Appendix 4-A

Lake Data Collected Between April & September 2007 by Intensive Survey Unit

Table 4-1: Lake James Physical Parameter Data Collected in 2007

Station	Date	Zone	TP (mg/L)	TKN (mg/L)	NH_3 (mg/L)	NO_x (mg/L)	Chlorophyll *a*	Turbidity
CTB013B	09-Apr-07	Photic	0.03	0.20	0.01	0.12	7	6.1
CTB013B	23-Apr-07	Photic	0.03	0.10	0.06	0.11	8	8.0
CTB013B	01-May-07	Photic	0.03	0.30	0.01	0.13	12	5.8
CTB013B	15-May-07	Photic	0.03	0.28	0.01	0.10	12	4.9
CTB013B	06-Jun-07	Photic	0.04	0.39	0.01	0.01	20	6.5
CTB013B	19-Jun-07	Photic	0.04	0.35	0.01	0.01	15	4.6
CTB013B	10-Jul-07	Photic	0.03	0.37	0.01	0.01	13	4.8
CTB013B	23-Jul-07	Photic	0.04	0.36	0.01	0.01	20	4.6
CTB013B	08-Aug-07	Photic	0.04	0.40	0.01	0.01	14	4.6
CTB013B	21-Aug-07	Photic	0.04	0.35	0.01	0.01	15	4.6
CTB013C	09-Apr-07	Photic	0.02	0.10	0.02	0.16	4	2.1
CTB013C	23-Apr-07	Photic	0.02	0.10	0.01	0.12	13	5.9
CTB013C	01-May-07	Photic	0.02	0.20	0.01	0.08	1	2.5
CTB013C	15-May-07	Photic	0.01	0.10	0.01	0.07	4	2.2
CTB013C	06-Jun-07	Photic	0.01	0.10	0.01	0.01	8	2.6
CTB013C	19-Jun-07	Photic	0.02	0.26	0.04	0.04	---	4.6
CTB015A	09-Apr-07	Photic	0.01	0.10	0.01	0.14	3	2.9
CTB015A	23-Apr-07	Photic	0.01	0.10	0.01	0.12	18	2.2
CTB015A	01-May-07	Photic	0.01	0.26	0.01	0.09	6	1.6
CTB015A	15-May-07	Photic	0.01	0.10	0.01	0.07	1	1.2
CTB015A	06-Jun-07	Photic	0.01	0.10	0.03	0.10	1	<1.0
CTB015A	19-Jun-07	Photic	0.01	0.10	0.01	0.06	1	1.7
CTB015A	10-Jul-07	Photic	0.01	0.10	0.01	0.01	---	1.6
CTB015A	23-Jul-07	Photic	0.01	0.10	0.01	0.01	2	1
CTB015A	08-Aug-07	Photic	0.01	0.21	0.03	0.04	2	1.5
CTB015A	21-Aug-07	Photic	0.01	0.10	0.02	0.06	1	1.7
CTB015C	09-Apr-07	Photic	0.01	0.10	0.03	0.14	<1	2.3
CTB015C	01-May-07	Photic	0.01	0.10	0.01	0.09	9	1.4
CTB015C	15-May-07	Photic	0.01	0.10	0.01	0.11	1	<1.0
CTB015C	06-Jun-07	Photic	0.01	0.10	0.01	0.06	<1	1.4
CTB015C	19-Jun-07	Photic	0.01	0.10	0.01	0.05	---	<1
CTB015C	10-Jul-07	Photic	0.01	0.10	0.01	0.01	<1	1.3
CTB015C	23-Jul-07	Photic	0.01	0.10	0.01	0.01	2	1.1
CTB015C	08-Aug-07	Photic	0.01	0.10	0.01	0.02	1	1.2
CTB015C	21-Aug-07	Photic	0.01	0.10	0.01	0.05	1	<1.0
CTB023A1	09-Apr-07	Photic	0.01	0.10	0.02	0.15	<1	2.2
CTB023A1	23-Apr-07	Photic	0.01	0.10	0.01	0.16	1	1.1
CTB023A1	01-May-07	Photic	0.01	0.10	0.01	0.15	1	<1.0
CTB023A1	15-May-07	Photic	0.01	0.10	0.01	0.12	2	---
CTB023A1	06-Jun-07	Photic	0.01	0.10	0.01	0.08	2	1.0
CTB023A1	19-Jun-07	Photic	0.01	0.20	0.01	0.05	2	2.8
CTB023A1	10-Jul-07	Photic	0.01	0.22	0.01	0.01	3	2.1
CTB023A1	23-Jul-07	Photic	0.01	0.10	0.01	0.01	4	1.6

Station	Date	Zone	TP (mg/L)	TKN (mg/L)	NH_3 (mg/L)	NO_x (mg/L)	Chlorophyll *a*	Turbidity
CTB023A1	08-Aug-07	Photic	0.01	0.10	0.01	0.02	4	1.5
CTB023A1	21-Aug-07	Photic	0.01	0.20	0.01	0.05	2	2.8
CTB023B	09-Apr-07	Photic	0.01	0.10	0.03	0.15	<1	2.1
CTB023B	23-Apr-07	Photic	0.01	0.10	0.02	0.15	1	1.2
CTB023B	01-May-07	Photic	0.01	0.10	0.01	0.14	2	<1.0
CTB023B	15-May-07	Photic	0.01	0.10	0.01	0.10	1	1.1
CTB023B	06-Jun-07	Photic	0.01	0.10	0.01	0.07	<1	<1.0
CTB023B	19-Jun-07	Photic	0.01	0.10	0.01	0.05	2	2.2
CTB023B	10-Jul-07	Photic	0.01	0.21	0.01	0.04	<1	1.1
CTB023B	23-Jul-07	Photic	0.01	0.10	0.01	0.01	2	<1.0
CTB023B	08-Aug-07	Photic	0.01	0.10	0.01	0.03	2	1.1
CTB023B	21-Aug-07	Photic	0.01	0.10	0.01	0.05	2	2.2
CTBO13C	19-Jun-07	Photic	0.02	0.26	0.04	0.04	5	4.6
CTBO13C	10-Jul-07	Photic	0.01	0.24	0.01	0.01	5	2.2
CTBO13C	23-Jul-07	Photic	0.01	0.10	0.01	0.01	6	2.5
CTBO13C	08-Aug-07	Photic	0.01	0.22	0.01	0.01	6	1.7
CTBO13C	21-Aug-07	Photic	0.02	0.26	0.04	0.04	5	4.6

Table 4-2: Lake James Chemical Parameter Data Collected in 2007

Station	Date	Depth	Temperature	DO	pH	Conductivity	Secchi Depth
CTB013B	09-Apr-07	0.15	12.4	11.2	8.1	59	1.4
CTB013B	23-Apr-07	0.15	19.3	8.7	7.2	56	0.8
CTB013B	01-May-07	0.15	20.9	9.8	7.6	63	0.6
CTB013B	15-May-07	0.15	22.4	9.1	7.6	58	0.8
CTB013B	06-Jun-07	0.15	26.5	9.4	8.3	65	1.1
CTB013B	19-Jun-07	0.15	26.8	9.2	8.0	65	1.3
CTB013B	20-Jun-07	0.15	26.8	9.2	8.0	65	---
CTB013B	10-Jul-07	0.15	29.8	9.6	8.4	71	1.9
CTB013B	23-Jul-07	0.15	27.5	8.6	7.6	73	1.5
CTB013B	08-Aug-07	0.15	29.1	7.8	7.4	58	1.4
CTB013B	21-Aug-07	0.15	29.6	8.3	7.6	94	1.3
CTB013C	09-Apr-07	0.15	11.3	11.5	7.5	54	2.6
CTB013C	23-Apr-07	0.15	17.3	10.8	7.8	52	1.0
CTB013C	01-May-07	0.15	19.9	10.4	8.0	55	1.9
CTB013C	15-May-07	0.15	22.9	9.9	7.7	56	2.2
CTB013C	06-Jun-07	0.15	25.5	8.7	7.9	57	2.1
CTB013C	27-Jul-09	0.15	29.8	7.5	7.9	69	0.7
CTB013C	10-Sep-09	0.15	23.9	5.0	7.1	79	0.4
CTB015A	09-Apr-07	0.15	13.3	11.2	7.5	52	3.2
CTB015A	23-Apr-07	0.15	16.8	11.0	7.9	47	1.9
CTB015A	01-May-07	0.15	19.5	10.5	8.3	49	2.2
CTB015A	15-May-07	0.15	22.2	8.4	7.6	50	3.3

Station	Date	Depth	Temperature	DO	pH	Conductivity	Secchi Depth
CTB015A	06-Jun-07	0.15	25.2	8.1	7.2	52	4.1
CTB015A	19-Jun-07	0.15	26.8	8.3	7.5	53	3.9
CTB015A	20-Jun-07	0.15	26.8	8.3	7.5	53	---
CTB015A	10-Jul-07	0.15	28.6	7.4	7.5	55	4.0
CTB015A	23-Jul-07	0.15	27.1	7.9	7.2	55	4.2
CTB015A	08-Aug-07	0.15	28.8	8.9	7.8	70	4.2
CTB015A	08-Aug-07	0.15	29.1	7.9	7.3	50	4.2
CTB015A	21-Aug-07	0.15	29.9	7.7	7.5	60	3.9
CTB015C	09-Apr-07	0.15	13.6	9.8	7.5	51	5.7
CTB015C	01-May-07	0.15	19.4	10.7	8.3	46	1.9
CTB015C	15-May-07	0.15	21.9	8.9	7.6	46	5.1
CTB015C	06-Jun-07	0.15	25.3	8.0	7.6	48	6.0
CTB015C	19-Jun-07	0.15	26.8	8.1	7.4	49	3.7
CTB015C	19-Jun-07	0.15	26.8	8.1	7.4	49	---
CTB015C	20-Jun-07	0.15	26.8	8.1	7.4	49	---
CTB015C	10-Jul-07	0.15	28.8	7.8	7.6	50	5.0
CTB015C	23-Jul-07	0.15	27.6	8.6	7.4	50	3.5
CTB015C	21-Aug-07	0.15	30.0	7.7	7.4	51	3.7
CTB023A1	09-Apr-07	0.15	12.5	11.0	7.3	49	4.7
CTB023A1	23-Apr-07	0.15	16.3	10.3	7.1	44	4.7
CTB023A1	01-May-07	0.15	18.4	10.2	7.5	45	4.1
CTB023A1	15-May-07	0.15	22.3	8.6	7.3	46	3.2
CTB023A1	06-Jun-07	0.15	24.9	8.0	7.3	46	3.2
CTB023A1	19-Jun-07	0.15	27.3	8.2	7.4	46	3.1
CTB023A1	10-Jul-07	0.15	28.9	8.0	7.6	47	5.5
CTB023A1	23-Jul-07	0.15	27.1	8.1	7.3	47	3.0
CTB023A1	08-Aug-07	0.15	29.1	8.1	7.7	47	2.7
CTB023A1	21-Aug-07	0.15	29.8	7.8	7.5	48	3.1
CTB023B	09-Apr-07	0.15	14.1	9.5	7.5	49	5.4
CTB023B	01-May-07	0.15	19.2	10.6	7.8	46	3.9
CTB023B	15-May-07	0.15	21.7	9.4	7.6	46	3.2
CTB023B	06-Jun-07	0.15	25.3	8.0	7.4	46	5.1
CTB023B	19-Jun-07	0.15	26.7	7.9	7.3	48	5.5
CTB023B	19-Jun-07	0.15	26.7	7.9	7.3	48	---
CTB023B	10-Jul-07	0.15	28.7	7.8	7.5	48	5.6
CTB023B	23-Jul-07	0.15	27.3	8.1	7.4	48	4.0
CTB023B	08-Aug-07	0.15	27.9	8.5	7.1	48	4.0
CTB023B	21-Aug-07	0.15	30.0	7.7	7.4	50	5.5
CTBO13C	19-Jun-07	0.15	26.7	8.6	7.5	58	2.9
CTBO13C	10-Jul-07	0.15	28.8	8.1	7.5	61	3.3
CTBO13C	23-Jul-07	0.15	27.3	8.0	7.2	62	2.3
CTBO13C	08-Aug-07	0.15	28.8	8.5	7.9	58	2.9
CTBO13C	21-Aug-07	0.15	28.8	7.8	7.1	64	2.9

Table 4-3: Lake Rhodhiss Chemical Parameter Data Collected in 2007

Station	Date	Zone	TP (mg/L)	TKN (mg/L)	NH_3 (mg/L)	NO_x (mg/L)	Chlorophyll *a*	Turbidity
CTB034A	02-May-07	Photic	0.02	0.20	0.01	0.16	2	11.0
CTB034A	16-May-07	Photic	0.02	0.25	0.01	0.02	15	1.8
CTB034A	05-Jun-07	Photic	0.06	0.32	0.04	0.26	5	13.0
CTB034A	20-Jun-07	Photic	0.05	0.42	0.01	0.12	19	9.4
CTB034A	11-Jul-07	Photic	0.06	0.53	0.01	0.02	8	6.7
CTB034A	24-Jul-07	Photic	0.07	0.75	0.01	0.01	25	7.5
CTB034A	07-Aug-07	Photic	0.05	0.40	0.01	0.10	9	11.0
CTB034A	22-Aug-07	Photic	0.05	0.50	0.01	0.06	15	7.4
CTB034A	26-Sep-07	Photic	0.12	0.79	0.01	0.01	70	11.0
CTB040A	02-May-07	Photic	0.03	0.26	0.01	0.07	14	3.6
CTB040A	16-May-07	Photic	0.04	0.26	0.01	0.02	19	2.7
CTB040A	05-Jun-07	Photic	0.03	0.33	0.01	0.08	12	3.2
CTB040A	20-Jun-07	Photic	0.03	0.44	0.01	0.01	18	7.5
CTB040A	11-Jul-07	Photic	0.05	0.48	0.01	0.01	16	3.8
CTB040A	24-Jul-07	Photic	0.05	0.52	0.01	0.01	22	5.4
CTB040A	07-Aug-07	Photic	0.05	0.48	0.01	0.01	22	4.0
CTB040A	22-Aug-07	Photic	0.04	0.38	0.01	0.01	18	3.6
CTB040A	26-Sep-07	Photic	0.04	0.43	0.01	0.01	19	3.9
CTB040B	02-May-07	Photic	0.02	0.10	0.01	0.02	7	2.1
CTB040B	16-May-07	Photic	0.04	0.26	0.10	0.12	13	8.4
CTB040B	05-Jun-07	Photic	0.03	0.33	0.01	0.01	11	2.6
CTB040B	20-Jun-07	Photic	0.03	0.40	0.01	0.01	13	3.4
CTB040B	11-Jul-07	Photic	0.03	0.49	0.01	0.01	16	3.9
CTB040B	24-Jul-07	Photic	0.03	0.55	0.01	0.01	21	3.6
CTB040B	07-Aug-07	Photic	0.03	0.41	0.01	0.01	20	3.2
CTB040B	22-Aug-07	Photic	0.03	0.44	0.01	0.01	14	3.1
CTB040B	26-Sep-07	Photic	0.03	0.46	0.01	0.01	13	3.1

Table 4-4: Lake Rhodhiss Physical Parameter Data Collected in 2007

Station	Date	Depth	Temperature	DO	pH	Conductivity	Secchi Depth
CTB034A	02-May-07	0.15	18.8	8.4	7.1	52	0.4
CTB034A	16-May-07	0.15	22.3	10.7	8.4	52	0.7
CTB034A	05-Jun-07	0.15	20.9	7.6	6.8	52	0.4
CTB034A	20-Jun-07	0.15	24.9	9.5	7.4	55	0.7
CTB034A	11-Jul-07	0.15	26.9	8.7	7.6	59	1.0
CTB034A	24-Jul-07	0.15	24.9	9.6	8.4	65	0.8
CTB034A	07-Aug-07	0.15	27.3	11.6	9.1	67	0.8
CTB034A	22-Aug-07	0.15	25.8	8.4	7.7	67	0.7
CTB034A	26-Sep-07	0.15	24.8	10.2	8.4	75	0.5
CTB040A	02-May-07	0.15	20.2	11.1	8.4	55	1.4
CTB040A	16-May-07	0.15	22.6	11.5	8.9	63	1.3
CTB040A	05-Jun-07	0.15	24.5	8.4	7.4	60	1.6

Station	Date	Depth	Temperature	DO	pH	Conductivity	Secchi Depth
CTB040A	20-Jun-07	0.15	26.4	10.4	8.9	63	1.4
CTB040A	11-Jul-07	0.15	28.1	10.5	9.3	69	1.3
CTB040A	24-Jul-07	0.15	25.7	9.0	8.8	69	0.9
CTB040A	07-Aug-07	0.15	29.1	10.7	8.9	77	1.2
CTB040A	22-Aug-07	0.15	27.6	8.8	8.4	78	0.8
CTB040A	26-Sep-07	0.15	23.6	10.6	8.8	90	1.1
CTB040B	02-May-07	0.15	21.0	10.7	8.7	51	1.8
CTB040B	16-May-07	0.15	21.5	11.7	8.8	58	1.9
CTB040B	05-Jun-07	0.15	25.5	10.3	8.9	63	1.8
CTB040B	20-Jun-07	0.15	27.5	9.6	8.7	64	1.1
CTB040B	11-Jul-07	0.15	28.6	10.0	9.4	71	1.2
CTB040B	24-Jul-07	0.15	25.7	9.1	8.9	64	1.1
CTB040B	07-Aug-07	0.15	30.1	10.6	9.2	75	1.2
CTB040B	22-Aug-07	0.15	28.5	8.8	8.8	58	1.0
CTB040B	26-Sep-07	0.15	25.2	9.7	8.7	78	1.3

Table 4-5: Lake Hickory Chemical Parameter Data Collected in 2007

Station	Date	Zone	TP (mg/L)	TKN (mg/L)	NH_3 (mg/L)	NO_x (mg/L)	Chlorophyll *a*	Turbidity
CTB048A	02-May-07	Photic	0.03	0.26	0.06	0.14	1	6.5
CTB048A	16-May-07	Photic	0.02	0.30	0.05	0.16	5	4.1
CTB048A	05-Jun-07	Photic	0.04	0.28	0.09	0.10	5	7.5
CTB048A	20-Jun-07	Photic	0.04	0.39	0.02	0.07	31	4.4
CTB048A	11-Jul-07	Photic	0.04	0.45	0.03	0.10	15	5.8
CTB048A	24-Jul-07	Photic	0.03	0.46	0.03	0.04	17	5.4
CTB048A	07-Aug-07	Photic	0.04	0.35	0.01	0.03	15	5.4
CTB048A	22-Aug-07	Photic	0.03	0.35	0.03	0.03	18	3.5
CTB048A	26-Sep-07	Photic	0.03	0.50	0.01	0.01	19	4.0
CTB056A	02-May-07	Photic	0.02	0.30	0.01	0.09	10	2.9
CTB056A	16-May-07	Photic	0.02	0.25	0.01	0.14	9	3.1
CTB056A	05-Jun-07	Photic	0.02	0.24	0.01	0.02	14	2.8
CTB056A	20-Jun-07	Photic	0.02	0.31	0.01	0.02	16	2.6
CTB056A	11-Jul-07	Photic	0.03	0.30	0.01	0.01	15	4.0
CTB056A	24-Jul-07	Photic	0.03	0.40	0.01	0.01	19	3.5
CTB056A	07-Aug-07	Photic	0.02	0.31	0.01	0.01	19	3.2
CTB056A	22-Aug-07	Photic	0.02	0.32	0.01	0.01	13	3.3
CTB056A	26-Sep-07	Photic	0.03	0.32	0.01	0.03	27	2.8
CTB058C	02-May-07	Photic	0.02	0.33	0.01	0.12	12	2.2
CTB058C	16-May-07	Photic	0.02	0.21	0.01	0.13	8	2.3
CTB058C	05-Jun-07	Photic	0.02	0.28	0.01	0.01	18	2.5
CTB058C	20-Jun-07	Photic	0.02	0.30	0.01	0.01	20	3.2
CTB058C	11-Jul-07	Photic	0.02	0.32	0.01	0.01	14	2.7
CTB058C	24-Jul-07	Photic	0.02	0.32	0.01	0.01	6	5.1
CTB058C	07-Aug-07	Photic	0.02	0.33	0.01	0.01	15	2.7

Station	Date	Zone	TP (mg/L)	TKN (mg/L)	NH_3 (mg/L)	NO_x (mg/L)	Chlorophyll *a*	Turbidity
CTB058C	22-Aug-07	Photic	0.02	0.28	0.01	0.01	12	2.0
CTB058C	26-Sep-07	Photic	0.02	0.30	0.01	0.04	20	2.4
CTB058D	02-May-07	Photic	0.02	0.32	0.01	0.12	9	2.2
CTB058D	16-May-07	Photic	0.02	0.23	0.01	0.12	6	2.1
CTB058D	05-Jun-07	Photic	0.02	0.26	0.01	0.01	13	2.8
CTB058D	20-Jun-07	Photic	0.02	0.30	0.01	0.01	13	2.2
CTB058D	11-Jul-07	Photic	0.02	0.29	0.01	0.01	4	2.1
CTB058D	24-Jul-07	Photic	0.02	0.34	0.01	0.01	8	2.1
CTB058D	07-Aug-07	Photic	0.01	0.33	0.01	0.01	6	2.5
CTB058D	22-Aug-07	Photic	0.02	0.28	0.01	0.01	10	1.9
CTB058D	26-Sep-07	Photic	0.01	0.27	0.06	0.03	16	1.8

Table 4-6: Lake Hickory Physical Parameter Data Collected in 2007

Station	Date	Depth	Temperature	DO	pH	Conductivity	Secchi Depth
CTB048A	02-May-07	0.15	18.7	8.1	6.8	50	1.1
CTB048A	16-May-07	0.15	19.8	8.0	6.9	54	1.4
CTB048A	05-Jun-07	0.15	23.6	7.5	7.0	60	1.0
CTB048A	20-Jun-07	0.15	25.6	8.8	7.1	57	0.9
CTB048A	11-Jul-07	0.15	25.7	6.9	7.2	59	1.0
CTB048A	24-Jul-07	0.15	26.3	8.2	7.1	59	1.1
CTB048A	07-Aug-07	0.15	28.0	8.1	7.4	60	1.1
CTB048A	22-Aug-07	0.15	28.0	7.4	7.0	64	1.2
CTB048A	26-Sep-07	0.15	27.7	8.4	8.2	65	1.2
CTB056A	02-May-07	0.15	20.7	11.3	8.2	50	1.8
CTB056A	16-May-07	0.15	21.5	9.6	7.4	50	1.8
CTB056A	05-Jun-07	0.15	25.3	9.1	7.7	52	1.6
CTB056A	20-Jun-07	0.15	27.0	9.7	8.3	54	1.5
CTB056A	11-Jul-07	0.15	28.1	8.5	7.7	55	1.4
CTB056A	24-Jul-07	0.15	26.6	7.7	7.1	57	1.2
CTB056A	07-Aug-07	0.15	29.2	9.4	8.2	58	1.4
CTB056A	22-Aug-07	0.15	28.9	8.0	7.5	61	1.8
CTB056A	26-Sep-07	0.15	27.9	5.9	8.3	65	1.7
CTB058C	02-May-07	0.15	20.8	10.6	8.1	50	2.0
CTB058C	16-May-07	0.15	21.8	10.0	7.6	49	1.7
CTB058C	05-Jun-07	0.15	25.2	9.5	8.3	52	1.8
CTB058C	20-Jun-07	0.15	26.6	9.7	8.4	53	1.5
CTB058C	11-Jul-07	0.15	28.2	9.1	8.1	55	1.6
CTB058C	24-Jul-07	0.15	26.7	8.1	7.2	56	1.4
CTB058C	07-Aug-07	0.15	29.3	9.2	8.1	58	2.0
CTB058C	22-Aug-07	0.15	29.0	7.8	7.3	60	1.4
CTB058C	26-Sep-07	0.15	27.7	4.6	7.9	65	1.8
CTB058D	02-May-07	0.15	22.2	10.1	7.9	49	2.1
CTB058D	16-May-07	0.15	21.7	10.6	7.6	48	2.2

Station	Date	Depth	Temperature	DO	pH	Conductivity	Secchi Depth
CTB058D	05-Jun-07	0.15	25.2	9.6	8.5	50	1.9
CTB058D	20-Jun-07	0.15	26.7	9.3	8.0	51	2.1
CTB058D	11-Jul-07	0.15	27.9	8.5	7.8	53	2.0
CTB058D	24-Jul-07	0.15	26.7	7.4	7.1	55	2.0
CTB058D	07-Aug-07	0.15	29.5	8.7	7.8	56	2.6
CTB058D	22-Aug-07	0.15	29.2	8.0	7.4	59	1.6
CTB058D	26-Sep-07	0.15	27.7	4.6	7.9	65	2.1

Table 4-7: Lake Norman Chemical Parameter Data Collected in 2007

Station	Date	Zone	TP (mg/L)	TKN (mg/L)	NH_3 (mg/L)	NO_x (mg/L)	Chlorophyll *a*	Turbidity
CTB079A	17-May-07	Photic	0.03	0.10	0.02	0.25	6	11.0
CTB079A	25-Jun-07	Photic	0.03	0.33	0.01	0.06	15	5.3
CTB079A	18-Jul-07	Photic	0.03	0.36	0.01	0.07	20	6.5
CTB079A	15-Aug-07	Photic	0.04	0.39	0.01	0.02	17	7.4
CTB079A	24-Sep-07	Photic	0.02	0.24	0.05	0.15	7.1	9.5
CTB082A	17-May-07	Photic	0.01	0.10	0.01	0.22	8	2.5
CTB082A	25-Jun-07	Photic	0.01	0.25	0.01	0.01	9	2.9
CTB082A	18-Jul-07	Photic	0.01	0.24	0.01	0.01	11	3.6
CTB082A	15-Aug-07	Photic	0.01	0.27	0.01	0.01	**9**	3.2
CTB082A	24-Sep-07	Photic	0.01	0.10	0.01	0.02	10	3.1
CTB082AA	17-May-07	Photic	0.01	0.10	0.01	0.17	3	3.2
CTB082AA	25-Jun-07	Photic	---	---	---	---	5	1.8
CTB082AA	18-Jul-07	Photic	0.01	0.20	0.01	0.09	8	1.9
CTB082AA	15-Aug-07	Photic	0.01	0.10	0.01	0.03	6	1.4
CTB082AA	24-Sep-07	Photic	0.01	0.10	0.01	0.02	6.5	3.8
CTB082B	17-May-07	Photic	0.01	0.10	0.01	0.23	8	2.8
CTB082B	25-Jun-07	Photic	0.02	0.26	0.01	0.17	11	2.8
CTB082B	18-Jul-07	Photic	0.01	0.28	0.01	0.15	6	2.5
CTB082B	15-Aug-07	Photic	0.01	0.25	0.01	0.04	12	2.3
CTB082B	24-Sep-07	Photic	0.01	0.10	0.01	0.08	5.8	2.1
CTB082BB	17-May-07	Photic	0.01	0.10	0.01	0.19	2	3.1
CTB082BB	25-Jun-07	Photic	0.01	0.10	0.01	0.11	4	2.2
CTB082BB	18-Jul-07	Photic	0.01	0.10	0.01	0.08	6	1.8
CTB082BB	15-Aug-07	Photic	0.01	0.20	0.01	0.03	6	1.5
CTB082BB	24-Sep-07	Photic	0.01	0.26	0.02	0.02	3	1.9
CTB082M	17-May-07	Photic	0.01	0.20	0.01	0.14	7	3.4
CTB082M	25-Jun-07	Photic	0.01	0.22	0.01	0.08	7	2.2
CTB082M	18-Jul-07	Photic	0.01	0.10	0.01	0.02	9	2.1
CTB082M	15-Aug-07	Photic	0.01	0.22	0.01	0.04	10	1.9
CTB082M	24-Sep-07	Photic	0.01	0.10	0.01	0.05	7	2.3
CTB082Q	17-May-07	Photic	0.02	0.10	0.01	0.18	3	3.0
CTB082Q	25-Jun-07	Photic	0.01	0.10	0.01	0.10	4	1.7
CTB082Q	18-Jul-07	Photic	0.01	0.10	0.01	0.06	6	1.9

Station	Date	Zone	TP (mg/L)	TKN (mg/L)	NH_3 (mg/L)	NO_x (mg/L)	Chlorophyll *a*	Turbidity
CTB082Q	15-Aug-07	Photic	0.01	0.20	0.01	0.01	6	2.2
CTB082Q	24-Sep-07	Photic	0.01	0.10	0.01	0.02	4.1	2.0
CTB082R	17-May-07	Photic	0.01	0.10	0.01	0.18	3	4.5
CTB082R	25-Jun-07	Photic	0.01	0.10	0.01	0.10	4	2.0
CTB082R	18-Jul-07	Photic	0.01	0.10	0.01	0.07	6	1.4
CTB082R	15-Aug-07	Photic	0.01	0.24	0.01	0.01	7	1.9
CTB082R	24-Sep-07	Photic	0.01	0.10	0.01	0.04	3.9	1.8

Table 4-8: Lake Norman Physical Parameter Data Collected in 2007

Station	Date	Depth	Temperature	DO	pH	Conductivity	Secchi Depth
CTB079A	17-May-07	0.15	21.1	7.9	7.1	50	0.9
CTB079A	25-Jun-07	0.15	28.2	9.4	8.2	54	1.2
CTB079A	18-Jul-07	0.15	28.6	7.2	7.3	55	0.9
CTB079A	15-Aug-07	0.15	29.3	8.1	7.2	61	0.9
CTB079A	24-Sep-07	0.15	27.0	8.1	7.3	63	0.9
CTB082A	17-May-07	0.15	22.4	8.8	7.6	58	2.2
CTB082A	25-Jun-07	0.15	28.4	8.9	8.5	61	1.9
CTB082A	18-Jul-07	0.15	29.0	8.0	7.9	62	1.7
CTB082A	15-Aug-07	0.15	30.6	7.7	7.4	66	1.4
CTB082A	24-Sep-07	0.15	27.1	8.6	7.9	70	1.8
CTB082AA	17-May-07	0.15	24.0	8.3	7.5	57	2.4
CTB082AA	25-Jun-07	0.15	31.0	8.3	7.5	58	2.5
CTB082AA	18-Jul-07	0.15	31.7	6.9	7.4	58	2.3
CTB082AA	15-Aug-07	0.15	33.8	7.5	7.5	63	2.2
CTB082AA	24-Sep-07	0.15	30.4	8.0	7.5	64	1.5
CTB082B	17-May-07	0.15	22.5	8.5	7.5	59	2.1
CTB082B	25-Jun-07	0.15	28.6	8.2	7.5	65	1.9
CTB082B	18-Jul-07	0.15	24.2	6.2	7.0	66	1.6
CTB082B	15-Aug-07	0.15	30.8	7.8	7.0	68	1.8
CTB082B	24-Sep-07	0.15	27.3	7.3	7.2	71	1.6
CTB082BB	17-May-07	0.15	23.1	8.6	7.4	56	3.4
CTB082BB	25-Jun-07	0.15	30.1	8.0	7.4	59	3.0
CTB082BB	18-Jul-07	0.15	31.1	6.7	7.2	58	3.0
CTB082BB	15-Aug-07	0.15	33.2	7.5	7.4	63	2.7
CTB082BB	24-Sep-07	0.15	30.5	6.8	7.2	66	1.7
CTB082M	17-May-07	0.15	23.4	9.0	7.6	58	2.6
CTB082M	25-Jun-07	0.15	28.5	8.8	7.9	62	2.0
CTB082M	18-Jul-07	0.15	28.0	7.8	7.8	63	2.1
CTB082M	15-Aug-07	0.15	30.9	8.3	7.6	68	2.0
CTB082M	24-Sep-07	0.15	28.6	8.4	7.9	72	2.0
CTB082Q	17-May-07	0.15	22.7	8.8	7.5	57	4.1
CTB082Q	25-Jun-07	0.15	29.0	8.5	7.8	59	3.0
CTB082Q	18-Jul-07	0.15	30.1	7.1	7.7	58	2.8

Station	Date	Depth	Temperature	DO	pH	Conductivity	Secchi Depth
CTB082Q	15-Aug-07	0.15	31.9	7.8	7.7	63	2.6
CTB082Q	24-Sep-07	0.15	28.8	7.9	7.5	65	2.6
CTB082R	17-May-07	0.15	21.4	8.9	7.6	57	3.0
CTB082R	25-Jun-07	0.15	29.9	8.3	7.4	59	3.0
CTB082R	18-Jul-07	0.15	29.9	7.0	7.4	59	2.3
CTB082R	15-Aug-07	0.15	32.1	7.7	7.4	63	2.5
CTB082R	24-Sep-07	0.15	28.5	7.4	7.4	65	2.2

Table 4-9: Lake Wylie Chemical Parameter Data Collected in 2007

Station	Date	Zone	TP (mg/L)	TKN (mg/L)	NH_3 (mg/L)	NO_x (mg/L)	Chlorophyll *a*	Turbidity
CTB105B	23-Jul-07	Photic	0.04	0.39	0.07	0.06	19	5.8
CTB105B	02-May-07	Photic	0.04	0.40	0.01	0.20	21	10.0
CTB105B	21-May-07	Photic	0.04	0.33	0.02	0.20	11	8.1
CTB105B	04-Jun-07	Photic	0.04	0.40	0.11	0.14	10	7.5
CTB105B	18-Jun-07	Photic	0.03	0.44	0.01	0.10	20	4.5
CTB105B	09-Jul-07	Photic	0.03	0.45	0.05	0.08	15	4.4
CTB105B	06-Aug-07	Photic	0.04	0.46	0.03	0.01	17	5.1
CTB105B	20-Aug-07	Photic	0.04	0.42	0.03	0.01	19	5.4
CTB105B	26-Sep-07	Photic	0.04	0.45	0.01	0.01	22	4.5
CTB174	02-May-07	Photic	0.06	0.41	0.01	0.24	19	10.0
CTB174	21-May-07	Photic	0.06	0.48	0.01	0.22	32	10.0
CTB174	04-Jun-07	Photic	0.04	0.40	0.06	0.18	14	9.3
CTB174	18-Jun-07	Photic	0.05	0.54	0.01	0.14	27	8.7
CTB174	09-Jul-07	Photic	0.04	0.46	0.01	0.11	26	6.2
CTB174	23-Jul-07	Photic	0.05	0.44	0.02	0.10	29	8.1
CTB174	06-Aug-07	Photic	0.07	0.45	0.02	0.04	18	6.4
CTB174	20-Aug-07	Photic	0.06	0.42	0.01	0.03	25	4.6
CTB174	12-Sep-07	Photic	0.05	0.37	0.02	0.03	15	5.4
CTB174	26-Sep-07	Photic	0.07	0.34	0.01	0.10	18	7.4
CTB177	02-May-07	Photic	0.04	0.50	0.01	0.17	32	7.7
CTB177	21-May-07	Photic	0.05	0.44	0.01	0.03	28	7.7
CTB177	04-Jun-07	Photic	0.04	0.40	0.04	0.07	13	4.8
CTB177	18-Jun-07	Photic	0.04	0.52	0.01	0.07	27	4.8
CTB177	09-Jul-07	Photic	0.04	0.55	0.01	0.02	34	4.9
CTB177	23-Jul-07	Photic	0.04	0.46	0.01	0.02	25	6.4
CTB177	06-Aug-07	Photic	0.05	0.53	0.01	0.01	21	6.2
CTB177	20-Aug-07	Photic	0.05	0.43	0.01	0.01	23	5.5
CTB177	12-Sep-07	Photic	0.05	0.50	0.05	0.01	14	9.9
CTB177	26-Sep-07	Photic	0.05	0.44	0.01	0.01	27	4.5
CTB178	02-May-07	Photic	0.02	0.32	0.01	0.21	12	2.6
CTB178	21-May-07	Photic	0.03	0.35	0.01	0.16	14	4.1
CTB178	04-Jun-07	Photic	0.03	0.36	0.03	0.12	16	4.9
CTB178	18-Jun-07	Photic	0.03	0.48	0.01	0.02	21	3.1

Station	Date	Zone	TP (mg/L)	TKN (mg/L)	NH_3 (mg/L)	NO_x (mg/L)	Chlorophyll *a*	Turbidity
CTB178	09-Jul-07	Photic	0.03	0.38	0.01	0.01	20	2.8
CTB178	23-Jul-07	Photic	0.03	0.38	0.01	0.03	21	3.2
CTB178	06-Aug-07	Photic	0.04	0.44	0.01	0.01	18	3.8
CTB178	20-Aug-07	Photic	0.03	0.39	0.01	0.01	20	3.7
CTB178	12-Sep-07	Photic	0.03	0.40	0.02	0.01	13	4.0
CTB178	26-Sep-07	Photic	0.03	0.41	0.01	0.01	18	2.5
CTB198B5	21-May-07	Photic	0.06	0.50	0.01	0.06	33	7.1
CTB198B5	04-Jun-07	Photic	0.07	0.62	0.03	0.03	41	10.0
CTB198B5	18-Jun-07	Photic	0.05	0.62	0.01	0.01	39	6.2
CTB198B5	09-Jul-07	Photic	0.04	0.51	0.01	0.01	32	7.1
CTB198B5	23-Jul-07	Photic	0.05	0.40	0.01	0.01	30	7.1
CTB198B5	06-Aug-07	Photic	0.06	0.58	0.01	0.01	34	8.8
CTB198B5	20-Aug-07	Photic	0.07	0.62	0.01	0.01	42	11.0
CTB198B5	12-Sep-07	Photic	0.06	0.43	0.01	0.01	35	8.5
CTB198B5	26-Sep-07	Photic	0.06	0.44	0.01	0.01	21	7.4
CTB198C5	02-May-07	Photic	0.04	0.36	0.01	0.16	14	8.8
CTB198C5	21-May-07	Photic	0.04	0.42	0.01	0.05	12	8.8
CTB198C5	04-Jun-07	Photic	0.04	0.39	0.01	0.01	18	7.1
CTB198C5	18-Jun-07	Photic	0.05	0.53	0.01	0.01	29	6.8
CTB198C5	09-Jul-07	Photic	0.05	0.55	0.01	0.01	27	7.2
CTB198C5	23-Jul-07	Photic	0.07	0.39	0.01	0.01	12	5.5
CTB198C5	06-Aug-07	Photic	0.05	0.60	0.01	0.01	28	9.6
CTB198C5	20-Aug-07	Photic	0.05	0.62	0.01	0.01	19	12.0
CTB198C5	12-Sep-07	Photic	0.04	0.48	0.01	0.01	21	11.0
CTB198C5	26-Sep-07	Photic	0.06	0.68	0.01	0.01	29	11.0
CTB198D	02-May-07	Photic	0.02	0.33	0.01	0.19	9	2.4
CTB198D	21-May-07	Photic	0.03	0.34	0.01	0.08	14	2.6
CTB198D	04-Jun-07	Photic	0.03	0.42	0.01	0.05	17	4.7
CTB198D	18-Jun-07	Photic	0.03	0.42	0.01	0.01	19	2.8
CTB198D	09-Jul-07	Photic	0.03	0.43	0.01	0.01	19	4.5
CTB198D	23-Jul-07	Photic	0.02	0.32	0.01	0.01	14	3.2
CTB198D	06-Aug-07	Photic	0.02	0.40	0.01	0.01	11	3.0
CTB198D	20-Aug-07	Photic	0.02	0.38	0.01	0.01	14	2.8
CTB198D	12-Sep-07	Photic	0.02	0.31	0.01	0.01	16	2.8
CTB198D	26-Sep-07	Photic	0.03	0.32	0.01	0.01	15	---

Table 4-10: Lake Wylie Physical Parameter Data Collected in 2007

Station	Date	Depth	Temperature	DO	pH	Conductivity	Secchi Depth
CTB105B	02-May-07	0.15	25.7	9.6	8.0	86	1.0
CTB105B	21-May-07	0.15	23.9	8.6	7.6	90	1.0
CTB105B	04-Jun-07	0.15	26.3	6.6	7.0	91	1.0
CTB105B	09-Jul-07	0.15	31.5	7.8	7.6	102	1.3
CTB105B	18-Jun-07	0.15	29.8	9.1	8.4	98	1.1

Station	Date	Depth	Temperature	DO	pH	Conductivity	Secchi Depth
CTB105B	23-Jul-07	0.15	29.3	7.3	7.4	98	1.2
CTB105B	06-Aug-07	0.15	33.0	8.5	8.3	113	1.2
CTB105B	20-Aug-07	0.15	31.5	7.4	7.7	100	1.1
CTB105B	12-Sep-07	0.15	29.5	6.1	7.3	102	1.0
CTB105B	26-Sep-07	0.15	28.3	9.1	8.8	115	1.0
CTB174	02-May-07	0.15	29.5	8.9	8.0	88	0.8
CTB174	21-May-07	0.15	27.5	10.4	8.5	96	0.6
CTB174	04-Jun-07	0.15	29.3	6.3	7.2	92	0.8
CTB174	18-Jun-07	0.15	33.6	9.7	8.5	100	0.7
CTB174	09-Jul-07	0.15	36.1	8.5	7.9	102	0.9
CTB174	23-Jul-07	0.15	32.4	8.4	7.7	102	0.9
CTB174	06-Aug-07	0.15	36.7	7.9	8.0	114	0.9
CTB174	12-Sep-07	0.15	34.1	5.6	7.1	101	1.0
CTB174	26-Sep-07	0.15	33.8	7.4	7.8	107	0.8
CTB177	02-May-07	0.15	25.2	10.4	8.5	87	1.0
CTB177	21-May-07	0.15	25.3	9.4	8.6	102	0.8
CTB177	04-Jun-07	0.15	27.9	7.5	8.1	91	1.2
CTB177	18-Jun-07	0.15	29.7	9.9	8.7	99	1.1
CTB177	09-Jul-07	0.15	31.4	9.4	8.5	103	1.2
CTB177	23-Jul-07	0.15	30.6	8.4	8.0	99	1.1
CTB177	06-Aug-07	0.15	33.0	8.3	8.4	112	1.0
CTB177	12-Sep-07	0.15	29.1	4.4	7.0	108	0.8
CTB177	26-Sep-07	0.15	29.4	10.2	9.1	114	1.2
CTB178	02-May-07	0.15	23.4	9.5	7.7	82	1.8
CTB178	21-May-07	0.15	25.3	9.2	8.3	92	1.4
CTB178	04-Jun-07	0.15	26.2	6.7	7.4	89	1.2
CTB178	18-Jun-07	0.15	29.1	9.7	8.5	97	1.5
CTB178	09-Jul-07	0.15	30.0	8.8	8.3	101	1.7
CTB178	23-Jul-07	0.15	30.2	7.7	7.6	99	1.6
CTB178	06-Aug-07	0.15	33.2	8.6	8.2	112	1.2
CTB178	20-Aug-07	0.15	30.8	7.2	7.7	108	0.8
CTB178	12-Sep-07	0.15	28.7	5.0	7.1	108	1.1
CTB178	26-Sep-07	0.15	27.8	9.4	8.8	111	1.5
CTB198B5	21-May-07	0.15	26.2	10.4	8.5	134	0.7
CTB198B5	04-Jun-07	0.15	27.3	9.1	8.2	118	0.5
CTB198B5	18-Jun-07	0.15	29.9	10.9	9.0	108	0.9
CTB198B5	09-Jul-07	0.15	30.2	9.2	8.5	112	0.9
CTB198B5	23-Jul-07	0.15	29.6	8.6	7.9	121	0.9
CTB198B5	06-Aug-07	0.15	32.6	10.7	8.7	151	0.6
CTB198B5	20-Aug-07	0.15	32.3	9.6	8.4	189	0.6
CTB198B5	26-Sep-07	0.15	28.7	9.6	8.7	140	1.1
CTB198C5	02-May-07	0.15	26.2	9.2	7.7	92	0.9
CTB198C5	21-May-07	0.15	25.9	9.5	8.5	100	0.9

Station	Date	Depth	Temperature	DO	pH	Conductivity	Secchi Depth
CTB198C5	04-Jun-07	0.15	26.9	8.1	8.5	103	0.9
CTB198C5	18-Jun-07	0.15	30.5	10.1	8.8	107	0.8
CTB198C5	09-Jul-07	0.15	31.1	9.8	8.8	116	0.9
CTB198C5	23-Jul-07	0.15	29.0	8.3	8.1	116	1.2
CTB198C5	06-Aug-07	0.15	33.0	9.5	8.7	128	0.6
CTB198C5	20-Aug-07	0.15	31.7	8.7	8.7	136	0.7
CTB198C5	12-Sep-07	0.15	28.3	7.3	7.4	154	0.7
CTB198C5	12-Sep-07	0.15	28.0	6.0	7.3	138	0.7
CTB198C5	26-Sep-07	0.15	28.6	9.5	8.8	134	1.0
CTB198D	02-May-07	0.15	25.1	9.1	7.8	81	1.9
CTB198D	21-May-07	0.15	25.6	9.6	8.7	90	1.6
CTB198D	04-Jun-07	0.15	25.0	8.5	7.9	89	1.4
CTB198D	18-Jun-07	0.15	29.4	9.5	8.7	97	1.7
CTB198D	09-Jul-07	0.15	30.0	8.8	8.6	101	1.3
CTB198D	23-Jul-07	0.15	29.9	8.3	8.1	106	1.8
CTB198D	06-Aug-07	0.15	31.6	9.2	8.7	112	1.6
CTB198D	20-Aug-07	0.15	31.0	8.2	8.7	115	1.9
CTB198D	12-Sep-07	0.15	28.5	6.8	7.5	115	1.6
CTB198D	26-Sep-07	0.15	28.0	9.2	8.8	117	1.3

Appendix 4-B

Lake Wylie TMDL & Original Management Strategies for Nutrients

(as seen in the 1995 *Catawba River Basinwide Water Quality Management Plan*)

FEB 05 1998

TMDL APPROVAL

Project:

Lake Wylie Nutrient Management Strategy

Location:

Mecklenburg and Gaston County, NC; York County, SC

Scope/Size:

The TMDL encompasses Lake Wylie and its tributaries including the Catawba River and its tributaries below Mountain Island Dam and the South Fork Catawba River below its confluence with Long Creek.

Water Quality Issue(s):

Eutrophication-related water quality standard violations.

Applicable Water Quality Standard(s):

The NC chlorophyll-a water quality standard for lakes is: not greater than 40 ug/l.

Water Quality Model:

The Walker Lake Model, an empirical, steady state model which relates eutrophication symptoms to external loadings, hydrology and reservoir morphometry, was calibrated for Lake Wylie.

Critical Conditions:

The model was used to predict the growing season (April-October) nutrient response of Lake Wylie during a low flow year.

TMDL Strategy:

NEW/EXPANDING DISCHARGES TO LAKE WYLIE*

>=1MGD, all new and expanding facilities must meet limits of 1 mg/l (TP) and 6 mg/l (TN-summer only).

<1MGD, but >0.05 MGD, all new and expanding facilities must meet a 2mg/l TP limit.

INDUSTRIAL DISCHARGES

All industrial discharges will be handled on a case-by-case basis because best available technology (BAT) is not clearly defined for them. The Division will require the industries in the management area to reduce TP and TN to BAT levels.

DISCHARGES TO CATAWBA CREEK (>0.05 MGD)

By 2001, all facilities must meet a 1 mg/l TP limit and 6 mg/l summertime TN limit. By 2006, all facilities must meet a 0.5 mg/l TP limit and TN limits of 4 mg/l summertime, 8 mg/l wintertime.

DISCHARGES TO CROWDERS CREEK (>1 MGD)

By 2001, all facilities must meet limits of 1 mg/l (TP) and 6 mg/l (TN - summer only).

DISCHARGES TO SOUTH FORK CATAWBA RIVER DOWNSTREAM OF LONG CREEK

>=1 MGD, all new and expanding facilities must meet limits of 1 mg/l (TP) and 6 mg/l (TN - summer only).

<1 MGD, but >0.05 MGD, all new and expanding facilities must meet a 2 mg/l TP limit.

*Defined as the Catawba River and its tributaries (unless otherwise noted) from the Mountain Island Lake dam to the Lake Wylie dam.

TMDL WASTELOAD ALLOCATION (WLA) STRATEGY

Tributary	Discharger	Flow MGD	TN, mg/l (lb/day)	TP, mg/l (lb/day)	Comments
S. Fork Catawba River	Gastonia NC0020184	16.0	*6.0 (801)	1.0 (133)	Plant not on line yet; these will be limits.
"	JPS NCG500169	4.0	8.8 (293)	2.7 (90)	Monitoring only; plant does not have limits.
Catawba River	Mt. Holley NC0021156	4.0	9.1 (304)	3.3 (110)	Currently discharges at these levels-no limits.
"	"	6.0	*6.0 (300)	1.0 (50)	After expansion, these will be permit limits.
"	Belmont NC0021181	5.0	15.0 (624)	8.3 (345)	Currently discharges at these levels-no limits.
"	"	7.0	*6.0 (350)	1.0 (58)	After expansion, these will be permit limits.
Catawba Creek	Gastonia NC0020192	9.0	*4.0 (300)	0.5 (38)	These will be permit limits by 2006.
Crowders Creek	Bessemer City NC0020826	1.5	*6.0 (75)	1.0 (13)	Permit limits by Jan. 01, 2000.
"	Gastonia NC0074268	6.0	*6.0 (300)	1.0 (50)	"

*April-October TN limit

The above WLAs which are scheduled to be implemented over the next several years are intended to prevent the average chlorophyll-a values from exceeding the 40 ug/l standard. The following table illustrates the improvement in the chlorophyll-a standard in the most impacted arms of Lake Wylie. These improvements (to meet the water quality standard) will be derived soley from permit limit modification.

Loading And Chlorophyll-a Levels Before TMDL Strategy

Tributary/Lake	TP, lbs/day	TN, (lbs/day)	Chlorophyll-a, (ug/l)
Catawba Creek	301	991	74
Crowders Creek	150	895	43
South Fork Catawba River	993	4760	-
Catawba River	801	7346	-
Lake Wylie	1195	9726	18.2

Loading And Chlorophyll-a Levels After TMDL Strategy

Tributary/Lake	TP, (lbs/day)	TN, (lbs/day)	Chlorophyll-a (ug/l)
Catawba Creek	56	337	35
Crowders Creek	82	520	33
South Fork Catawba River	718	4491	-
Catawba River	455	7068	-
Lake Wylie	825	8885	15.5

LOAD ALLOCATION (LA) BREAKDOWN

Nutrient budgets for point and non-point contributions were estimated for the South Fork, Catawba Creek and Crowders Creek watersheds based on average nutrient concentration, mean flow for each tributary, and NPDES compliance data. Estimated growing season background loadings were separated from estimated growing season loadings due to point sources.

The load allocations considered in the model for TMDL development are as follows:

Tributary	TP, (lbs/day)	TN, (lbs/day)
South Fork Catawba River	495	3398
Catawba Creek	19	36
Crowders Creek	20	144
Catawba River	346	6418

The LA for nonpoint source loading does not specify the percent reduction for TN and TP, because the previously identified WLAs will result in the average chlorophyll-a standard being met. However, the South Fork Catawba River has been identified as the highest priority for implementation of BMPs.

MARGIN OF SAFETY (MOS)

The water quality model was used to predict the nutrient response of Lake Wylie to a low flow year. Flow data from the 1986 growing season were selected for this run as it was the lowest flow in the past 10 years.

Availability for Public Comment:

Two public meetings were held to present the Catawba River Basin Plan in November, 1994. A number of comments were received about the Lake Wylie nutrient management strategy at these meetings. Based on the comments, NCDEM revised the strategy. The Catawba River Basin Plan was approved by the Environmental Management Commission in February, 1995.

Date Submitted:

NCDEM sent the final Catawba River Basin Plan containing the Lake Wylie Nutrient Management Strategy to EPA on December 14, 1995. Due to the furlough, EPA did not receive the Basin Plan until January 10, 1996.

Technical Approver John A. Kopchynski

Technical Reviewer [signature]
R4 TMDL Coordinator

This TMDL strategy is hereby approved as meeting the requirements of Section 303(d) of the Clean Water Act.

Approved [signature]
Robert F. McGhee, Director
Water Management Division

Date 2/5/96

Lake Wylie TMDL
1995
Catawba River Basinwide
Water Quality Management Plan

6.4 MANAGEMENT STRATEGIES FOR NUTRIENTS

Control of nutrients is necessary to limit algal growth potential, to assure protection of the instream chlorophyll *a* standard, and to avoid the development of nuisance conditions in the state's waterways. Point source controls are typically NPDES permit limitations on total phosphorus (TP) and total nitrogen (TN). Nonpoint controls of nutrients generally include best management practices (BMPs) to control nutrient loading from areas such as agricultural land and urban areas.

Assimilative capacity for nutrients vary greatly in the Catawba Basin as the waters flow from stream to lake to stream. A 1992 report by DEM and South Carolina Department of Health and Environmental Control (92-04) described the assimilative capacity of Lake Wylie as exhausted. Rhodhiss Lake and Lake Hickory are eutrophic lakes, but their short retention time mitigates the effect by somewhat controlling algal growth. Ongoing and planned studies will further detail the assimilative capacity for nutrients of Lake James, Rhodhiss Lake, Lake Hickory, Lookout Shoals Lake, and Mountain Island Lake.

6.4.1 Lake Wylie Management Strategy

The 1992 Lake Wylie Report (92-04) documented eutrophic conditions in Lake Wylie and several of its major tributaries. To address eutrophication in Lake Wylie, the state developed a point and non-point nutrient control strategy for the Lake Wylie watershed. For point sources, it required state-of-the-art nutrient removal for all new or expanding wastewater discharges in the vicinity of the lake. In addition, the nutrient management strategy required existing facilities on tributaries to the three most highly eutrophic arms of the lake (South Fork Catawba River, Catawba Creek and Crowders Creek) to meet stringent nutrient removal requirements. For nonpoint sources, this strategy included targeting of funds from the state's Agricultural Cost Share Program for the Reduction of Nonpoint Source Pollution for implementation of best management practices on agricultural lands to highly impacted watersheds of Lake Wylie.

In conjunction with the Catawba River basinwide planning effort, the existing Lake Wylie management strategy was reexamined using current water quality data to assess the strategy's consistency with the State's stated goal of managing problem pollutants while accommodating reasonable economic growth. The Lake Wylie nutrient management strategy presented below is designed to reduce and eventually prevent the occurrence of eutrophication-related water quality standard violations in Lake Wylie and is consistent with the general results and conclusions of the 1992 Lake Wylie report.

The Lake Wylie Nutrient Management Area

In order to control nutrient loading in Lake Wylie and its major tributaries, both point and non-point source controls need to be implemented. For the purposes of this document, the Lake Wylie Nutrient Management Area is considered to be Lake Wylie and its tributaries including the Catawba River and its tributaries below Mountain Island Dam and the South Fork Catawba River below its confluence with Long Creek. The upper watersheds of the Catawba River, above Mountain Island Lake Dam, and the South Fork Catawba River, above Long Creek, are not included in the management area due to both the distance of these waters from Lake Wylie and the presence of impoundments which trap some nutrients. Because distance from the lake and the presence of impoundments may somewhat mitigate the effects of nutrients released into the upper Lake Wylie watersheds, nutrient management will be focused within the study area as defined above.

Future study will be conducted to reevaluate the extent of the defined management area. Point and non-point sources on the South Fork Catawba River upstream of Long Creek will be further assessed to determine what effect additional control of nutrients in the upper South Fork Catawba River basin may have upon eutrophication in Lake Wylie. Results of this study will be considered during the development of the next Catawba River Basin Plan.

Recommended Point Source Nutrient Reduction Strategies

To reduce nutrient enrichment of Lake Wylie, the following recommendations are made for point source discharges within the Lake Wylie Nutrient Management Area. These recommendations are summarized and compared with those from the 1992 Lake Wylie Report in Table 6.2, below.

Reference is also made to Figures 6.1 and 6.2, below, and Figure 3.4 in Chapter 3. Figures 6.1 and 6.2 depict the average daily nutrient loading and predicted chlorophyll *a* concentrations in the four major tributary arms and the mainstem of Lake Wylie based on the nutrient management strategy described below. The key differences between Figures 6.1 and 6.2 pertain to nutrient loadings in the Catawba River arm and the lake mainstem resulting from possible future expansions and upgrading of the Mt. Holly and Belmont municipal wastewater treatment plants (WWTPs). In Figure 6.1, the nutrient loadings to the lake mainstem area, which are shown enclosed by a dashed box in the figure, would be 1077 lbs/day for total phosphorus (TP) and 9289 lbs/day for total nitrogen (TN). The predicted average chlorophyll *a* concentration would be 17.2

ug/l (compared to the state standard of 40 ug/l). Figure 6.2 shows conditions in which the Mt. Holly and Belmont WWTPs are enlarged. Even though their respective flows would increase by 2.0 MGD, their actual nutrient loadings are reduced because nutrient limits would apply to the plants upon expansion. As a result, the TP and TN loads and the predicted chlorophyll *a* concentrations in the mainstem of the lake are lower in Figure 6.2 than in 6.1.

Finally, a comparison can be made between present and permitted nutrient loadings and chlorophyll *a* concentrations by comparing Figures 6.1 and 6.2 with Figure 3.4 in Chapter 3. Major nutrient loading reductions and predicted chlorophyll *a* concentrations can be seen in the Catawba Creek and Crowders Creeks arms when comparing existing conditions (Figure 3.4) and the recommended permitting strategies contained herein. The reductions in nutrient loadings and chlorophyll *a* in the two other lake arms and the lake mainstem are less dramatic but significant.

New Discharges

It is recommended that no new discharges should be allowed to the lake mainstem or its tributaries, unless an evaluation of engineering alternatives shows that it is the most environmentally sound alternative. For any new discharges that meet this requirement it is recommended that advanced treatment technology be required. It is further recommended that any new facility with a permitted design flow of greater than or equal to 1 MGD should be required to meet monthly average limits of 1.0 mg/l total phosphorus (TP) and 6.0 mg/l total nitrogen (TN), (nitrogen limits to apply for the months April through October only). For new facilities with a permitted design flow of less than 1 MGD but greater than 0.05 MGD (50,000 gallons per day) it is recommended that they meet a total phosphorus limit of 2.0 mg/l.

All industrial discharges will be handled on a case-by-case basis because attainable advanced removal technology cannot be clearly defined for them as a group. The Division will require the industries in the management area to control TP and TN to best available technology levels applicable to their industrial type.

Existing Discharges

Existing discharges to the lake mainstem and tributaries should be encouraged to be removed when alternatives become available. Programs such as the Charlotte-Mecklenburg Utility Department (CMUD) sewer line extension project should continue to be supported.

Upon expansion or major modification, it is recommended that all existing discharges should be required to apply advanced nutrient removal technology. For all expanding facilities with a permitted design flow greater than or equal to 1 MGD, recommended monthly average limits are as follows: 1.0 mg/l TP and 6.0 mg/l TN, (nitrogen limits to apply for the months of April through October only). For expanding facilities with a permitted design flow less than 1 MGD but greater than or equal to 0.05 MGD, the recommended TP limit is 2.0 mg/l. No expansion should be allowed that increases the total nutrient load from the facility unless an evaluation of engineering alternatives shows that it is the most environmentally sound alternative.

All existing industrial discharges will be handled on a case-by-case basis because attainable advanced removal technology can not be clearly defined for them as a group. DEM will require the industries in the management area to reduce TP and TN to best available technology levels.

To reduce nutrient enrichment in the two most eutrophic arms of Lake Wylie, additional recommendations are made for point source discharges to the Catawba Creek and Crowders Creek watersheds. In both watersheds, incentives should be established to encourage the privately owned facilities to tie on to larger municipal WWTPs which have a greater resource base to draw on in order to consistently operate the state-of-art treatment facilities required to protect water quality in the above listed sensitive areas. In addition, specific nutrient management recommendations are presented below.

Table 6.2 Comparison of 1992 and 1995 Point Source Phosphorus Reduction Strategies for Lake Wylie

1992 STRATEGY	1995 STRATEGY
NEW/EXPANDING DISCHARGES TO LAKE WYLIE*	NEW/EXPANDING DISCHARGES TO LAKE WYLIE*
Upon expansion, all facilities must meet BAT limits (defined as 0.5 mg/l TP, 4 mg/l summertime TN and 8 mg/l wintertime TN)	≥ 1 MGD, all new and expanding facilities must meet limits of 1 mg/l (TP) and 6 mg/l (TN - summer only). <1 MGD, but >0.05 MGD, all new and expanding facilities must meet a 2 mg/l TP limit.
INDUSTRIAL DISCHARGES	INDUSTRIAL DISCHARGES
All industrial discharges will be handled on a case-by-case basis because best available technology (BAT) is not clearly defined for them. The Division will require the industries in the management area to reduce TP and TN to BAT levels.	No change
DISCHARGES TO CATAWBA CREEK (>0.05 MGD)	DISCHARGES TO CATAWBA CREEK (>0.05 MGD)
By 1998, all facilities must meet BAT limits (defined as 0.5 mg/l TP, 4 mg/l summertime TN and 8 mg/l wintertime TN)	By 2001, all facilities must meet a 1 mg/l TP limit and 6 mg/l summertime TN limit. By 2006, all facilities must meet a 0.5 mg/l TP limit and TN limits of 4 mg/l in the summertime and 8 mg/l in the wintertime.
DISCHARGES TO CROWDERS CREEK (>1 MGD)	DISCHARGES TO CROWDERS CREEK (>1 MGD)
By 1998, all facilities must meet BAT limits (defined as 0.5 mg/l TP, 4 mg/l summertime TN and 8 mg/l wintertime TN)	By 2001, all facilities must meet limits of 1 mg/l (TP) and 6 mg/l (TN - summer only).
DISCHARGES TO SOUTH FORK CATAWBA RIVER DOWNSTREAM OF LONG CREEK	DISCHARGES TO SOUTH FORK CATAWBA RIVER DOWNSTREAM OF LONG CREEK
By 1998, all facilities must meet BAT limits (defined as 0.5 mg/l TP, 4 mg/l summertime TN and 8 mg/l wintertime TN)	≥ 1 MGD, all new and expanding facilities must meet limits of 1 mg/l (TP) and 6 mg/l (TN - summer only). <1 MGD, but >0.05 MGD, all new and expanding facilities must meet a 2 mg/l TP limit.

*Defined as the Catawba River and its tributaries (unless otherwise noted) from the Mountain Island Lake dam to the Lake Wylie dam.

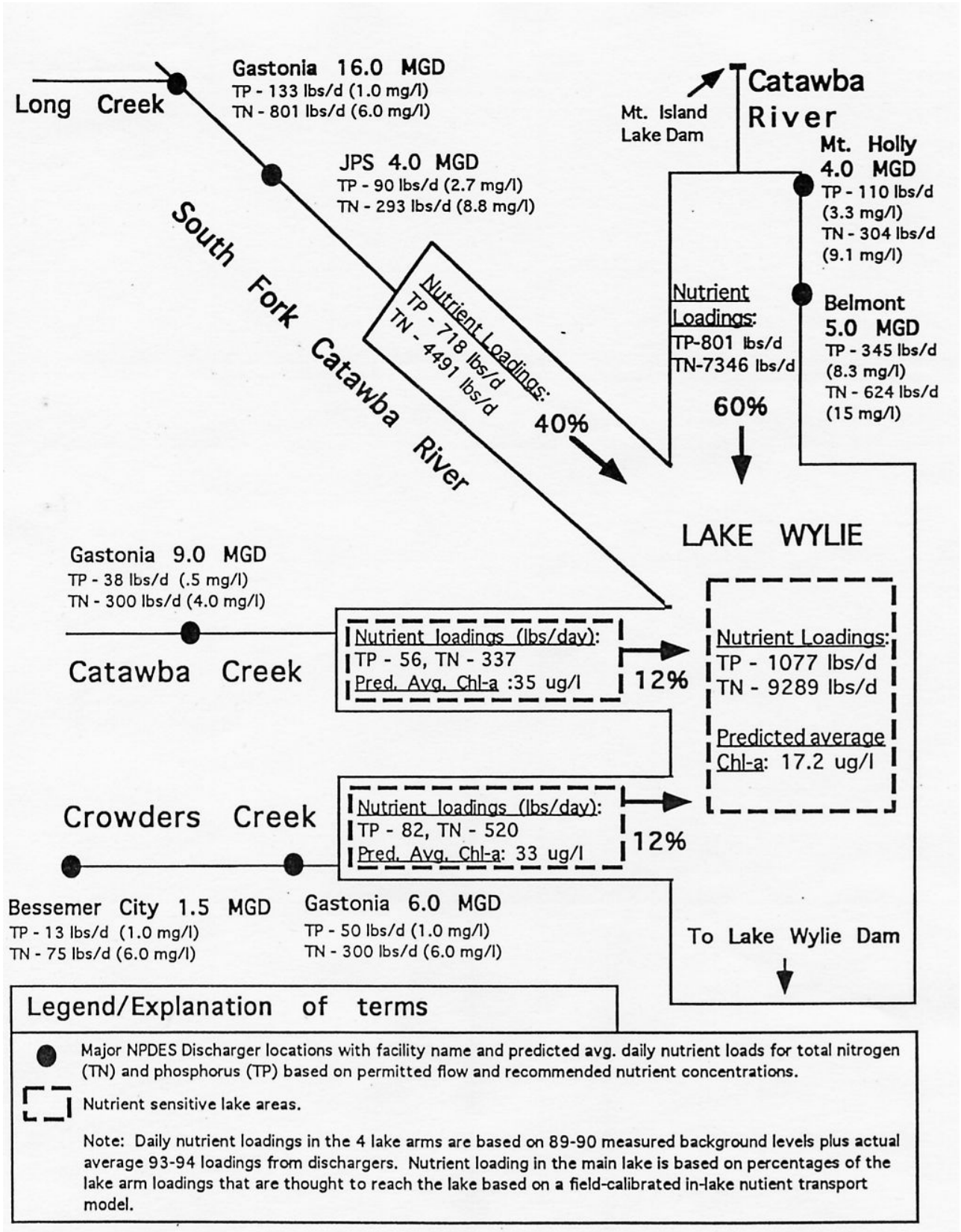

Figure 6.1 Schematic Diagram of Lake Wylie Showing Nutrient Loadings and Predicted Chlorophyll-a Concentrations in the 4 Major Arms and the Mainstem of the Lake Under the 1995 Lake Wylie Nutrient Management Strategy

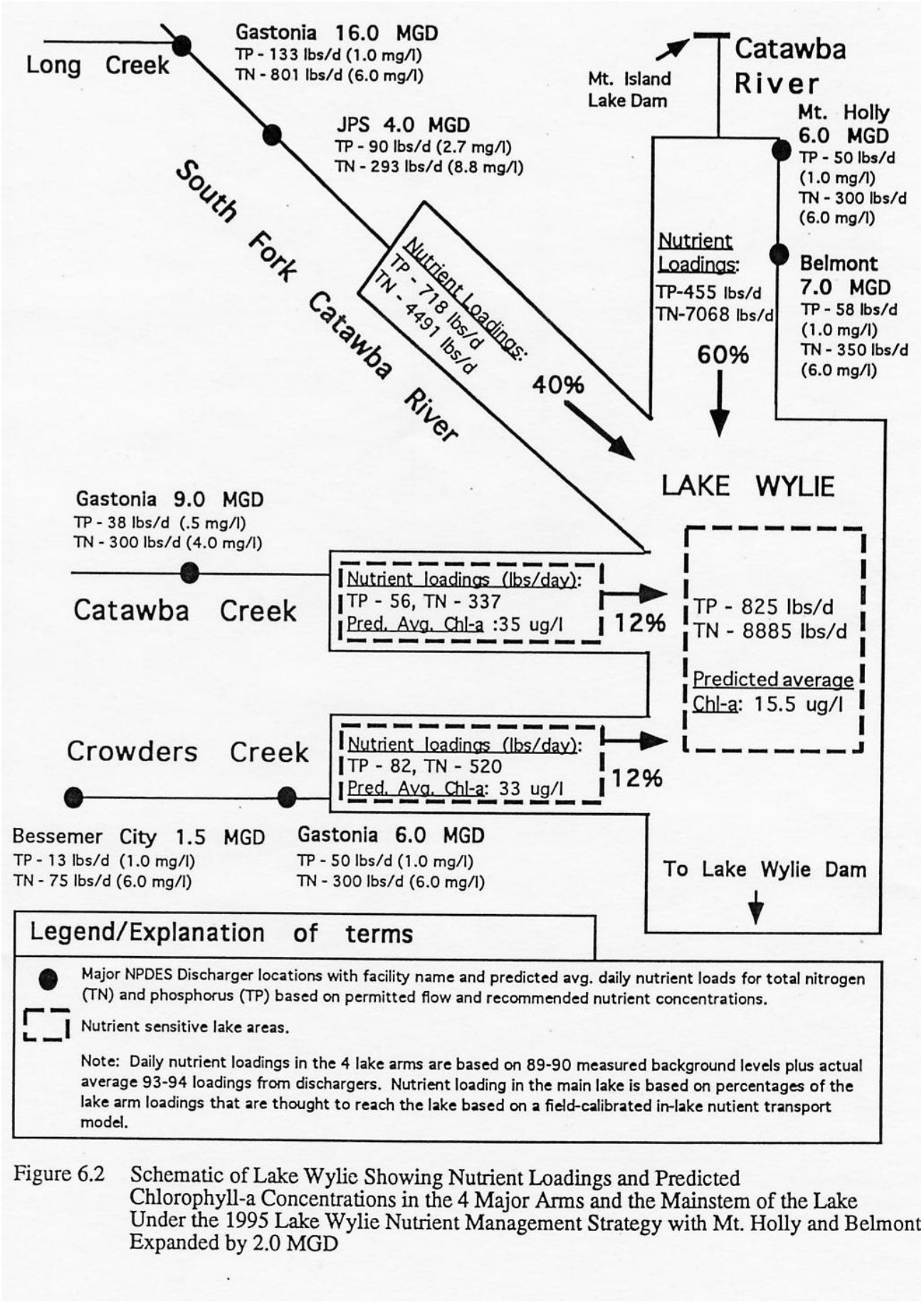

Figure 6.2 Schematic of Lake Wylie Showing Nutrient Loadings and Predicted Chlorophyll-a Concentrations in the 4 Major Arms and the Mainstem of the Lake Under the 1995 Lake Wylie Nutrient Management Strategy with Mt. Holly and Belmont Expanded by 2.0 MGD

Catawba Creek
All existing surface water discharges in these watersheds with a permitted design flow of greater than or equal to 0.05 MGD should be required to apply state-of-art nutrient removal technology. Existing facilities have been notified of this strategy and will be required to meet permit limits of 0.5 mg/l TP and TN limits of 4 mg/l in the summer and 8 mg/l in the winter by 2006. Interim limits of 1.0 mg/l TP and 6.0 mg/l TN (summer) will become effective January 1, 2001. Based on a comparison between Figure 3.4, in Chapter 3, and Figure 6.1, it can be seen that these recommendations would result in reducing the predicted chlorophyll *a* concentration in Catawba creek from 74 ug/l (Figure 3.4) to 35 ug/l (Figure 6.1).

Crowders Creek
By January 1, 2000, it is recommended that all facilities with a permitted design flow of greater than or equal to 1 MGD will be required to meet limits of 1.0 mg/l TP and 6.0 mg/l TN. The nitrogen limits would apply for the months of April through October only. Based on a comparison between Figure 3.4, in Chapter 3, and Figure 6.1, it can be seen that these recommendations would result in reducing the predicted chlorophyll *a* concentration in the creek from 43 ug/l to 33 ug/l.

Non point sources
All tributaries to Lake Wylie should be targeted by the NC Division of Soil and Water Conservation for cost share funds for use in implementation of best management practices (BMPs). When possible, resources should be targeted toward implementation of BMPs in the Catawba Creek, Crowders Creek, and the South Fork Catawba River watersheds since a significant amount of the nutrients reaching these streams is from non-point sources. Since the South Fork Catawba River provides by far the largest nutrient load of any tributary to Lake Wylie, the South Fork should be considered the highest priority for implementation of BMPs.