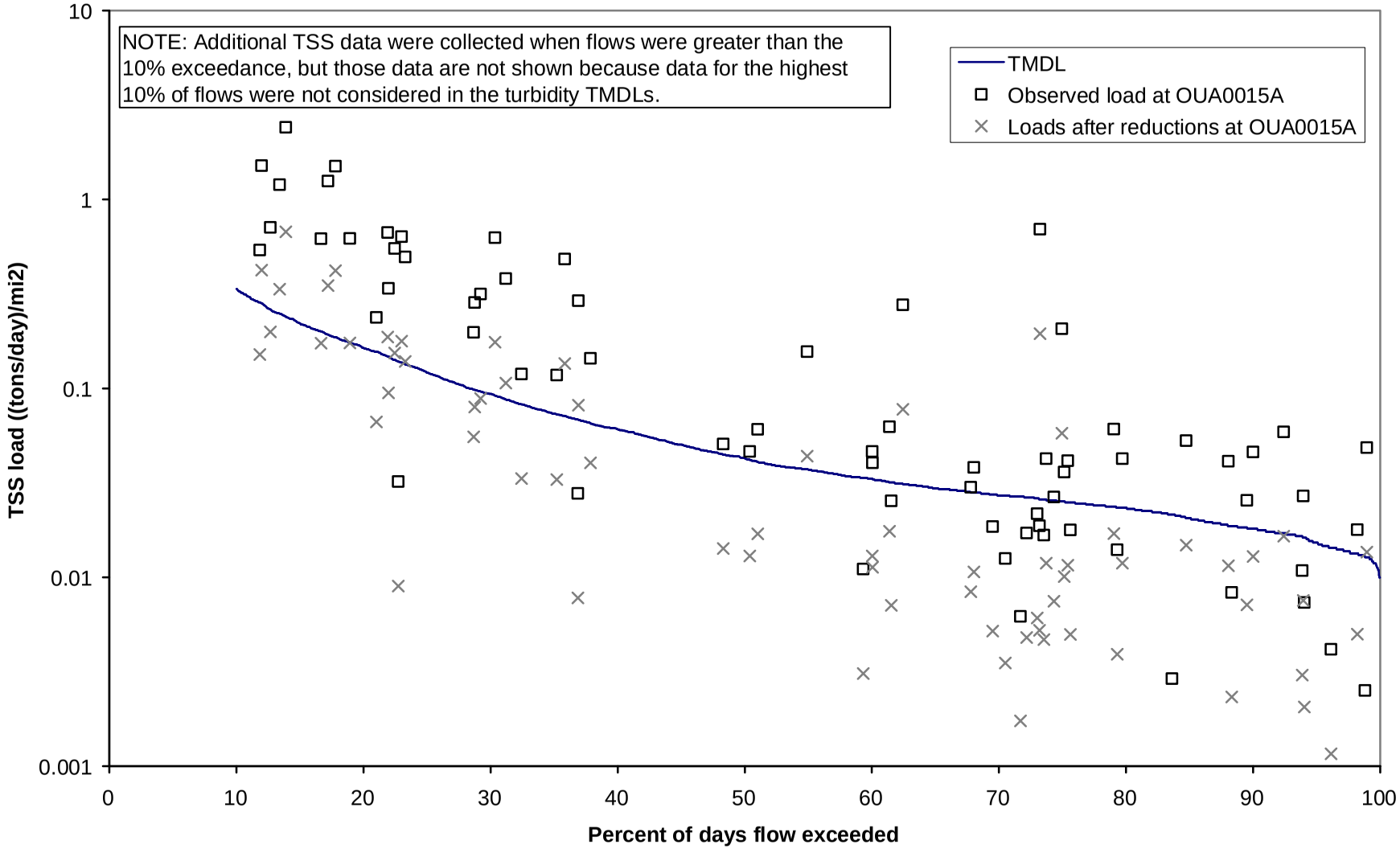


Figure I.3. Winter TSS Load Duration Curve for Boeuf River at UWBFR01

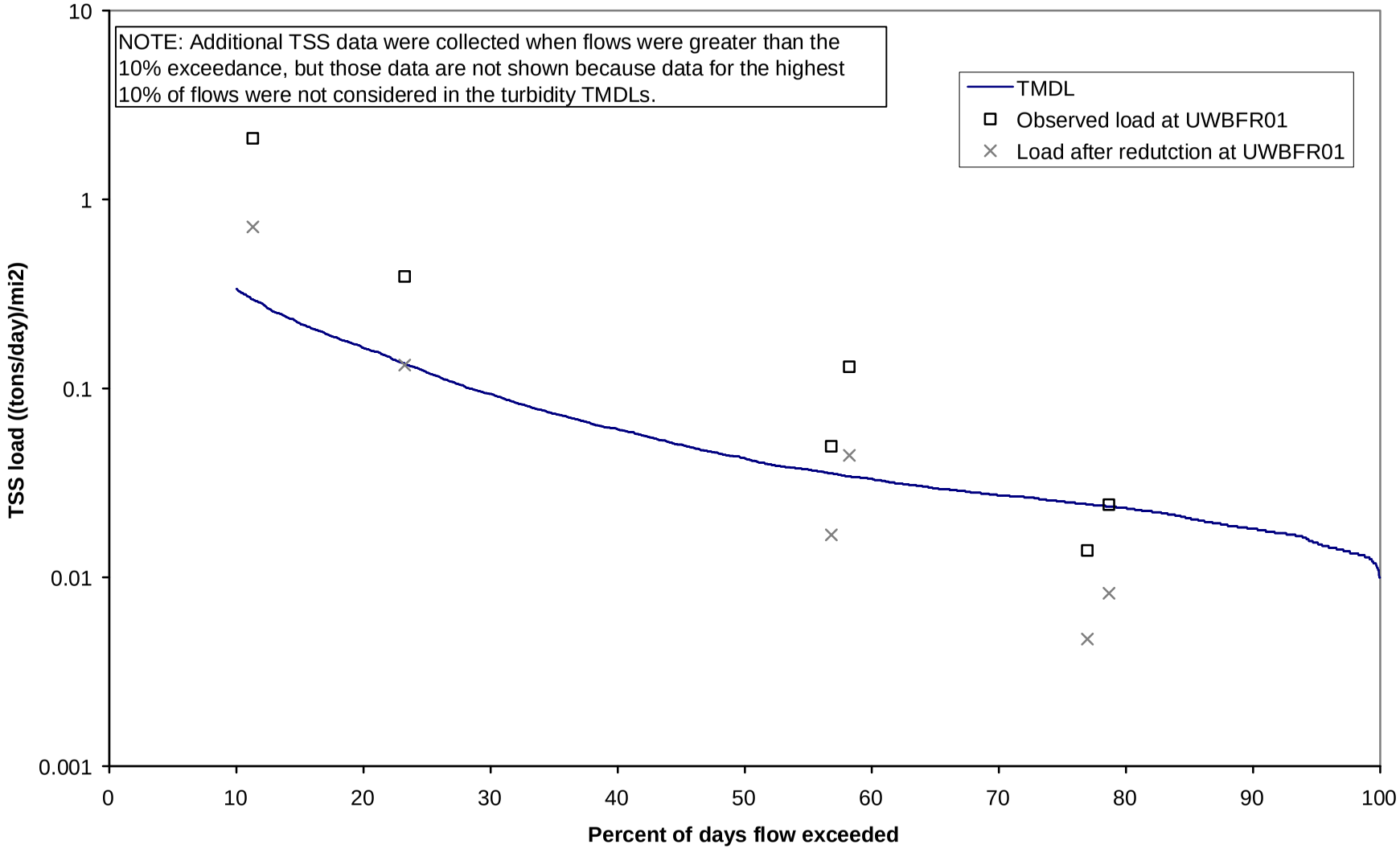


Figure I.4. Winter TSS Load Duration Curve for Big Bayou at OUA032

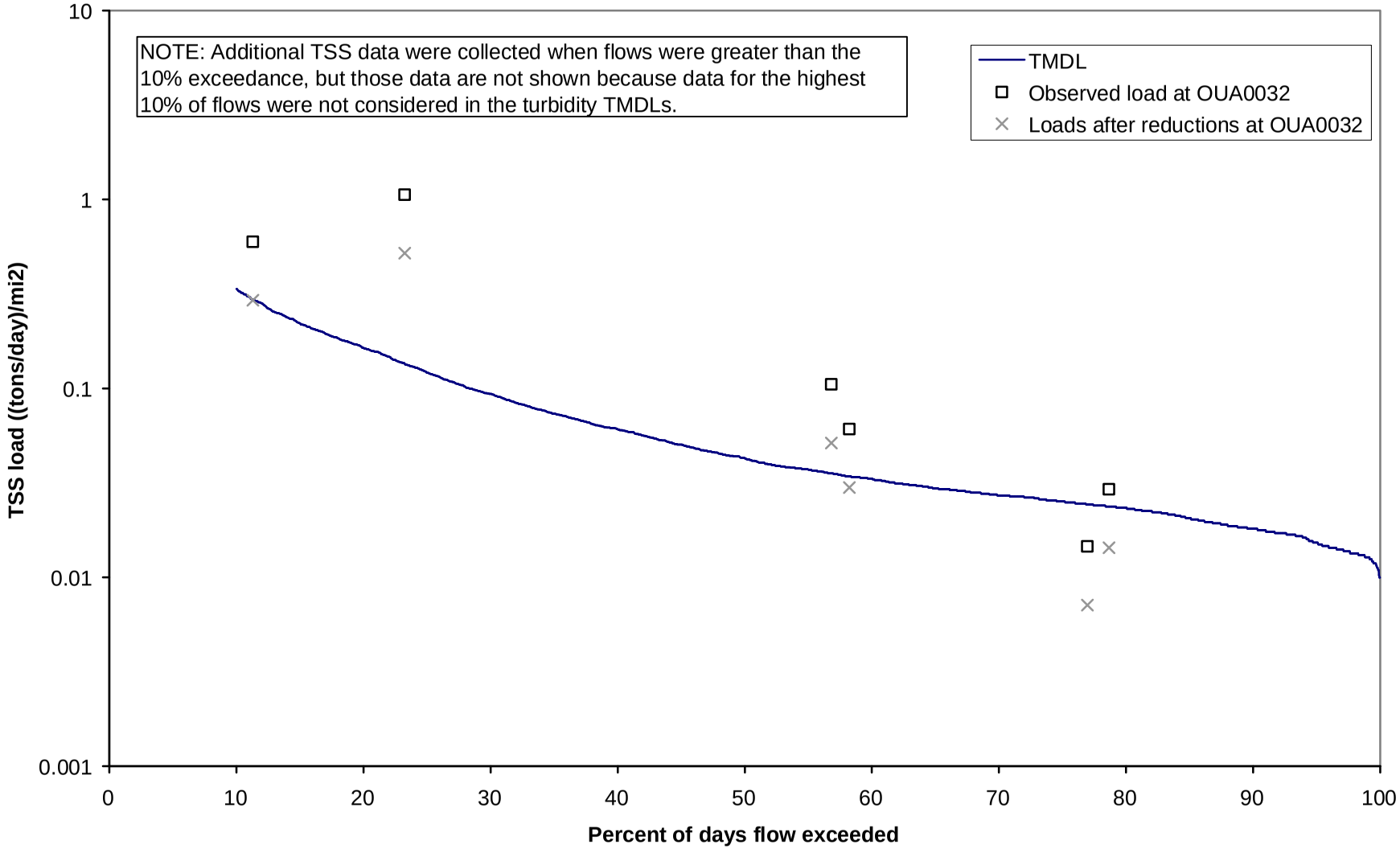


Figure I.5. Winter TSS Load Duration Curve for Big Bayou at UWBGB01

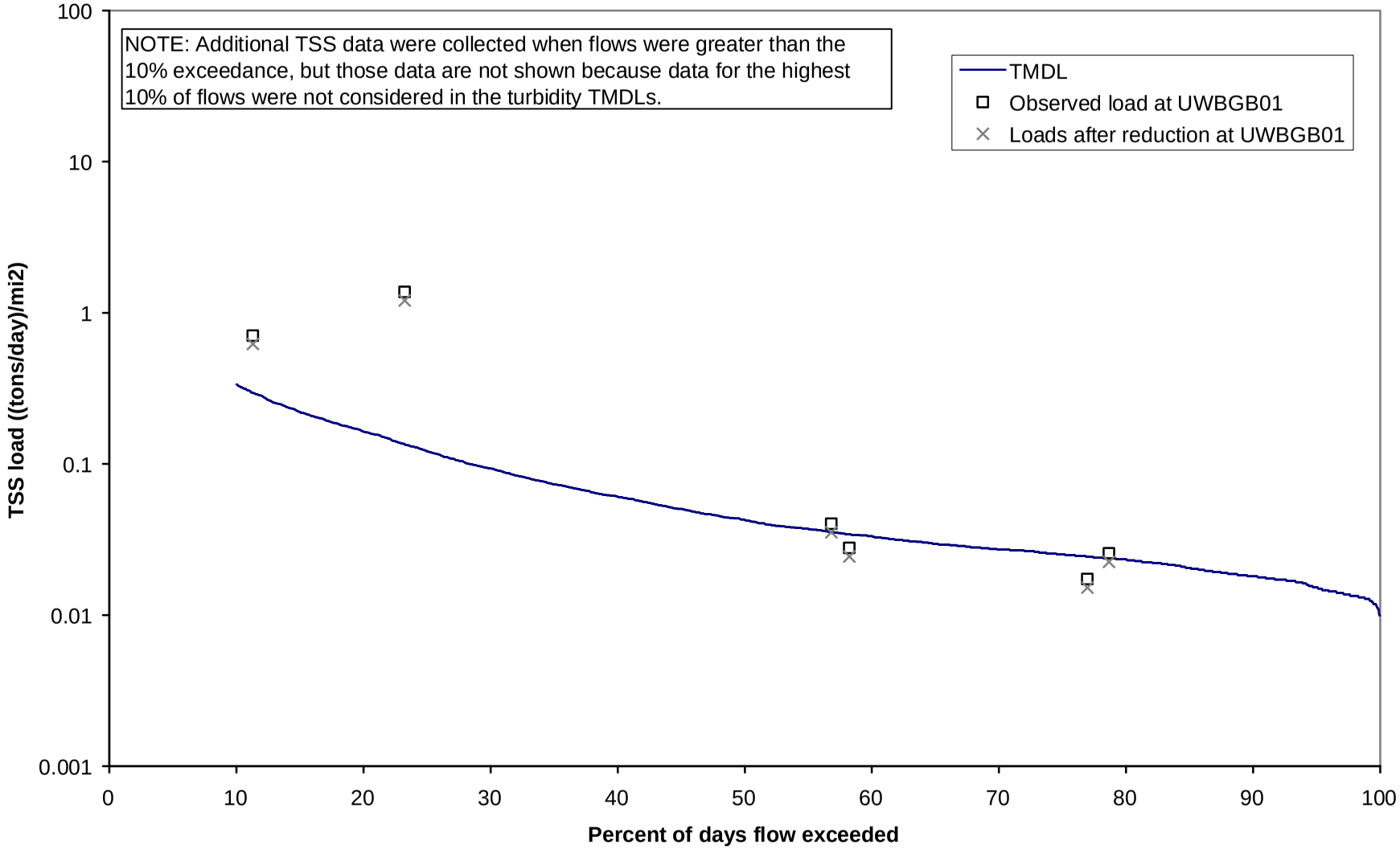


Figure I.6. Winter TSS Load Duration Curve for Oak Bayou at OUA0179

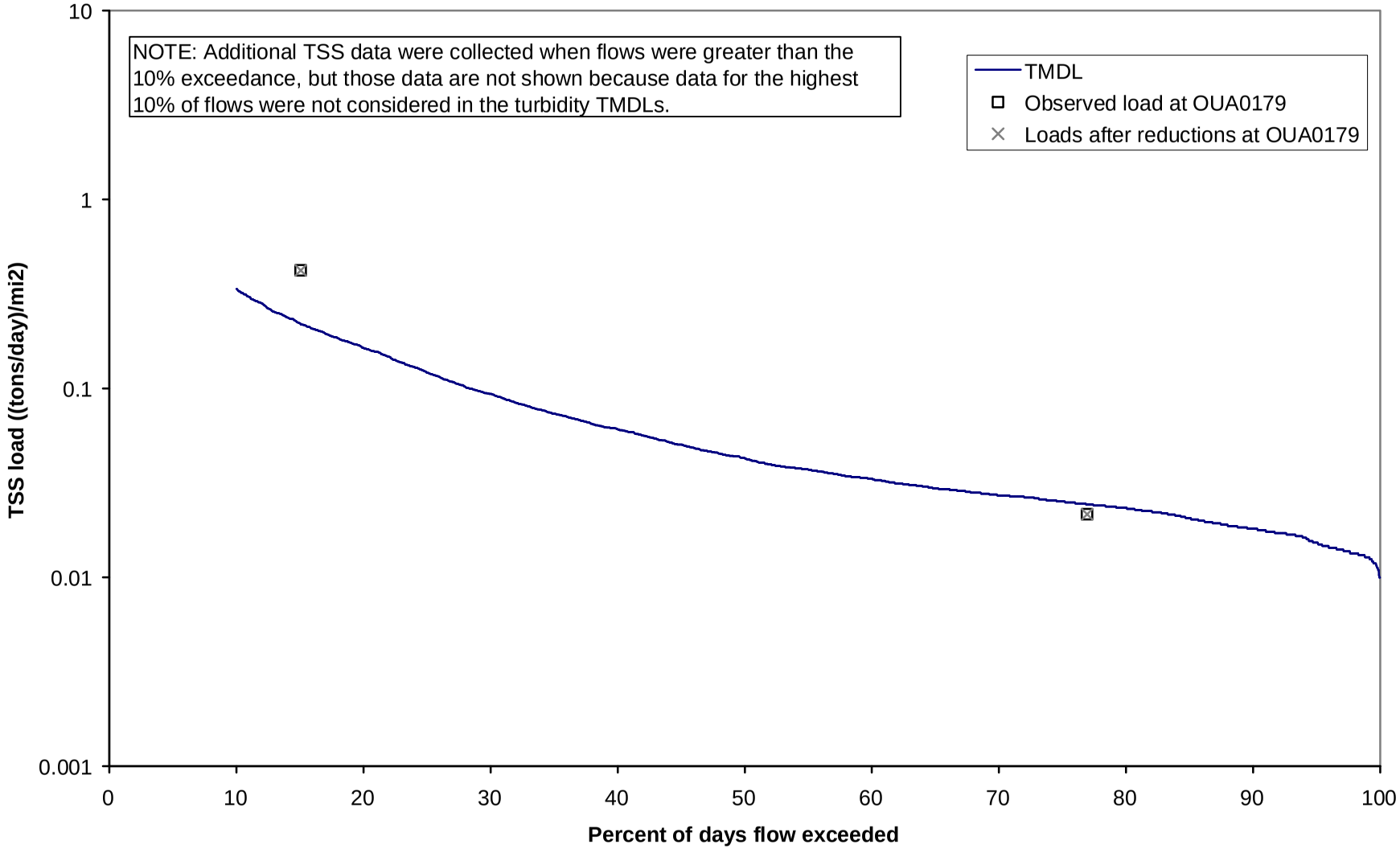


Figure I.7. Winter TSS Load Duration Curve for Bayou Macon at UWBYM01

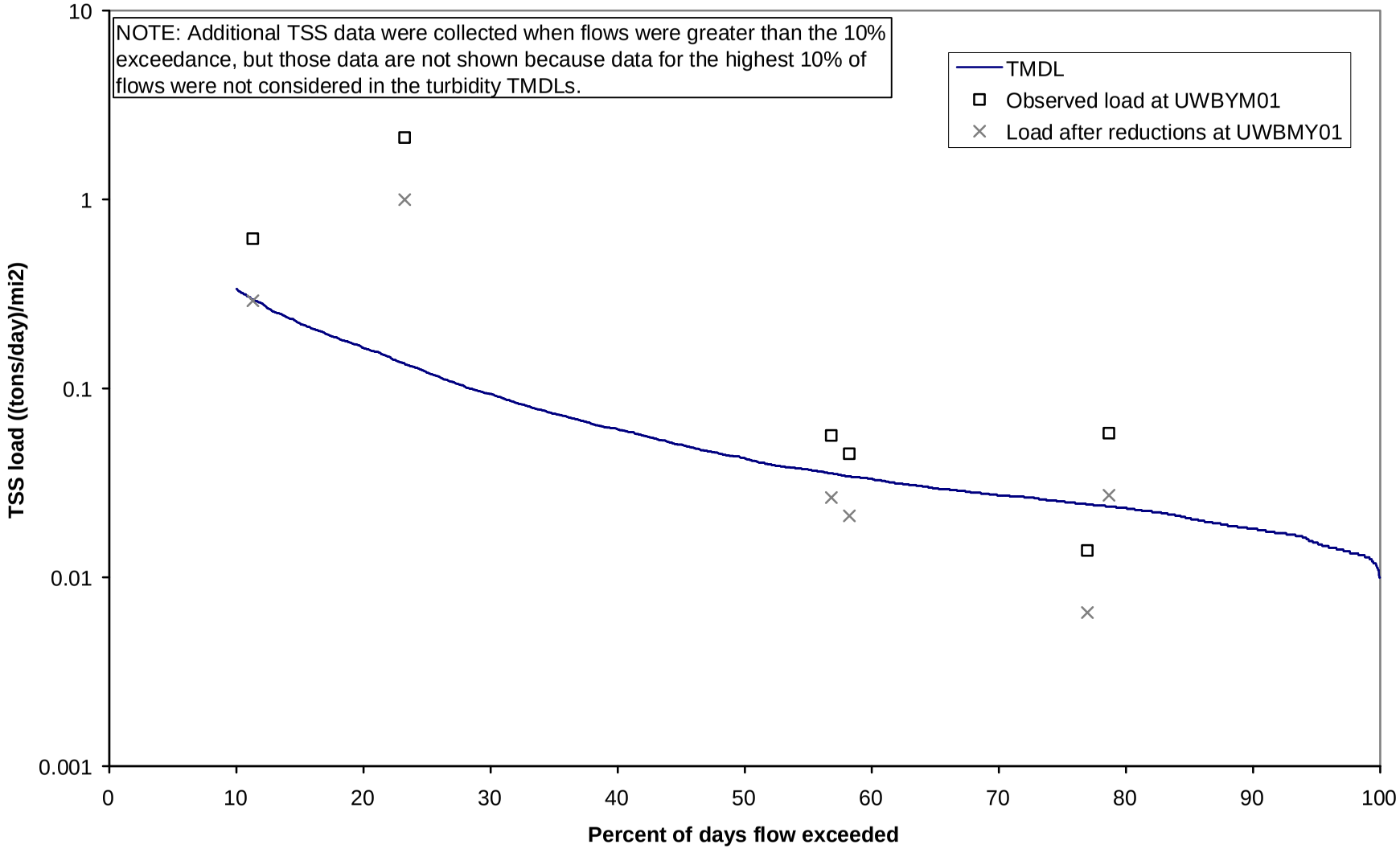
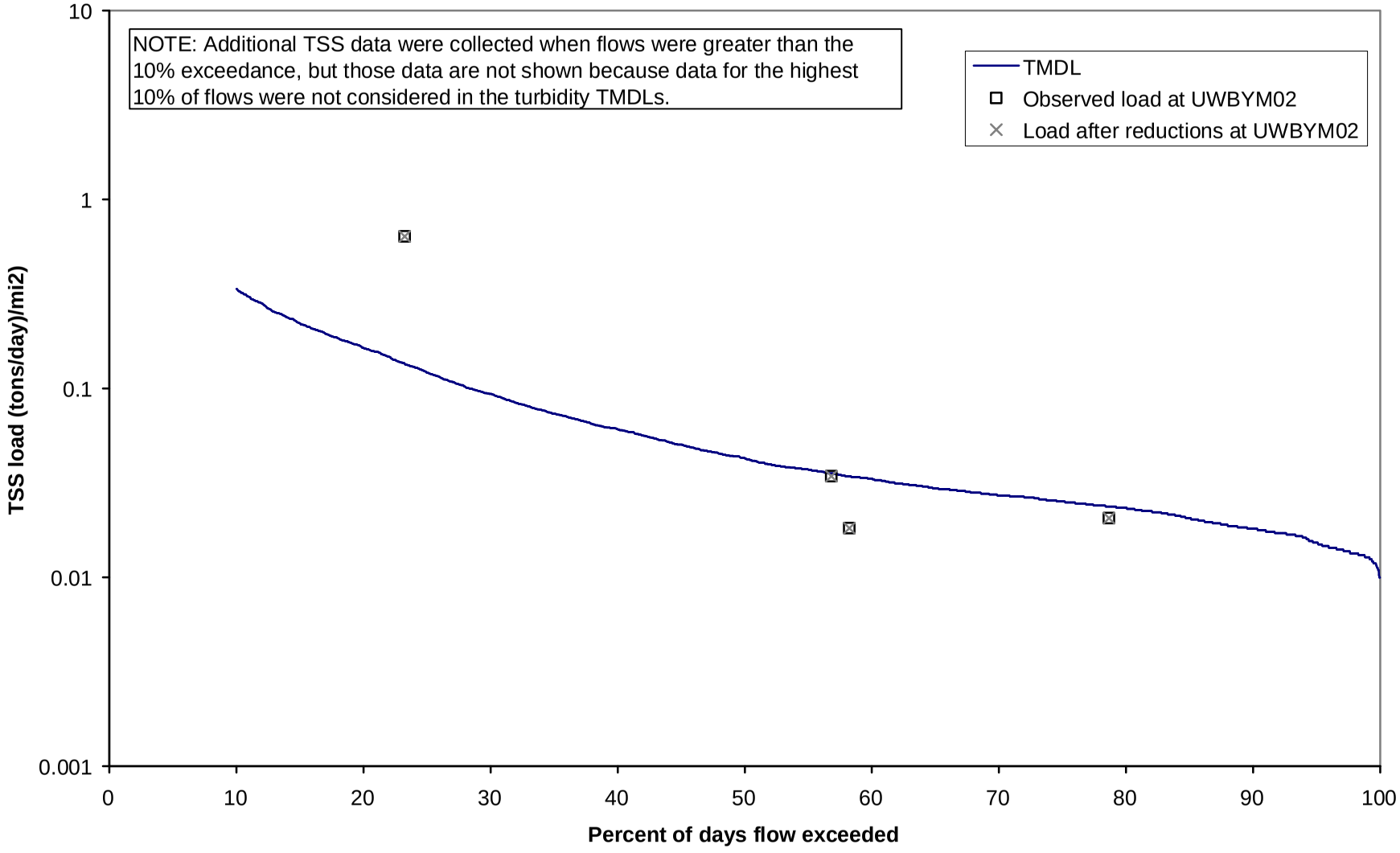


Figure I.8. Winter TSS Load Duration Curve for Bayou Macon at UWBYM02



APPENDIX J

Calculations for Summer Chloride TMDLs

TABLE J.1. CALCULATIONS FOR ALLOWABLE LOADS PER UNIT AREA FOR CHLORIDE DURING SUMMER

Percentage of total flow in basin represented by Bayou Macon:

USGS gage number and name	Avg. annual flow 1957-68 (cfs)	Drainage area (mi2)	Percent of combined flow
07367700 Boeuf River near AR/LA state line	875	785	65.2%
07369700 Bayou Macon near Kilbourne, LA	467	504	34.8%
	1,342	1,289	100.0%

Margin of Safety (MOS) = 10%

								Boeuf River Chloride standard = 90 mg/L			Other Streams Chloride standard = 48 mg/L		
				Adjusted flow for entire basin									
Season	Date	Observed flow at Eudora (cfs)	Percent exceedance for observed flow	cfs	cfs/mi2	cms/mi2	"Width" for area under curves	Allowable chloride load at this flow (tons/day)/mi2	Target chloride load at this flow (tons/day)/mi2	"Area under TMDL curve" (tons/day)/mi2	Allowable chloride load at this flow (tons/day)/mi2	Target chloride load at this flow (tons/day)/mi2	"Area under TMDL curve" (tons/day)/mi2
A	B	C	D	E = C / 34.8%	F = E / 1289 mi2	G = E / 35.32	H = D1 - D2	I = G * 90 mg/L * conversion	J = I * (1 - MOS)	K = H * I	L = G * 48 mg/L * conversion	M = L * (1 - MOS)	N = H * L
SUMMER	06/22/02	24	99.98%	69.0	0.054	0.0015	0.03%	0.01	0.01	4.04E-06	0.01	0.01	2.16E-06
SUMMER	06/20/02	25	99.95%	71.8	0.056	0.0016	0.03%	0.01	0.01	4.21E-06	0.01	0.01	2.25E-06
SUMMER	06/21/02	26	99.92%	74.7	0.058	0.0016	0.03%	0.01	0.01	4.38E-06	0.01	0.01	2.34E-06
SUMMER	06/19/02	31	99.89%	89.1	0.069	0.0020	0.03%	0.02	0.02	5.22E-06	0.01	0.01	2.79E-06
SUMMER	05/21/95	32	99.86%	92.0	0.071	0.0020	0.03%	0.02	0.02	5.39E-06	0.01	0.01	2.88E-06
SUMMER	05/22/95	32	99.83%	92.0	0.071	0.0020	0.03%	0.02	0.02	5.39E-06	0.01	0.01	2.88E-06
SUMMER	10/10/01	32	99.80%	92.0	0.071	0.0020	0.03%	0.02	0.02	5.39E-06	0.01	0.01	2.88E-06
SUMMER	05/20/95	33	99.77%	94.8	0.074	0.0021	0.03%	0.02	0.02	5.56E-06	0.01	0.01	2.97E-06

For brevity, most of the rows in this spreadsheet have been hidden (between the 99.77% and the 0.23% exceedances).

SUMMER	05/03/91	3110	0.23%	8936.8	6.933	0.1963	0.03%	1.68	1.51	5.24E-04	0.90	0.81	2.80E-04
SUMMER	05/06/91	3110	0.20%	8936.8	6.933	0.1963	0.03%	1.68	1.51	5.24E-04	0.90	0.81	2.80E-04
SUMMER	05/02/91	3130	0.17%	8994.3	6.978	0.1976	0.03%	1.69	1.52	5.28E-04	0.90	0.81	2.81E-04
SUMMER	05/04/91	3130	0.14%	8994.3	6.978	0.1976	0.03%	1.69	1.52	5.28E-04	0.90	0.81	2.81E-04
SUMMER	05/05/91	3130	0.11%	8994.3	6.978	0.1976	0.03%	1.69	1.52	5.28E-04	0.90	0.81	2.81E-04
SUMMER	05/01/91	3170	0.08%	9109.2	7.067	0.2001	0.03%	1.72	1.54	5.34E-04	0.91	0.82	2.85E-04
SUMMER	05/31/98	3250	0.05%	9339.1	7.245	0.2051	0.03%	1.76	1.58	5.48E-04	0.94	0.84	2.92E-04
SUMMER	05/30/98	3270	0.02%	9396.6	7.290	0.2064	0.03%	1.77	1.59	5.51E-04	0.94	0.85	2.94E-04
						TOTALS =	**100.00%**			**9.00E-02**			**4.80E-02**

FILE: R:\PROJECTS\2110-613\TECH\TMDL\TMDL CHLORIDES-SUMMER.XLS

TABLE J.2. CALCULATIONS FOR CHLORIDE LOADS AND PERCENT REDUCTION
FOR SUMMER FOR BOEUF RIVER AT OUA0015A (REACH 08050001-018)

WQ standard for chloride = 90 mg/L
Percent reduction needed = 43%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Season	Date	Observed chloride at OUA0015A (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current chloride load (tons/day)/mi2	Reduced chloride load (tons/day)/mi2	Allowable chloride load with MOS incorporated (tons/day)/mi2	Reduced load less than or equal to allow. load?
SUMMER	9/23/03	66.0	0.0084	27.1%	0.053	0.0301	0.0648	Yes
SUMMER	8/12/03	104.0	0.0056	53.6%	0.055	0.0314	0.0428	Yes
SUMMER	7/15/03	55.3	0.0064	42.2%	0.034	0.0193	0.0497	Yes
SUMMER	6/17/03	27.0	0.0304	5.0%	0.078	0.0445	0.2342	Yes
SUMMER	5/20/03	7.4	0.0063	43.3%	0.004	0.0025	0.0487	Yes
SUMMER	11/5/02	39.8	0.0434	3.3%	0.165	0.0938	0.3350	Yes
SUMMER	10/15/02	14.8	0.0055	54.3%	0.008	0.0044	0.0424	Yes
SUMMER	9/17/02	100.0	0.0040	77.6%	0.038	0.0216	0.0307	Yes
SUMMER	8/20/02	66.6	0.0050	60.6%	0.032	0.0180	0.0385	Yes
SUMMER	6/25/02	160.0	0.0041	75.2%	0.063	0.0356	0.0316	No
SUMMER	5/28/02	15.4	0.0064	42.3%	0.009	0.0054	0.0497	Yes
SUMMER	11/19/01	92.3	0.0038	81.7%	0.033	0.0190	0.0292	Yes
SUMMER	10/23/01	22.5	0.0028	96.9%	0.006	0.0035	0.0219	Yes
SUMMER	9/17/01	44.2	0.0048	63.7%	0.020	0.0115	0.0370	Yes
SUMMER	8/20/01	82.7	0.0073	32.8%	0.058	0.0329	0.0565	Yes
SUMMER	7/24/01	139.0	0.0045	68.3%	0.060	0.0343	0.0351	Yes
SUMMER	6/19/01	75.4	0.0044	70.8%	0.032	0.0181	0.0341	Yes
SUMMER	5/22/01	57.7	0.0138	14.4%	0.076	0.0433	0.1066	Yes
SUMMER	11/7/00	33.9	0.0058	50.9%	0.019	0.0107	0.0448	Yes
SUMMER	10/17/00	118.9	0.0039	80.4%	0.044	0.0249	0.0297	Yes
SUMMER	9/19/00	136.0	0.0042	73.6%	0.055	0.0312	0.0326	Yes
SUMMER	7/25/00	162.4	0.0054	55.2%	0.084	0.0478	0.0419	No
SUMMER	6/27/00	49.5	0.0049	62.4%	0.023	0.0131	0.0375	Yes
SUMMER	5/30/00	42.9	0.0050	59.9%	0.021	0.0118	0.0390	Yes
SUMMER	11/22/99	141.3	0.0030	95.0%	0.041	0.0232	0.0234	Yes
SUMMER	10/19/99	102.0	0.0038	82.1%	0.037	0.0210	0.0292	Yes

Season	Date	Observed chloride at OUA0015A (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current chloride load (tons/day)/mi2	Reduced chloride load (tons/day)/mi2	Allowable chloride load with MOS incorporated (tons/day)/mi2	Reduced load less than or equal to allow. load?
SUMMER	9/21/99	82.8	0.0049	61.5%	0.039	0.0221	0.0380	Yes
SUMMER	8/17/99	112.0	0.0083	27.5%	0.089	0.0507	0.0643	Yes
SUMMER	7/27/99	131.0	0.0210	8.7%	0.262	0.1495	0.1621	Yes
SUMMER	6/29/99	60.4	0.0145	13.9%	0.083	0.0474	0.1115	Yes
SUMMER	5/25/99	51.9	0.0052	57.4%	0.026	0.0148	0.0404	Yes
SUMMER	11/16/98	123.0	0.0158	12.4%	0.185	0.1054	0.1217	Yes
SUMMER	9/29/98	162.9	0.0151	12.9%	0.235	0.1340	0.1169	No
SUMMER	9/1/98	101.0	0.0070	35.7%	0.067	0.0384	0.0540	Yes
SUMMER	8/11/98	101.0	0.0080	28.8%	0.076	0.0436	0.0614	Yes
SUMMER	7/22/98	58.3	0.0104	19.6%	0.058	0.0330	0.0803	Yes
SUMMER	6/9/98	32.7	0.0090	24.3%	0.028	0.0159	0.0691	Yes
SUMMER	5/19/98	111.0	0.0044	72.3%	0.046	0.0262	0.0336	Yes
SUMMER	10/28/97	29.0	0.0042	73.8%	0.012	0.0067	0.0326	Yes
SUMMER	9/30/97	120.3	0.0034	89.2%	0.039	0.0223	0.0263	Yes
SUMMER	8/26/97	81.4	0.0052	58.6%	0.040	0.0229	0.0399	Yes
SUMMER	7/22/97	79.2	0.0045	68.6%	0.034	0.0195	0.0351	Yes
SUMMER	5/13/97	14.1	0.0090	23.7%	0.012	0.0069	0.0696	Yes
SUMMER	11/19/96	31.1	0.0038	82.8%	0.011	0.0064	0.0292	Yes
SUMMER	10/1/96	18.1	0.0058	51.0%	0.010	0.0057	0.0448	Yes
SUMMER	9/10/96	85.6	0.0048	64.1%	0.039	0.0223	0.0370	Yes
SUMMER	8/6/96	49.8	0.0074	32.5%	0.035	0.0200	0.0570	Yes
SUMMER	7/16/96	165.0	0.0068	38.0%	0.107	0.0611	0.0526	No
SUMMER	6/18/96	142.0	0.0049	61.7%	0.067	0.0380	0.0380	Yes
SUMMER	5/21/96	62.6	0.0053	56.8%	0.032	0.0180	0.0409	Yes
SUMMER	10/17/95	140.0	0.0032	93.3%	0.043	0.0245	0.0248	Yes
SUMMER	9/19/95	183.0	0.0033	91.0%	0.058	0.0332	0.0258	No
SUMMER	8/8/95	145.0	0.0085	26.9%	0.117	0.0666	0.0652	No
SUMMER	7/17/95	44.4	0.0068	38.1%	0.029	0.0164	0.0526	Yes
SUMMER	6/20/95	106.0	0.0061	47.4%	0.061	0.0349	0.0467	Yes
SUMMER	5/23/95	63.2	0.0033	92.4%	0.020	0.0113	0.0253	Yes
SUMMER	11/28/94	50.8	0.0241	6.2%	0.117	0.0665	0.1860	Yes
SUMMER	9/27/94	102.0	0.0090	24.1%	0.088	0.0500	0.0696	Yes

Season	Date	Observed chloride at OUA0015A (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current chloride load (tons/day)/mi2	Reduced chloride load (tons/day)/mi2	Allowable chloride load with MOS incorporated (tons/day)/mi2	Reduced load less than or equal to allow. load?
SUMMER	8/16/94	90.8	0.0242	6.2%	0.209	0.1192	0.1865	Yes
SUMMER	7/19/94	37.0	0.0802	1.6%	0.282	0.1610	0.6184	Yes
SUMMER	6/28/94	120.0	0.0191	9.9%	0.219	0.1246	0.1475	Yes
SUMMER	5/24/94	40.1	0.0083	27.6%	0.032	0.0180	0.0638	Yes
SUMMER	11/23/93	19.8	0.0175	11.1%	0.033	0.0188	0.1349	Yes
SUMMER	10/26/93	79.7	0.0025	98.4%	0.019	0.0109	0.0195	Yes
SUMMER	9/21/93	172.0	0.0040	77.1%	0.066	0.0377	0.0312	No
SUMMER	7/26/93	96.9	0.0086	26.3%	0.079	0.0452	0.0662	Yes
SUMMER	6/21/93	83.7	0.0323	4.6%	0.257	0.1466	0.2488	Yes
SUMMER	5/18/93	30.6	0.0052	58.8%	0.015	0.0086	0.0399	Yes
SUMMER	9/29/92	98.4	0.0035	88.7%	0.033	0.0185	0.0268	Yes
SUMMER	9/1/92	97.2	0.0076	30.9%	0.071	0.0403	0.0589	Yes
SUMMER	8/4/92	49.6	0.0081	28.3%	0.038	0.0219	0.0628	Yes
SUMMER	7/7/92	71.6	0.0062	45.2%	0.043	0.0243	0.0482	Yes
SUMMER	6/2/92	95.5	0.0062	46.0%	0.056	0.0321	0.0477	Yes
SUMMER	5/5/92	44.1	0.0033	91.5%	0.014	0.0080	0.0258	Yes
SUMMER	11/25/91	20.7	0.0053	57.0%	0.010	0.0060	0.0409	Yes
SUMMER	8/6/91	93.9	0.0066	40.9%	0.059	0.0338	0.0511	Yes
SUMMER	7/2/91	59.3	0.0193	9.7%	0.109	0.0622	0.1490	Yes
SUMMER	11/27/90	34.3	0.0039	81.1%	0.013	0.0072	0.0297	Yes
SUMMER	10/30/90	36.2	0.0036	86.0%	0.012	0.0071	0.0278	Yes
SUMMER	10/2/90	72.7	0.0033	92.6%	0.023	0.0130	0.0253	Yes
SUMMER	9/4/90	134.0	0.0063	44.2%	0.081	0.0459	0.0487	Yes
SUMMER	8/7/90	105.0	0.0057	51.9%	0.057	0.0327	0.0443	Yes
SUMMER	6/5/90	11.1	0.0208	8.8%	0.022	0.0126	0.1607	Yes
SUMMER	5/1/90	14.8	0.0062	45.3%	0.009	0.0050	0.0482	Yes
		TOTALS =	0.7741		5.171			

Total number of values =	84
Allowable % of exceedances =	10%
Allowable no. of exceedances =	9
No. of exceedances before reductions =	35
No. of exceedances after reductions =	7

Flow weighted average chloride (mg/L) = (5.171 / 0.7741) / conversion = 70 mg/L

Average flow per unit area for summer =	0.0105	cms/mi2
Estimated drainage area for reach 18 =	180	mi2
Average flow for summer for reach 18 = 0.0105 * 180 =	1.887	cms
Existing total chloride load for summer for reach 18		
= 70 mg/L * 1.887 cms * conversions =	12.58	tons/day
Sum of design flows for point sources for reach 18 =	0.000	cms
Assumed effluent chloride concentration for point sources =	60	mg/L
Existing point source chloride load for summer for reach 18 =		
= 0.000 cms * 60 mg/L * conversions =	0.00	tons/day
Existing NPS chloride load for summer for reach 18 = 12.58 - 0.00 =	12.58	tons/day
Total allowable loading per unit area to meet stds (from Table J.1) =	9.00E-02	tons/day/mi2
Total allowable loading for reach 18 = 9.00E-2 * 180 mi2 =	16.17	tons/day
Explicit MOS for chloride for summer for reach 18 (10% * 16.17) =	1.62	tons/day
WLA for chloride for summer for reach 18 (same as existing load) =	0.00	tons/day
LA for chloride for summer for reach 18 = total - MOS - WLA =	14.55	tons/day

FILE: R:\PROJECTS\2110-613\TECH\TMDL\TMDL CHLORIDES-SUMMER.XLS

TABLE J.3. CALCULATIONS FOR CHLORIDE LOADS AND PERCENT REDUCTION
FOR SUMMER FOR BOEUF RIVER AT UWBFR01 (REACH 08050001-019)

WQ standard for chloride = 90 mg/L
Percent reduction needed = 41%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Season	Date	Observed chloride at UWBFR01 (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current chloride load (tons/day)/mi2	Reduced chloride load (tons/day)/mi2	Allowable chloride load with MOS incorporated (tons/day)/mi2	Reduced load less than or equal to allow. load?
SUMMER	9/10/01	45.7	0.0073	32.8%	0.032	0.0188	0.0565	Yes
SUMMER	7/17/01	56.6	0.0044	70.8%	0.024	0.0140	0.0341	Yes
SUMMER	5/14/01	101.5	0.0049	61.4%	0.048	0.0281	0.0380	Yes
SUMMER	11/6/00	136.0	0.0052	57.3%	0.068	0.0400	0.0404	Yes
SUMMER	10/1/96	31.8	0.0058	51.0%	0.018	0.0104	0.0448	Yes
SUMMER	5/7/96	25.5	0.0048	64.2%	0.012	0.0069	0.0370	Yes
SUMMER	10/3/95	199.0	0.0032	94.0%	0.060	0.0353	0.0243	No
SUMMER	7/18/95	48.7	0.0069	36.7%	0.032	0.0190	0.0536	Yes
SUMMER	9/12/94	76.7	0.0092	22.8%	0.067	0.0397	0.0711	Yes
SUMMER	6/6/94	60.2	0.0097	21.5%	0.056	0.0329	0.0750	Yes
		TOTALS =	0.0615		0.415			

Total number of values =	10
Allowable % of exceedances =	10%
Allowable no. of exceedances =	1
No. of exceedances before reductions =	3
No. of exceedances after reductions =	1

Flow weighted average chloride (mg/L) = (0.415 / 0.0615) / conversion = 71 mg/L

Average flow per unit area for summer = 0.0105 cms/mi2
Estimated drainage area for reach 19 = 176 mi2
Average flow for summer for reach 19 = 0.0105 * 176 = 1.852 cms

Existing total chloride load for summer for reach 19
= 71 mg/L * 1.852 cms * conversions = 12.53 tons/day

Sum of design flows for point sources for reach 19 = 0.004 cms

Assumed effluent chloride concentration for point sources =	60	mg/L
Existing point source chloride load for summer for reach 19 =		
= 0.004 cms * 60 mg/L * conversions =	0.0227	tons/day
Existing NPS chloride load for summer for reach 19 = 12.53 - 0.02 =	12.51	tons/day
Total allowable loading per unit area to meet stds (from Table J.1) =	9.00E-02	tons/day/mi2
Total allowable loading for reach 19 = 9.00E-2 * 176 mi2 =	15.88	tons/day
Explicit MOS for chloride for summer for reach 19 (10% * 15.88) =	1.59	tons/day
WLA for chloride for summer for reach 19 (same as existing load) =	0.02	tons/day
Point source future growth:		
Assumed increase in design flow = 50% =	0.002	cms
Effluent conc. in excess of standard = MAX (0, 60 - 90) =	0	mg/L
Future growth explicit load = 0.002 * 0 * conversions =	0	tons/day
LA for chloride for summer for reach 19 = total - MOS - WLA - FG =	14.27	tons/day

FILE: R:\PROJECTS\2110-613\TECH\TMDL\TMDL CHLORIDES-SUMMER.XLS

TABLE J.4. CALCULATIONS FOR CHLORIDE LOADS AND PERCENT REDUCTION
FOR SUMMER FOR BIG BAYOU AT OUA0032 (REACH 08050001-022)

WQ standard for chloride = 48 mg/L
Percent reduction needed = 56%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Season	Date	Observed chloride at OUA0032 (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current chloride load (tons/day)/mi2	Reduced chloride load (tons/day)/mi2	Allowable chloride load with MOS incorporated (tons/day)/mi2	Reduced load less than or equal to allow. load?
SUMMER	9/10/01	33.7	0.0073	32.8%	0.023	0.0103	0.0301	Yes
SUMMER	7/17/01	96.4	0.0044	70.8%	0.041	0.0178	0.0182	Yes
SUMMER	5/14/01	40.0	0.0049	61.4%	0.019	0.0083	0.0203	Yes
SUMMER	11/6/00	69.4	0.0052	57.3%	0.035	0.0152	0.0216	Yes
SUMMER	10/1/96	35.2	0.0058	51.0%	0.019	0.0086	0.0239	Yes
SUMMER	5/7/96	33.8	0.0048	64.2%	0.015	0.0068	0.0197	Yes
SUMMER	10/3/95	116.5	0.0032	94.0%	0.035	0.0154	0.0130	No
SUMMER	7/18/95	73.1	0.0069	36.7%	0.048	0.0213	0.0286	Yes
SUMMER	9/12/94	49.0	0.0092	22.8%	0.043	0.0189	0.0379	Yes
SUMMER	6/6/94	51.7	0.0097	21.5%	0.048	0.0211	0.0400	Yes
		TOTALS =	0.0615		0.327			

Total number of values =	10
Allowable % of exceedances =	10%
Allowable no. of exceedances =	1
No. of exceedances before reductions =	6
No. of exceedances after reductions =	1

Flow weighted average chloride (mg/L) = (0.327 / 0.0615) / conversion = 56 mg/L

Average flow per unit area for summer = 0.0105 cms/mi2
Estimated drainage area for reach 22 = 189 mi2
Average flow for summer for reach 22 = 0.0105 * 189 = 1.984 cms

Existing total chloride load for summer for reach 22
= 56 mg/L * 1.984 cms * conversions = 10.58 tons/day

Sum of design flows for point sources for reach 22 = 0.083 cms

Assumed effluent chloride concentration for point sources =	60	mg/L
Existing point source chloride load for summer for reach 22 =		
= 0.083 cms * 60 mg/L * conversions =	0.48	tons/day
Existing NPS chloride load for summer for reach 22 = 10.58 - 0.48 =	10.10	tons/day
Total allowable loading per unit area to meet stds (from Table J.1) =	4.80E-02	tons/day/mi2
Total allowable loading for reach 22 = 4.80E-2 * 189 mi2 =	9.07	tons/day
Explicit MOS for chloride for summer for reach 22 (10% * 9.07) =	0.91	tons/day
WLA for chloride for summer for reach 22 (same as existing load) =	0.48	tons/day
Point source future growth:		
Assumed increase in design flow = 50% =	0.042	cms
Effluent conc. in excess of standard = MAX (0, 60 - 48) =	12	mg/L
Future growth explicit load = 0.042 * 12 * conversions =	0.05	tons/day
LA for chloride for summer for reach 22 = total - MOS - WLA - FG =	7.63	tons/day

FILE: R:\PROJECTS\2110-613\TECH\TMDL\TMDL CHLORIDES-SUMMER.XLS

TABLE J.5. CALCULATIONS FOR CHLORIDE LOADS AND PERCENT REDUCTION
FOR SUMMER FOR BIG BAYOU AT UWBGB01 (REACH 08050001-022)

WQ standard for chloride = 48 mg/L
Percent reduction needed = 80%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Season	Date	Observed chloride at UWBGB01 (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current chloride load (tons/day)/mi2	Reduced chloride load (tons/day)/mi2	Allowable chloride load with MOS incorporated (tons/day)/mi2	Reduced load less than or equal to allow. load?
SUMMER	9/10/01	28.6	0.0073	32.8%	0.020	0.0040	0.0301	Yes
SUMMER	7/17/01	87.0	0.0044	70.8%	0.037	0.0073	0.0182	Yes
SUMMER	5/14/01	230.9	0.0049	61.4%	0.108	0.0217	0.0203	No
SUMMER	11/6/00	136.3	0.0052	57.3%	0.068	0.0136	0.0216	Yes
SUMMER	10/1/96	14.2	0.0058	51.0%	0.008	0.0016	0.0239	Yes
SUMMER	5/7/96	49.3	0.0048	64.2%	0.023	0.0045	0.0197	Yes
SUMMER	10/3/95	211.0	0.0032	94.0%	0.063	0.0127	0.0130	Yes
SUMMER	7/18/95	129.1	0.0069	36.7%	0.085	0.0171	0.0286	Yes
SUMMER	9/12/94	95.0	0.0092	22.8%	0.083	0.0167	0.0379	Yes
SUMMER	6/6/94	77.0	0.0097	21.5%	0.071	0.0143	0.0400	Yes
		TOTALS =	0.0615		0.567			

Total number of values =	10
Allowable % of exceedances =	10%
Allowable no. of exceedances =	1
No. of exceedances before reductions =	8
No. of exceedances after reductions =	1

Flow weighted average chloride (mg/L) = (0.567 / 0.0615) / conversion = 97 mg/L

Average flow per unit area for summer = 0.0105 cms/mi2
Estimated drainage area for reach 22 = 189 mi2
Average flow for summer for reach 22 = 0.0105 * 189 = 1.984 cms

Existing total chloride load for summer for reach 22
= 97 mg/L * 1.984 cms * conversions = 18.33 tons/day

Sum of design flows for point sources for reach 22 = 0.083 cms

Assumed effluent chloride concentration for point sources =	60	mg/L
Existing point source chloride load for summer for reach 22 =		
= 0.083 cms * 60 mg/L * conversions =	0.48	tons/day
Existing NPS chloride load for summer for reach 22 = 18.33 - 0.48 =	17.85	tons/day
Total allowable loading per unit area to meet stds (from Table J.1) =	4.80E-02	tons/day/mi2
Total allowable loading for reach 22 = 4.80E-2 * 189 mi2 =	9.07	tons/day
Explicit MOS for chloride for summer for reach 22 (10% * 9.07) =	0.91	tons/day
WLA for chloride for summer for reach 22 (same as existing load) =	0.48	tons/day
Point source future growth:		
Assumed increase in design flow = 50% =	0.042	cms
Effluent conc. in excess of standard = MAX (0, 60 - 48) =	12	mg/L
Future growth explicit load = 0.042 * 12 * conversions =	0.05	tons/day
LA for chloride for summer for reach 22 = total - MOS - WLA - FG =	7.63	tons/day

FILE: R:\PROJECTS\2110-613\TECH\TMDL\TMDL CHLORIDES-SUMMER.XLS

TABLE J.6. CALCULATIONS FOR CHLORIDE LOADS AND PERCENT REDUCTION
FOR SUMMER FOR OAK BAYOU AT OUA0179 (REACH 08050002-010)

WQ standard for chloride = 48 mg/L
Percent reduction needed = 65%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Season	Date	Observed chloride at OUA0179 (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current chloride load (tons/day)/mi2	Reduced chloride load (tons/day)/mi2	Allowable chloride load with MOS incorporated (tons/day)/mi2	Reduced load less than or equal to allow. load?
SUMMER	9/11/01	122.0	0.0071	34.8%	0.082	0.029	0.0291	Yes
SUMMER	7/16/01	90.4	0.0069	36.9%	0.059	0.021	0.0283	Yes
SUMMER	5/15/01	118.2	0.0049	61.3%	0.055	0.019	0.0203	Yes
SUMMER	11/7/00	126.4	0.0058	50.9%	0.070	0.024	0.0239	No
		TOTALS =	0.0247		0.267			

Total number of values =	4
Allowable % of exceedances =	10%
Allowable no. of exceedances =	1
No. of exceedances before reductions =	4
No. of exceedances after reductions =	1

Flow weighted average chloride (mg/L) = (0.267 / 0.0247) / conversion = 113 mg/L

Average flow per unit area for summer = 0.0105 cms/mi2
Estimated drainage area for reach 10 = 136 mi2
Average flow for summer for reach 10 = 0.0105 * 136 = 1.430 cms

Existing total chloride load for summer for reach 10
= 113 mg/L * 1.430 cms * conversions = 15.39 tons/day

Sum of design flows for point sources for reach 10 = 0.000 cms
Assumed effluent chloride concentration for point sources = 60 mg/L
Existing point source chloride load for summer for reach 10 =
= 0.000 cms * 60 mg/L * conversions = 0.00 tons/day

Existing NPS chloride load for summer for reach 10 = 15.39 - 0.00 = 15.39 tons/day

Total allowable loading per unit area to meet stds (from Table J.1) =	4.80E-02	tons/day/mi2
Total allowable loading for reach 10 = 4.80E-2 * 136 mi2 =	6.54	tons/day
Explicit MOS for chloride for summer for reach 10 (10% * 6.54) =	0.65	tons/day
WLA for chloride for summer for reach 10 (same as existing load) =	0.00	tons/day
LA for chloride for summer for reach 10 = total - MOS - WLA =	5.89	tons/day

FILE: R:\PROJECTS\2110-613\TECH\TMDL\TMDL CHLORIDES-SUMMER.XLS

Figure J.1. Summer Flow Duration Curve for USGS 07369680 Bayou Macon near Eudora

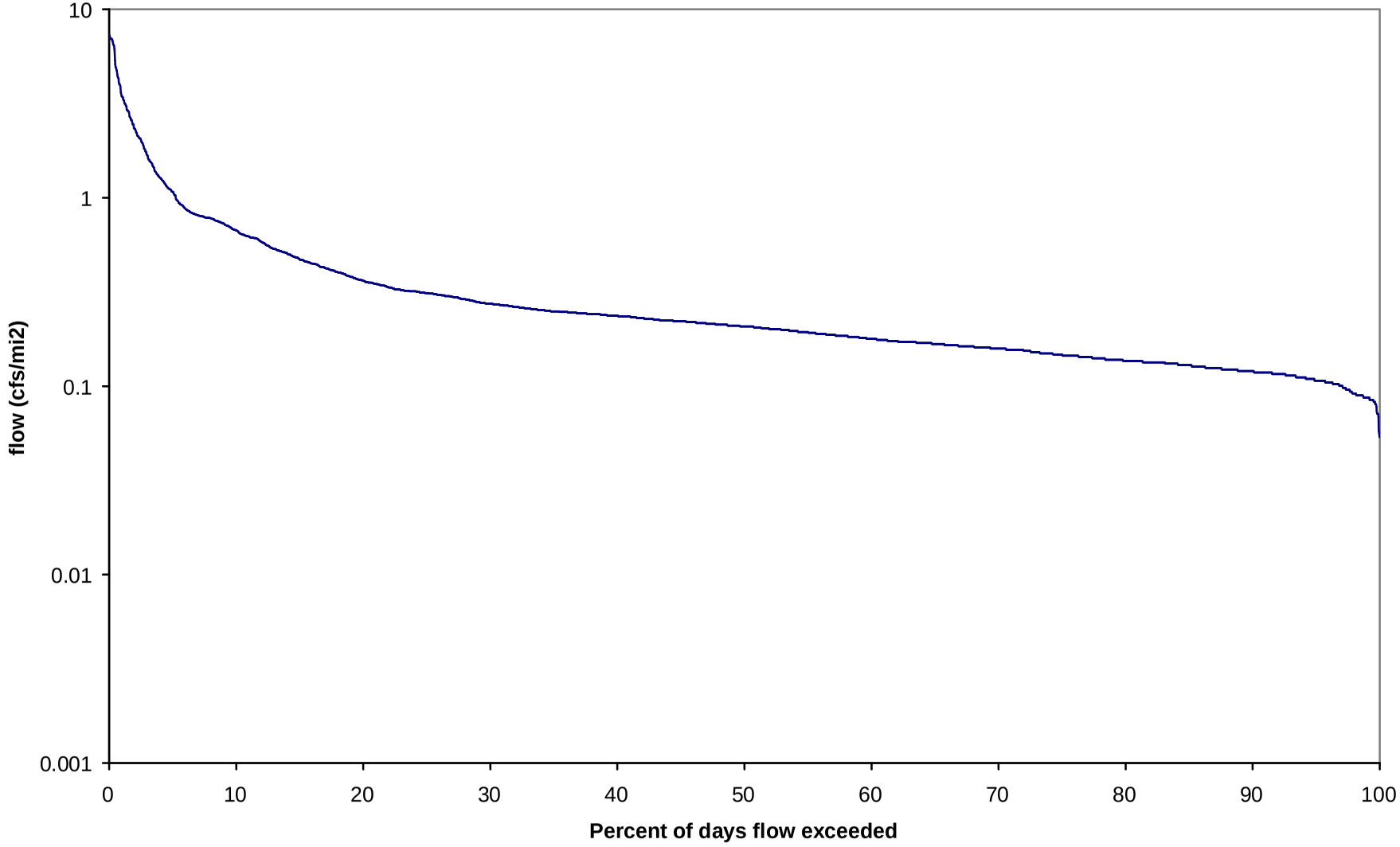


Figure J.2. Summer Chloride Load Duration Curve for Boeuf River at OUA0015A

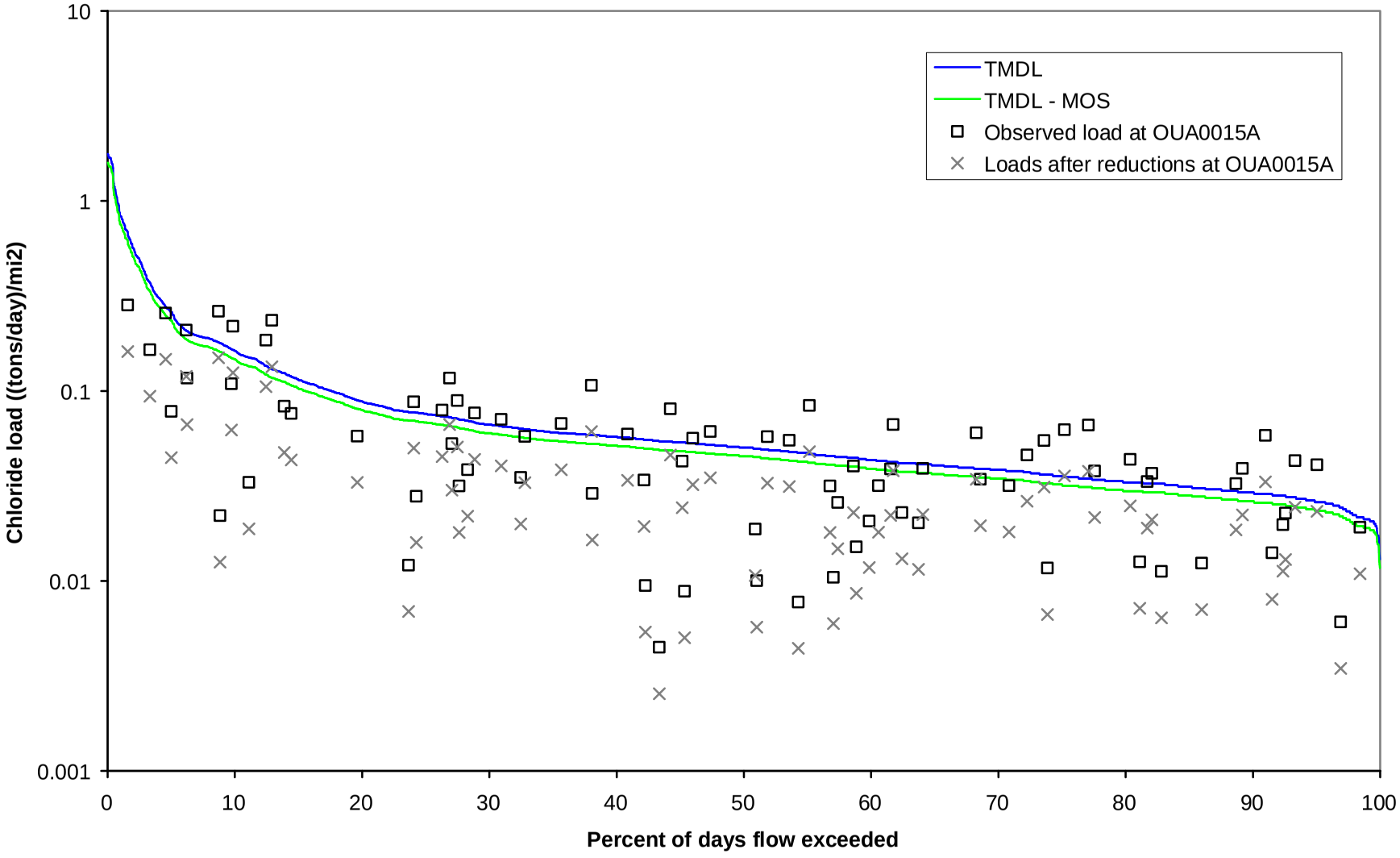


Figure J.3. Summer Chloride Load Duration Curve for Boeuf River at UWBFR01

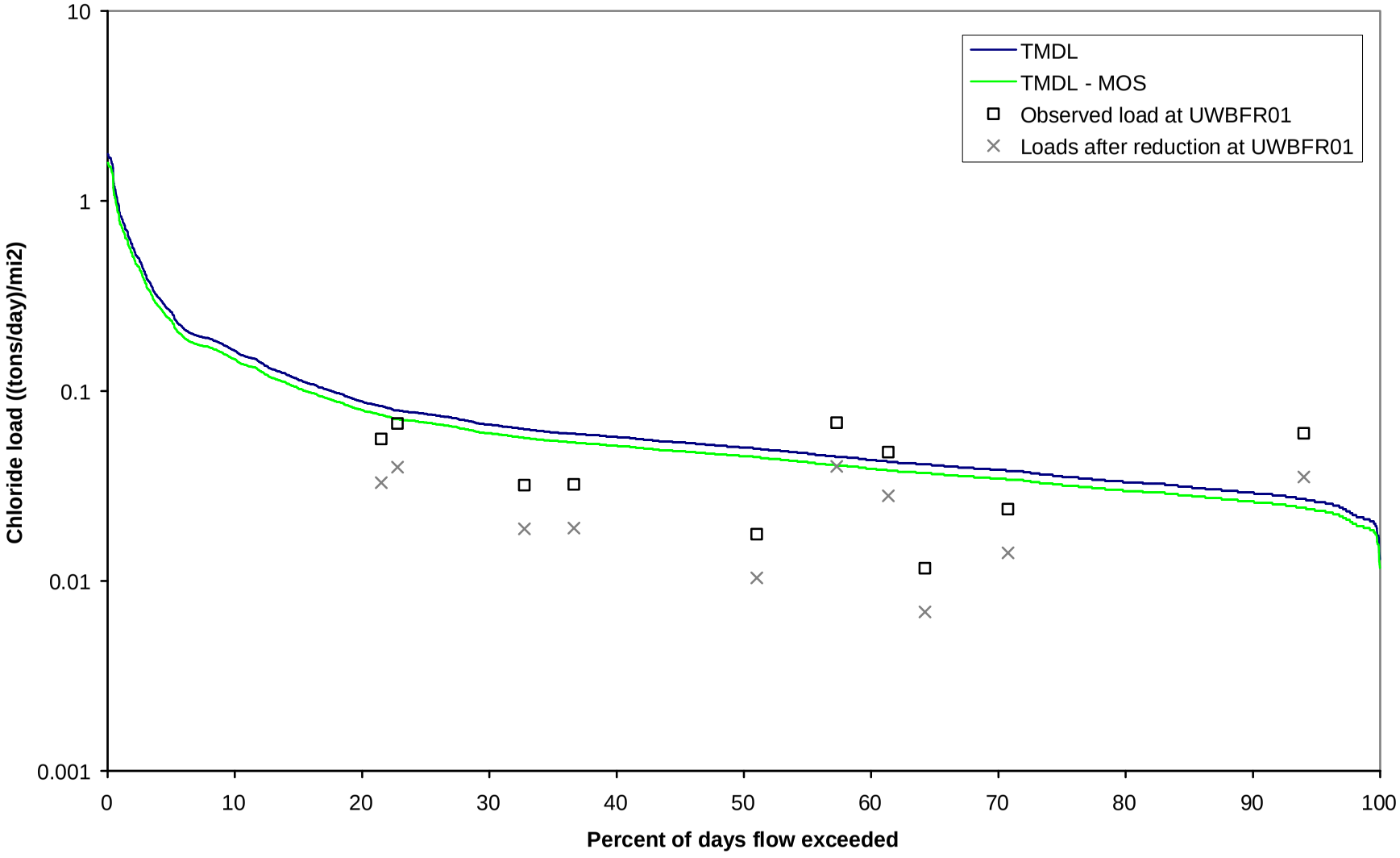


Figure J.4. Summer Chloride Load Duration Curve for Big Bayou at OUA032

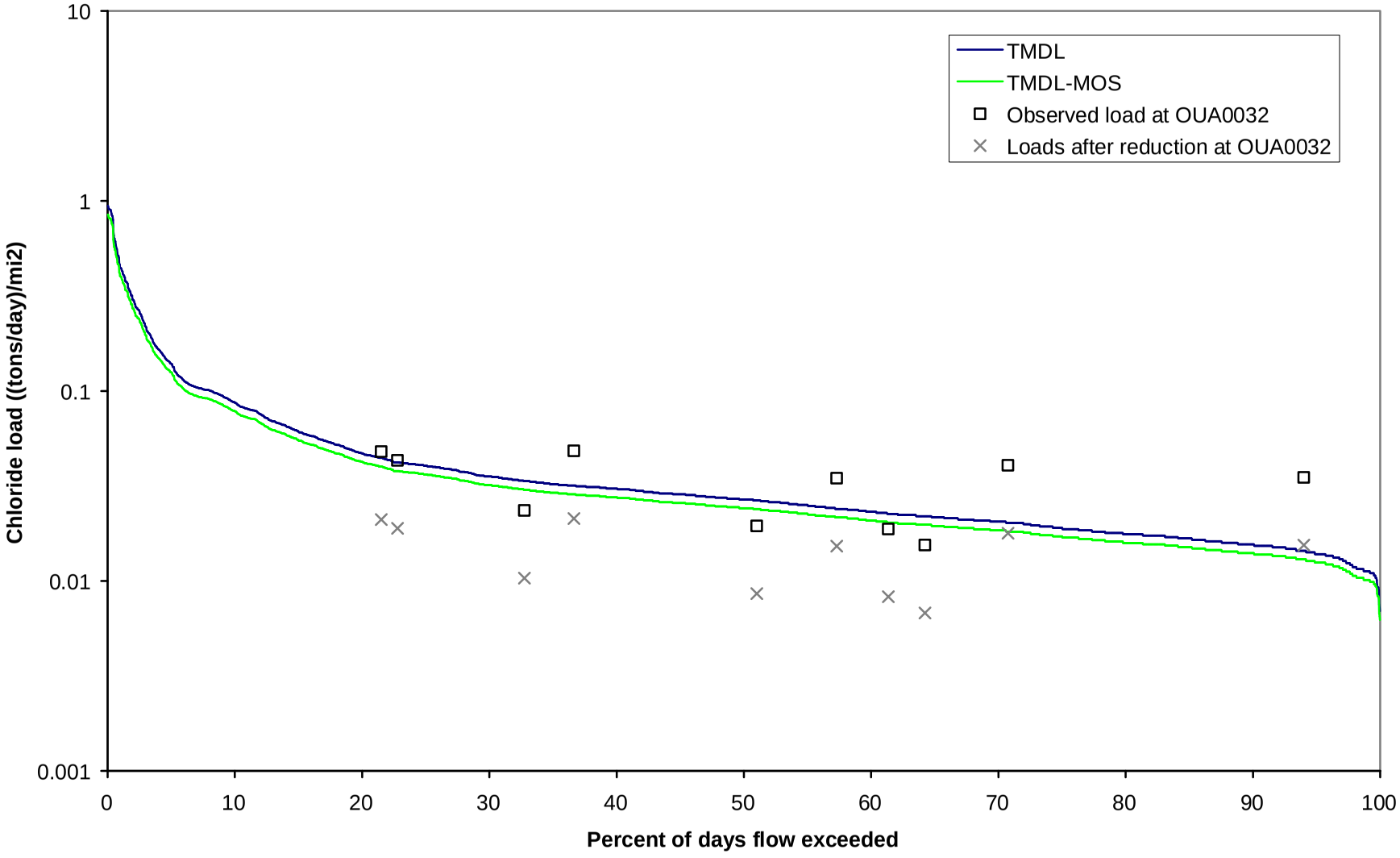


Figure J.5. Summer Chloride Load Duration Curve for Big Bayou at UWBGB01

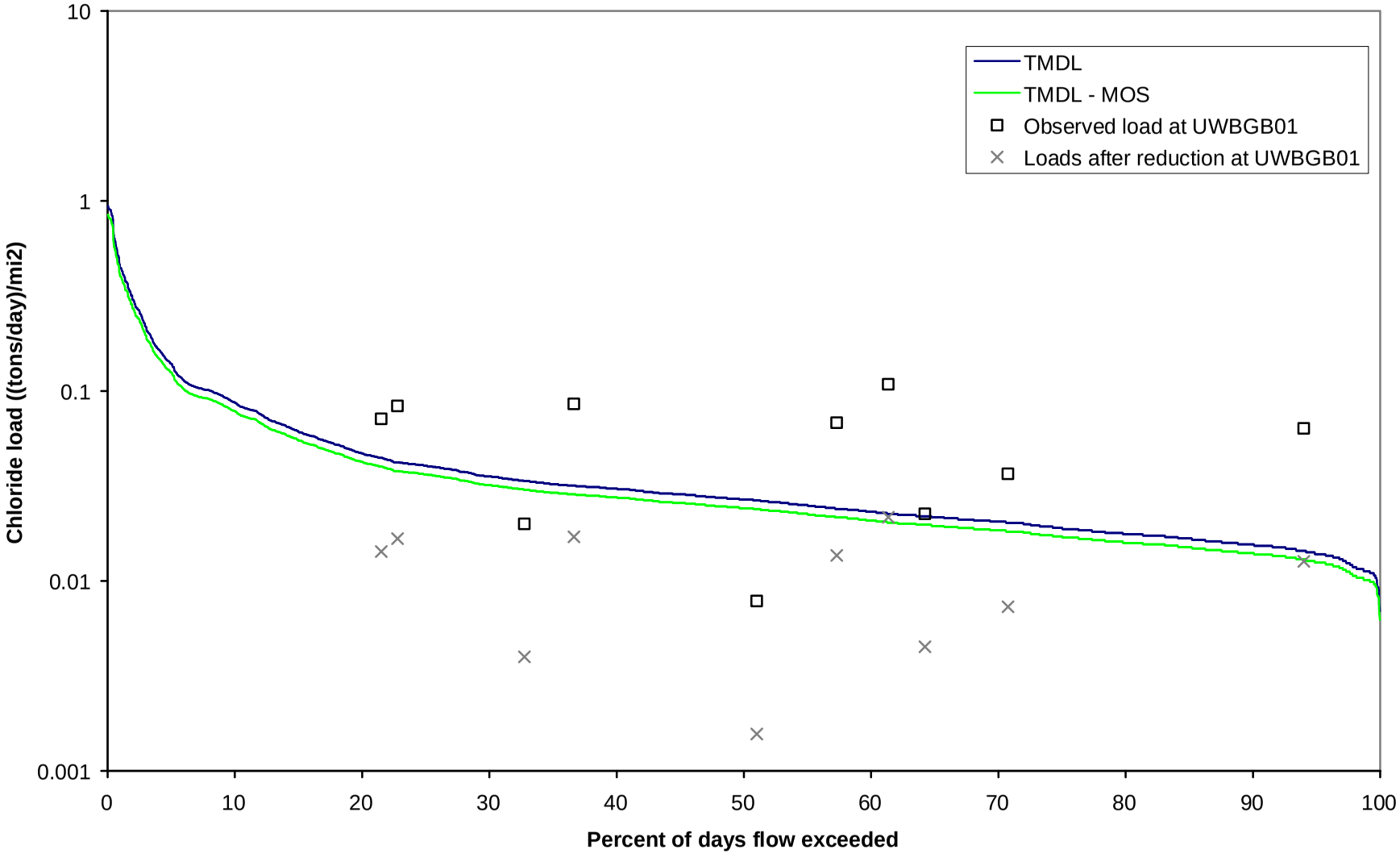
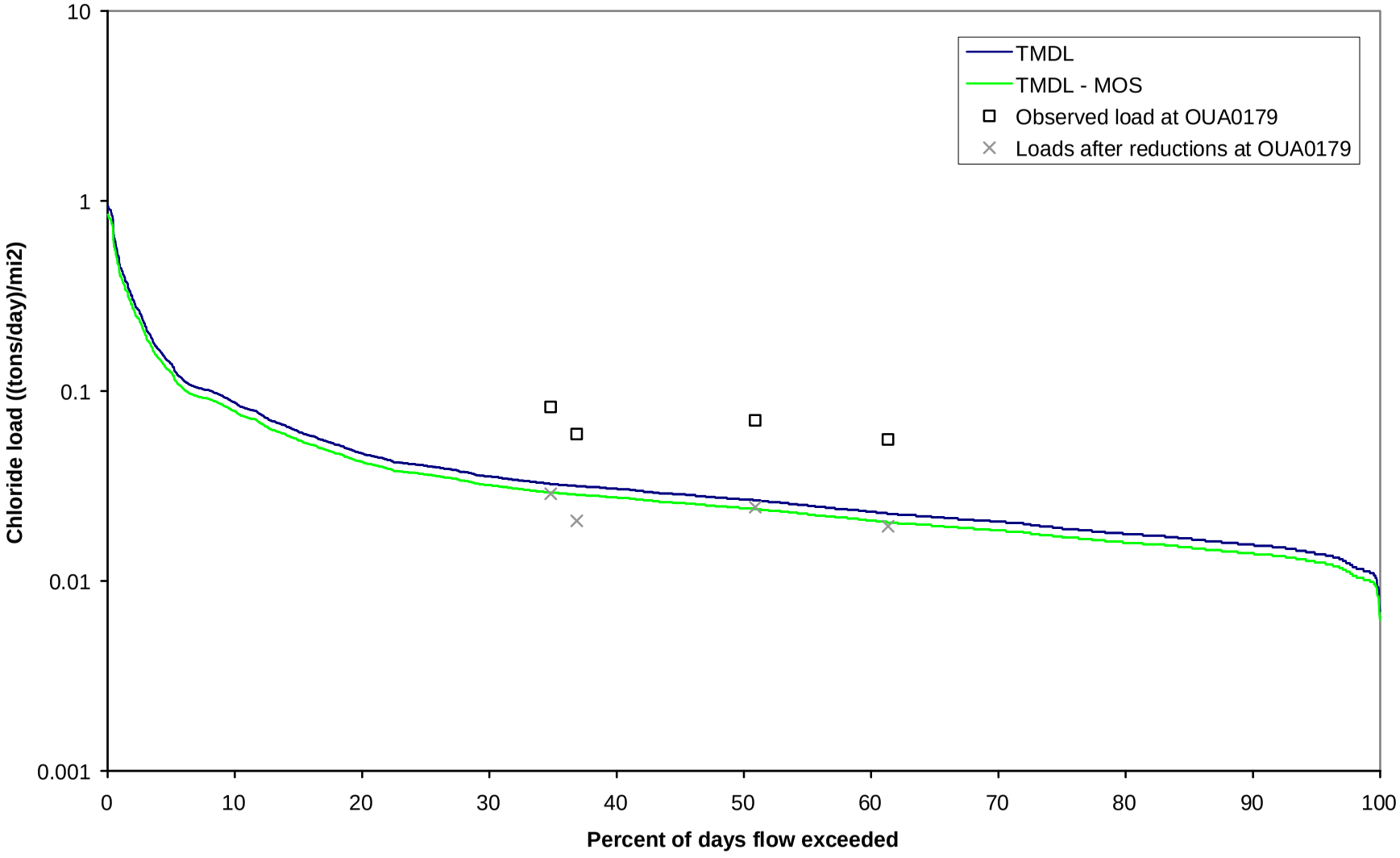


Figure J.6. Summer Chloride Load Duration Curve for Oak Bayou at OUA0179



APPENDIX K

Calculations for Winter Chloride TMDLs

TABLE K.1. CALCULATIONS FOR ALLOWABLE LOADS PER UNIT AREA FOR CHLORIDE DURING WINTER

Percentage of total flow in basin represented by Bayou Macon:

USGS gage number and name	Avg. annual flow 1958-67 (cfs)	Drainage area (mi2)	Percent of combined flow
07367700 Boeuf River near AR/LA state line	875	785	65.2%
07369700 Bayou Macon near Kilbourne, LA	467	504	34.8%
	1,342	1,289	100.0%

	Boeuf	Others	
TMDL =	2.344052752	1.250161467	(gm/sec)/mi2
Total allowable load =	0.223246884	0.119065005	(tons/day)/mi2

Margin of Safety (MOS) = 10%

								Boeuf River Chloride standard = 90 mg/L			Other Streams Chloride standard = 48 mg/L		
Season	Date	Observed flow at Eudora (cfs)	Percent exceedance for observed flow	Adjusted flow for entire basin cfs	cfs/mi2	cms/mi2	"Width" for area under curves	Allowable chloride load at this flow (tons/day)/mi2	Target chloride load at this flow (tons/day)/mi2	"Area under TMDL curve" (tons/day)/mi2	Allowable chloride load at this flow (tons/day)/mi2	Target chloride load at this flow (tons/day)/mi2	"Area under TMDL curve" (tons/day)/mi2
A	B	C	D	E = C / 34.8%	F = E / 1289 mi2	G = E / 35.32	H = D1 - D2	I = G * 90 mg/L	J = I * (1 - MOS)	K = H * I	L = G * 48 mg/L	J = I * (1 - MOS)	N = H * L
WINTER	02/22/00	35	99.98%	100.6	0.078	0.0022	0.04%	0.02	0.02	8.35E-06	0.01	0.01	4.45E-06
WINTER	02/23/00	35	99.93%	100.6	0.078	0.0022	0.04%	0.02	0.02	8.35E-06	0.01	0.01	4.45E-06
WINTER	02/21/00	36	99.89%	103.4	0.080	0.0023	0.04%	0.02	0.02	8.59E-06	0.01	0.01	4.58E-06
WINTER	02/20/00	37	99.85%	106.3	0.082	0.0023	0.04%	0.02	0.02	8.83E-06	0.01	0.01	4.71E-06
WINTER	02/24/00	37	99.80%	106.3	0.082	0.0023	0.04%	0.02	0.02	8.83E-06	0.01	0.01	4.71E-06
WINTER	03/05/00	38	99.76%	109.2	0.085	0.0024	0.04%	0.02	0.02	9.06E-06	0.01	0.01	4.83E-06
WINTER	03/06/00	38	99.71%	109.2	0.085	0.0024	0.04%	0.02	0.02	9.06E-06	0.01	0.01	4.83E-06
WINTER	03/07/00	38	99.67%	109.2	0.085	0.0024	0.04%	0.02	0.02	9.06E-06	0.01	0.01	4.83E-06
For brevity, most of the rows in this spreadsheet have been hidden (between the 99.67% and the 0.33% exceedances).													
WINTER	04/30/91	3200	0.33%	9195.4	7.134	0.2020	0.04%	1.73	1.56	7.63E-04	0.92	0.83	4.07E-04
WINTER	04/26/95	3250	0.29%	9339.1	7.245	0.2051	0.04%	1.76	1.58	7.75E-04	0.94	0.84	4.13E-04
WINTER	02/01/99	3310	0.24%	9511.5	7.379	0.2089	0.04%	1.79	1.61	7.90E-04	0.96	0.86	4.21E-04
WINTER	01/30/99	3500	0.20%	10057.5	7.803	0.2209	0.04%	1.89	1.70	8.35E-04	1.01	0.91	4.45E-04
WINTER	01/31/99	3560	0.15%	10229.9	7.936	0.2247	0.04%	1.93	1.73	8.49E-04	1.03	0.92	4.53E-04
WINTER	04/25/95	3790	0.11%	10890.8	8.449	0.2392	0.04%	2.05	1.85	9.04E-04	1.09	0.98	4.82E-04
WINTER	04/24/95	4150	0.07%	11925.3	9.252	0.2619	0.04%	2.25	2.02	9.90E-04	1.20	1.08	5.28E-04
WINTER	04/23/95	4170	0.02%	11982.8	9.296	0.2632	0.04%	2.26	2.03	9.95E-04	1.20	1.08	5.31E-04
						TOTALS =	**100.00%**			**2.23E-01**			**1.19E-01**

FILE: R:\PROJECTS\2110-613\TECH\TMDL\TMDL CHLORIDES-WINTER.XLS

TABLE K.2. CALCULATIONS FOR CHLORIDE LOADS AND PERCENT REDUCTION FOR WINTER FOR BOEUF RIVER AT OUA0015A (REACH 08050001-018)

WQ standard for chloride = 90 mg/L
Percent reduction needed = 0%

Error check for reduction is / is not needed:
Error check for less or more reduction needed:

Season	Date	Observed chloride at OUA0015A (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	load (gm/s	load (tons/	Observed chloride times flow per unit area	Current chloride load (tons/day)/mi2	Reduced chloride load (tons/day)/mi2
WINTER	4/15/03	18.2	0.00379	88.4%	0.07	0.006564	0.069	0.007	0.0066
WINTER	3/25/03	19.6	0.00417	85.3%	0.08	0.007776	0.082	0.008	0.0078
WINTER	2/25/03	6.1	0.05782	13.1%	0.35	0.033423	0.351	0.033	0.0334
WINTER	1/21/03	38.0	0.00290	96.1%	0.11	0.010508	0.110	0.011	0.0105
WINTER	12/3/02	45.3	0.00259	99.0%	0.12	0.011165	0.117	0.011	0.0112
WINTER	4/23/02	32.1	0.00568	69.9%	0.18	0.01735	0.182	0.017	0.0174
WINTER	3/26/02	12.6	0.01995	31.6%	0.25	0.023916	0.251	0.024	0.0239
WINTER	2/26/02	19.7	0.00846	52.6%	0.17	0.015861	0.167	0.016	0.0159
WINTER	1/14/02	26.6	0.00669	62.3%	0.18	0.016962	0.178	0.017	0.0170
WINTER	12/11/01	27.5	0.05302	14.0%	1.46	0.138861	1.458	0.139	0.1389
WINTER	4/17/01	11.0	0.01445	38.6%	0.16	0.015074	0.158	0.015	0.0151
WINTER	3/26/01	38.5	0.00644	63.7%	0.25	0.023582	0.248	0.024	0.0236
WINTER	2/27/01	13.7	0.04873	15.4%	0.67	0.063671	0.669	0.064	0.0637
WINTER	1/30/01	49.4	0.01856	33.4%	0.92	0.087252	0.916	0.087	0.0873
WINTER	12/19/00	17.7	0.01767	34.3%	0.31	0.029792	0.313	0.030	0.0298
WINTER	4/24/00	38.0	0.00473	80.1%	0.18	0.017132	0.180	0.017	0.0171
WINTER	3/27/00	23.0	0.01950	32.2%	0.45	0.042722	0.449	0.043	0.0427
WINTER	2/29/00	24.1	0.00290	96.2%	0.07	0.006664	0.070	0.007	0.0067
WINTER	1/25/00	6.3	0.00259	99.2%	0.02	0.00154	0.016	0.002	0.0015
WINTER	12/20/99	33.5	0.00328	93.7%	0.11	0.010472	0.110	0.010	0.0105
WINTER	4/27/99	4.5	0.00524	75.0%	0.02	0.00222	0.023	0.002	0.0022
WINTER	3/23/99	12.7	0.00568	70.1%	0.07	0.006871	0.072	0.007	0.0069
WINTER	2/23/99	44.1	0.00536	74.0%	0.24	0.022533	0.237	0.023	0.0225
WINTER	1/26/99	14.1	0.05049	14.8%	0.71	0.067807	0.712	0.068	0.0678

Season	Date	Observed chloride at OUA0015A (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	load (gm/s	load (tons/	Observed chloride times flow per unit area	Current chloride load (tons/day)/mi2	Reduced chloride load (tons/day)/mi2
WINTER	12/22/98	32.0	0.03168	23.3%	1.01	0.096565	1.014	0.097	0.0966
WINTER	4/14/98	45.1	0.00379	88.6%	0.17	0.016256	0.171	0.016	0.0163
WINTER	3/17/98	30.7	0.02714	25.9%	0.83	0.079252	0.832	0.079	0.0793
WINTER	2/17/98	6.0	0.06817	11.0%	0.41	0.038914	0.409	0.039	0.0389
WINTER	1/20/98	14.2	0.01666	35.5%	0.24	0.022467	0.236	0.022	0.0225
WINTER	4/15/97	11.9	0.00505	76.9%	0.06	0.005708	0.060	0.006	0.0057
WINTER	3/11/97	16.3	0.02651	26.4%	0.43	0.041277	0.433	0.041	0.0413
WINTER	2/25/97	8.2	0.02777	25.6%	0.23	0.021644	0.227	0.022	0.0216
WINTER	12/17/96	26.2	0.05725	13.3%	1.50	0.142641	1.498	0.143	0.1426
WINTER	4/23/96	6.1	0.12687	4.0%	0.78	0.073946	0.776	0.074	0.0739
WINTER	3/12/96	48.7	0.00271	98.3%	0.13	0.012599	0.132	0.013	0.0126
WINTER	2/20/96	27.4	0.00366	90.5%	0.10	0.009556	0.100	0.010	0.0096
WINTER	1/30/96	25.1	0.00511	76.3%	0.13	0.01224	0.129	0.012	0.0122
WINTER	12/18/95	69.9	0.02998	24.4%	2.10	0.199727	2.097	0.200	0.1997
WINTER	3/28/95	22.8	0.00555	71.5%	0.13	0.012052	0.127	0.012	0.0121
WINTER	2/14/95	34.2	0.00524	75.3%	0.18	0.017068	0.179	0.017	0.0171
WINTER	1/10/95	14.2	0.00934	50.1%	0.13	0.012633	0.133	0.013	0.0126
WINTER	12/19/94	12.3	0.01477	38.1%	0.18	0.017302	0.182	0.017	0.0173
WINTER	4/19/94	9.9	0.04828	15.4%	0.48	0.045434	0.477	0.045	0.0454
WINTER	3/15/94	10.6	0.01325	40.7%	0.14	0.013381	0.140	0.013	0.0134
WINTER	2/15/94	3.6	0.14517	2.8%	0.52	0.049773	0.523	0.050	0.0498
WINTER	4/13/93	6.0	0.02985	24.4%	0.18	0.017032	0.179	0.017	0.0170
WINTER	3/9/93	3.7	0.00549	72.2%	0.02	0.001951	0.020	0.002	0.0020
WINTER	2/9/93	22.5	0.00473	80.5%	0.11	0.010144	0.107	0.010	0.0101
WINTER	12/1/92	32.2	0.00372	90.0%	0.12	0.01142	0.120	0.011	0.0114
WINTER	4/7/92	5.3	0.00682	61.5%	0.04	0.003408	0.036	0.003	0.0034
WINTER	3/3/92	10.2	0.00480	79.8%	0.05	0.00466	0.049	0.005	0.0047
WINTER	2/4/92	16.5	0.00511	76.5%	0.08	0.008034	0.084	0.008	0.0080
WINTER	1/7/92	3.6	0.00543	73.5%	0.02	0.001846	0.019	0.002	0.0018
WINTER	4/2/91	13.7	0.00757	57.3%	0.10	0.009883	0.104	0.010	0.0099

Season	Date	Observed chloride at OUA0015A (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	load (gm/s	load (tons/	Observed chloride times flow per unit area	Current chloride load (tons/day)/mi2	Reduced chloride load (tons/day)/mi2
WINTER	3/12/91	2.4	0.02809	25.3%	0.07	0.006474	0.068	0.006	0.0065
WINTER	2/5/91	19.9	0.04065	18.6%	0.81	0.077038	0.809	0.077	0.0770
WINTER	1/2/91	11.1	0.07259	10.3%	0.81	0.076734	0.806	0.077	0.0767
WINTER	4/3/90	8.4	0.02695	26.2%	0.23	0.021561	0.226	0.022	0.0216
WINTER	3/6/90	9.2	0.01098	45.6%	0.10	0.009623	0.101	0.010	0.0096
WINTER	2/6/90	5.7	0.07006	10.8%	0.40	0.038033	0.399	0.038	0.0380
WINTER	1/2/90	16.3	0.04980	15.1%	0.81	0.077309	0.812	0.077	0.0773
		TOTALS =	1.4173		#REF!			1.995	Total nu
									Allowable % o
									Allowable no. o
									No. of exceedances bef
									No. of exceedances a

Flow weighted average chloride (mg/L) = (1.995 / 1.4173) / conversion = 15 mg/L

Average flow per unit area for winter = 0.0260 cms/mi2
Estimated drainage area for reach 18 = 180 mi2
Average flow for winter for reach 18 = 0.0260 * 180 = 4.682 cms

Existing total chloride load for winter for reach 18
= 15 mg/L * 4.682 cms * conversions = 6.69 tons/day

%

Sum of design flows for point sources for reach 18 = 0.000 cms
Assumed effluent chloride concentration for point sources = TOTAL 60 mg/L
Existing point source chloride load for winter for reach 18 =
= 0.000 cms * 60 mg/L * conversions = 0.00 tons/day

Existing NPS chloride load for winter for reach 18 = 6.69 - 0.00 = 6.69 tons/day

Total allowable loading per unit area to meet stds (from Table K.1) = 2.23E-01 tons/day/mi2
Total allowable loading for reach 18 = 2.23E-1 * 180 mi2 = 40.13 tons/day

Explicit MOS for chloride for winter for reach 18 (10% * 40.13) =	4.01	tons/day
WLA for chloride for winter for reach 18 (same as existing load) =	0.00	tons/day
LA for chloride for winter for reach 18 = total - MOS - WLA =	36.12	tons/day

FILE: R:\PROJECTS\2110-613\TECH\TMDL\TMDL CHLORIDES-WINTER.XLS

TABLE K.3. CALCULATIONS FOR CHLORIDE LOADS AND PERCENT REDUCTION
FOR WINTER FOR BOEUF RIVER, AT UWBFR01 (REACH 08050001-019)

WQ standard for chloride = 90 mg/L
Percent reduction = 0%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Season	Date	Observed chloride at UWBFR01 (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current chloride load (tons/day)/mi2	Reduced chloride load (tons/day)/mi2	Allowable chloride load with MOS incorporated (tons/day)/mi2	Reduced load less than or equal to allow. load?
WINTER	3/6/01	7.5	0.0600	12.5%	0.043	0.0426	0.51396	Yes
WINTER	1/22/01	8.5	0.0770	9.4%	0.062	0.0622	0.66004	Yes
WINTER	2/27/96	18.2	0.0069	60.3%	0.012	0.0120	0.05951	Yes
WINTER	4/11/95	31.6	0.0274	25.9%	0.082	0.0824	0.23480	Yes
WINTER	1/17/95	17.4	0.0072	59.0%	0.012	0.0119	0.06168	Yes
		TOTALS =	0.1785		0.211			

Total number of values =	5
Allowable % of exceedances =	10%
Allowable no. of exceedances =	1
No. of exceedances before reductions =	0
No. of exceedances after reductions =	0

Flow weighted average chloride (mg/L) = (0.211 / 0.1785) / conversion = 12 mg/L

Average flow per unit area for winter = 0.0260 cms/mi2
Estimated drainage area for reach 19 = 176 mi2
Average flow for winter for reach 19 = 0.0260 * 176 = 4.597 cms

Existing total chloride load for winter for reach 19
= 12 mg/L * 4.597 cms * conversions = 5.25 tons/day

Sum of design flows for point sources for reach 19 = 0.004 cms
Assumed effluent chloride concentration for point sources = 60 mg/L
Existing point source chloride load for winter for reach 19 =
= 0.004 cms * 60 mg/L * conversions = 0.0227 tons/day

Existing NPS chloride load for winter for reach 19 = 5.25 - 0.02 = 5.23 tons/day

Total allowable loading per unit area to meet stds (from Table J.1) =	2.23E-01	tons/day/mi2
Total allowable loading for reach 19 = 2.23E-1 * 176 mi2 =	39.40	tons/day
Explicit MOS for chloride for winter for reach 19 (10% * 39.40) =	3.94	tons/day
WLA for chloride for winter for reach 19 (same as existing load) =	0.02	tons/day
Point source future growth:		
Assumed increase in design flow = 50% =	0.002	cms
Effluent conc. in excess of standard = MAX (0, 60 - 90) =	0	mg/L
Future growth explicit load = 0.000 * 0 * conversions =	0	tons/day
LA for chloride for summer for reach 19 = total - MOS - WLA - FG =	35.44	tons/day

FILE: R:\PROJECTS\2110-613\TECH\TMDL\TMDL CHLORIDES-WINTER.XLS

TABLE K.4. CALCULATIONS FOR EXISTING CHLORIDE LOADS AND PERCENT REDUCTION
FOR WINTER FOR BIG BAYOU AT OUA0032 (REACH 08050001-022)

WQ standard for chloride = 48 mg/L
Percent reduction = 0%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Season	Date	Observed chloride at OUA0032 (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current chloride load (tons/day)/mi2	Reduced chloride load (tons/day)/mi2	Allowable chloride load with MOS incorporated (tons/day)/mi2	Reduced load less than or equal to allow. load?
WINTER	3/6/01	7.0	0.05996	12.5%	0.040	0.0397	0.24670	Yes
WINTER	1/22/01	9.8	0.07700	9.4%	0.072	0.0718	0.31682	Yes
WINTER	2/27/96	21.4	0.00694	60.3%	0.014	0.0142	0.02857	Yes
WINTER	4/11/95	11.4	0.02739	25.9%	0.030	0.0297	0.11270	Yes
WINTER	1/17/95	18.3	0.00720	59.0%	0.013	0.0125	0.02960	Yes
		TOTALS =	0.17850		0.168			

Total number of values =	5
Allowable % of exceedances =	10%
Allowable no. of exceedances =	1
No. of exceedances before reductions =	0
No. of exceedances after reductions =	0

Flow weighted average chloride (mg/L) = (0.168 / 0.1785) / conversion = 10 mg/L

Average flow per unit area for winter = 0.0260 cms/mi2
Estimated drainage area for reach 22 = 189 mi2
Average flow for winter for reach 22 = 0.0260 * 189 = 4.924 cms

Existing total chloride load for winter for reach 22
= 10 mg/L * 4.924 cms * conversions = 4.69 tons/day

Sum of design flows for point sources for reach 22 = 0.083 cms
Assumed effluent chloride concentration for point sources = 60 mg/L
Existing point source chloride load for winter for reach 22 =
= 0.083 cms * 60 mg/L * conversions = 0.48 tons/day

Existing NPS chloride load for winter for reach 22 = 4.69 - 0.48 =	4.21	tons/day
Total allowable loading per unit area to meet stds (from Table J.1) =	1.19E-01	tons/day/mi2
Total allowable loading for reach 22 = 1.19E-1 * 189 mi2 =	22.51	tons/day
Explicit MOS for chloride for winter for reach 22 (10% * 22.51) =	2.25	tons/day
WLA for chloride for winter for reach 22 (same as existing load) =	0.48	tons/day
Point source future growth:		
Assumed increase in design flow = 50% =	0.042	cms
Effluent conc. in excess of standard = MAX (0, 60 - 48) =	12	mg/L
Future growth explicit load = 0.000 * 0 * conversions =	0.05	tons/day
LA for chloride for winter for reach 22 = total - MOS - WLA - FG =	19.73	tons/day

FILE: R:\PROJECTS\2110-613\TECH\TMDL\TMDL CHLORIDES-WINTER.XLS

TABLE K.5. CALCULATIONS FOR EXISTING CHLORIDE LOADS AND PERCENT REDUCTION
FOR WINTER FOR BIG BAYOU AT UWBGB01 (REACH 08050001-022)

WQ standard for chloride = 48 mg/L
Percent reduction = 0%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Season	Date	Observed chloride at UWBGB01 (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current chloride load (tons/day)/mi2	Reduced chloride load (tons/day)/mi2	Allowable chloride load with MOS incorporated (tons/day)/mi2	Reduced load less than or equal to allow. load?
WINTER	2/27/96	59.5	0.0069	60.3%	0.039	0.0394	0.02857	No
WINTER	1/17/95	19.0	0.0072	59.0%	0.013	0.0130	0.02960	Yes
WINTER	4/11/95	12.6	0.0274	25.9%	0.033	0.0329	0.11270	Yes
WINTER	3/6/01	19.5	0.0600	12.5%	0.111	0.1112	0.24670	Yes
WINTER	1/22/01	11.9	0.0770	9.4%	0.087	0.0870	0.31682	Yes
		TOTALS =	0.1785		0.283			

Total number of values =	5
Allowable % of exceedances =	10%
Allowable no. of exceedances =	1
No. of exceedances before reductions =	1
No. of exceedances after reductions =	1

Flow weighted average chloride (mg/L) = (0.283 / 0.1785) / conversion = 17 mg/L

Average flow per unit area for winter = 0.0260 cms/mi2
Estimated drainage area for reach 22 = 189 mi2
Average flow for winter for reach 22 = 0.0260 * 189 = 4.924 cms

Existing total chloride load for winter for reach 22
= 17 mg/L * 4.924 cms * conversions = 7.97 tons/day

Sum of design flows for point sources for reach 22 = 0.083 cms
Assumed effluent chloride concentration for point sources = 60 mg/L
Existing point source chloride load for winter for reach 22 =
= 0.083 cms * 60 mg/L * conversions = 0.48 tons/day

Existing NPS chloride load for winter for reach 22 = 7.97 - 0.48 =	7.49	tons/day
Total allowable loading per unit area to meet stds (from Table J.1) =	1.19E-01	tons/day/mi2
Total allowable loading for reach 22 = 1.19E-1 * 189 mi2 =	22.51	tons/day
Explicit MOS for chloride for winter for reach 22 (10% * 22.51) =	2.25	tons/day
WLA for chloride for winter for reach 22 (same as existing load) =	0.48	tons/day
Point source future growth:		
Assumed increase in design flow = 50% =	0.04	cms
Effluent conc. in excess of standard = MAX (0, 60 - 48) =	12.00	mg/L
Future growth explicit load = 0.042 * 12 * conversions =	0.05	tons/day
LA for chloride for winter for reach 22 = total - MOS - WLA - FG =	19.73	tons/day

FILE: R:\PROJECTS\2110-613\TECH\TMDL\TMDL CHLORIDES-WINTER.XLS

TABLE K.6. CALCULATIONS FOR EXISTING CHLORIDE LOADS AND PERCENT REDUCTION
FOR WINTER FOR OAK BAYOU OUA0179 (REACH 08050002-010)

WQ standard for chloride = 48 mg/L
Percent reduction = 0%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Season	Date	Observed chloride at OUA179 (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current chloride load (tons/day)/mi2	Reduced chloride load (tons/day)/mi2	Allowable chloride load with MOS incorporated (tons/day)/mi2	Reduced load less than or equal to allow. load?
WINTER	1/23/01	10.1	0.0442	16.7%	0.043	0.0426	0.18178	Yes
WINTER	3/5/01	6.0	0.0757	9.5%	0.044	0.0436	0.31162	Yes
		TOTALS =	0.1199		0.086			

Total number of values =	2
Allowable % of exceedances =	10%
Allowable no. of exceedances =	1
No. of exceedances before reductions =	0
No. of exceedances after reductions =	0

Flow weighted average chloride (mg/L) = (0.086 / 0.1199) / conversion = 8 mg/L

Average flow per unit area for winter = 0.0260 cms/mi2
Estimated drainage area for reach 10 = 136 mi2
Average flow for winter for reach 10 = 0.0260 * 136 = 3.549 cms

Existing total chloride load for winter for reach 10
= 8 mg/L * 3.549 cms * conversions = 2.70 tons/day

Sum of design flows for point sources for reach 10 = 0.000 cms
Assumed effluent chloride concentration for point sources = 60 mg/L
Existing point source chloride load for winter for reach 10 =
= 0.000 cms * 60 mg/L * conversions = 0.00 tons/day

Existing NPS chloride load for winter for reach 10 = 2.70 - 0.00 = 2.70 tons/day

Total allowable loading per unit area to meet stds (from Table J.1) =	1.19E-01	tons/day/mi2
Total allowable loading for reach 10 = 1.19E-1 * 136 mi2 =	16.23	tons/day
Explicit MOS for chloride for winter for reach 10 (10% * 16.23) =	1.62	tons/day
WLA for chloride for winter for reach 10 (same as existing load) =	0.00	tons/day
LA for chloride for winter for reach 10 = total - MOS - WLA =	14.61	tons/day

FILE: R:\PROJECTS\2110-613\TECH\TMDL\TMDL CHLORIDES-WINTER.XLS

Figure K.1. Winter Flow Duration Curve for USGS 07369680 Bayou Macon near Eudora

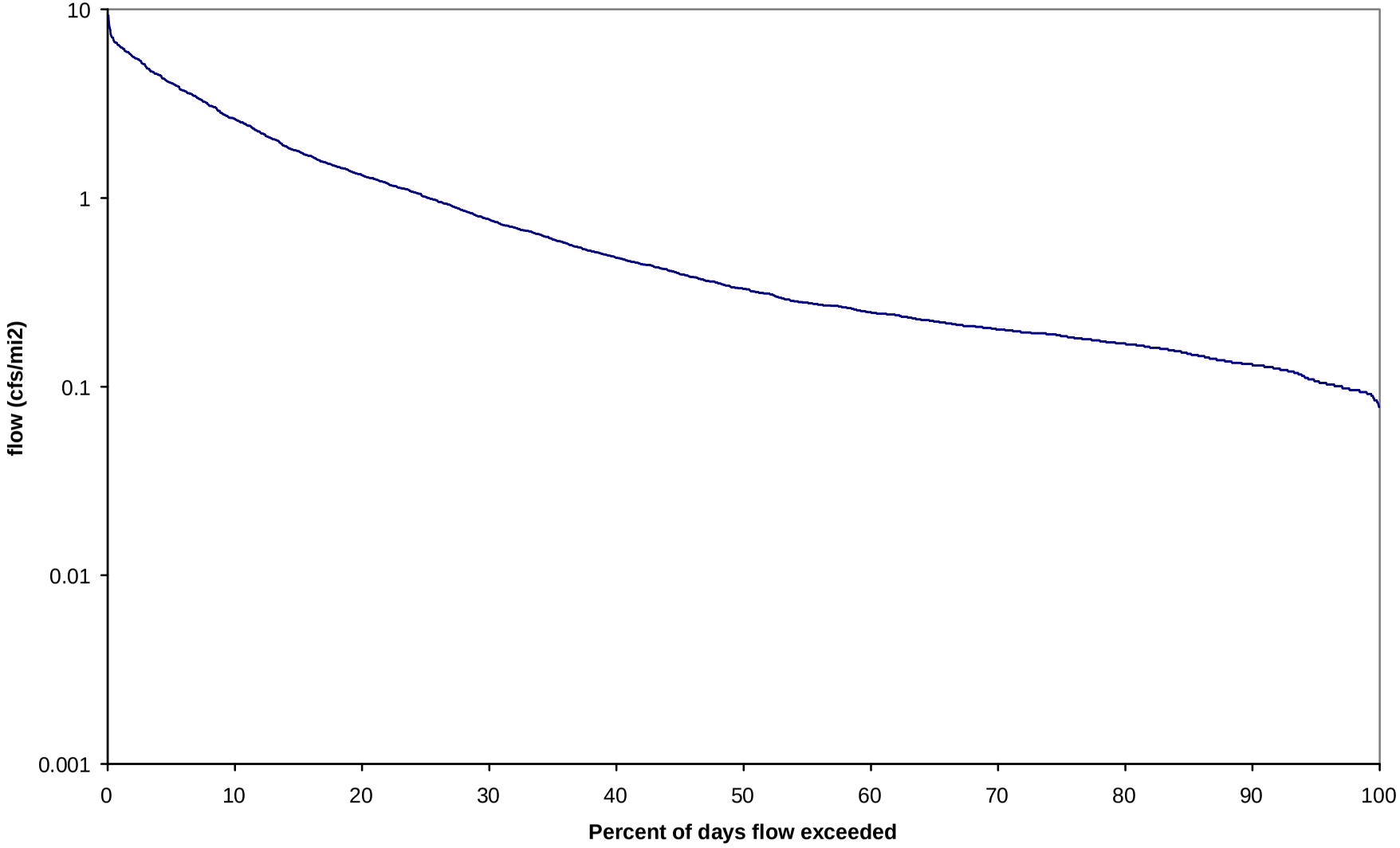


Figure K.2. Winter Chloride Load Duration Curve for Boeuf River at OUA0015A

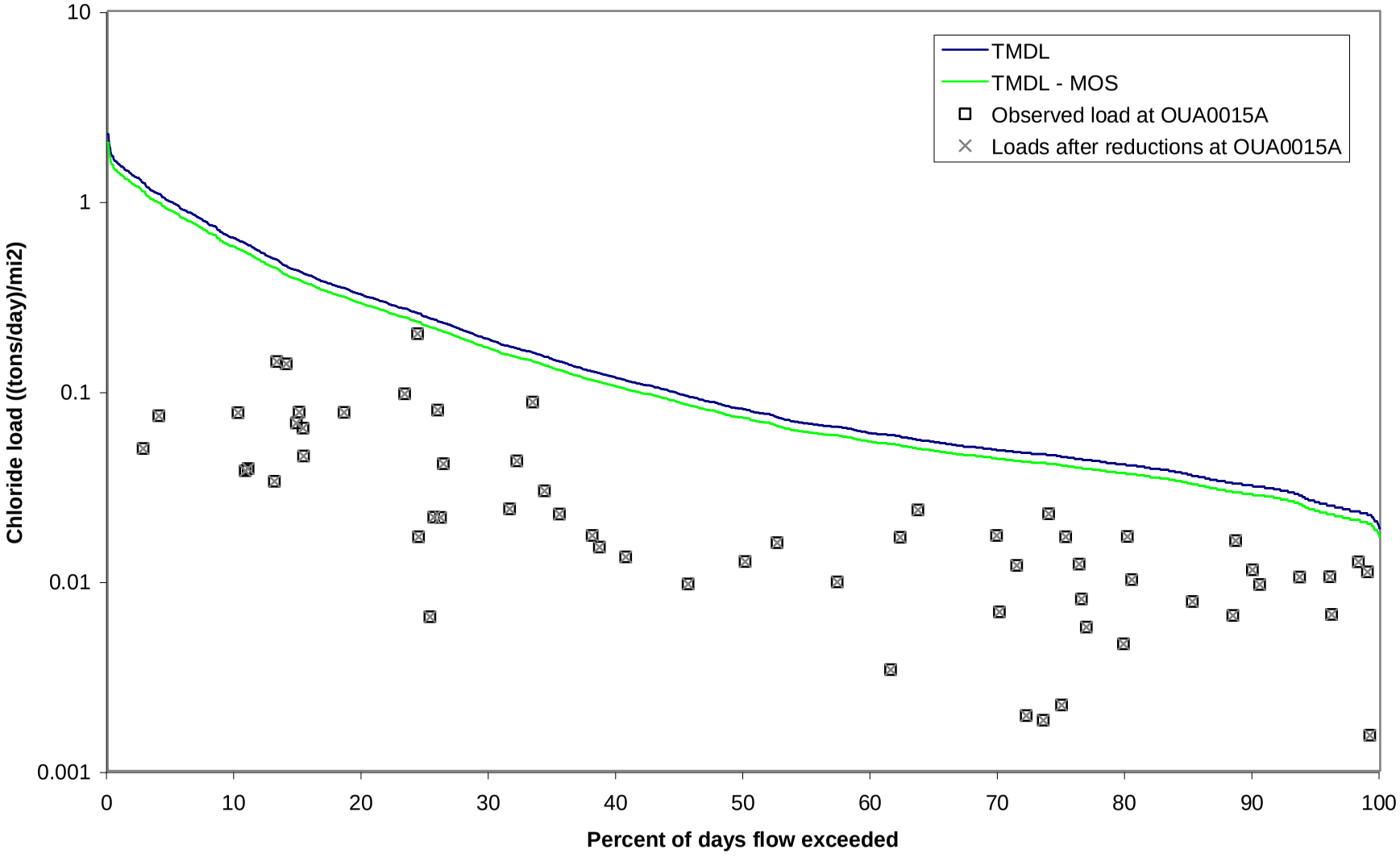


Figure K.3. Winter Chloride Load Duration Curve for Boeuf River at UWBFR01

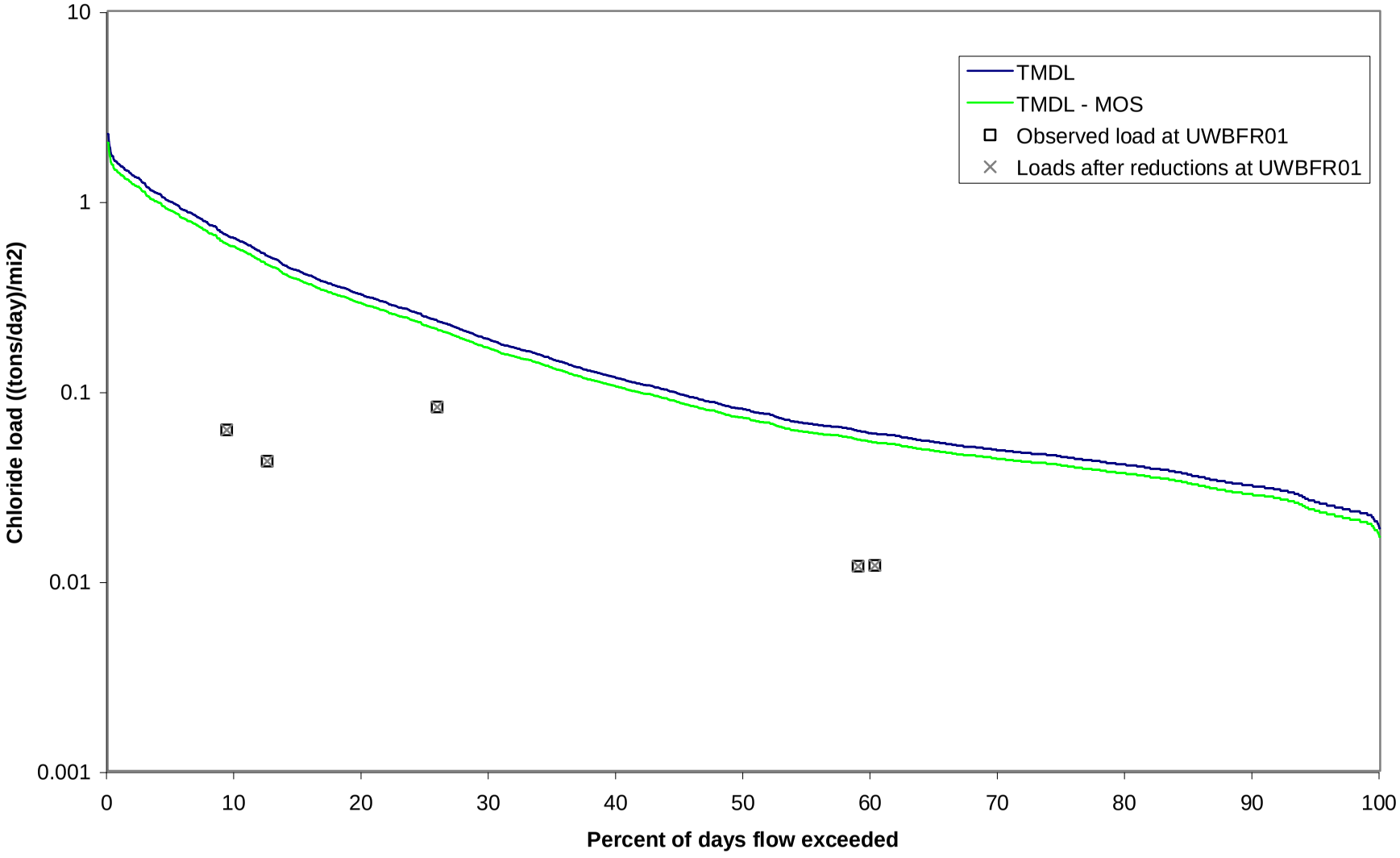


Figure K.4. Winter Chloride Load Duration Curve for Big Bayou at OUA032

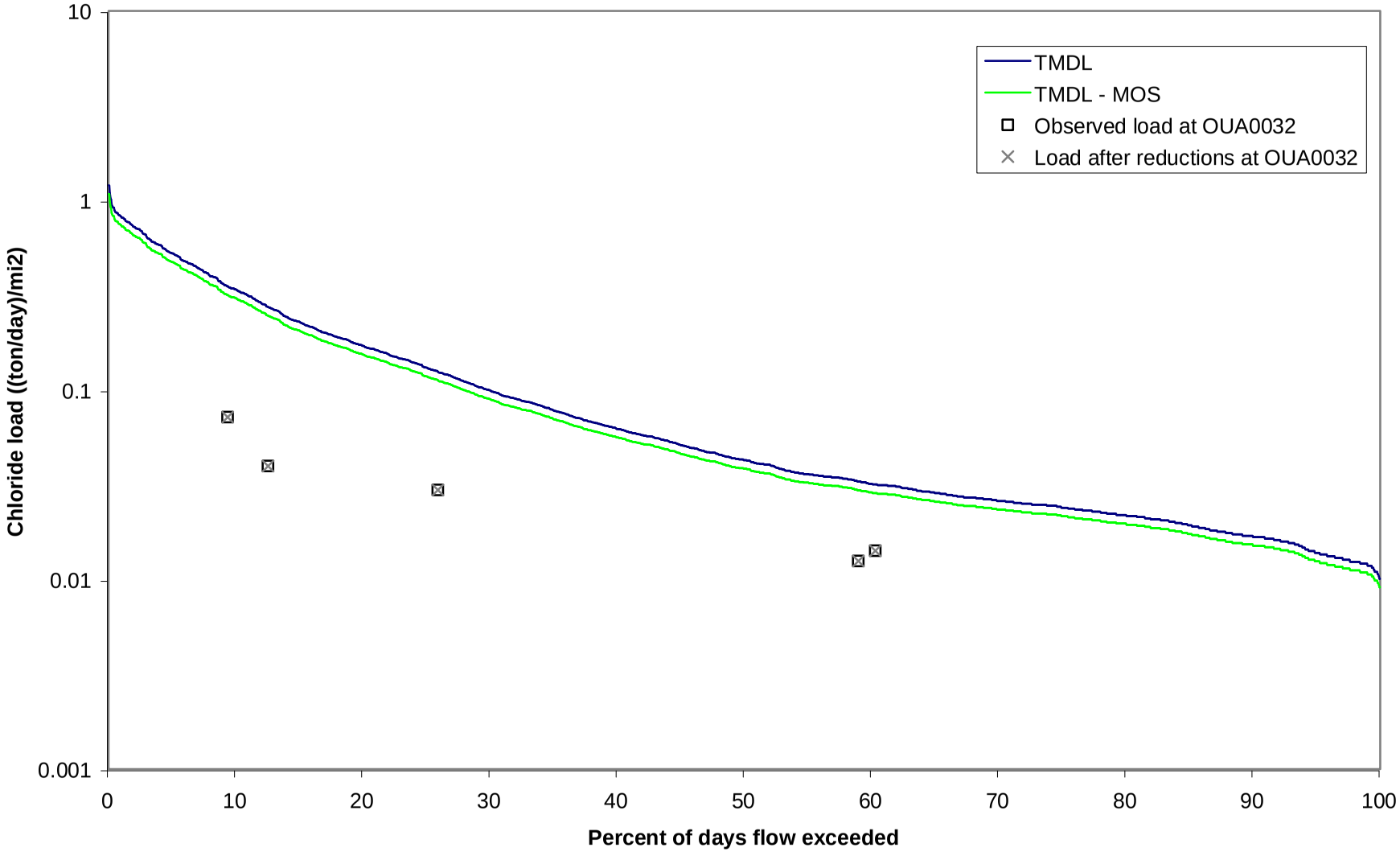


Figure K.5. Winter Chloride Load Duration Curve for Big Bayou at UWBGB01

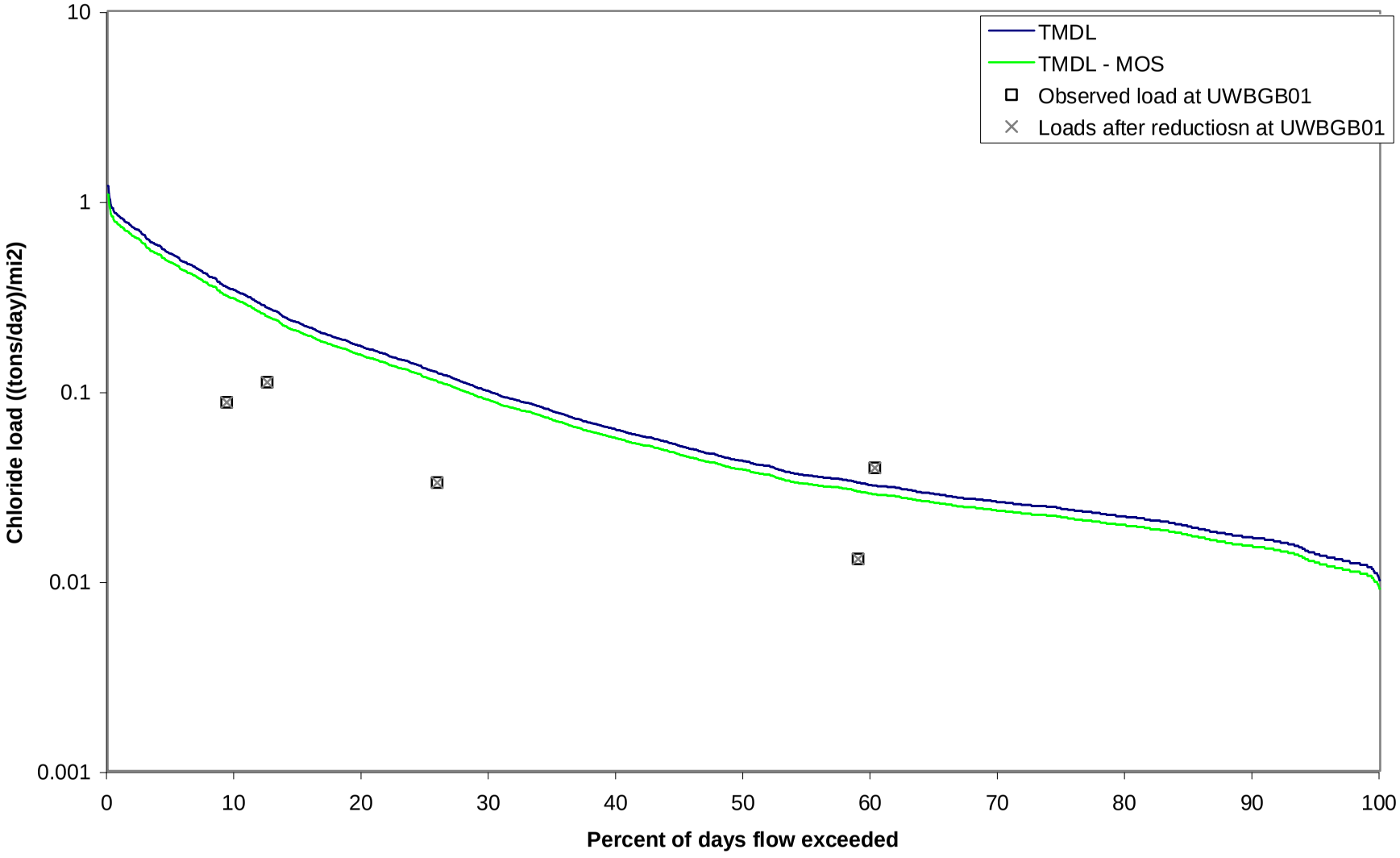
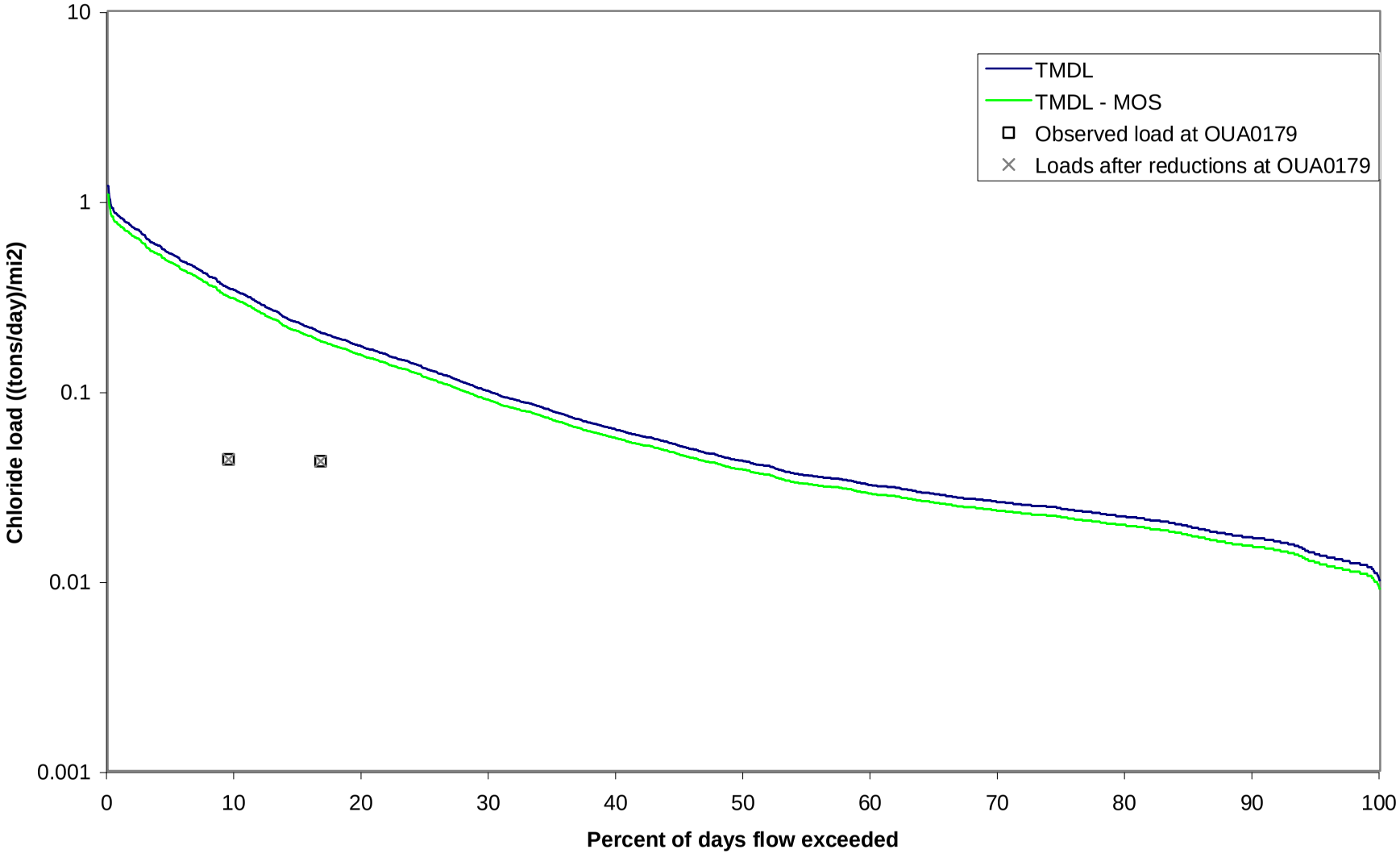


Figure K.6. Winter Chloride Load Duration Curve for Oak Bayou at OUA0179



APPENDIX L

Calculations for Summer TDS TMDL

TABLE L.1. CALCULATIONS FOR ALLOWABLE LOADS PER UNIT AREA FOR TDS DURING SUMMER

Percentage of total flow in basin represented by Bayou Macon:

USGS gage number and name	Avg. annual flow 1957-68 (cfs)	Drainage area (mi2)	Percent of combined flow
07367700 Boeuf River near AR/LA state line	875	785	65.2%
07369700 Bayou Macon near Kilbourne, LA	467	504	34.8%
	1,342	1,289	100.0%

Margin of Safety (MOS) = 10%

								Boeuf River TDS standard = 460 mg/L			Other Streams (Oak Log Bayou) TDS standard = 411 mg/L		
				Adjusted flow for entire basin									
Season	Date	Observed flow at Eudora (cfs)	Percent exceedance for observed flow	cfs	cfs/mi2	cms/mi2	"Width" for area under curves	Allowable TDS load at this flow (tons/day)/mi2	Target TDS load at this flow (tons/day)/mi2	"Area under TMDL curve" (tons/day)/mi2	Allowable TDS load at this flow (tons/day)/mi2	Target TDS load at this flow (tons/day)/mi2	"Area under TMDL curve" (tons/day)/mi2
A	B	C	D	E = C / 34.8%	F = E / 1289 mi2	G = E / 35.32	H = D1 - D2	I = G * 460 mg/L * conversion	J = I * (1 - MOS)	K = H * I	L = G * 411 mg/L * conversion	M = L * (1 - MOS)	N = H * L
SUMMER	06/22/02	24	99.98%	69.0	0.054	0.0015	0.03%	0.07	0.06	2.07E-05	0.06	0.05	1.85E-05
SUMMER	06/20/02	25	99.95%	71.8	0.056	0.0016	0.03%	0.07	0.06	2.15E-05	0.06	0.06	1.92E-05
SUMMER	06/21/02	26	99.92%	74.7	0.058	0.0016	0.03%	0.07	0.06	2.24E-05	0.06	0.06	2.00E-05
SUMMER	06/19/02	31	99.89%	89.1	0.069	0.0020	0.03%	0.09	0.08	2.67E-05	0.08	0.07	2.39E-05
SUMMER	05/21/95	32	99.86%	92.0	0.071	0.0020	0.03%	0.09	0.08	2.76E-05	0.08	0.07	2.46E-05
SUMMER	05/22/95	32	99.83%	92.0	0.071	0.0020	0.03%	0.09	0.08	2.76E-05	0.08	0.07	2.46E-05
SUMMER	10/10/01	32	99.80%	92.0	0.071	0.0020	0.03%	0.09	0.08	2.76E-05	0.08	0.07	2.46E-05
SUMMER	05/20/95	33	99.77%	94.8	0.074	0.0021	0.03%	0.09	0.08	2.84E-05	0.08	0.07	2.54E-05

For brevity, most of the rows in this spreadsheet have been hidden (between the 99.77% and the 0.23% exceedances).

SUMMER	05/03/91	3110	0.23%	8936.8	6.933	0.1963	0.03%	8.60	7.74	2.68E-03	7.68	6.92	2.39E-03
SUMMER	05/06/91	3110	0.20%	8936.8	6.933	0.1963	0.03%	8.60	7.74	2.68E-03	7.68	6.92	2.39E-03
SUMMER	05/02/91	3130	0.17%	8994.3	6.978	0.1976	0.03%	8.66	7.79	2.70E-03	7.73	6.96	2.41E-03
SUMMER	05/04/91	3130	0.14%	8994.3	6.978	0.1976	0.03%	8.66	7.79	2.70E-03	7.73	6.96	2.41E-03
SUMMER	05/05/91	3130	0.11%	8994.3	6.978	0.1976	0.03%	8.66	7.79	2.70E-03	7.73	6.96	2.41E-03
SUMMER	05/01/91	3170	0.08%	9109.2	7.067	0.2001	0.03%	8.77	7.89	2.73E-03	7.83	7.05	2.44E-03
SUMMER	05/31/98	3250	0.05%	9339.1	7.245	0.2051	0.03%	8.99	8.09	2.80E-03	8.03	7.23	2.50E-03
SUMMER	05/30/98	3270	0.02%	9396.6	7.290	0.2064	0.03%	9.04	8.14	2.82E-03	8.08	7.27	2.52E-03
						TOTALS =	**100.00%**			**4.60E-01**			**4.11E-01**

FILE: R:\PROJECTS\2110-613\TECH\TMDL\REVISED\TMDL TDS-SUMMER.XLS

TABLE L.2. CALCULATIONS FOR TDS LOADS AND PERCENT REDUCTION
FOR SUMMER FOR BOEUF RIVER AT OUA0015A (REACH 08050001-018)

WQ standard for TDS = 460 mg/L
Percent reduction needed = 26%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Season	Date	Observed TDS at OUA0015A (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current TDS load (tons/day)/mi2	Reduced TDS load (tons/day)/mi2	Allowable TDS load with MOS incorporated (tons/day)/mi2	Reduced load less than or equal to allow. load?
SUMMER	7/19/94	232	0.0802	1.6%	1.771	1.3107	3.1606	Yes
SUMMER	11/5/02	198	0.0434	3.3%	0.819	0.6060	1.7122	Yes
SUMMER	6/21/93	379	0.0323	4.6%	1.164	0.8615	1.2717	Yes
SUMMER	6/17/03	187	0.0304	5.0%	0.541	0.4001	1.1971	Yes
SUMMER	8/16/94	354	0.0242	6.2%	0.815	0.6031	0.9532	Yes
SUMMER	11/28/94	231	0.0241	6.2%	0.530	0.3925	0.9507	Yes
SUMMER	7/27/99	643	0.0210	8.7%	1.287	0.9525	0.8287	No
SUMMER	7/2/91	274	0.0193	9.7%	0.504	0.3730	0.7615	Yes
SUMMER	6/28/94	416	0.0191	9.9%	0.758	0.5607	0.7541	Yes
SUMMER	11/23/93	179	0.0175	11.1%	0.298	0.2206	0.6894	Yes
SUMMER	11/16/98	462	0.0158	12.4%	0.694	0.5138	0.6222	Yes
SUMMER	9/29/98	567	0.0151	12.9%	0.818	0.6053	0.5973	No
SUMMER	6/29/99	332	0.0145	13.9%	0.457	0.3382	0.5699	Yes
SUMMER	5/22/01	265.5	0.0138	14.4%	0.350	0.2586	0.5450	Yes
SUMMER	7/22/98	298	0.0104	19.6%	0.296	0.2187	0.4106	Yes
SUMMER	5/13/97	296	0.0090	23.7%	0.254	0.1883	0.3559	Yes
SUMMER	9/27/94	444	0.0090	24.1%	0.382	0.2824	0.3559	Yes
SUMMER	6/9/98	196	0.0090	24.3%	0.167	0.1238	0.3534	Yes
SUMMER	7/26/93	348	0.0086	26.3%	0.285	0.2105	0.3385	Yes
SUMMER	8/8/95	518	0.0085	26.9%	0.417	0.3088	0.3335	Yes
SUMMER	9/23/03	307	0.0084	27.1%	0.245	0.1816	0.3310	Yes
SUMMER	8/17/99	483.5	0.0083	27.5%	0.384	0.2839	0.3285	Yes
SUMMER	5/24/94	270	0.0083	27.6%	0.213	0.1573	0.3260	Yes
SUMMER	8/4/92	240	0.0081	28.3%	0.186	0.1377	0.3210	Yes
SUMMER	8/11/98	423	0.0080	28.8%	0.320	0.2371	0.3136	Yes
SUMMER	9/3/91	391	0.0078	29.5%	0.291	0.2157	0.3086	Yes
SUMMER	9/1/92	409	0.0076	30.9%	0.297	0.2201	0.3011	Yes
SUMMER	8/6/96	231	0.0074	32.5%	0.162	0.1202	0.2912	Yes

SUMMER	8/20/01	366	0.0073	32.8%	0.255	0.1889	0.2887	Yes
SUMMER	6/4/91	231	0.0073	33.1%	0.161	0.1192	0.2887	Yes
SUMMER	9/1/98	408	0.0070	35.7%	0.272	0.2015	0.2762	Yes
SUMMER	7/16/96	676	0.0068	38.0%	0.439	0.3248	0.2688	No
SUMMER	7/17/95	209	0.0068	38.1%	0.136	0.1004	0.2688	Yes
SUMMER	6/10/97	276	0.0067	39.5%	0.176	0.1301	0.2638	Yes
SUMMER	8/6/91	409	0.0066	40.9%	0.258	0.1910	0.2613	Yes
SUMMER	7/15/03	265	0.0064	42.2%	0.162	0.1202	0.2538	Yes
SUMMER	5/28/02	193	0.0064	42.3%	0.118	0.0876	0.2538	Yes
SUMMER	5/20/03	460	0.0063	43.3%	0.277	0.2046	0.2489	Yes
SUMMER	9/4/90	549	0.0063	44.2%	0.330	0.2442	0.2489	Yes
SUMMER	7/7/92	282	0.0062	45.2%	0.168	0.1242	0.2464	Yes
SUMMER	6/2/92	380	0.0062	46.0%	0.224	0.1657	0.2439	Yes
SUMMER	6/20/95	419	0.0061	47.4%	0.242	0.1789	0.2389	Yes
SUMMER	11/7/00	185	0.0058	50.9%	0.102	0.0757	0.2290	Yes
SUMMER	10/1/96	142	0.0058	51.0%	0.079	0.0581	0.2290	Yes
SUMMER	8/12/03	473	0.0056	53.6%	0.250	0.1852	0.2190	Yes
SUMMER	10/15/02	206	0.0055	54.3%	0.108	0.0797	0.2165	Yes
SUMMER	7/25/00	804	0.0054	55.2%	0.416	0.3076	0.2140	No
SUMMER	5/21/96	305	0.0053	56.8%	0.154	0.1140	0.2090	Yes
SUMMER	11/25/91	252	0.0053	57.0%	0.127	0.0942	0.2090	Yes
SUMMER	5/25/99	259	0.0052	57.4%	0.129	0.0956	0.2066	Yes
SUMMER	8/26/97	377	0.0052	58.6%	0.186	0.1375	0.2041	Yes
SUMMER	5/18/93	287	0.0052	58.8%	0.141	0.1047	0.2041	Yes
SUMMER	5/30/00	295	0.0050	59.9%	0.142	0.1050	0.1991	Yes
SUMMER	8/20/02	319	0.0050	60.6%	0.151	0.1121	0.1966	Yes
SUMMER	9/21/99	378	0.0049	61.5%	0.177	0.1312	0.1941	Yes
SUMMER	6/18/96	474	0.0049	61.7%	0.222	0.1645	0.1941	Yes
SUMMER	6/27/00	272	0.0049	62.4%	0.126	0.0932	0.1916	Yes
SUMMER	9/17/01	230.5	0.0048	63.7%	0.105	0.0779	0.1891	Yes
SUMMER	9/10/96	358	0.0048	64.1%	0.164	0.1210	0.1891	Yes
SUMMER	7/24/01	537	0.0045	68.3%	0.232	0.1720	0.1792	Yes
SUMMER	7/22/97	357	0.0045	68.6%	0.155	0.1143	0.1792	Yes
SUMMER	10/1/91	407	0.0045	69.1%	0.176	0.1304	0.1792	Yes
SUMMER	6/19/01	401	0.0044	70.8%	0.169	0.1249	0.1742	Yes
SUMMER	5/19/98	548	0.0044	72.3%	0.227	0.1682	0.1717	Yes
SUMMER	9/19/00	557	0.0042	73.6%	0.224	0.1660	0.1667	Yes
SUMMER	10/28/97	227	0.0042	73.8%	0.091	0.0677	0.1667	Yes
SUMMER	9/21/93	601	0.0040	77.1%	0.231	0.1711	0.1593	No

SUMMER	10/29/91	372	0.0040	77.2%	0.143	0.1059	0.1593	Yes
SUMMER	9/17/02	381	0.0040	77.6%	0.144	0.1068	0.1568	Yes
SUMMER	10/17/00	499	0.0039	80.4%	0.183	0.1354	0.1518	Yes
SUMMER	11/27/90	204	0.0039	81.1%	0.075	0.0554	0.1518	Yes
SUMMER	11/19/01	540	0.0038	81.7%	0.195	0.1441	0.1493	Yes
SUMMER	10/19/99	395.5	0.0038	82.1%	0.143	0.1056	0.1493	Yes
SUMMER	11/18/97	277	0.0038	82.7%	0.100	0.0739	0.1493	Yes
SUMMER	11/19/96	242	0.0038	82.8%	0.087	0.0646	0.1493	Yes
SUMMER	10/30/90	48	0.0036	86.0%	0.016	0.0122	0.1419	Yes
SUMMER	9/29/92	407	0.0035	88.7%	0.135	0.0996	0.1369	Yes
SUMMER	9/30/97	454	0.0034	89.2%	0.147	0.1091	0.1344	Yes
SUMMER	11/13/95	596	0.0033	90.9%	0.190	0.1405	0.1319	No
SUMMER	9/19/95	611	0.0033	91.0%	0.195	0.1441	0.1319	No
SUMMER	5/5/92	290	0.0033	91.5%	0.092	0.0684	0.1319	Yes
SUMMER	5/23/95	312	0.0033	92.4%	0.098	0.0722	0.1294	Yes
SUMMER	10/2/90	349	0.0033	92.6%	0.109	0.0807	0.1294	Yes
SUMMER	10/17/95	597	0.0032	93.3%	0.183	0.1354	0.1269	No
SUMMER	11/22/99	655	0.0030	95.0%	0.189	0.1399	0.1195	No
SUMMER	10/23/01	154	0.0028	96.9%	0.042	0.0308	0.1120	Yes
SUMMER	10/26/93	317	0.0025	98.4%	0.076	0.0564	0.0995	Yes
		TOTALS =	0.7747		24.752			

Total number of values =	87
Allowable % of exceedances =	10%
Allowable no. of exceedances =	9
No. of exceedances before reductions =	20
No. of exceedances after reductions =	9

Flow weighted average TDS (mg/L) = (24.752 / 0.7747) / conversion = 335 mg/L

Average flow per unit area for summer = 0.0105 cms/mi2
Estimated drainage area for reach 18 = 180 mi2
Average flow for summer for reach 18 = 0.0105 * 180 = 1.887 cms

Existing total TDS load for summer for reach 18
= 335 mg/L * 1.887 cms * conversions = 60.28 tons/day

Sum of design flows for point sources for reach 18 = 0.000 cms
Assumed effluent TDS concentration for point sources = 60 mg/L
Existing point source TDS load for summer for reach 18 =

= 0.000 cms * 60 mg/L * conversions =	0.00	tons/day
Existing NPS TDS load for summer for reach 18 = 60.28 - 0.00 =	60.28	tons/day
Total allowable loading per unit area to meet stds (from Table L.1) =	4.60E-01	tons/day/mi2
Total allowable loading for reach 18 = 4.60E-1 * 180 mi2 =	82.66	tons/day
Explicit MOS for TDS for summer for reach 18 (10% * 82.66) =	8.27	tons/day
WLA for TDS for summer for reach 18 (same as existing load) =	0.00	tons/day
LA for TDS for summer for reach 18 = total - MOS - WLA =	74.39	tons/day

FILE: R:\PROJECTS\2110-613\TECH\TMDL\REVISED\TMDL TDS-SUMMER.XLS

TABLE L.3. CALCULATIONS FOR TDS LOADS AND PERCENT REDUCTION
FOR SUMMER FOR OAK BAYOU AT OUA0179 (REACH 08050002-010)

WQ standard for TDS = 411 mg/L
Percent reduction needed = 32%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Season	Date	Observed TDS at OUA0179 (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current TDS load (tons/day)/mi2	Reduced TDS load (tons/day)/mi2	Allowable TDS load with MOS incorporated (tons/day)/mi2	Reduced load less than or equal to allow. load?
SUMMER	9/11/01	475	0.0071	34.8%	0.320	0.217	0.2490	Yes
SUMMER	7/16/01	525	0.0069	36.9%	0.344	0.234	0.2424	Yes
SUMMER	5/15/01	538	0.0049	61.3%	0.252	0.172	0.1734	Yes
SUMMER	11/7/00	888.5	0.0058	50.9%	0.491	0.334	0.2046	No
		TOTALS =	0.0247		1.407			

Total number of values =	4
Allowable % of exceedances =	10%
Allowable no. of exceedances =	1
No. of exceedances before reductions =	4
No. of exceedances after reductions =	1

Flow weighted average TDS (mg/L) = (1.407 / 0.0247) / conversion = 599 mg/L

Average flow per unit area for summer = 0.0105 cms/mi2
Estimated drainage area for reach 10 = 136 mi2
Average flow for summer for reach 10 = 0.0105 * 136 = 1.430 cms

Existing total TDS load for summer for reach 10
= 599 mg/L * 1.430 cms * conversions = 81.56 tons/day

Sum of design flows for point sources for reach 10 = 0.000 cms
Assumed effluent TDS concentration for point sources = 60 mg/L
Existing point source TDS load for summer for reach 10 =
= 0.000 cms * 60 mg/L * conversions = 0.00 tons/day

Existing NPS TDS load for summer for reach 10 = 81.56 - 0.00 = 81.56 tons/day

Total allowable loading per unit area to meet stds (from Table L.1) =	4.11E-01	tons/day/mi2
Total allowable loading for reach 10 = 4.11E-1 * 136 mi2 =	55.98	tons/day
Explicit MOS for TDS for summer for reach 10 (10% * 55.98) =	5.60	tons/day
WLA for TDS for summer for reach 10 (same as existing load) =	0.00	tons/day
LA for TDS for summer for reach 10 = total - MOS - WLA =	50.38	tons/day

FILE: R:\PROJECTS\2110-613\TECH\TMDL\REVISED\TMDL TDS-SUMMER.XLS

Table L.3

Figure L.1. Summer Flow Duration Curve for USGS 07369680 Bayou Macon near Eudora

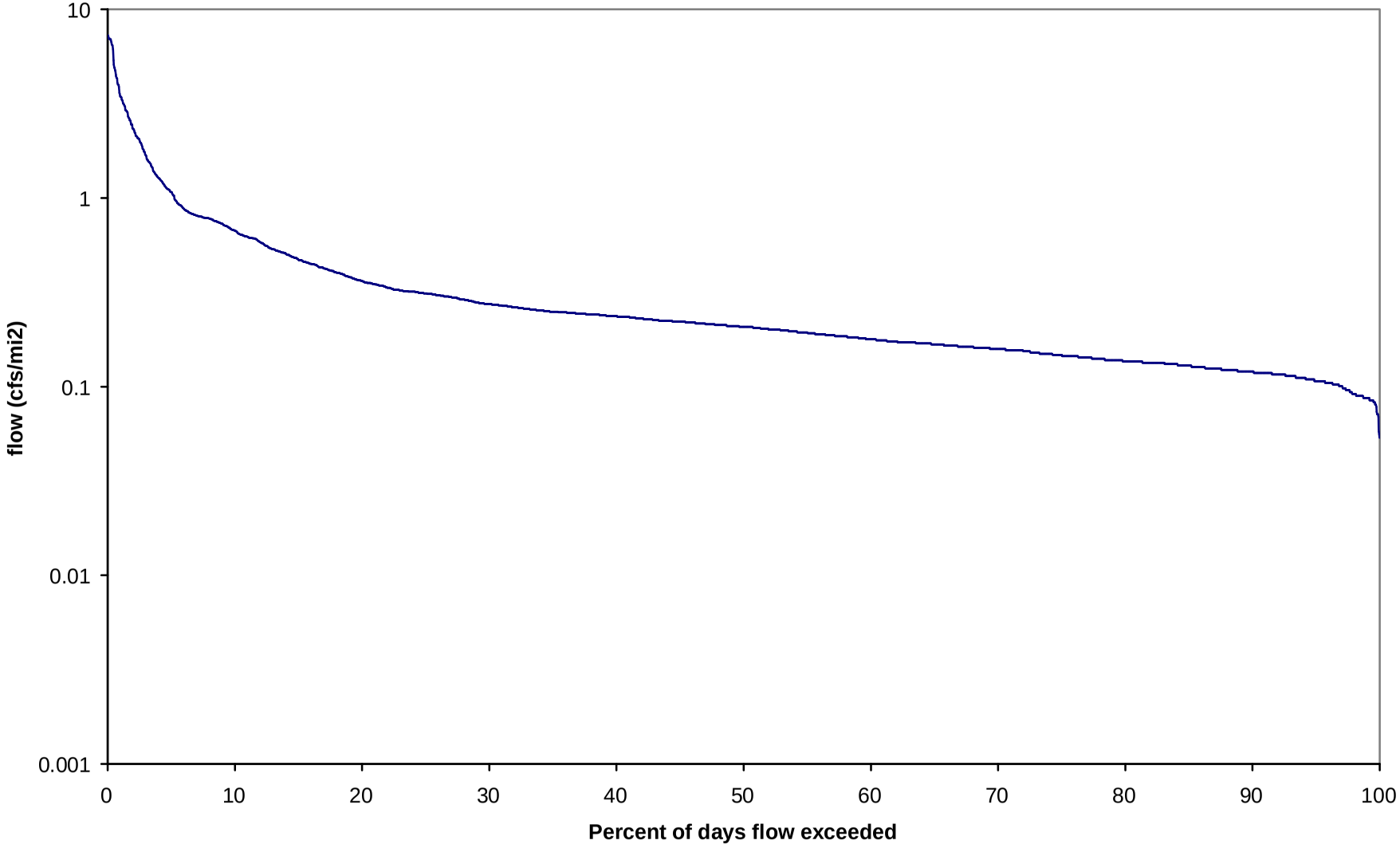


Figure L.2. Summer TDS Load Duration Curve for Boeuf River at OUA0015A

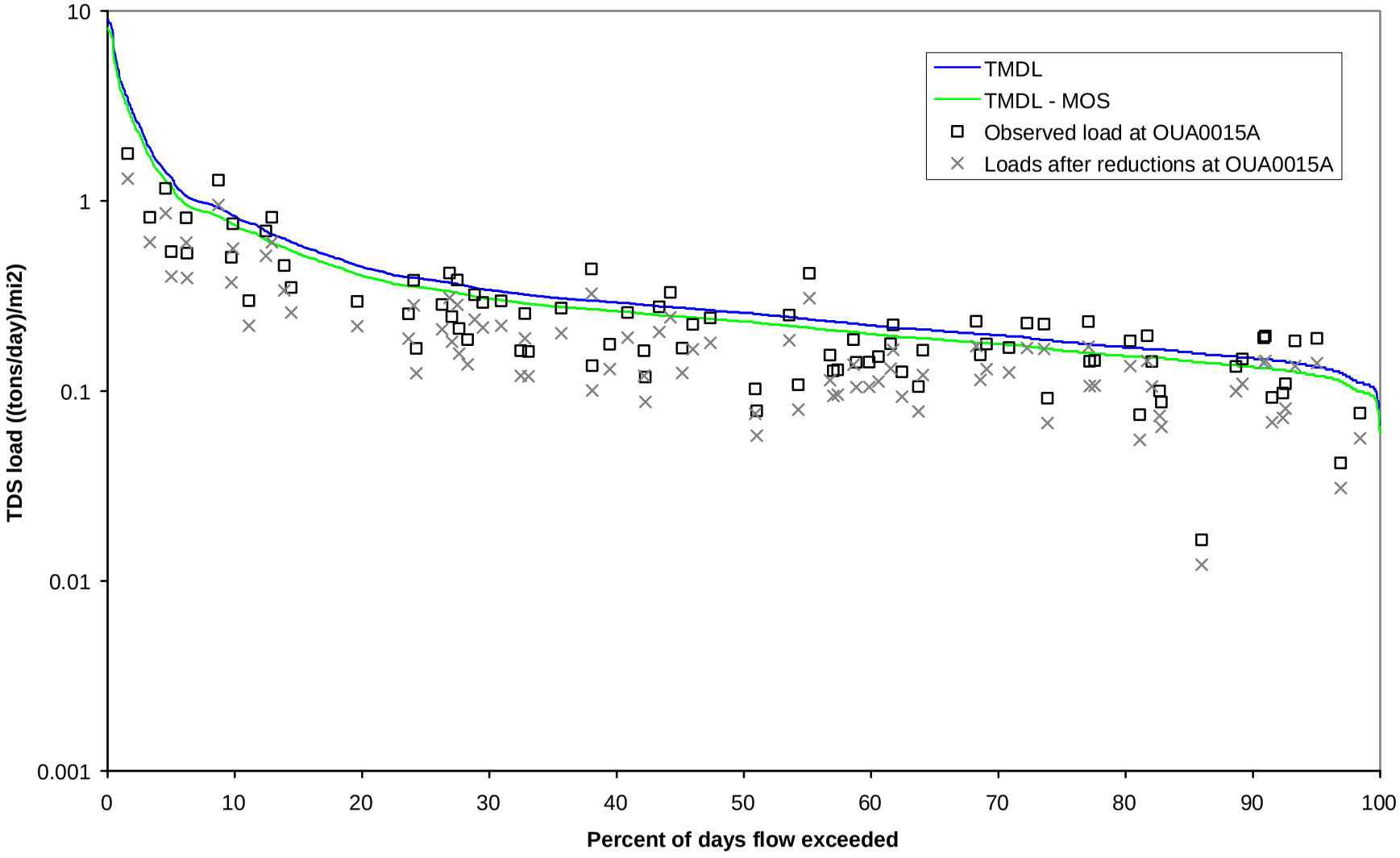
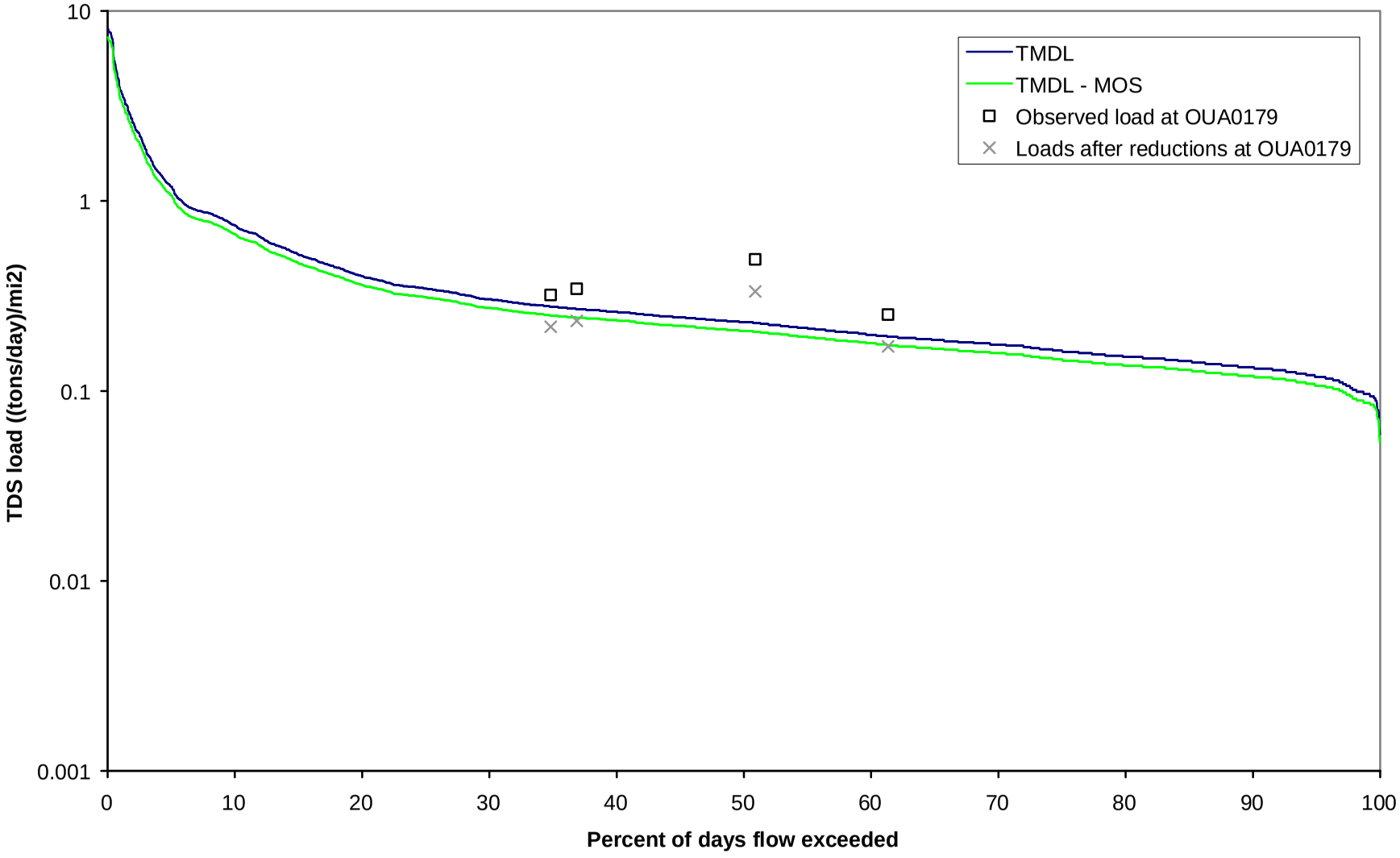


Figure L.3. Summer TDS Load Duration Curve for Oak Bayou at OUA0179



APPENDIX M

Calculations for Winter TDS TMDL

TABLE M.1. CALCULATIONS FOR ALLOWABLE LOADS PER UNIT AREA FOR TDS DURING WINTER

Percentage of total flow in basin represented by Bayou Macon:

USGS gage number and name	Avg. annual flow 1958-67 (cfs)	Drainage area (mi2)	Percent of combined flow
07367700 Boeuf River near AR/LA state line	875	785	65.2%
07369700 Bayou Macon near Kilbourne, LA	467	504	34.8%
	1,342	1,289	100.0%

	Boeuf	Others	
TMDL =	11.98071406	10.70450757	(gm/sec)/mi2
Total allowable load =	1.141039631	1.019494105	(tons/day)/mi2

Margin of Safety (MOS) = 10%

								Boeuf River TDS standard = 460 mg/L			Other Streams TDS standard = 411 mg/L		
Season	Date	Observed flow at Eudora (cfs)	Percent exceedance for observed flow	Adjusted flow for entire basin cfs	cfs/mi2	cms/mi2	"Width" for area under curves	Allowable TDS load at this flow (tons/day)/mi2	Target TDS load at this flow (tons/day)/mi2	"Area under TMDL curve" (tons/day)/mi2	Allowable TDS load at this flow (tons/day)/mi2	Target TDS load at this flow (tons/day)/mi2	"Area under TMDL curve" (tons/day)/mi2
A	B	C	D	E = C / 34.8%	F = E / 1289 mi2	G = E / 35.32	H = D1 - D2	I = G * 460 mg/L	J = I * (1 - MOS)	K = H * I	L = G * 411 mg/L	J = I * (1 - MOS)	N = H * L
WINTER	02/22/00	35	99.98%	100.6	0.078	0.0022	0.04%	0.10	0.09	4.27E-05	0.09	0.08	3.81E-05
WINTER	02/23/00	35	99.93%	100.6	0.078	0.0022	0.04%	0.10	0.09	4.27E-05	0.09	0.08	3.81E-05
WINTER	02/21/00	36	99.89%	103.4	0.080	0.0023	0.04%	0.10	0.09	4.39E-05	0.09	0.08	3.92E-05
WINTER	02/20/00	37	99.85%	106.3	0.082	0.0023	0.04%	0.10	0.09	4.51E-05	0.09	0.08	4.03E-05
WINTER	02/24/00	37	99.80%	106.3	0.082	0.0023	0.04%	0.10	0.09	4.51E-05	0.09	0.08	4.03E-05
WINTER	03/05/00	38	99.76%	109.2	0.085	0.0024	0.04%	0.11	0.09	4.63E-05	0.09	0.08	4.14E-05
WINTER	03/06/00	38	99.71%	109.2	0.085	0.0024	0.04%	0.11	0.09	4.63E-05	0.09	0.08	4.14E-05
WINTER	03/07/00	38	99.67%	109.2	0.085	0.0024	0.04%	0.11	0.09	4.63E-05	0.09	0.08	4.14E-05

For brevity, most of the rows in this spreadsheet have been hidden (between the 99.67% and the 0.33% exceedances).

WINTER	04/30/91	3200	0.33%	9195.4	7.134	0.2020	0.04%	8.85	7.96	3.90E-03	7.91	7.12	3.49E-03
WINTER	04/26/95	3250	0.29%	9339.1	7.245	0.2051	0.04%	8.99	8.09	3.96E-03	8.03	7.23	3.54E-03
WINTER	02/01/99	3310	0.24%	9511.5	7.379	0.2089	0.04%	9.15	8.24	4.04E-03	8.18	7.36	3.61E-03
WINTER	01/30/99	3500	0.20%	10057.5	7.803	0.2209	0.04%	9.68	8.71	4.27E-03	8.65	7.78	3.81E-03
WINTER	01/31/99	3560	0.15%	10229.9	7.936	0.2247	0.04%	9.84	8.86	4.34E-03	8.80	7.92	3.88E-03
WINTER	04/25/95	3790	0.11%	10890.8	8.449	0.2392	0.04%	10.48	9.43	4.62E-03	9.36	8.43	4.13E-03
WINTER	04/24/95	4150	0.07%	11925.3	9.252	0.2619	0.04%	11.48	10.33	5.06E-03	10.25	9.23	4.52E-03
WINTER	04/23/95	4170	0.02%	11982.8	9.296	0.2632	0.04%	11.53	10.38	5.08E-03	10.30	9.27	4.54E-03
						TOTALS =	**100.00%**			**1.14E+00**			**1.02E+00**

FILE: R:\PROJECTS\2110-613\TECH\TMDL\REVISED\TMDL TDS-WINTER.XLS

TABLE M.2. CALCULATIONS FOR TDS LOADS AND PERCENT REDUCTION FOR WINTER FOR BOEUF RIVER AT OUA0015A (REACH 08050001-018)

WQ standard for TDS = 460 mg/L
Percent reduction needed = 0%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Season	Date	Observed TDS at OUA0015A (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current TDS load (tons/day)/mi2	Reduced TDS load (tons/day)/mi2	Allowable TDS load with MOS incorporated (tons/day)/mi2	Reduced load less than or equal to allow. load?
WINTER	2/15/94	92	0.14517	2.8%	1.272	1.2720	6.35994	Yes
WINTER	4/23/96	308	0.12687	4.0%	3.721	3.7215	5.55803	Yes
WINTER	1/2/91	238	0.07259	10.3%	1.645	1.6453	3.17997	Yes
WINTER	2/17/98	134	0.06817	11.0%	0.870	0.8700	2.98641	Yes
WINTER	2/25/03	199	0.05782	13.1%	1.096	1.0958	2.53291	Yes
WINTER	12/17/96	191	0.05725	13.3%	1.041	1.0414	2.50803	Yes
WINTER	12/11/01	200	0.05302	14.0%	1.010	1.0099	2.32276	Yes
WINTER	1/26/99	225	0.05049	14.8%	1.082	1.0820	2.21215	Yes
WINTER	2/5/91	192	0.04065	18.6%	0.743	0.7433	1.78078	Yes
WINTER	1/18/94	306	0.03781	19.9%	1.102	1.1018	1.65635	Yes
WINTER	12/22/98	189	0.03168	23.3%	0.570	0.5703	1.38813	Yes
WINTER	12/18/95	291	0.02998	24.4%	0.831	0.8309	1.31347	Yes
WINTER	4/13/93	198	0.02985	24.4%	0.563	0.5630	1.30793	Yes
WINTER	3/12/91	60	0.02809	25.3%	0.161	0.1605	1.23051	Yes
WINTER	2/25/97	263	0.02777	25.6%	0.696	0.6956	1.21668	Yes
WINTER	3/17/98	185	0.02714	25.9%	0.478	0.4782	1.18903	Yes
WINTER	3/26/02	217	0.01995	31.6%	0.412	0.4122	0.87380	Yes
WINTER	3/27/00	238	0.01950	32.2%	0.442	0.4421	0.85444	Yes
WINTER	1/30/01	277	0.01856	33.4%	0.490	0.4895	0.81297	Yes
WINTER	12/19/00	175.5	0.01767	34.3%	0.295	0.2954	0.77425	Yes
WINTER	1/20/98	196	0.01666	35.5%	0.311	0.3110	0.73001	Yes
WINTER	12/19/94	178	0.01477	38.1%	0.250	0.2504	0.64705	Yes
WINTER	4/17/01	235	0.01445	38.6%	0.323	0.3235	0.63323	Yes
WINTER	1/12/93	101	0.01389	39.7%	0.134	0.1336	0.60834	Yes
WINTER	3/15/94	205	0.01325	40.7%	0.259	0.2588	0.58069	Yes
WINTER	2/26/02	226	0.00846	52.6%	0.182	0.1820	0.37054	Yes

WINTER	4/2/91	279	0.00757	57.3%	0.201	0.2013	0.33182	Yes
WINTER	4/7/92	104	0.00682	61.5%	0.068	0.0675	0.29864	Yes
WINTER	1/14/02	208	0.00669	62.3%	0.133	0.1325	0.29311	Yes
WINTER	3/26/01	219	0.00644	63.7%	0.134	0.1343	0.28205	Yes
WINTER	4/23/02	230.5	0.00568	69.9%	0.125	0.1247	0.24887	Yes
WINTER	3/23/99	220	0.00568	70.1%	0.119	0.1190	0.24887	Yes
WINTER	3/28/95	197	0.00555	71.5%	0.104	0.1042	0.24334	Yes
WINTER	3/9/93	95	0.00549	72.2%	0.050	0.0497	0.24057	Yes
WINTER	1/7/92	86	0.00543	73.5%	0.044	0.0445	0.23781	Yes
WINTER	2/23/99	228	0.00536	74.0%	0.116	0.1165	0.23504	Yes
WINTER	4/27/99	214	0.00524	75.0%	0.107	0.1068	0.22951	Yes
WINTER	2/14/95	251	0.00524	75.3%	0.125	0.1252	0.22951	Yes
WINTER	1/30/96	423	0.00511	76.3%	0.206	0.2060	0.22398	Yes
WINTER	2/4/92	203	0.00511	76.5%	0.099	0.0988	0.22398	Yes
WINTER	4/15/97	230	0.00505	76.9%	0.111	0.1106	0.22122	Yes
WINTER	3/3/92	214	0.00480	79.8%	0.098	0.0978	0.21015	Yes
WINTER	4/24/00	225	0.00473	80.1%	0.101	0.1014	0.20739	Yes
WINTER	2/9/93	223	0.00473	80.5%	0.101	0.1005	0.20739	Yes
WINTER	3/25/03	214	0.00417	85.3%	0.085	0.0849	0.18250	Yes
WINTER	4/15/03	243	0.00379	88.4%	0.088	0.0876	0.16591	Yes
WINTER	4/14/98	243	0.00379	88.6%	0.088	0.0876	0.16591	Yes
WINTER	12/1/92	248	0.00372	90.0%	0.088	0.0880	0.16315	Yes
WINTER	2/20/96	225	0.00366	90.5%	0.078	0.0784	0.16038	Yes
WINTER	12/20/99	225	0.00328	93.7%	0.070	0.0703	0.14379	Yes
WINTER	1/21/03	259	0.00290	96.1%	0.072	0.0716	0.12720	Yes
WINTER	2/29/00	344.5	0.00290	96.2%	0.095	0.0953	0.12720	Yes
WINTER	3/12/96	260	0.00271	98.3%	0.067	0.0672	0.11890	Yes
WINTER	12/3/02	209	0.00259	99.0%	0.052	0.0515	0.11337	Yes
WINTER	1/25/00	83.5	0.00259	99.2%	0.021	0.0206	0.11337	Yes
			1.1783		22.824		Total number of values =	55
							Allowable % of exceedances =	10%
							Allowable no. of exceedances =	6
							No. of exceedances before reductions =	0
							No. of exceedances after reductions =	0

Flow weighted average TDS (mg/L) = (22.824 / 1.1783) / conversion = 203 mg/L

Average flow per unit area for winter =	0.0260	cms/mi2
Estimated drainage area for reach 18 =	180	mi2
Average flow for winter for reach 18 = 0.0260 * 180 =	4.682	cms
Existing total TDS load for winter for reach 18		
= 203 mg/L * 4.682 cms * conversions =	90.69	tons/day
Sum of design flows for point sources for reach 18 =	0.000	cms
Assumed effluent TDS concentration for point sources =	60	mg/L
Existing point source TDS load for winter for reach 18 =		
= 0.000 cms * 60 mg/L * conversions =	0.00	tons/day
Existing NPS TDS load for winter for reach 18 = 90.69 - 0.00 =	90.69	tons/day
Total allowable loading per unit area to meet stds (from Table M.1) =	1.14E+00	tons/day/mi2
Total allowable loading for reach 18 = 1.14E0 * 180 mi2 =	205.12	tons/day
Explicit MOS for TDS for winter for reach 18 (10% * 205.12) =	20.51	tons/day
WLA for TDS for winter for reach 18 (same as existing load) =	0.00	tons/day
LA for TDS for winter for reach 18 = total - MOS - WLA =	184.61	tons/day

FILE: R:\PROJECTS\2110-613\TECH\TMDL\REVISED\TMDL TDS-WINTER.XLS

TABLE M.3. CALCULATIONS FOR EXISTING TDS LOADS AND PERCENT REDUCTION
FOR WINTER FOR OAK BAYOU OUA0179 (REACH 08050002-010)

WQ standard for TDS = 411 mg/L
Percent reduction = 0%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Season	Date	Observed TDS at OUA179 (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current TDS load (tons/day)/mi2	Reduced TDS load (tons/day)/mi2	Allowable TDS load with MOS incorporated (tons/day)/mi2	Reduced load less than or equal to allow. load?
WINTER	3/5/01	203.5	0.0757	9.5%	1.468	1.4680	2.66829	Yes
WINTER	1/23/01	235.0	0.0442	16.7%	0.989	0.9889	1.55650	Yes
		TOTALS =	0.1199		2.457			

Total number of values =	2
Allowable % of exceedances =	10%
Allowable no. of exceedances =	1
No. of exceedances before reductions =	0
No. of exceedances after reductions =	0

Flow weighted average TDS (mg/L) = (2.457 / 0.1199) / conversion = 215 mg/L

Average flow per unit area for winter = 0.0260 cms/mi2
Estimated drainage area for reach 10 = 136 mi2
Average flow for winter for reach 10 = 0.0260 * 136 = 3.549 cms

Existing total TDS load for winter for reach 10
= 215 mg/L * 3.549 cms * conversions = 72.71 tons/day

Sum of design flows for point sources for reach 10 = 0.000 cms
Assumed effluent TDS concentration for point sources = 60 mg/L
Existing point source TDS load for winter for reach 10 =
= 0.000 cms * 60 mg/L * conversions = 0.00 tons/day

Existing NPS TDS load for winter for reach 10 = 72.71 - 0.00 = 72.71 tons/day

Total allowable loading per unit area to meet stds (from Table M.1) =	1.02E+00	tons/day/mi2
Total allowable loading for reach 10 = 1.02E0 * 136 mi2 =	138.93	tons/day
Explicit MOS for TDS for winter for reach 10 (10% * 138.93) =	13.89	tons/day
WLA for TDS for winter for reach 10 (same as existing load) =	0.00	tons/day
LA for TDS for winter for reach 10 = total - MOS - WLA =	125.04	tons/day

FILE: R:\PROJECTS\2110-613\TECH\TMDL\REVISED\TMDL TDS-WINTER.XLS

Figure M.1. Winter Flow Duration Curve for USGS 07369680 Bayou Macon near Eudora

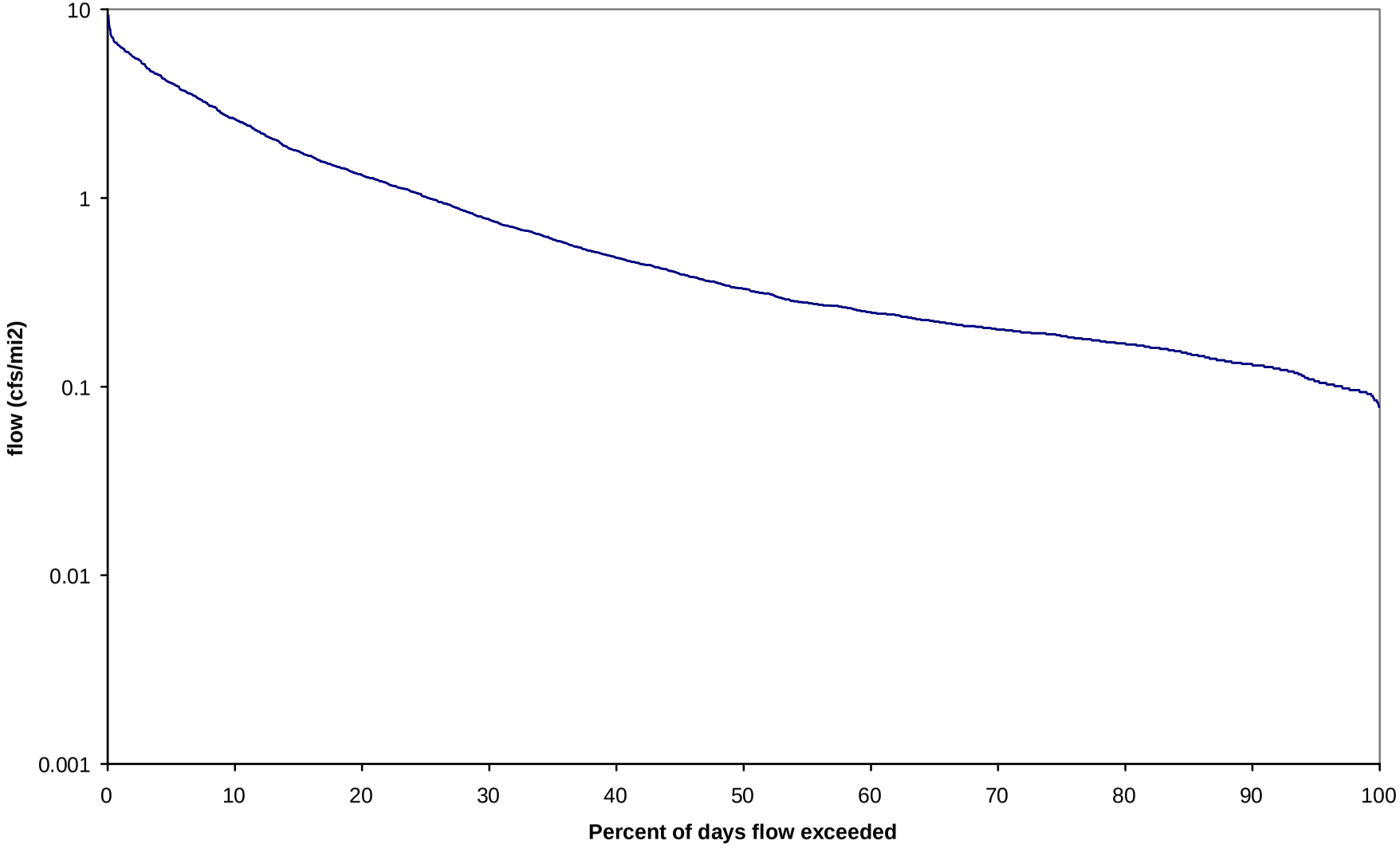


Figure M.2. Winter TDS Load Duration Curve for Boeuf River at OUA0015A

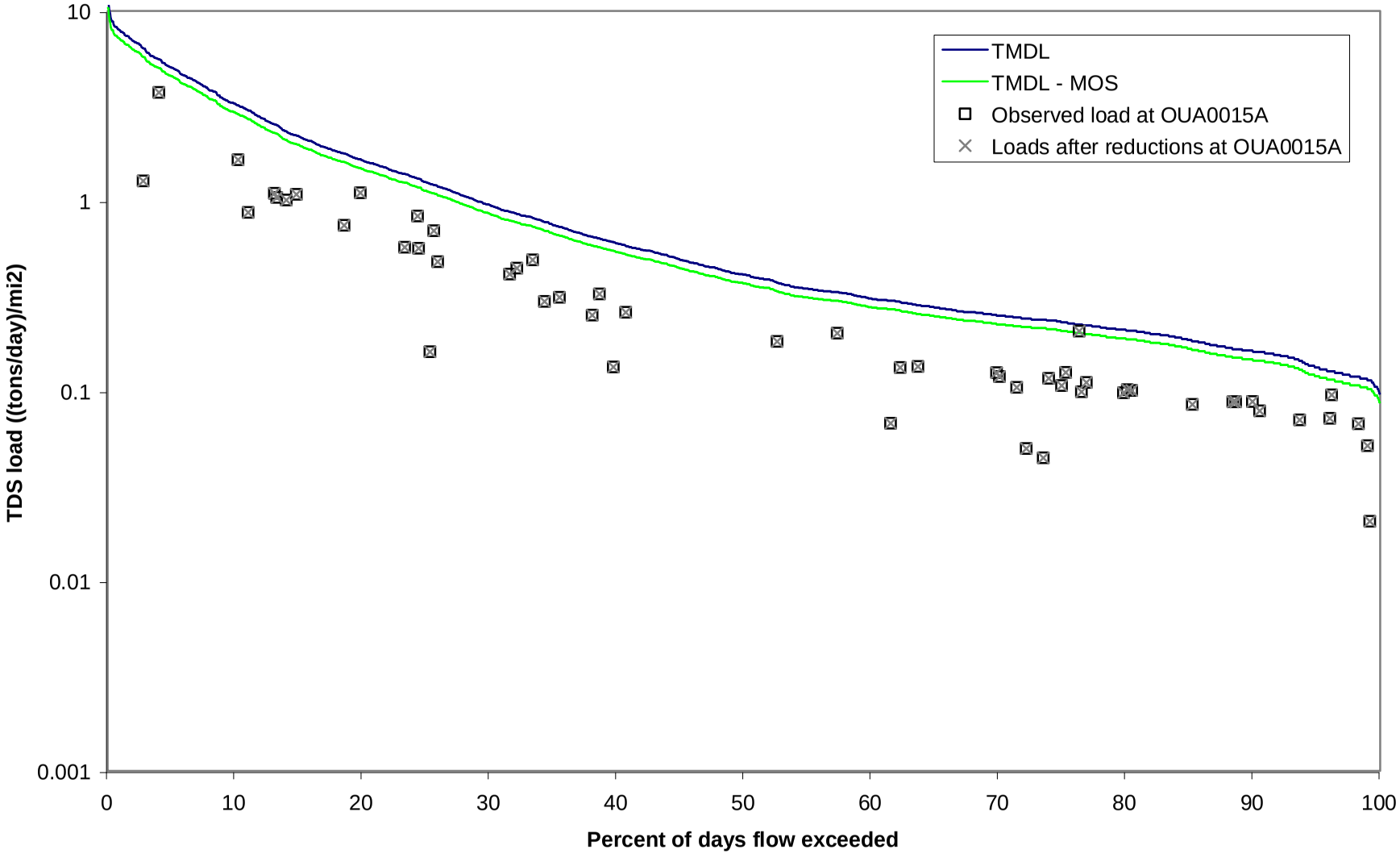
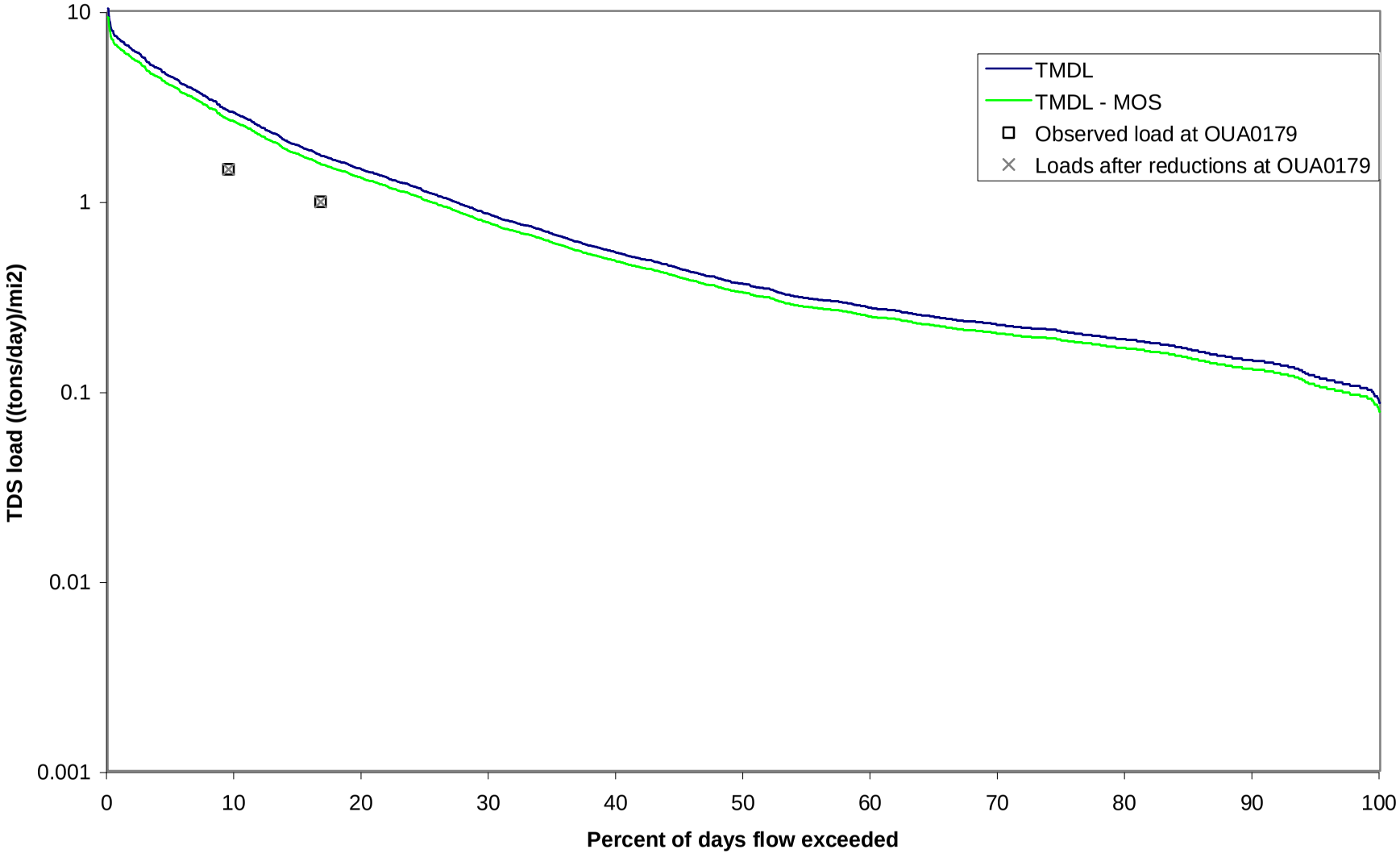


Figure M.3. Winter TDS Load Duration Curve for Oak Bayou at OUA0179



APPENDIX N

WLAs for Individual Point Sources

TABLE N.1. CALCULATIONS FOR ALLOWABLE LOADS PER UNIT AREA FOR SULFATE DURING SUMMER

Percentage of total flow in basin represented by Bayou Macon:

USGS gage number and name	Avg. annual flow 1958-67 (cfs)	Drainage area (mi2)	Percent of combined flow
07367700 Boeuf River near AR/LA state line	875	785	65.2%
07369700 Bayou Macon near Kilbourne, LA	467	504	34.8%
	1,342	1,289	100.0%

Margin of Safety (MOS) = 10%

Season	Date	Observed flow at Eudora (cfs)	Percent exceedance for observed flow	Adjusted flow for entire basin cfs	cfs/mi2	cms/mi2	"Width" for area under curves	Sulfate standard = 30 mg/L: Allowable Sulfates load to meet standard (tons/day)/mi2	Target Sulfates load with MOS incorporated (tons/day)/mi2	"Area under TMDL curve" (tons/day)/mi2
A	B	C	D	E = C / 34.8%	F = E / 1289 mi2	G = E / 35.32	H = D1 - D2	I = G * 30 mg/L * conversion	J = I * (1 - MOS)	K = H * I
SUMMER	06/22/02	24	99.98%	69.0	0.054	0.0015	0.03%	0.004	0.004	1.35E-06
SUMMER	06/20/02	25	99.95%	71.8	0.056	0.0016	0.03%	0.005	0.004	1.40E-06
SUMMER	06/21/02	26	99.92%	74.7	0.058	0.0016	0.03%	0.005	0.004	1.46E-06
SUMMER	06/19/02	31	99.89%	89.1	0.069	0.0020	0.03%	0.006	0.005	1.74E-06
SUMMER	05/21/95	32	99.86%	92.0	0.071	0.0020	0.03%	0.006	0.005	1.80E-06
SUMMER	05/22/95	32	99.83%	92.0	0.071	0.0020	0.03%	0.006	0.005	1.80E-06
SUMMER	10/10/01	32	99.80%	92.0	0.071	0.0020	0.03%	0.006	0.005	1.80E-06
SUMMER	05/20/95	33	99.77%	94.8	0.074	0.0021	0.03%	0.006	0.005	1.85E-06

For brevity, most of the rows in this spreadsheet have been hidden (between the 99.77% and the 0.23% exceedances).

SUMMER	05/03/91	3110	0.23%	8936.8	6.933	0.1963	0.03%	0.561	0.505	1.75E-04
SUMMER	05/06/91	3110	0.20%	8936.8	6.933	0.1963	0.03%	0.561	0.505	1.75E-04
SUMMER	05/02/91	3130	0.17%	8994.3	6.978	0.1976	0.03%	0.564	0.508	1.76E-04
SUMMER	05/04/91	3130	0.14%	8994.3	6.978	0.1976	0.03%	0.564	0.508	1.76E-04
SUMMER	05/05/91	3130	0.11%	8994.3	6.978	0.1976	0.03%	0.564	0.508	1.76E-04
SUMMER	05/01/91	3170	0.08%	9109.2	7.067	0.2001	0.03%	0.572	0.515	1.78E-04
SUMMER	05/31/98	3250	0.05%	9339.1	7.245	0.2051	0.03%	0.586	0.527	1.83E-04
SUMMER	05/30/98	3270	0.02%	9396.6	7.290	0.2064	0.03%	0.590	0.531	1.84E-04
						TOTALS =	**100.00%**			**3.00E-02**

FILE: R:\PROJECTS\2110-613\TECH\TMDL\REVISED\TMDL SULFATE-SUMMER.XLS

TABLE N.2. CALCULATIONS FOR SULFATE LOADS AND PERCENT REDUCTION
FOR SUMMER FOR BOEUF RIVER AT OUA0015A (REACH 08050001-018)

WQ standard for Sulfate = 30 mg/L
Percent reduction = 59%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Season	Date	Observed Sulfates at OUA0179 (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current Sulfates load (tons/day)/mi2	Reduced Sulfates load (tons/day)/mi2	Allowable Sulfate load with MOS incorporated (tons/day)/mi2	Reduced load less than or equal to allow. load?
SUMMER	7/19/94	13.5	0.0802	1.6%	0.103	0.0423	0.2061	Yes
SUMMER	11/5/02	15.0	0.0434	3.3%	0.062	0.0254	0.1117	Yes
SUMMER	6/21/93	36.0	0.0323	4.6%	0.111	0.0453	0.0829	Yes
SUMMER	6/17/03	12.8	0.0304	5.0%	0.037	0.0152	0.0781	Yes
SUMMER	8/16/94	24.9	0.0242	6.2%	0.057	0.0235	0.0622	Yes
SUMMER	11/28/94	21.9	0.0241	6.2%	0.050	0.0206	0.0620	Yes
SUMMER	7/27/99	76.8	0.0210	8.7%	0.154	0.0630	0.0540	No
SUMMER	7/2/91	33.0	0.0193	9.7%	0.061	0.0249	0.0497	Yes
SUMMER	6/28/94	47.5	0.0191	9.9%	0.087	0.0355	0.0492	Yes
SUMMER	11/23/93	13.0	0.0175	11.1%	0.022	0.0089	0.0450	Yes
SUMMER	11/16/98	43.0	0.0158	12.4%	0.065	0.0265	0.0406	Yes
SUMMER	9/29/98	46.3	0.0151	12.9%	0.067	0.0274	0.0390	Yes
SUMMER	6/29/99	23.9	0.0145	13.9%	0.033	0.0135	0.0372	Yes
SUMMER	5/22/01	22.0	0.0138	14.4%	0.029	0.0119	0.0355	Yes
SUMMER	7/22/98	21.3	0.0104	19.6%	0.021	0.0087	0.0268	Yes
SUMMER	5/13/97	13.6	0.0090	23.7%	0.012	0.0048	0.0232	Yes
SUMMER	9/27/94	39.8	0.0090	24.1%	0.034	0.0140	0.0232	Yes
SUMMER	6/9/98	14.6	0.0090	24.3%	0.012	0.0051	0.0230	Yes
SUMMER	7/26/93	36.9	0.0086	26.3%	0.030	0.0124	0.0221	Yes
SUMMER	8/8/95	42.3	0.0085	26.9%	0.034	0.0140	0.0217	Yes
SUMMER	9/23/03	26.7	0.0084	27.1%	0.021	0.0088	0.0216	Yes
SUMMER	8/17/99	45.6	0.0083	27.5%	0.036	0.0148	0.0214	Yes
SUMMER	5/24/94	26.4	0.0083	27.6%	0.021	0.0085	0.0213	Yes
SUMMER	8/4/92	18.3	0.0081	28.3%	0.014	0.0058	0.0209	Yes
SUMMER	8/11/98	28.1	0.0080	28.8%	0.021	0.0087	0.0205	Yes
SUMMER	9/1/92	28.8	0.0076	30.9%	0.021	0.0086	0.0196	Yes

SUMMER	8/6/96	17.5	0.0074	32.5%	0.012	0.0050	0.0190	Yes
SUMMER	8/20/01	24.1	0.0073	32.8%	0.017	0.0069	0.0188	Yes
SUMMER	6/4/91	14.0	0.0073	33.1%	0.010	0.0040	0.0188	Yes
SUMMER	9/1/98	30.0	0.0070	35.7%	0.020	0.0082	0.0180	Yes
SUMMER	7/16/96	98.6	0.0068	38.0%	0.064	0.0262	0.0175	No
SUMMER	7/17/95	18.4	0.0068	38.1%	0.012	0.0049	0.0175	Yes
SUMMER	6/10/97	18.1	0.0067	39.5%	0.012	0.0047	0.0172	Yes
SUMMER	8/6/91	47.0	0.0066	40.9%	0.030	0.0122	0.0170	Yes
SUMMER	7/15/03	21.9	0.0064	42.2%	0.013	0.0055	0.0166	Yes
SUMMER	5/28/02	9.4	0.0064	42.3%	0.006	0.0024	0.0166	Yes
SUMMER	5/20/03	10.0	0.0063	43.3%	0.006	0.0025	0.0162	Yes
SUMMER	9/4/90	38.0	0.0063	44.2%	0.023	0.0094	0.0162	Yes
SUMMER	7/7/92	25.4	0.0062	45.2%	0.015	0.0062	0.0161	Yes
SUMMER	6/2/92	50.0	0.0062	46.0%	0.029	0.0121	0.0159	Yes
SUMMER	6/20/95	52.4	0.0061	47.4%	0.030	0.0124	0.0156	Yes
SUMMER	11/7/00	8.8	0.0058	50.9%	0.005	0.0020	0.0149	Yes
SUMMER	10/1/96	12.2	0.0058	51.0%	0.007	0.0028	0.0149	Yes
SUMMER	8/12/03	39.1	0.0056	53.6%	0.021	0.0085	0.0143	Yes
SUMMER	10/15/02	5.7	0.0055	54.3%	0.003	0.0012	0.0141	Yes
SUMMER	7/25/00	91.4	0.0054	55.2%	0.047	0.0194	0.0140	No
SUMMER	5/21/96	32.5	0.0053	56.8%	0.016	0.0067	0.0136	Yes
SUMMER	11/25/91	11.6	0.0053	57.0%	0.006	0.0024	0.0136	Yes
SUMMER	5/25/99	23.2	0.0052	57.4%	0.012	0.0047	0.0135	Yes
SUMMER	8/26/97	21.3	0.0052	58.6%	0.011	0.0043	0.0133	Yes
SUMMER	5/18/93	20.2	0.0052	58.8%	0.010	0.0041	0.0133	Yes
SUMMER	5/30/00	24.1	0.0050	59.9%	0.012	0.0048	0.0130	Yes
SUMMER	8/20/02	23.1	0.0050	60.6%	0.011	0.0045	0.0128	Yes
SUMMER	9/21/99	42.7	0.0049	61.5%	0.020	0.0082	0.0127	Yes
SUMMER	6/18/96	71.8	0.0049	61.7%	0.034	0.0138	0.0127	No
SUMMER	6/27/00	30.9	0.0049	62.4%	0.014	0.0059	0.0125	Yes
SUMMER	9/17/01	13.9	0.0048	63.7%	0.006	0.0026	0.0123	Yes
SUMMER	9/10/96	29.8	0.0048	64.1%	0.014	0.0056	0.0123	Yes
SUMMER	7/24/01	65.7	0.0045	68.3%	0.028	0.0117	0.0117	Yes
SUMMER	7/22/97	31.4	0.0045	68.6%	0.014	0.0056	0.0117	Yes
SUMMER	6/19/01	57.7	0.0044	70.8%	0.024	0.0099	0.0114	Yes
SUMMER	5/19/98	76.6	0.0044	72.3%	0.032	0.0130	0.0112	No
SUMMER	9/19/00	49.9	0.0042	73.6%	0.020	0.0082	0.0109	Yes

SUMMER	10/28/97	19.8	0.0042	73.8%	0.008	0.0033	0.0109	Yes
SUMMER	6/25/02	108.4	0.0041	75.2%	0.042	0.0174	0.0105	No
SUMMER	9/21/93	45.0	0.0040	77.1%	0.017	0.0071	0.0104	Yes
SUMMER	9/17/02	26.9	0.0040	77.6%	0.010	0.0042	0.0102	Yes
SUMMER	10/17/00	53.6	0.0039	80.4%	0.020	0.0081	0.0099	Yes
SUMMER	11/27/90	26.0	0.0039	81.1%	0.010	0.0039	0.0099	Yes
SUMMER	11/19/01	72.0	0.0038	81.7%	0.026	0.0107	0.0097	No
SUMMER	10/19/99	37.5	0.0038	82.1%	0.014	0.0055	0.0097	Yes
SUMMER	11/18/97	21.8	0.0038	82.7%	0.008	0.0032	0.0097	Yes
SUMMER	11/19/96	18.3	0.0038	82.8%	0.007	0.0027	0.0097	Yes
SUMMER	10/30/90	25.0	0.0036	86.0%	0.009	0.0035	0.0093	Yes
SUMMER	9/29/92	35.9	0.0035	88.7%	0.012	0.0049	0.0089	Yes
SUMMER	9/30/97	26.5	0.0034	89.2%	0.009	0.0035	0.0088	Yes
SUMMER	11/13/95	65.4	0.0033	90.9%	0.021	0.0085	0.0086	Yes
SUMMER	9/19/95	63.4	0.0033	91.0%	0.020	0.0083	0.0086	Yes
SUMMER	5/5/92	36.7	0.0033	91.5%	0.012	0.0048	0.0086	Yes
SUMMER	5/23/95	41.3	0.0033	92.4%	0.013	0.0053	0.0084	Yes
SUMMER	10/17/95	61.7	0.0032	93.3%	0.019	0.0078	0.0083	Yes
SUMMER	11/22/99	92.4	0.0030	95.0%	0.027	0.0109	0.0078	No
SUMMER	10/23/01	10.4	0.0028	96.9%	0.003	0.0011	0.0073	Yes
SUMMER	10/26/93	28.5	0.0025	98.4%	0.007	0.0028	0.0065	Yes
		TOTALS =	0.7591		2.190			

Total number of values =	84
Allowable % of exceedances =	10%
Allowable no. of exceedances =	9
No. of exceedances before reductions =	38
No. of exceedances after reductions =	8

Flow weighted average Sulfates (mg/L) = (2.190 / 0.7591) / conversion = 30 mg/L

Average flow per unit area for summer = 0.0105 cms/mi2
Estimated drainage area for reach 18 = 180 mi2
Average flow for summer for reach 18 = 0.0105 * 180 = 1.887 cms

Existing total Sulfates load for summer for reach 18
= 30 mg/L * 1.887 cms * conversions = 5.39 tons/day

Sum of design flows for point sources for reach 18 =	0.000	cms
Assumed effluent Sulfates concentration for point sources =	60	mg/L
Existing point source Sulfates load for summer for reach 18 =		
= 0.000 cms * 60 mg/L * conversions =	0.00	tons/day
Existing NPS Sulfates load for summer for reach 18 = 5.39 - 0.00 =	5.39	tons/day
Total allowable loading per unit area to meet sSulfates (from Table N.1) =	3.00E-02	tons/day/mi2
Total allowable loading for reach 18 = 3.00E-2 * 180 mi2 =	5.39	tons/day
Explicit MOS for Sulfates for summer for reach 18 (10% * 5.39) =	0.54	tons/day
WLA for Sulfates for summer for reach 18 (same as existing load) =	0.00	tons/day
LA for Sulfates for summer for reach 18 = total - MOS - WLA =	4.85	tons/day

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Figure N.1. Summer Flow Duration Curve for USGS 07369680 Bayou Macon near Eudora

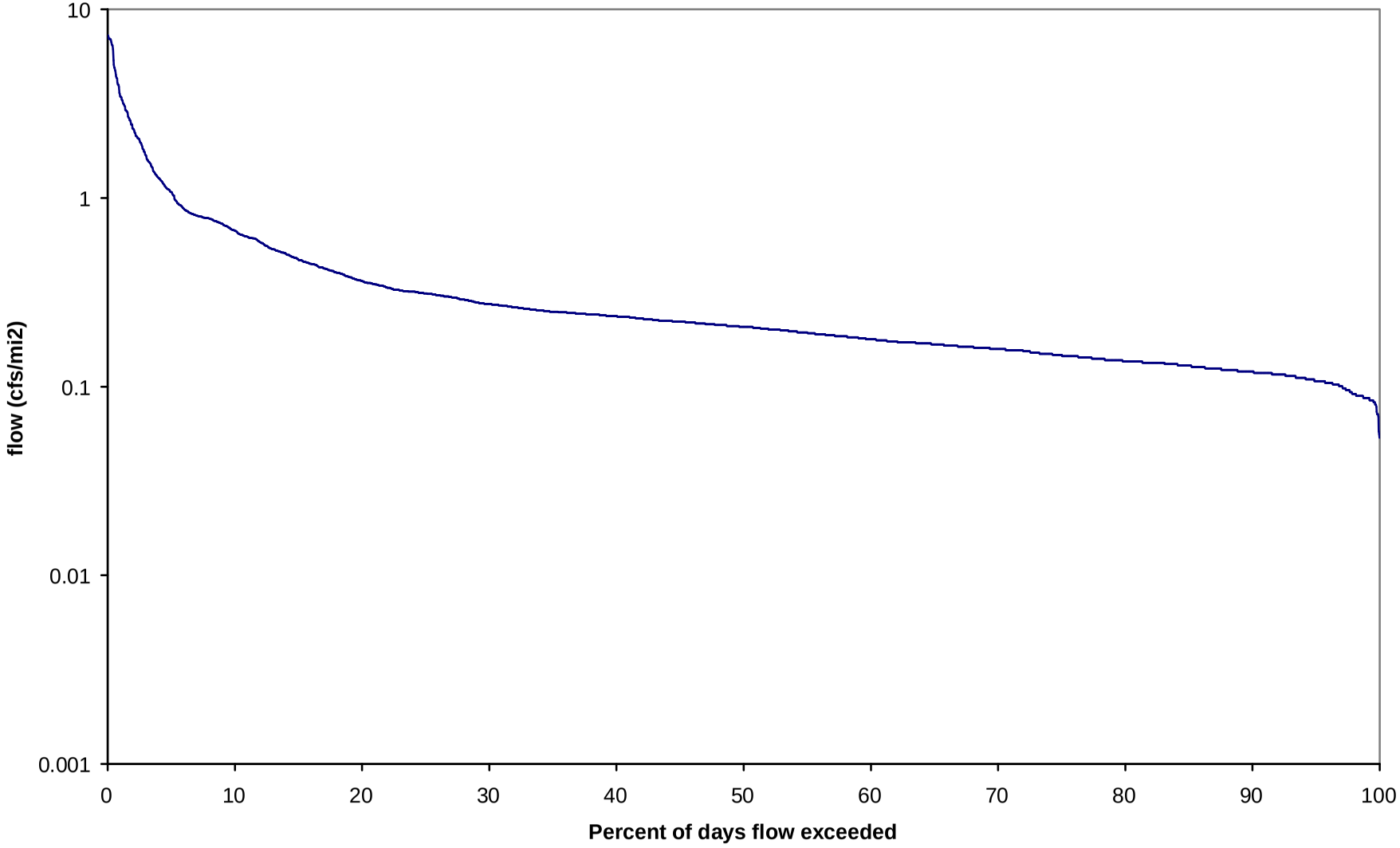
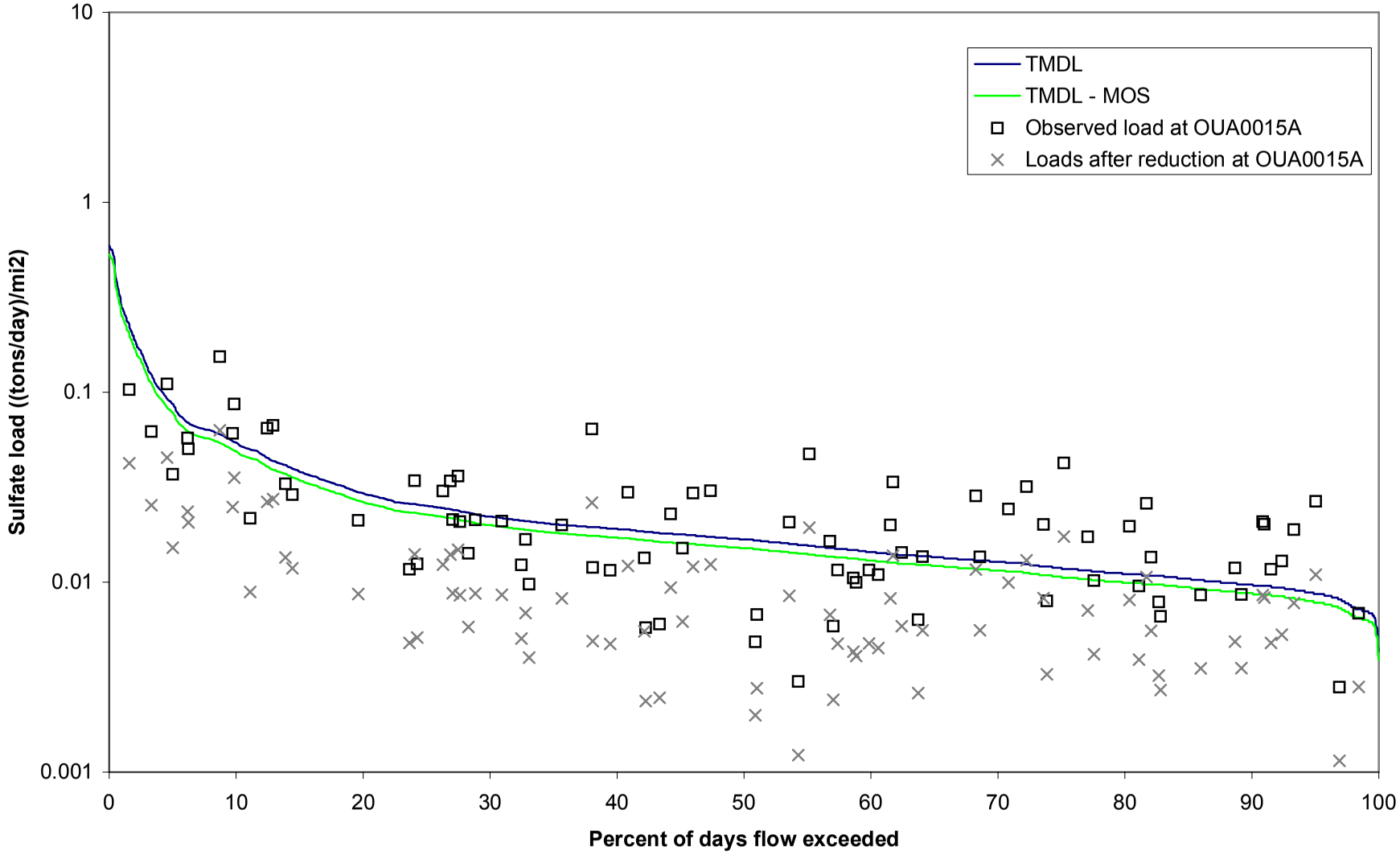


Figure N.2. Summer Sulfate Load Duration Curve for Boeuf River at OUA0015A



APPENDIX O

Calculations for Winter Sulfate TMDL

TABLE O.1. CALCULATIONS FOR ALLOWABLE LOADS PER UNIT AREA FOR SULFATE DURING WINTER

Percentage of total flow in basin represented by Bayou Macon:

USGS gage number and name	Avg. annual flow 1958-67 (cfs)	Drainage area (mi2)	Percent of combined flow
07367700 Boeuf River near AR/LA state line	875	785	65.2%
07369700 Bayou Macon near Kilbourne, LA	467	504	34.8%
	1,342	1,289	100.0%

Margin of Safety (MOS) = 10%

Season	Date	Observed flow at Eudora (cfs)	Percent exceedance for observed flow	Adjusted flow for entire basin cfs	cfs/mi2	cms/mi2	"Width" for area under curves	Sulfate standard = 30 mg/L: Allowable chloride load at this flow (tons/day)/mi2	Target Sulfates load at this flow (tons/day)/mi2	"Area under curve" (tons/day)/mi2
A	B	C	D	E = C / 34.8%	F = E / 1289 mi2	G = E / 35.32	H = D1 - D2	I = G * 30 mg/L	J = I * (1 - MOS)	K = H * I
WINTER	02/22/00	35	99.98%	100.6	0.078	0.0022	0.04%	0.01	0.01	2.78E-06
WINTER	02/23/00	35	99.93%	100.6	0.078	0.0022	0.04%	0.01	0.01	2.78E-06
WINTER	02/21/00	36	99.89%	103.4	0.080	0.0023	0.04%	0.01	0.01	2.86E-06
WINTER	02/20/00	37	99.85%	106.3	0.082	0.0023	0.04%	0.01	0.01	2.94E-06
WINTER	02/24/00	37	99.80%	106.3	0.082	0.0023	0.04%	0.01	0.01	2.94E-06
WINTER	03/05/00	38	99.76%	109.2	0.085	0.0024	0.04%	0.01	0.01	3.02E-06
WINTER	03/06/00	38	99.71%	109.2	0.085	0.0024	0.04%	0.01	0.01	3.02E-06
WINTER	03/07/00	38	99.67%	109.2	0.085	0.0024	0.04%	0.01	0.01	3.02E-06

For brevity, most of the rows in this spreadsheet have been hidden (between the 99.67% and the 0.33% exceedances).

WINTER	04/30/91	3200	0.33%	9195.4	7.134	0.2020	0.04%	0.58	0.52	2.54E-04
WINTER	04/26/95	3250	0.29%	9339.1	7.245	0.2051	0.04%	0.59	0.53	2.58E-04
WINTER	02/01/99	3310	0.24%	9511.5	7.379	0.2089	0.04%	0.60	0.54	2.63E-04
WINTER	01/30/99	3500	0.20%	10057.5	7.803	0.2209	0.04%	0.63	0.57	2.78E-04
WINTER	01/31/99	3560	0.15%	10229.9	7.936	0.2247	0.04%	0.64	0.58	2.83E-04
WINTER	04/25/95	3790	0.11%	10890.8	8.449	0.2392	0.04%	0.68	0.62	3.01E-04
WINTER	04/24/95	4150	0.07%	11925.3	9.252	0.2619	0.04%	0.75	0.67	3.30E-04
WINTER	04/23/95	4170	0.02%	11982.8	9.296	0.2632	0.04%	0.75	0.68	3.32E-04
						TOTALS =	**100.00%**			**7.44E-02**

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TABLE O.2. CALCULATIONS FOR SULFATE LOADS AND PERCENT REDUCTION
FOR WINTER FOR BOEUF RIVER AT OUA0015A (REACH 08050001-018)

WQ standard for Sulfates = 30 mg/L
Percent reduction = 0%

Error check for reduction is / is not needed: ok
Error check for less or more reduction needed: ok

Season	Date	Observed Sulfates at OUA0015A (mg/L)	Flow per unit area on sampling day (cms/mi2)	Percent exceedance for flow on sampling day	Current Sulfates load (tons/day)/mi2	Reduced Sulfates load (tons/day)/mi2	Allowable Sulfates load with MOS incorporated (tons/day)/mi2	Reduced load less than or equal to allow. load?
WINTER	1/2/91	11.0	0.0726	10.3%	0.076	0.0760	0.1867	Yes
WINTER	2/5/91	14.0	0.0406	18.6%	0.054	0.0542	0.1045	Yes
WINTER	3/12/91	4.0	0.0281	25.3%	0.011	0.0107	0.0722	Yes
WINTER	4/2/91	12.0	0.0076	57.3%	0.009	0.0087	0.0195	Yes
WINTER	1/7/92	9.3	0.0054	73.5%	0.005	0.0048	0.0140	Yes
WINTER	2/4/92	15.3	0.0051	76.5%	0.007	0.0074	0.0131	Yes
WINTER	3/3/92	16.3	0.0048	79.8%	0.007	0.0074	0.0123	Yes
WINTER	4/7/92	9.7	0.0068	61.5%	0.006	0.0063	0.0175	Yes
WINTER	12/1/92	21.0	0.0037	90.0%	0.007	0.0074	0.0096	Yes
WINTER	1/12/93	10.1	0.0139	39.7%	0.013	0.0134	0.0357	Yes
WINTER	2/9/93	18.3	0.0047	80.5%	0.008	0.0083	0.0122	Yes
WINTER	3/9/93	7.8	0.0055	72.2%	0.004	0.0041	0.0141	Yes
WINTER	4/13/93	11.8	0.0299	24.4%	0.034	0.0336	0.0768	Yes
WINTER	12/20/93	14.1	0.0035	92.6%	0.005	0.0047	0.0089	Yes
WINTER	1/18/94	14.8	0.0378	19.9%	0.053	0.0533	0.0972	Yes
WINTER	2/15/94	7.5	0.1452	2.8%	0.104	0.1040	0.3733	Yes
WINTER	3/15/94	9.0	0.0133	40.7%	0.011	0.0114	0.0341	Yes
WINTER	4/19/94	15.0	0.0483	15.4%	0.069	0.0690	0.1242	Yes
WINTER	12/19/94	7.9	0.0148	38.1%	0.011	0.0111	0.0380	Yes
WINTER	2/14/95	17.7	0.0052	75.3%	0.009	0.0088	0.0135	Yes
WINTER	3/28/95	13.1	0.0056	71.5%	0.007	0.0069	0.0143	Yes
WINTER	12/18/95	31.6	0.0300	24.4%	0.090	0.0902	0.0771	No
WINTER	1/30/96	24.3	0.0051	76.3%	0.012	0.0118	0.0131	Yes
WINTER	2/20/96	16.3	0.0037	90.5%	0.006	0.0057	0.0094	Yes
WINTER	3/12/96	18.2	0.0027	98.3%	0.005	0.0047	0.0070	Yes
WINTER	4/23/96	19.2	0.1269	4.0%	0.232	0.2320	0.3262	Yes

WINTER	12/17/96	16.9	0.0572	13.3%	0.092	0.0921	0.1472	Yes
WINTER	2/25/97	4.9	0.0278	25.6%	0.013	0.0130	0.0714	Yes
WINTER	3/11/97	12.4	0.0265	26.4%	0.031	0.0313	0.0682	Yes
WINTER	4/15/97	14.5	0.0050	76.9%	0.007	0.0070	0.0130	Yes
WINTER	1/20/98	4.4	0.0167	35.5%	0.007	0.0070	0.0428	Yes
WINTER	2/17/98	3.7	0.0682	11.0%	0.024	0.0243	0.1753	Yes
WINTER	3/17/98	8.8	0.0271	25.9%	0.023	0.0227	0.0698	Yes
WINTER	4/14/98	21.1	0.0038	88.6%	0.008	0.0076	0.0097	Yes
WINTER	12/22/98	14.1	0.0317	23.3%	0.043	0.0425	0.0815	Yes
WINTER	1/26/99	6.6	0.0505	14.8%	0.032	0.0319	0.1298	Yes
WINTER	2/23/99	11.6	0.0054	74.0%	0.006	0.0059	0.0138	Yes
WINTER	3/23/99	8.6	0.0057	70.1%	0.005	0.0046	0.0146	Yes
WINTER	12/20/99	16.4	0.0033	93.7%	0.005	0.0051	0.0084	Yes
WINTER	1/25/00	7.3	0.0026	99.2%	0.002	0.0018	0.0067	Yes
WINTER	2/29/00	13.0	0.0029	96.2%	0.004	0.0036	0.0075	Yes
WINTER	3/27/00	9.9	0.0195	32.2%	0.018	0.0185	0.0502	Yes
WINTER	4/24/00	12.6	0.0047	80.1%	0.006	0.0057	0.0122	Yes
WINTER	12/19/00	9.0	0.0177	34.3%	0.015	0.0151	0.0454	Yes
WINTER	1/30/01	10.6	0.0186	33.4%	0.019	0.0188	0.0477	Yes
WINTER	2/27/01	5.6	0.0487	15.4%	0.026	0.0259	0.1253	Yes
WINTER	3/26/01	9.7	0.0064	63.7%	0.006	0.0059	0.0166	Yes
WINTER	4/17/01	12.3	0.0145	38.6%	0.017	0.0169	0.0372	Yes
WINTER	12/11/01	10.0	0.0530	14.0%	0.050	0.0505	0.1363	Yes
WINTER	1/14/02	8.2	0.0067	62.3%	0.005	0.0052	0.0172	Yes
WINTER	2/26/02	6.1	0.0085	52.6%	0.005	0.0049	0.0217	Yes
WINTER	3/26/02	6.5	0.0199	31.6%	0.012	0.0123	0.0513	Yes
WINTER	4/23/02	11.2	0.0057	69.9%	0.006	0.0060	0.0146	Yes
WINTER	12/3/02	18.9	0.0026	99.0%	0.005	0.0047	0.0067	Yes
WINTER	1/21/03	13.4	0.0029	96.1%	0.004	0.0037	0.0075	Yes
WINTER	2/25/03	5.0	0.0578	13.1%	0.027	0.0274	0.1487	Yes
WINTER	3/25/03	8.5	0.0042	85.3%	0.003	0.0034	0.0107	Yes
WINTER	4/15/03	15.1	0.0038	88.4%	0.005	0.0054	0.0097	Yes
		TOTALS =	1.3001		1.387		Total number of values =	58
							Allowable % of exceedances =	10%
							Allowable no. of exceedances =	6
							No. of exceedances before reductions =	1
							No. of exceedances after reductions =	1

Flow weighted average Sulfate (mg/L) = (1.387 / 1.3001) / conversion =	11	mg/L
Average flow per unit area for winter =	0.0260	cms/mi2
Estimated drainage area for reach 18 =	180	mi2
Average flow for winter for reach 18 = 0.0260 * 180 =	4.682	cms
Existing total Sulfates load for winter for reach 18 = 11 mg/L * 4.682 cms * conversions =	4.99	tons/day
Sum of design flows for point sources for reach 18 =	0.000	cms
Assumed effluent Sulfates concentration for point sources =	60	mg/L
Existing point source Sulfates load for winter for reach 18 = = 0.000 cms * 60 mg/L * conversions =	0.00	tons/day
Existing NPS Sulfates load for winter for reach 18 = 4.99 - 0.00 =	4.99	tons/day
Total allowable loading per unit area to meet Sulfates (from Table O.1) =	7.44E-02	tons/day/mi2
Total allowable loading for reach 18 = 7.44E-2 * 180 mi2 =	13.38	tons/day
Explicit MOS for Sulfates for winter for reach 18 (10% * 13.38) =	1.34	tons/day
WLA for Sulfates for winter for reach 18 (same as existing load) =	0.00	tons/day
LA for Sulfates for winter for reach 18 = total - MOS - WLA =	12.04	tons/day

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Figure O.1. Winter Flow Duration Curve for USGS 07369680 Bayou Macon near Eudora

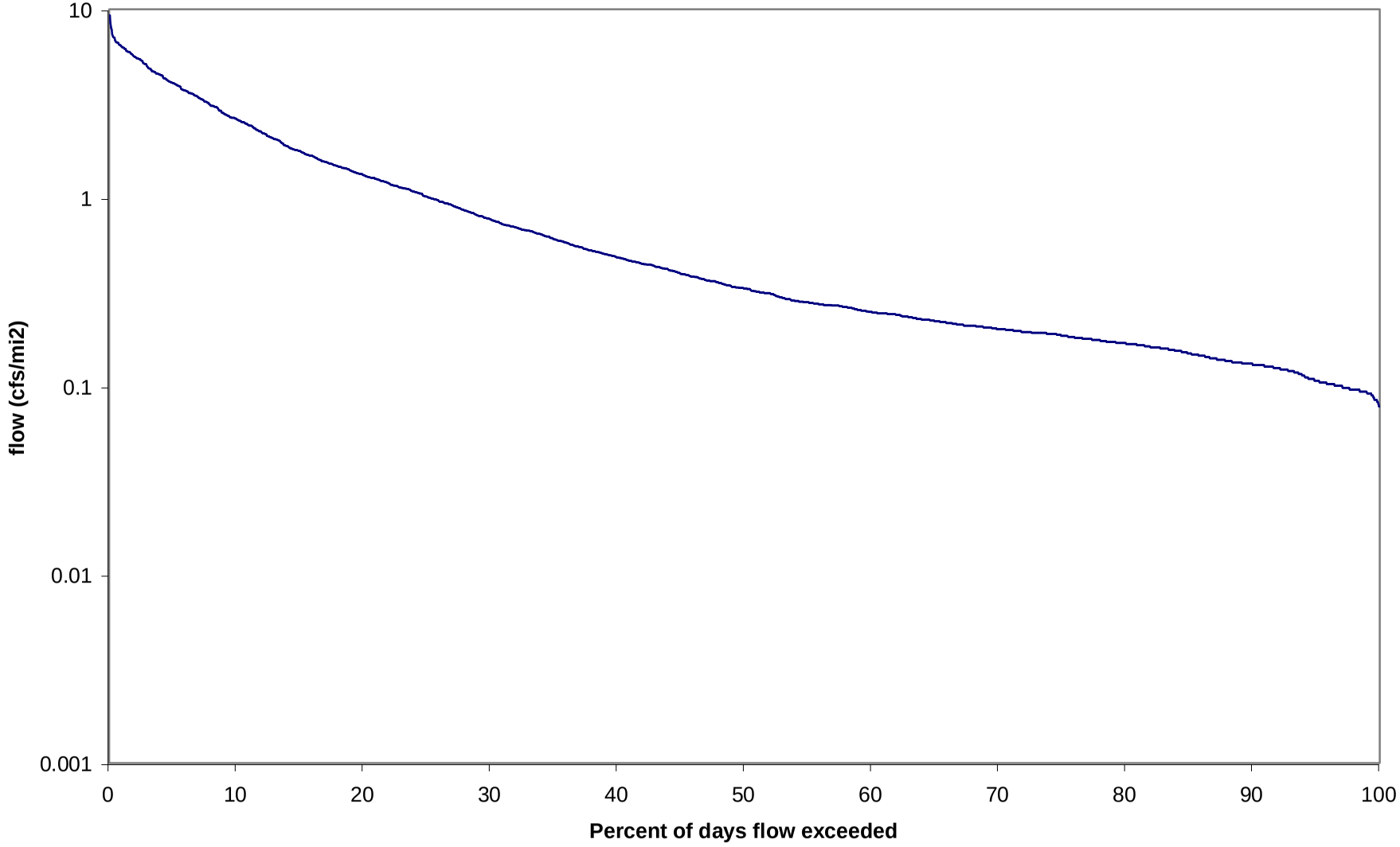
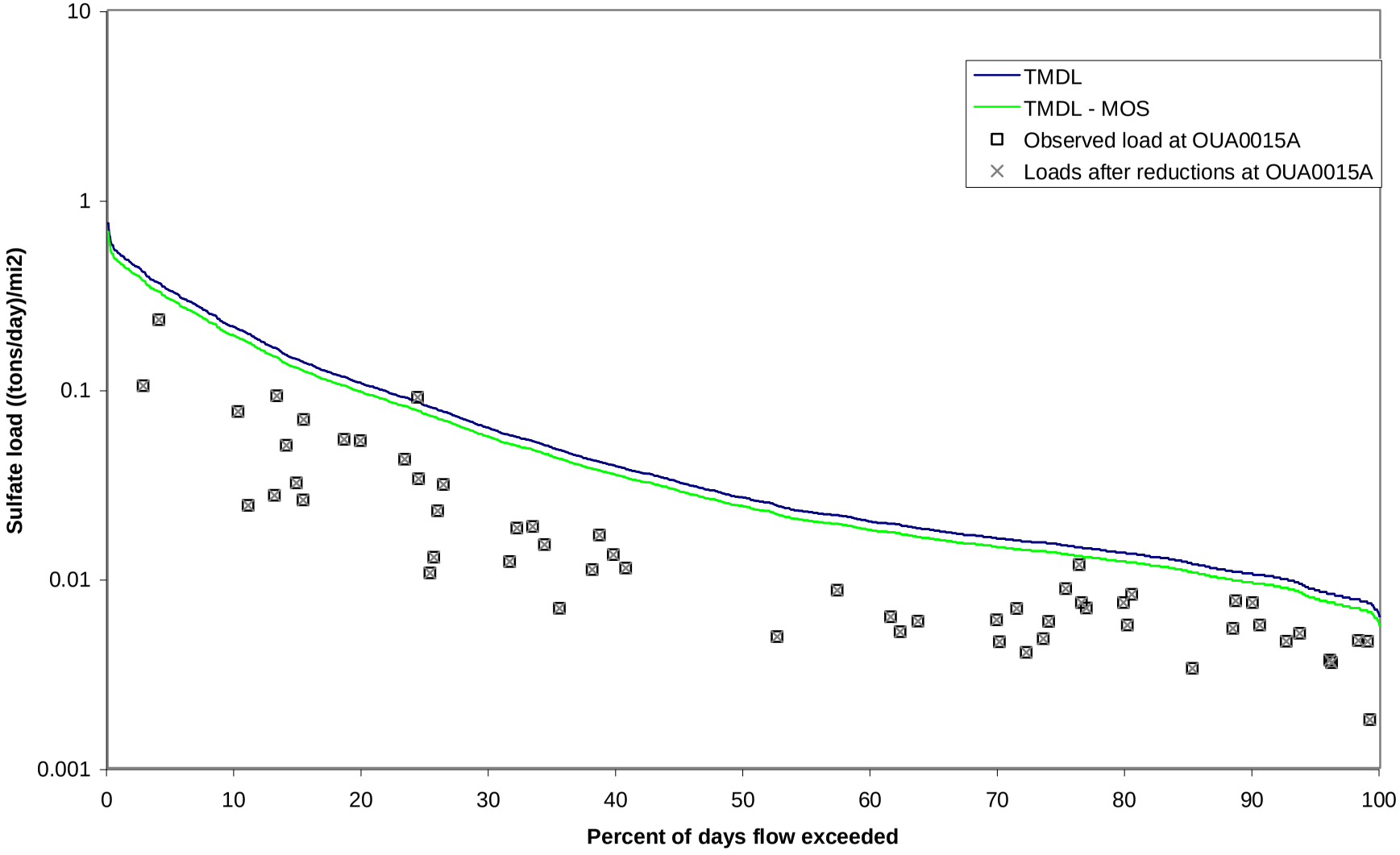


Figure O.2. Winter Sulfate Load Duration Curve for Boeuf River at OUA0015A



APPENDIX P

WLAs for Individual Point Sources

Table P.1 Summary of WLAs for individual point sources.

Reach ID	Stream Name	Parameter	Permit Number	Facility Name	Design flow rate (MGD)	Assumed effluent conc. (mg/L)	Wasteload allocation		Future Growth (50% of WLA)		Reduction required?
							(lbs/day)	(tons/day)	(lbs/day)	(tons/day)	
08050001-022	Big Bayou	Chloride	AR0022071	City of McGehee	0.6	60	300.4	0.15	150.2	0.08	NO
			AR0022250	City of Dermott-South Pond	1.2	60	600.9	0.30	300.4	0.15	NO
			AR0041297	City of Montrose	0.1	60	50.1	0.03	25.0	0.01	NO
				TOTAL	1.9		951.4	0.48	475.7	0.24	
08050001-018	Boeuf River	Chloride	None								
		TDS	None								
		Sulfate	None								
08050001-019	Boeuf River	Chloride	AR0033707	City of Tillar	0.0900	60	45.1	0.02	22.5	0.01	NO
			AR0046507	AR Hwy Dept-McGehee HQ	0.0005	60	0.3	1.25E-04	0.1	6.26E-05	NO
				TOTAL	0.0905		45.3	0.02	22.7	0.01	
08050002-010	Oak Bayou	Chloride	None								
		TDS	None								

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