

SUMMARY TABLE A. NPS Contribution Prioritization by Sub-Basin in the Ten Mile and Palmer Watersheds

Historic Water Quality Data

Watershed/Year	Data Source	Parameter	Ranking			
			#1	#2	#3	#4
<u>Palmer</u>	DMF	Bacteria	RR04/05	RR06	PM10	PM11
	MADEP	Bacteria	RR05	PM06	RR06	PM10
	RIDEM	Bacteria	RR06	NA for MA	NA for MA	NA for MA

ASA Screening Model Output

Watershed/Parameter	Base Year	Ranking			
		#1	#2	#3	#4
<u>Palmer</u>	FC 1999	CR03	TC03	RR06	PM08/PE06

ESS (2003A) Water Quality Results

Watershed/Parameter		Ranking			
		#1	#2	#3	#4
<u>Palmer</u>	FC	FB02	BL01	TC01	CR01

SUMMARY TABLE B. ESS (2003A) Sites Exceeding Fecal Coliform Standard (from upstream to downstream)

Watershed/ Site No.	Sites Exceeding Fecal Coliform Standard				Potential Sources
	Wet	Highest Concentration (col./100 ml)	Dry	Highest Concentration (col./100 ml)	
<u>PALMER</u>					
BA 01	X	430			Pasture/cropland, pig
BA 03	X	660			Pasture/cropland, pig
BA 02	X	8,800			Pasture/cropland, pig
PW 05	X	740			SWRO, horse, pasture
PW 01	X	660			SWRO, horse, pasture
PE 09			X	390	Septic, SWRO
PE 03			X	380	Septic, SWRO
PE 04			X	390	Septic, SWRO
BL 01	X	42,000			Septic, waterfowl, SWRO
FB 02	X	40,000	X	220,000	Cow, pig, waterfowl, lack of buffer
FB 03	X	22,000			Cow, pig, horse, waterfowl, lack of buffer
CR 01	X	18,000			Septic, Ag (multiple), SWRO
CR 02	X	3,200	X	280	Septic, pig, lack of buffer
CR 03	X	13,000	X	430	Septic, Ag (multiple), SWRO, lack of buffer
OS 01	X	2,100			Wildlife
OS 04	X	1,300			SWRO, wildlife
RR 07	X	520			Horse, pig
RR 05	X	23,000			Pasture/cropland, horse, SWRO, lack of buffer
RR 06	X	4,300	X	340	Pasture/cropland, horse, SWRO, lack of buffer
PM 10			X	450	Pasture/cropland, pig, SWRO, lack of buffer
PM 14	X	3,100			Pasture/cropland, pig
PM 26			X	230	Pasture/cropland, pig
PM 11	X	820			Ag (multiple), waterfowl, SWRO
PM 25	X	1,100			Pig, pasture/cropland
RB 01	X	1,900			Lack of buffer, Ag (multiple)
RB 02	X	9,000			Lack of buffer, Ag (multiple)
BB 01	X	12,000			Ag (multiple), septic
TC 05	X	1,100			Septic, SWRO, Ag (multiple)
TC 07			X	1,000	Septic, SWRO, Ag (multiple)
TC 03	X	3,800	X	350	Ag (multiple), waterfowl, septic, lack of buffer
TC 01	X	24,000			Ag (multiple), waterfowl, lack of buffer
TC 11			X	340	Ag (multiple), waterfowl, septic, lack of buffer
<u>TEN MILE</u>					
SM 01	X	560			SWRO, Ag (multiple), septic
TM 08	X	930			SWRO, Ag (multiple), pig, horse
TM 21	X	900			SWRO, septic

**Table PW01. Bacteriological Data for the Palmer River - West Branch
(Wolf Plain Brook and Bliss Brook) (Basin PW-02) NPS Assessment**

Site	Date	Sample Type (Dry or Wet)	Fecal Coliform (col./ 100 ml)	Fecal Coliform (col./ 100 ml) Dry	Fecal Coliform (col./ 100 ml) Wet	E. Coli (col./ 100 ml)	Sample Round
PW01	4/30/2001	Dry	170	170	660	170	Round 1
PW01	7/26/2001	Wet	660			660	Round 1
Geo Mean			335	170	660	335	
% of samples > 400 Col/100 mL			50			50	
PW02	5/1/2001	Dry (Medium)	22	22	47	22	Round 1
PW02	5/22/2001	Wet	47	28	120	47	Round 1
PW02	6/8/2001	Dry	28	15		28	Round 1
PW02	10/10/2001	Dry	15	66		15	Confirmatory
PW02	1/7/2002	Wet	120	33		120	Confirmatory
PW02	6/29/1999	Dry	66	130			MADEP
PW02	6/29/1999	Dry	33				MADEP
PW02	8/31/1999	Dry	130				MADEP
Geo Mean			44	37	75	35	
% of samples > 400 Col/100 mL			0			0	
PW03	4/30/2001	Dry	110	110	170	110	Round 1
PW03	7/26/2001	Wet	170			170	Round 1
Geo Mean			137	110	170	137	
% of samples > 400 Col/100 mL			0			0	
PW04	4/30/2001	Dry	8	8	44	8	Round 1
PW04	7/26/2001	Wet	44			44	Round 1
Geo Mean			19	8	44	19	
% of samples > 400 Col/100 mL			0			0	
PW05	10/23/2001	Dry	19	19	740	19	Round 2
PW05	11/26/2001	Wet	740			740	Round 2
Geo Mean			119	19	740	119	
% of samples > 400 Col/100 mL			50			50	
PW06	10/23/2001	Dry	1	1	7	1	Round 2
PW06	11/26/2001	Wet	7			7	Round 2
Geo Mean			3	1	7	3	
% of samples > 400 Col/100 mL			0			0	
WB01	4/30/2001	Dry	1			1	Round 1
Geo Mean			1	1	no sample	1	
% of samples > 400 Col/100 mL			0			0	
BA01	4/30/2001	Dry	7	7	430	7	Round 1
BA01	7/26/2001	Wet	430			430	Round 1
Geo Mean			55	7	430	55	
% of samples > 400 Col/100 mL			50			50	
BA02	4/30/2001	Dry	<1	<1	8,800	<1	Round 1
BA02	7/26/2001	Wet	8,800			8,800	Round 1
Geo Mean			66	0.5	8,800	66	
% of samples > 400 Col/100 mL			50			50	
BA03	4/30/2001	Dry	54	54	660	54	Round 1
BA03	7/26/2001	Wet	660			660	Round 1
Geo Mean			189	54	660	189	
% of samples > 400 Col/100 mL			50			50	
BA04	10/23/2001	Dry	<1	<1	4	<1	Round 2
BA04	11/26/2001	Wet	4			4	Round 2
Geo Mean			1	0.5	4	1	
% of samples > 400 Col/100 mL			0			0	
BA05	10/23/2001	Dry	21	21	16	21	Round 2
BA05	11/26/2001	Wet	16			16	Round 2
Geo Mean			18	21	16	18	
% of samples > 400 Col/100 mL			0			0	
BA06	10/23/2001	Dry	1	1	1	1	Round 2
BA06	11/26/2001	Wet	1			1	Round 2
Geo Mean			1	1	1	1	
% of samples > 400 Col/100 mL			0			0	

Shading indicates that field parameter exceeds Massachusetts Class BCWF Water Quality Standards (DEP 1998) and/or the Best Professional Judgment (BPJ) of ESS Water Resource Scientists.

DUP: Duplicate sample collected in field. DUP values are not included in calculation of Means.

Geometric Means are presented for fecal coliform and E. coli values.

LABDUP: Laboratory replicate data. LABDUP values are averaged with the original value before calculation of the Geometric Mean.

Less than (<) values are divided by two before incorporating into the calculation of Means.

N/A: Not applicable, sampling of parameter not required as per Scope of Work.

NO FLOW: Non-flowing conditions at sampling locations prevented sample collection.

Sample Round refers to four sampling events (Round 1, Round 2, Round 3 and Confirmatory) conducted during the NPS Assessment, which allowed for bracketing of bacteriological sources.

Table PE03. Bacteriological Data for the Palmer River - East Branch (Basin PE-06) NPS Assessment

Site	Date	Sample Type (Dry or Wet)	Fecal Coliform (col./ 100 ml)	Fecal Coliform (col./ 100 ml) Dry	Fecal Coliform (col./ 100 ml) Wet	E. Coli (col./ 100 ml)	Sample Round
PE03	4/30/2001	Dry	380	380	70	380	Round 1
PE03	7/26/2001	Wet	70	240		50	Round 1
PE03	5/9/2002	Dry	240			220	Round 3
Geo Mean			186	302	70	161	
% of samples > 400 Col/100 mL			0			0	
PE04	4/30/2001	Dry	350	350	240	350	Round 1
PE04	5/22/2001	Wet	240	390		240	Round 1
PE04	6/8/2001	Dry	390			390	Round 1
Geo Mean			320	369	240	320	
% of samples > 400 Col/100 mL			0			0	
PE05	4/30/2001	Dry	9	9	260	9	Round 1
PE05	7/26/2001	Wet	260			260	Round 1
Geo Mean			48	9	260	48	
% of samples > 400 Col/100 mL			0			0	
PE06	10/10/2001	Dry	12	12	370	9	Confirmatory
PE06	1/7/2002	Wet	370	1,300		370	Confirmatory
PE06	6/29/1999	Dry	1,300				
Geo Mean			179	125	370	58	
% of samples > 400 Col/100 mL			33			0	
PE07	10/23/2001	Dry	2	2	19	2	Round 2
PE07	11/26/2001	Wet	19			19	Round 2
Geo Mean			6	2	19	6	
% of samples > 400 Col/100 mL			0			0	
PE08	10/23/2001	Dry	10	10	57	8	Round 2
PE08	11/26/2001	Wet	57			57	Round 2
Geo Mean			24	10	57	21	
% of samples > 400 Col/100 mL			0			0	
PE09	5/9/2002	Dry	390	390		390	Round 3
Geo Mean			390	390		390	
% of samples > 400 Col/100 mL			100			100	

Shading indicates that field parameter exceeds Massachusetts Class BCWF Water Quality Standards (DEP 1998) and/or the Best Professional Judgment (BPJ) of ESS Water Resource Scientists.

DUP: Duplicate sample collected in field. DUP values are not included in calculation of Means.

Geometric Means are presented for fecal coliform and E. coli values.

LABDUP: Laboratory replicate data. LABDUP values are averaged with the original value before calculation of the Geometric Mean.

Less than (<) values are divided by two before incorporating into the calculation of Means.

N/A: Not applicable, sampling of parameter not required as per Scope of Work.

NO FLOW: Non-flowing conditions at sampling locations prevented sample collection.

Sample Round refers to four sampling events (Round 1, Round 2, Round 3 and Confirmatory) conducted during the NPS Assessment, which allowed for bracketing of bacteriological sources.

Table RB02. Bacteriological Data for the Rumney Marsh Brook and Beaver Dam Brook (Basin RB-02) NPS Assessment

Site	Date	Sample Type (Dry or Wet)	Fecal Coliform (col./ 100 ml)	Fecal Coliform (col./ 100 ml) Dry	Fecal Coliform (col./ 100 ml) Wet	E. Coli (col./ 100 ml)	Sample Round
RB01	4/30/2001	Dry	6	6	1,900	6	Round 1
RB01	7/26/2001	Wet	1,900			1,900	Round 1
Geo Mean			107	6	1,900	107	
% of samples > 400 Col/100 mL			50			50	
RB02	4/30/2001	Dry	77	77	9,000	77	Round 1
RB02	7/26/2001	Wet	9,000			9,000	Round 1
Geo Mean			832	77	9,000	832	
% of samples > 400 Col/100 mL			50			50	
BB01	4/30/2001	Dry	16	16	12,000	16	Round 1
BB01	7/26/2001	Wet	12,000			12,000	Round 1
Geo Mean			438	16	12,000	438	
% of samples > 400 Col/100 mL			50			50	
BB02	#####	Dry	22	22	260	22	Round 2
BB02	#####	Wet	260			230	Round 2
Geo Mean			76	22	260	71	
% of samples > 400 Col/100 mL			0			0	

Shading indicates that field parameter exceeds Massachusetts Class BCWF Water Quality Standards (DEP 1998) and/or the Best Professional Judgment (BPJ) of ESS Water Resource Scientists.

DUP: Duplicate sample collected in field. DUP values are not included in calculation of Means.

Geometric Means are presented for fecal coliform and E. coli values.

LABDUP: Laboratory replicate data. LABDUP values are averaged with the original value before calculation of the Geometric Mean.

Less than (<) values are divided by two before incorporating into the calculation of Means.

N/A: Not applicable, sampling of parameter not required as per Scope of Work.

NO FLOW: Non-flowing conditions at sampling locations prevented sample collection.

Sample Round refers to four sampling events (Round 1, Round 2, Round 3 and Confirmatory) conducted during the NPS Assessment, which allowed for bracketing of bacteriological sources.

Table BL02/WR03. Bacteriological Data for the Bad Luck Brook and Warren Upper Reservoir (Basin BL-02/WR-03) NPS Assessment

Site	Date	Sample Type (Dry or Wet)	Fecal Coliform (col./ 100 ml)	Fecal Coliform (col./ 100 ml) Dry	Fecal Coliform (col./ 100 ml) Wet	E. Coli (col./ 100 ml)	Sample Round
BL01	4/30/2001	Dry	1	1	4,200	1	Round 1
BL01	7/26/2001	Wet	42,000		1,900	42,000	Round 1
BL01	6/5/2002	Wet	1,900			1,900	Round 3
BL01-DUP	6/5/2002	Wet	1,500			1,400	Round 3
BL01	11/11/2002	Wet	580		580	580	
Geo Mean			464	1	1,667	464	
% of samples > 400 Col/100 mL			67			67	
BL02	4/30/2001	Dry	33	33	470	33	Round 1
BL02	7/26/2001	Wet	470			470	Round 1
Geo Mean			125	33	470	125	
% of samples > 400 Col/100 mL			50			50	
BL03	6/5/2002	Wet	150		150	150	Round 3
BL03-DUP	6/5/2002	Wet	86			86	Round 3
Geo Mean			150		150	150	
% of samples > 400 Col/100 mL			0			0	
WR01	10/24/2001	Dry	21	21	22	21	Round 2
WR01	11/26/2001	Wet	22		19	12	Round 2
WR01-LABDUP	11/26/2001	Wet	19			14	Round2
Geo Mean			21	21	20.5	17	
% of samples > 400 Col/100 mL			0			0	
WR02	10/24/2001	Dry	NO FLOW			NO FLOW	Round 2
WR02	11/26/2001	Wet	NO FLOW			NO FLOW	Round 2
Geo Mean			NO FLOW			NO FLOW	
% of samples > 400 Col/100 mL			NO FLOW			NO FLOW	
WR03	10/24/2001	Dry	12	12	3	11	Round 2
WR03	11/26/2001	Wet	3			1	Round 2
Geo Mean			6	12	3	3	
% of samples > 400 Col/100 mL			0			0	

Shading indicates that field parameter exceeds Massachusetts Class BCWF Water Quality Standards (DEP 1998) and/or the Best Professional Judgment (BPJ) of ESS Water Resource Scientists.

DUP: Duplicate sample collected in field. DUP values are not included in calculation of Means.

Geometric Means are presented for fecal coliform and E. coli values.

LABDUP: Laboratory replicate data. LABDUP values are averaged with the original value before calculation of the Geometric Mean.

Less than (<) values are divided by two before incorporating into the calculation of Means.

N/A: Not applicable, sampling of parameter not required as per Scope of Work.

NO FLOW: Non-flowing conditions at sampling locations prevented sample collection.

Sample Round refers to four sampling events (Round 1, Round 2, Round 3 and Confirmatory) conducted during the NPS Assessment, which allowed for bracketing of bacteriological sources.

Table FB03. Bacteriological Data for the Fullers Brook (Basin FB-03) NPS Assessment

Site	Date	Sample Type (Dry or Wet)	Fecal Coliform (col./ 100 ml)	Fecal Coliform (col./ 100 ml) Dry	Fecal Coliform (col./ 100 ml) Wet	E. Coli (col./ 100 ml)	Sample Round
FB01	4/30/2001	Dry	56	56		56	Round 1
Geo Mean			56	56		56	
% of samples > 400 Col/100 mL			0			0	
FB02	4/30/2001	Dry	26,000	26,000	40,000	26,000	Round 1
FB02	5/9/2002	Dry	220,000	22,000		220,000	Round 3
FB02	6/5/2002	Wet	40,000			39,000	Round 3
FB02-DUP	6/5/2002	Wet	38,000			37,000	Round 3
FB02	11/1/2002	Dry	86,000	86,000		80,000	
FB02	11/11/2002	Wet	230,000		230,000	230,000	
Geo Mean			85,337	36,641	95,917	83,687	
% of samples > 400 Col/100 mL			100			100	
FB03	4/30/2001	Dry	310	310	22,000	310	Round 1
FB03	7/26/2001	Wet	22,000			22,000	Round 1
Geo Mean			40,000	310	22,000	2,612	
% of samples > 400 Col/100 mL			50			50	
FB04	5/9/2002	Dry	10	10	330	10	Round 3
FB04-DUP	5/9/2002	Dry	<1		500	<1	Round 3
FB04	6/5/2002	Wet	330			330	Round 3
FB04-DUP	6/5/2002	Wet	400			400	Round 3
FB04-LABDUP	6/5/2002	Wet	500			500	Round 3
Geo Mean			64	10	415	64	
% of samples > 400 Col/100 mL			50			50	

Shading indicates that field parameter exceeds Massachusetts Class BCWF Water Quality Standards (DEP 1998) and/or the Best Professional Judgment (BPJ) of ESS Water Resource Scientists.

DUP: Duplicate sample collected in field. DUP values are not included in calculation of Means.

Geometric Means are presented for fecal coliform and E. coli values.

LABDUP: Laboratory replicate data. LABDUP values are averaged with the original value before calculation of the Geometric Mean.

Less than (<) values are divided by two before incorporating into the calculation of Means.

N/A: Not applicable, sampling of parameter not required as per Scope of Work.

NO FLOW: Non-flowing conditions at sampling locations prevented sample collection.

Sample Round refers to four sampling events (Round 1, Round 2, Round 3 and Confirmatory) conducted during the NPS Assessment, which allowed for bracketing of bacteriological sources.

Table CR03. Bacteriological Data for the Clear Run Brook (Basin CR-03) NPS Assessment

Site	Date	Sample Type (Dry or Wet)	Fecal Coliform (col./ 100 ml)	Fecal Coliform (col./ 100 ml) Dry	Fecal Coliform (col./ 100 ml) Wet	E. Coli (col./ 100 ml)	Sample Round
CR01	4/30/2001	Dry	12	12	18,000	12	Round 1
CR01	7/26/2001	Wet	18,000		620	18,000	Round 1
CR01	6/5/2002	Wet	620			600	Round 3
CR01-DUP	6/5/2002	Wet	490			490	Round 3
Geo Mean			512	12	3,341	506	
% of samples > 400 Col/100 mL			67			67	
CR02	4/30/2001	Dry	280	280	3,200	280	Round 1
CR02	7/26/2001	Wet	3,200	285	1,300	3,200	Round 1
CR02	5/9/2002	Dry	280			280	Round 3
CR02-LABDUP	5/9/2002	Dry	290			290	Round 3
CR02	6/5/2002	Wet	1300			1300	Round 3
Geo Mean			759	282	2,040	759	
% of samples > 400 Col/100 mL			50			50	
CR03	4/30/2001	Dry	100	100	13,000	100	Round 1
CR03	7/26/2001	Wet	13,000	375	13,000	13,000	Round 1
CR03	10/10/2001	Dry	430	270		430	Confirmatory
CR03-LABDUP	10/10/2001	Dry	320	410		320	Confirmatory
CR03	1/7/2002	Wet	13,000			13,000	Confirmatory
CR03	5/9/2002	Dry	270			270	Round 3
CR03	8/31/1999	Dry	410				DEP
CR03	11/1/2002	Dry	4,700	4,700		3,900	
Geo Mean			1,186	455	13,000	1,372	
% of samples > 400 Col/100 mL			50			40	
CR04	10/25/2001	Dry	57	57	160	57	Round 2
CR04	11/26/2001	Wet	160			160	Round 2
Geo Mean			95	57	160	95	
% of samples > 400 Col/100 mL			0			0	
CR05	10/25/2001	Dry	19	19	270	19	Round 2
CR05	11/26/2001	Wet	270		53	270	Round 2
CR05-DUP	11/26/2001	Wet	180			150	Round 2
CR05	6/5/2002	Wet	53			51	Round 3
Geo Mean			65	19	120	64	
% of samples > 400 Col/100 mL			0			0	
CR06	10/25/2001	Dry	76	76	68	76	Round 2
CR06	11/26/2001	Wet	68			66	Round 2
Geo Mean			72	76	68	71	
% of samples > 400 Col/100 mL			0			0	
CR07	5/9/2002	Dry	320	320		320	Round 3
Geo Mean			320	320		320	
% of samples > 400 Col/100 mL			0			0	

Shading indicates that field parameter exceeds Massachusetts Class BCWF Water Quality Standards (DEP 1998) and/or the Best Professional Judgment (BPJ) of ESS Water Resource Scientists.

DUP: Duplicate sample collected in field. DUP values are not included in calculation of Means.

Geometric Means are presented for fecal coliform and E. coli values.

LABDUP: Laboratory replicate data. LABDUP values are averaged with the original value before calculation of the Geometric Mean.

Less than (<) values are divided by two before incorporating into the calculation of Means.

N/A: Not applicable, sampling of parameter not required as per Scope of Work.

NO FLOW: Non-flowing conditions at sampling locations prevented sample collection.

Table PM08. Bacteriological Data for the Palmer River - Main Stem
(Upstream of Shad Factory Pond Outlet) (Basin PM-08) NPS Assessment

Site	Date	Sample Type (Dry or Wet)	Fecal Coliform (col./ 100 ml)	Fecal Coliform (col./ 100 ml) Dry	Fecal Coliform (col./ 100 ml) Wet	E. Coli (col./ 100 ml)	Sample Round
PM05	5/1/2001	Dry (Medium)	46	46	210	46	Round 1
PM05	5/22/2001	Wet	210	80		210	Round 1
PM05	6/8/2001	Dry	80			80	Round 1
Geo Mean			92	61	210	92	
% of samples > 400 Col/100 mL			0			0	
PM06	4/30/2001	Dry	54	54	140	54	Round 1
PM06	5/22/2001	Wet	140	64		140	Round 1
PM06	6/8/2001	Dry	64			64	Round 1
PM06-DUP	6/8/2001	Dry	58			58	Round 1
Geo Mean			79	59	140	79	
% of samples > 400 Col/100 mL			0			0	
PM07	4/30/2001	Dry	110	110	330	110	Round 1
PM07	5/22/2001	Wet	330	69		330	Round 1
PM07	6/8/2001	Dry	69			69	Round 1
Geo Mean			136	87	330	136	
% of samples > 400 Col/100 mL			0			0	
PM08	5/1/2001	Dry (Medium)	85	85	170	85	Round 1
PM08	5/22/2001	Wet	170	45	70	170	Round 1
PM08	6/8/2001	Dry	45	23	220	45	Round 1
PM08	10/10/2001	Dry	23	930	220	23	Confirmatory
PM08	1/7/2002	Wet	70	220		70	Confirmatory
PM08	6/29/1999	Dry	220	260			DEP
PM08	6/29/1999	Dry	260	4,800			DEP
PM08	7/29/1999	Dry	4,800	260			DEP
PM08	8/31/1999	Dry	260	280			DEP
PM08	8/31/1999	Dry	280	930			DEP
PM08	8/12/1997	Dry	930	97			DMF
PM08	8/14/1997	Wet	220	56			DMF
PM08	3/13/1996	Dry	97	46			RIDEM
PM08	6/7/1996	Dry	56	65			RIDEM
PM08	6/12/1996	Dry	46	28			RIDEM
PM08	7/10/1996	Dry	65	120			RIDEM
PM08	7/23/1996	Dry	28	960			RIDEM
PM08	8/8/1996	Dry	120	1,600			RIDEM
PM08	8/15/1996	Dry	960	87			RIDEM
PM08	9/11/1996	Dry	1,600	560			RIDEM
PM08	10/23/1996	Dry	87				RIDEM
PM08	7/14/1997	Dry	560				RIDEM
Geo Mean			173	195	155	64	
% of samples > 43 Col/100 mL			91			0	
PM12	4/30/2001	Dry	41	41	280	41	Round 1
PM12	5/22/2001	Wet	280	53		280	Round 1
PM12	6/8/2001	Dry	53			53	Round 1
Geo Mean			85	47	280	85	
% of samples > 400 Col/100 mL			0			0	
PM16	10/23/2001	Dry	17	17	260	16	Round 2
PM16	11/26/2001	Wet	260			260	Round 2
Geo Mean			66	17	260	64	
% of samples > 400 Col/100 mL			0			0	
PM17	10/23/2001	Dry	12	12	200	12	Round 2
PM17	11/26/2001	Wet	200			200	Round 2
Geo Mean			49	12	200	49	
% of samples > 400 Col/100 mL			0			0	
PM18	10/23/2001	Dry	73	73	370	72	Round 2
PM18	11/26/2001	Wet	370			360	Round 2
Geo Mean			164	73	370	161	
% of samples > 400 Col/100 mL			0			0	
PM19	10/23/2001	Dry	40	37	185	40	Round 2
PM19-LABDUP	10/23/2001	Dry	34			34	Round 2
PM19-DUP	10/23/2001	Dry	35			35	Round 2
PM19	11/26/2001	Wet	160			160	Round 2
PM19-LABDUP	11/26/2001	Wet	210			210	Round 2
Geo Mean			83	37	185	80	
% of samples > 400 Col/100 mL			0			0	
PM20	10/24/2001	Dry	30	30	140	29	Round 2
PM20	11/26/2001	Wet	160			150	Round 2
PM20-LABDUP	11/26/2001	Wet	120			110	Round 2
Geo Mean			65	30	140	61	
% of samples > 400 Col/100 mL			0			0	
PM21	10/23/2001	Dry	25	25	87	24	Round 2
PM21	11/26/2001	Wet	87			86	Round 2
Geo Mean			47	25	87	45	
% of samples > 400 Col/100 mL			0			0	
PM24	10/23/2001	Dry	NO FLOW			NO FLOW	Round 2
PM24	11/26/2001	Wet	NO FLOW			NO FLOW	Round 2
Geo Mean			NO FLOW			NO FLOW	

Shading indicates that field parameter exceeds Massachusetts Class BCWF Water Quality Standards (DEP 1998) and/or the Best Professional Judgment (BPJ) of ESS Water Resource Scientists.

DUP: Duplicate sample collected in field. DUP values are not included in calculation of Means.

Geometric Means are presented for fecal coliform and E. coli values.

LABDUP: Laboratory replicate data. LABDUP values are averaged with the original value before calculation of the Geometric Mean.

Less than (<) values are divided by two before incorporating into the calculation of Means.

N/A: Not applicable, sampling of parameter not required as per Scope of Work.

NO FLOW: Non-flowing conditions at sampling locations prevented sample collection.

Sample Round refers to four sampling events (Round 1, Round 2, Round 3 and Confirmatory) conducted during the NPS Assessment, which allowed for bracketing of bacteriological sources.

Table TC03. Bacteriological Data for the Torrey Creek (Basin TC-03) NPS Assessment

Site	Date	Sample Type (Dry or Wet)	Fecal Coliform (col./ 100 ml)	Fecal Coliform (col./ 100 ml) Dry	Fecal Coliform (col./ 100 ml) Wet	E. Coli (col./ 100 ml)	Sample Round
TC01	5/1/2001	Dry	70	70	24,000	70	Round 1
TC01	9/14/2001	Wet	24,000		460	24,000	Round 1
TC01	6/5/2002	Wet	460			460	Round 3
TC01	11/11/2002	Wet	13		13	13	
Geo Mean			317	70	524	317	
% of samples > 400 Col/100 mL			67			67	
TC02	5/1/2001	Dry	10	10		10	Round 1
Geo Mean			10	10		10	
% of samples > 400 Col/100 mL			0			0	
TC03	5/1/2001	Dry (Medium)	20	20	3,800	20	Round 1
TC03	9/14/2001	Wet	3,800	350	290	3,600	Round 1
TC03	10/10/2001	Dry	350			340	Confirmatory
TC03	1/7/2002	Wet	290			290	Confirmatory
TC03-DUP	1/7/2002	Wet	230			230	Confirmatory
Geo Mean			296	84	1,050	290	
% of samples > 400 Col/100 mL			25			25	
TC04	10/25/2001	Dry	200	200	49	200	Round 2
TC04	11/26/2001	Wet	49			49	Round 2
Geo Mean			99	200	49	99	
% of samples > 400 Col/100 mL			0			0	
TC05	10/25/2001	Dry	110	100	1,100	110	Round 2
TC05-DUP	10/25/2001	Dry	140			140	Round 2
TC05	11/26/2001	Wet	1,100			1,000	Round 2
Geo Mean			257	110	1,100	249	
% of samples > 400 Col/100 mL			33			33	
TC06	10/25/2001	Dry	33	36	280	33	Round 2
TC06-LABDUP	10/25/2001	Dry	39			38	Round 2
TC06	11/26/2001	Wet	280			260	Round 2
Geo Mean			100	36	280	93	
% of samples > 400 Col/100 mL			0			0	
TC07	10/25/2001	Dry	1,000	1,000		1,000	Round 2
TC07	11/26/2001	Wet	NO FLOW	69		NO FLOW	Round 2
TC07	5/9/2002	Dry	69			40	Round 3
Geo Mean			263	263		200	
% of samples > 400 Col/100 mL			50			50	
TC08	10/25/2001	Dry	200	200	40	200	Round 2
TC08	11/26/2001	Wet	40			40	Round 2
Geo Mean			89	200	40	89	
% of samples > 400 Col/100 mL			0			0	
TC09	10/25/2001	Dry	10	10		10	Round 2
TC09	11/26/2001	Wet	NO FLOW			NO FLOW	Round 2
Geo Mean			10	10		10	
% of samples > 400 Col/100 mL			0			0	
TC10	6/5/2002	Wet	200		200	200	Round 3
Geo Mean			200		200	200	
% of samples > 400 Col/100 mL			0			0	
TC11	5/9/2002	Dry	340	340	220	340	Round 3
TC11	6/5/2002	Wet	220			180	Round 3
Geo Mean			273	340	220	247	
% of samples > 400 Col/100 mL			0			0	
TC12	5/9/2002	Dry	100	100	190	100	Round 3
TC12	6/5/2002	Wet	190			190	Round 3
Geo Mean			138	100	190	138	
% of samples > 400 Col/100 mL			0			0	
TC13	5/9/2002	Dry	1	1	11	1	Round 3
TC13	6/5/2002	Wet	11			9	Round 3
Geo Mean			3	1	11	3	
% of samples > 400 Col/100 mL			0			0	

Shading indicates that field parameter exceeds Massachusetts Class BCWF Water Quality Standards (DEP 1998) and/or the Best Professional Judgment (BPJ) of ESS Water Resource Scientists.

DUP: Duplicate sample collected in field. DUP values are not included in calculation of Means.

Geometric Means are presented for fecal coliform and E. coli values.

LABDUP: Laboratory replicate data. LABDUP values are averaged with the original value before calculation of the Geometric Mean.

Less than (<) values are divided by two before incorporating into the calculation of Means.

N/A: Not applicable, sampling of parameter not required as per Scope of Work.

NO FLOW: Non-flowing conditions at sampling locations prevented sample collection.

Sample Round refers to four sampling events (Round 1, Round 2, Round 3 and Confirmatory) conducted during the NPS Assessment, which allowed for bracketing of bacteriological sources.

Table OS04. Bacteriological Data for the Oak Swamp Brook (Basin OS-04) NPS Assessment

Site	Date	Sample Type (Dry or Wet)	Fecal Coliform (col./ 100 ml)	Fecal Coliform (col./ 100 ml) Dry	Fecal Coliform (col./ 100 ml) Wet	E. Coli (col./ 100 ml)	Sample Round
OS01	5/1/2001	Dry	140	140	2,100	140	Round 1
OS01	7/26/2001	Wet	2,100			2,100	Round 1
Geo Mean			542	140	2,100	542	
% of samples > 400 Col/100 mL			50			50	
OS03	#####	Dry	42	42	40	42	Round 2
OS03	#####	Wet	40			40	Round 2
Geo Mean			41	42	40	41	
% of samples > 400 Col/100 mL			0			0	
OS04	5/1/2001	Dry (Medium)	15	15	1,300	15	Round 1
OS04	9/14/2001	Wet	1,300			1,300	Round 1
Geo Mean			140	15	1,300	140	
% of samples > 400 Col/100 mL			50			50	

Shading indicates that field parameter exceeds Massachusetts Class BCWF Water Quality Standards (DEP 1998) and/or the Best Professional Judgment (BPJ) of ESS Water Resource Scientists.

DUP: Duplicate sample collected in field. DUP values are not included in calculation of Means.

Geometric Means are presented for fecal coliform and E. coli values.

LABDUP: Laboratory replicate data. LABDUP values are averaged with the original value before calculation of the Geometric Mean.

Less than (<) values are divided by two before incorporating into the calculation of Means.

N/A: Not applicable, sampling of parameter not required as per Scope of Work.

NO FLOW: Non-flowing conditions at sampling locations prevented sample collection.

Sample Round refers to four sampling events (Round 1, Round 2, Round 3 and Confirmatory) conducted during the NPS Assessment, which allowed for bracketing of bacteriological sources.

Table RR06. Bacteriological Data for the Rocky Run (Basin RR-06) NPS Assessment

Site	Date	Sample Type (Dry or Wet)	Fecal Coliform (col./ 100 ml)	Fecal Coliform (col./ 100 ml) Dry	Fecal Coliform (col./ 100 ml) Wet	E. Coli (col./ 100 ml)	Sample Round
RR01	5/1/2001	Dry	20	20	60	20	Round 1
RR01	9/14/2001	Wet	60			20	Round 1
Geo Mean			35	20	60	20	
% of samples > 400 Col/100 mL			0			0	
RR02	5/1/2001	Dry	80	80	260	80	Round 1
RR02	9/14/2001	Wet	260			260	Round 1
Geo Mean			144	80	260	144	
% of samples > 400 Col/100 mL			0			0	
RR04	5/1/2001	Dry (Medium)	28	28	290	28	Round 1
RR04	9/14/2001	Wet	290			290	Round 1
Geo Mean			90	28	290	90	
% of samples > 400 Col/100 mL			0			0	
RR05	5/1/2001	Dry	110	110	23,000	60	Round 1
RR05	9/14/2001	Wet	23,000	11	1,200	23,000	Round 1
RR05	6/5/2002	Wet	1,200	420		1,100	Round 3
RR05	3/13/1996	Dry	11	690			RIDEM
RR05	6/7/1996	Dry	420	630			RIDEM
RR05	6/12/1996	Dry	690	740			RIDEM
RR05	7/10/1996	Dry	630	370			RIDEM
RR05	7/23/1996	Dry	740	1,300			RIDEM
RR05	8/8/1996	Dry	370	1,200			RIDEM
RR05	8/15/1996	Dry	1,300	140			RIDEM
RR05	9/11/1996	Dry	1,200	1,200			RIDEM
RR05	10/23/1996	Dry	140				RIDEM
RR05	7/14/1997	Dry	1,200				RIDEM
Geo Mean			552	366	5,254	1,149	
% of samples > 400 Col/100 mL			69			67	
RR06	5/1/2001	Dry (Medium)	49	49	4,300	49	Round 1
RR06	9/14/2001	Wet	4,300	340	530	4,000	Round 1
RR06	10/10/2001	Dry	340	100	8,700	340	Confirmatory
RR06	1/7/2002	Wet	530	3,500		530	Confirmatory
RR06	5/9/2002	Dry	100	8,200		100	Round 3
RR06	7/29/1999	Dry	3,500	1,500			DEP
RR06	8/31/1999	Dry	8,200	120			DEP
RR06	8/12/1997	Dry	1,500	240			DMF
RR06	8/14/1997	Wet	8,700	92			DMF
RR06	7/23/1996	Dry	120	42			RIDEM
RR06	8/15/1996	Dry	240	660			RIDEM
RR06	9/11/1996	Dry	92				RIDEM
RR06	10/23/1996	Dry	42				RIDEM
RR06	7/14/1997	Dry	660				RIDEM
RR06	11/11/2002	Wet	23		23	23	
Geo Mean			422	331	822	208	
% of samples > 400 Col/100 mL			50			40	
RR07	5/1/2001	Dry	1	1	520	1	Round 1
RR07	9/14/2001	Wet	520			520	Round 1
Geo Mean			23	1	520	23	
% of samples > 400 Col/100 mL			50			50	
RR08	5/1/2001	Dry	1	1	130	1	Round 1
RR08	9/14/2001	Wet	130			130	Round 1
Geo Mean			11	1	130	11	
% of samples > 400 Col/100 mL			0			0	
RR10	10/24/2001	Dry	33	33	4	33	Round 2
RR10	11/26/2001	Wet	4			4	Round 2
Geo Mean			11	33	4	11	
% of samples > 400 Col/100 mL			0			0	
RR11	10/24/2001	Dry	74	74	3	74	Round 2
RR11	11/26/2001	Wet	3			3	Round 2
Geo Mean			15	74	3	15	
% of samples > 400 Col/100 mL			0			0	
RR12	10/24/2001	Dry	140	140	230	140	Round 2
RR12-DUP	10/24/2001	Dry	110			110	Round 2
RR12	11/26/2001	Wet	230			230	Round 2
Geo Mean			179	140	230	179	
% of samples > 400 Col/100 mL			0			0	
RR13	5/9/2002	Dry	130	130		130	Round 3
Geo Mean			130	130		130	
% of samples > 400 Col/100 mL			0			0	

Shading indicates that field parameter exceeds Massachusetts Class BCWF Water Quality Standards

(DEP 1998) and/or the Best Professional Judgment (BPJ) of ESS Water Resource Scientists.

DUP: Duplicate sample collected in field. DUP values are not included in calculation of Means.

Geometric Means are presented for fecal coliform and E. coli values.

LABDUP: Laboratory replicate data. LABDUP values are averaged with the original value before calculation of the Geometric Mean.

Less than (<) values are divided by two before incorporating into the calculation of Means.

N/A: Not applicable, sampling of parameter not required as per Scope of Work.

NO FLOW: Non-flowing conditions at sampling locations prevented sample collection.

Sample Round refers to four sampling events (Round 1, Round 2, Round 3 and Confirmatory) conducted during the NPS Assessment, which allowed for bracketing of bacteriological sources.

**Table PM11. Bacteriological Data for the Palmer River - Main Stem
(Downstream of the Shad Factory Pond Outlet) (Basin PM-11) NPS Assessment**

Site	Date	Sample Type (Dry or Wet)	Fecal Coliform (col./ 100 ml)	Fecal Coliform (col./ 100 ml) Dry	Fecal Coliform (col./ 100 ml) Wet	E. Coli (col./ 100 ml)	Sample Round
PM10	5/1/2001	Dry	450	450	330	450	Round 1
PM10	5/22/2001	Wet	330	77	300	330	Round 1
PM10	6/8/2001	Dry	77	110		77	Round 1
PM10	5/9/2002	Dry	110	100		110	Round 3
Geo Mean			188	140	315	188	
% of samples > 43 Col/100 mL			100			25	
PM11	5/1/2001	Dry (Medium)	24	24	820	24	Round 1
PM11	5/22/2001	Wet	820	86	240	820	Round 1
PM11	6/8/2001	Dry	86	15		86	Round 1
PM11	10/10/2001	Dry	15	1,600		15	Confirmatory
PM11	1/7/2002	Wet	240	640		240	Confirmatory
PM11	8/31/1999	Dry	1,600				DEP
PM11	8/12/1999	Dry	640				DMF
Geo Mean			180	126	444	91	
% of samples > 43 Col/100 mL			71			60	
PM13	4/30/2001	Dry	2	2	10	2	Round 1
PM13	5/22/2001	Wet	10	26		10	Round 1
PM13	6/8/2001	Dry	26			26	Round 1
Geo Mean			8	7	10	8	
% of samples > 400 Col/100 mL			0			0	
PM14	5/1/2001	Dry	40	40	3,100	40	Round 1
PM14	5/22/2001	Wet	3,100	99	6.5	3,100	Round 1
PM14	6/8/2001	Dry	99			99	Round 1
PM14	6/5/2002	Wet	1			1	Round 3
PM14-DUP	6/5/2002	Wet	9			9	Round 3
PM14-LABDUP	6/5/2002	Wet	12			12	Round 3
Geo Mean			96	63	142	96	
% of samples > 400 Col/100 mL			25			25	
PM22	10/24/2001	Dry	56	56	2	56	Round 2
PM22	11/26/2001	Wet	NO FLOW			NO FLOW	Round 2
PM22	6/5/2002	Wet	2			2	Round 3
Geo Mean			11	56	2	11	
% of samples > 400 Col/100 mL			0			0	
PM23	10/23/2001	Dry	30	26	24	30	Round 2
PM23-LABDUP	10/23/2001	Dry	22			22	Round 2
PM23	11/26/2001	Wet	24			23	Round 2
Geo Mean			25	26	24	24	
% of samples > 400 Col/100 mL			0			0	
PM25	5/9/2002	Dry	130	145	1,100	110	Round 3
PM25-LABDUP	5/9/2002	Dry	160			150	Round 3
PM25	6/5/2002	Wet	1,100			1,100	Round 3
PM25	11/11/2002	Wet	150		150	150	
Geo Mean			278	145	406	263	
% of samples > 43 Col/100 mL			100			100	
PM26	5/9/2002	Dry	230	230		230	Round 3
Geo Mean			230	230		230	
% of samples > 43 Col/100 mL			100			100	

Shading indicates that field parameter exceeds Massachusetts Class BCWF Water Quality Standards (DEP 1998) and/or the Best Professional Judgment (BPJ) of ESS Water Resource Scientists.

DUP: Duplicate sample collected in field. DUP values are not included in calculation of Means.

Geometric Means are presented for fecal coliform and E. coli values.

LABDUP: Laboratory replicate data. LABDUP values are averaged with the original value before calculation of the Geometric Mean.

Less than (<) values are divided by two before incorporating into the calculation of Means.

N/A: Not applicable, sampling of parameter not required as per Scope of Work.

NO FLOW: Non-flowing conditions at sampling locations prevented sample collection.

Sample Round refers to four sampling events (Round 1, Round 2, Round 3 and Confirmatory) conducted during the

Table BG04. Bacteriological Data for the Bungay River (Basin BG-04) NPS Assessment

Site	Date	Sample Type (Dry or Wet)	Fecal Coliform (col./ 100 ml)	Fecal Coliform (col./ 100 ml) Dry	Fecal Coliform (col./ 100 ml) Wet	E. Coli (col./ 100 ml)	Sample Round
BG04	10/10/2001	Dry	87	87	27	87	Confirmatory
BG04	1/7/2002	Wet	27			27	Confirmatory
Geo Mean			48	87	27	48	
% of samples > 400 Col/100 mL			0			0	

Shading indicates that field parameter exceeds Massachusetts Class BWWF Water Quality Standards (DEP 1998) and/or the Best Professional Judgment (BPJ) of ESS Water Resource Scientists.

DUP: Duplicate sample collected in field. DUP values are not included in calculation of Means.

Geometric Means are presented for fecal coliform and E. coli values.

LABDUP: Laboratory replicate data. LABDUP values are averaged with the original value before calculation of the Geometric Mean.

Less than (<) values are divided by two before incorporating into the calculation of Means.

N/A: Not applicable, sampling of parameter not required as per Scope of Work.

NO FLOW: Non-flowing conditions at sampling locations prevented sample collection.

Sample Round refers to four sampling events (Round 1, Round 2, Round 3 and Confirmatory) conducted during the NPS Assessment, which allowed for bracketing of bacteriological sources.

Table SM01. Bacteriological Data for the Seven Mile River - Upstream of Confluence with Tenmile River (Basin SM-01) NPS Assessment

Site	Date	Sample Type (Dry or Wet)	Fecal Coliform (col./ 100 ml)	Fecal Coliform (col./ 100 ml) Dry	Fecal Coliform (col./ 100 ml) Wet	E. Coli (col./ 100 ml)	Sample Round
SM01	10/10/2001	Dry	120	120	560	120	Confirmatory
SM01	1/7/2002	Wet	560			560	Confirmatory
Geo Mean			259	120	560	259	
% of samples > 400 Col/100 mL			50			50	

Shading indicates that field parameter exceeds Massachusetts Class BWWF Water Quality Standards (DEP 1998) and/or the Best Professional Judgment (BPJ) of ESS Water Resource Scientists.

DUP: Duplicate sample collected in field. DUP values are not included in calculation of Means.

Geometric Means are presented for fecal coliform and E. coli values.

LABDUP: Laboratory replicate data. LABDUP values are averaged with the original value before calculation of the Geometric Mean.

Less than (<) values are divided by two before incorporating into the calculation of Means.

N/A: Not applicable, sampling of parameter not required as per Scope of Work.

NO FLOW: Non-flowing conditions at sampling locations prevented sample collection.

Sample Round refers to four sampling events (Round 1, Round 2, Round 3 and Confirmatory) conducted during the NPS Assessment, which allowed for bracketing of bacteriological sources.

Table SM02. Bacteriological Data for the Seven Mile River - Upstream of Orrs Pond Inlet (Basin SM-02)
NPS Assessment

Site	Date	Sample Type (Dry or Wet)	Fecal Coliform (col./ 100 ml)	Fecal Coliform (col./ 100 ml) Dry	Fecal Coliform (col./ 100 ml) Wet	E. Coli (col./ 100 ml)	Sample Round
SM02	10/10/2001	Dry	21	21	220	21	Confirmatory
SM02	1/7/2002	Wet	220			220	Confirmatory
Geo Mean			68	21	220	68	
Arithmetic Mean			121			121	
% of samples > 100 Col/100 mL			50			50	

Class A waterbody

Shading indicates that field parameter exceeds Massachusetts Class AWWF Water Quality Standards (DEP 1998) and/or the Best Professional Judgment (BPJ) of ESS Water Resource Scientists.

DUP: Duplicate sample collected in field. DUP values are not included in calculation of Means.

Geometric Means are presented for fecal coliform and E. coli values.

LABDUP: Laboratory replicate data. LABDUP values are averaged with the original value before calculation of the Geometric Mean.

Less than (<) values are divided by two before incorporating into the calculation of Means.

N/A: Not applicable, sampling of parameter not required as per Scope of Work.

NO FLOW: Non-flowing conditions at sampling locations prevented sample collection.

Table TM01. Bacteriological Data for the Ten Mile River - Upstream of Plainville Pond Outlet (Basin TM-01)
NPS Assessment

Site	Date	Sample Type (Dry or Wet)	Fecal Coliform (col./ 100 ml)	Fecal Coliform (col./ 100 ml) Dry	Fecal Coliform (col./ 100 ml) Wet	E. Coli (col./ 100 ml)	Sample Round
TM01	10/10/2001	Dry	15	15	260	15	Confirmatory
TM01-DUP	10/10/2001	Dry	19			19	Confirmatory
TM01	1/7/2002	Wet	260			260	Confirmatory
Geo Mean			62	15	260	62	
% of samples > 400 Col/100 mL			0			0	

Shading indicates that field parameter exceeds Massachusetts Class BWWF Water Quality Standards (DEP 1998) and/or the Best Professional Judgment (BPJ) of ESS Water Resource Scientists.

DUP: Duplicate sample collected in field. DUP values are not included in calculation of Means.

Geometric Means are presented for fecal coliform and E. coli values.

LABDUP: Laboratory replicate data. LABDUP values are averaged with the original value before calculation of the Geometric Mean.

Less than (<) values are divided by two before incorporating into the calculation of Means.

N/A: Not applicable, sampling of parameter not required as per Scope of Work.

NO FLOW: Non-flowing conditions at sampling locations prevented sample collection.

**Table TM08. Bacteriological Data for the Ten Mile River - Upstream of Confluence with Bungay River
(Basin TM-08) NPS Assessment**

Site	Date	Sample Type (Dry or Wet)	Fecal Coliform (col./ 100 ml)	Fecal Coliform (col./ 100 ml) Dry	Fecal Coliform (col./ 100 ml) Wet	E. Coli (col./ 100 ml)	Sample Round
TM08	10/10/2001	Dry	42	42	930	39	Confirmatory
TM08	1/7/2002	Wet	930			910	Confirmatory
Geo Mean			198	42	930	188	
% of samples > 400 Col/100 mL			50			50	

Shading indicates that field parameter exceeds Massachusetts Class BWWF Water Quality Standards (DEP 1998) and/or the Best Professional Judgment (BPJ) of ESS Water Resource Scientists.

DUP: Duplicate sample collected in field. DUP values are not included in calculation of Means.

Geometric Means are presented for fecal coliform and E. coli values.

LABDUP: Laboratory replicate data. LABDUP values are averaged with the original value before calculation of the Geometric Mean.

Less than (<) values are divided by two before incorporating into the calculation of Means.

N/A: Not applicable, sampling of parameter not required as per Scope of Work.

NO FLOW: Non-flowing conditions at sampling locations prevented sample collection.

**Table TM15. Bacteriological Data for the Ten Mile River - Upstream of Ten Mile River State Park
(Basin TM-15) NPS Assessment**

Site	Date	Sample Type (Dry or Wet)	Fecal Coliform (col./ 100 ml)	Fecal Coliform (col./ 100 ml) Dry	Fecal Coliform (col./ 100 ml) Wet	E. Coli (col./ 100 ml)	Sample Round
TM15	10/10/2001	Dry	62	62	350	62	Confirmatory
TM15	1/7/2002	Wet	350			350	Confirmatory
Geo Mean			147	62	350	147	
% of samples > 400 Col/100 mL			0			0	

Shading indicates that field parameter exceeds Massachusetts Class BWWF Water Quality Standards (DEP 1998) and/or the Best Professional Judgment (BPJ) of ESS Water Resource Scientists.

DUP: Duplicate sample collected in field. DUP values are not included in calculation of Means.

Geometric Means are presented for fecal coliform and E. coli values.

LABDUP: Laboratory replicate data. LABDUP values are averaged with the original value before calculation of the Geometric Mean.

Less than (<) values are divided by two before incorporating into the calculation of Means.

N/A: Not applicable, sampling of parameter not required as per Scope of Work.

NO FLOW: Non-flowing conditions at sampling locations prevented sample collection.

Table TM20. Bacteriological Data for the Ten Mile River - Upstream of Omega Pond Inlet (Basin TM-20)
NPS Assessment

Site	Date	Sample Type (Dry or Wet)	Fecal Coliform (col./ 100 ml)	Fecal Coliform (col./ 100 ml) Dry	Fecal Coliform (col./ 100 ml) Wet	E. Coli (col./ 100 ml)	Sample Round
TM20	10/10/2001	Dry	72	72	130	72	Confirmatory
TM20	1/7/2002	Wet	130			130	Confirmatory
Geo Mean			97	72	130	97	
% of samples > 400 Col/100 mL			0			0	

Shading indicates that field parameter exceeds Massachusetts Class BWWF Water Quality Standards (DEP 1998) and/or the Best Professional Judgment (BPJ) of ESS Water Resource Scientists.

DUP: Duplicate sample collected in field. DUP values are not included in calculation of Means.

Geometric Means are presented for fecal coliform and E. coli values.

LABDUP: Laboratory replicate data. LABDUP values are averaged with the original value before calculation of the Geometric Mean.

Less than (<) values are divided by two before incorporating into the calculation of Means.

N/A: Not applicable, sampling of parameter not required as per Scope of Work.

NO FLOW: Non-flowing conditions at sampling locations prevented sample collection.

Table TM21. Bacteriological Data for the Ten Mile River - Upstream of Dodgeville Pond Outlet (Basin TM-21)
NPS Assessment

Site	Date	Sample Type (Dry or Wet)	Fecal Coliform (col./ 100 ml)	Fecal Coliform (col./ 100 ml) Dry	Fecal Coliform (col./ 100 ml) Wet	E. Coli (col./ 100 ml)	Sample Round
TM21	10/10/2001	Dry	87	87	900	85	Confirmatory
TM21	1/7/2002	Wet	900			690	Confirmatory
Geo Mean			280	87	900	242	
% of samples > 400 Col/100 mL			50			50	

Shading indicates that field parameter exceeds Massachusetts Class BWWF Water Quality Standards (DEP 1998) and/or the Best Professional Judgment (BPJ) of ESS Water Resource Scientists.

DUP: Duplicate sample collected in field. DUP values are not included in calculation of Means.

Geometric Means are presented for fecal coliform and E. coli values.

LABDUP: Laboratory replicate data. LABDUP values are averaged with the original value before calculation of the Geometric Mean.

Less than (<) values are divided by two before incorporating into the calculation of Means.

N/A: Not applicable, sampling of parameter not required as per Scope of Work.

NO FLOW: Non-flowing conditions at sampling locations prevented sample collection.

Table 2-1 - Palmer River bacteria data from the MA Division of Marine Fisheries--12 August 1997

Station	Location	Sample Type	Salinity ppt (?)	Coliform CFU/100 ml	General Remarks
PS2	map map map map creek behind big barn large creek	River/Dry	14	TNTC	MTEC to 10000
PS3		River/Dry	18	TNTC	
PS4		River/Dry	20	7500	
PS5		River/Dry	10	4000	
PS6		River/Dry	20	2400	
PS7		River/Dry	11	3700	
PS8		River/Dry	12	4600	
PS9		River/Dry	20	TNTC	
PS10		River/Dry	14	4700	
PS11		River/Dry	20	6200	
PS1A	map (Water St.)	Road/Dry	0	300	-MTEC to 10000
PS10D	map (Providence St.)	Road/Dry	0	100	-PS6 - Pond north of house leading to stream -House at 160 Davis may have failed septic 50' from stream
PS10E	map (Mason St.)	Road/Dry	8	1500	
PS10B	map (Davis St.)	Road/Dry	0	400	
PS10A	map (Davis St.)	Road/Dry	0	TNTC	
PS10C	map (43 Davis St.)	Road/Dry	0	400	
PS11A	map	Road/Dry	0	500	
4	Old Providence Rd. Bridge	Dry	23	640	MTEC to 1000
6	Dam	Dry	27	30	Classification Stations
7	Providence St. Bridge	Dry	0	490	
8	Reed St. Bridge	Dry	0	930	

Table B1 - Palmer River bacteria data from the MA Division of Marine Fisheries--14 August 1997

Station	Location	Sample Type	Salinity ppt (?)	Coliform CFU/100 ml	General Remarks
PS2	map	River/Wet	14	24000	MTEC to 100,000
PS3	map	River/Wet	18	94000	
PS4	map	River/Wet	20	50000	
PS5	left map	River/Wet	18	47000	
PS6	right map	River/Wet	18	37000	
PS7	left map	River/Wet	19	43000	
PS8	right map	River/Wet	19	44000	
PS9	behind barn	River/Wet	18	67000	
PS10	big branch	River/Wet	18	31000	
PS11	S. of 195	River/Wet	8	19000	
PS1	map	Roads/Wet	0	<100	MTEC to 10000 except Sta 10A to 100,000
PS1A	Water St. Culvert	Roads/Wet	0	1200	
PS10D	Providence St.	Roads/Wet	0	300	
PS10C	Davis St.	Roads/Wet	0	1100	
PS10A	Davis St.	Roads/Wet	0	13000	
PS10B	Davis St.	Roads/Wet	0	4200	
PS10E	Mason St. Rocky Run	Roads/Wet	5	8700	
PS7A	Mason St.	Roads/Wet	10	TNTC	
PS12A	Golf Course	Roads/Wet	0	600	
PS13A (?)	(illegible)	Roads/Wet	0	600	
8	Reed Rd. bridge	Wet	0	220	-Classification Stations -MTEC to 1000
7	Providence St. bridge	Wet	2	TNTC	
4	Old Providence Rd. bridge	Wet	24	TNTC	

Table B2 - MADEP data - 1999.

Station	ESS Subwatershed	Date	Bacterial Data	
			E. coli cfu/100 mL	Fecal Coliform cfu/100 mL
PE03	PE-06	6/29/1999	<16	130
PE04	PE-06		1400	1300
PM05	PM-08		33	220
PM08	PM-08		33	260
PM08 split	PM-08		82	230
PW01	PW-02		<16	33
PW02	PW-02		66	66
PM06	PM-08	7/29/1999	4100	4800
RR06	RR-06		3500	3500
CR03	CR-03	8/31/1999	150	410
PM06	PM-08		230	260
PM06	PM-08		150	280
PM10	PM-11		1100	1600
PW02	PW-02		81	130
RR05	RR-06		5700	8200
CA01	?		210	410

sampling conditions (wet or dry) unknown

Table B3

NOTE: The following Environmental Science Services/MADEP (ESS), Rhode Island DEM (RIDEM), and Save The Bay (STB) site codes correspond with one another.

ESS #	RIDEM #	STB #
PW-01		1
PW-02		2
PE-03		3
PE-04		4
PM-05		5
PM-06		6
PM-07		7
PM-08	T3	8
PM-15		8a
PM-09		9
PM-10		10
PM-11	5.2	11
	5.1	12
	BC03	13
	BC01	14
	T8	15
RR-04	T5	16
RR-06	T6	17
	GA2-6	
	GA2-6A	
	7	
	7A	
	8	

Table B4. RIDEM Data

Excerpts From

FECAL COLIFORM TMDL FOR PALMER RIVER, RHODE ISLAND. Rhode Island Department of Environmental Management. March 15, 2002

Table 3.1: RIDEM Dry weather tributary and point source stations.

Station	Location	Stage/ Discharge	Fecal coliform Sampling	Nutrient Sampling
T1	Runnins River, Route 6	♦	♦	♦
T2	Runnins River, School St.	♦		
T3	Palmer River, Reed St.	♦	♦	♦
T4	Oak Swamp Brook, Rocky Run	♦		
T5	Rocky Run, Davis St.	♦	♦	
T6	Rocky Run, Mason St.		♦	♦
T7	Blount Seafood	♦	♦	♦
T8	Warren WWTF	♦	♦	♦
T9	Unnamed tributary, Warren Ave.	♦		
T10	Runnins River, Mink St.	♦		

Table 1: Receiving water characterization summary.

Station	Dry Weather Geometric Mean (fc/100 ml)	Number of samples, dry weather	Wet Weather Geometric Mean (fc/100 ml)	Number of samples, wet weather	Weighted Average Geometric Mean fc/100 ml	Percent of values > 49 fc/100 ml
6A	62*	44	1400*	4	1066*	59%*
6	18*	54	582*	5	441*	30%*
7	10	55	82*	5	64*	17%*
7A	14	53	105*	5	82*	8%
8	10	62	54*	5	43*	6%

*Values violate water quality standards

Table 4.1: Dry weather fecal coliform concentrations in the Upper Palmer River 1996-1997.

Station	Shad Factory T3	Mason Street T6	Davis Street T5
Geometric Mean fc/100 ml	145	413	146
Maximum fc/100 ml	1600	1300	660
# samples	10	10	5

Table 4.2: Dry weather fecal coliform concentrations, June 16, 1997

Location	fc/100 ml
Rocky Run – Davis Street	930
Rocky Run – below farm	23000
Rocky Run – Mason Street	430
Rocky Run – Providence Street	430
Rocky Run – Reed Street	93
Rocky Run – Barney Avenue	430

Table 4.4: Upper Palmer River wet weather data, October 1998

Station	Bungtown Bridge	Rocky Run at Mason Street
Geometric mean (fc/100 ml)	2472	7573
% > 400	96%	100%
Maximum (fc/100 ml)	14000	210000
# of samples	16	19

Table 4.3: Comparison of data collected by the MADMF in 1997 at various stations along the Palmer River with local land use.

Station #	Fecal coliform concentration fc/100 ml	Predominant land use in drainage area
PS1	<100	Forest
PS10D	300	Forest
PS11A	600	Roadway/ Wetland/ Forest
PS12	600 no flow	Wetland
PS12A	600	Developed open space (Golf course)
PS10C	1100	Cropland/ Residential/ Forest/Open land
PS1A	1200	Residential/ Forest
PS10B	4200	Forest/ Cropland/ Residential
PS10E	8700	Forest/ Cropland/ Nursery
PS11	19000	Wetland/ Cropland/ Forest
PS2	24000	Cropland/ Forest
PS3	94000	Cropland/ Forest/ Wetland
PS4	50000	Cropland/ Wetland
PS5	47000	Cropland/ Wetland
PS6	37000	Cropland/ Pasture/ Wetland
PS7	43000	Cropland/ Wetland
PS8	44000	Cropland/ Wetland
PS9	67000	Cropland/ Wetland
PS10	31000	Nursery/ Cropland/ Pasture/ Residential
PS10A	13000	Forest/ Cropland/ Residential/ Open land

Table 4.8 Dry Weather data for Belcher Cove Streams.

Station	Belcher Stream West Ward St. (BC05)	Belcher Stream West J.J. Cleansers (BC02)	Belcher Stream West Market St. (BC04)	Belcher Stream West Jamiel Park (BC01)	Belcher Stream East South of Rte 136 (BC03)
Geometric mean fc/100 ml	413	1264	1801	3201	9.7
% > 200	100%	100%	100%	100%	0%
# samples	4	4	3	3	4

Table 4.9: Wet weather fecal coliform concentrations in the Belcher Cove Streams.

Station	Belcher Stream West Ward St. (BC05)	Belcher Stream West J.J. Cleansers (BC02)	Belcher Stream West Market St. (BC04)	Belcher Stream West Jamiel's Park (BC01)	Belcher Stream East South of Rte 136 (BC03)
Geometric mean fc/100 ml	1800	10488	3000	5130	16143
% > 200	100%	100%	100%	100%	100%
# samples	1	2	1	2	8

Table 5.1: Dry weather fecal coliform data at low and high tide in the Palmer River.

Shaded areas are measurements taken at high tide.

Reach	Mouth of Palmer River	Belcher Cove	Lower Palmer River	Upper Palmer River	Mouth of Palmer River	Belcher Cove	Lower Palmer River	Upper Palmer River
Station	3	4	5	5.1	3	4	5	5.1
Count	6	6	6	1	6	6	6	1
Geometric mean fc/100 ml	4.5	3.1	9.4	550*	5.9	2.4	3.8	8*
%>49	0%	0%	17%	-	17%	0%	0%	-
Min	2	1	2	-	0.5	1	0.5	-
Max	11.5	17	70	-	185	16	17	-

*Only a single sample was taken.

Table 5.2: Summary of dry weather fecal coliform data from RI Shellfish Survey 1996-1999.

Reach	Upper Palmer River Source	Upper Palmer River	Lower Palmer River	Belcher Cove	Mouth of Palmer River
Station	6A	6	7	7A	8
Count	44	54	55	53	62
Geometric mean fc/100 ml	62	18	10	14	10
% > 49	49%	23%	9%	17%	2%
Maximum fc/100 ml	430	2300	230	150	93

Table 5.3: Wet weather fecal coliform data, August 1997 and October 1998 in the Palmer River.

Station	6A	6	7	7A	8
Count	4	5	5	5	5
Geometric Mean	1400	582	82	105	54
%>49	100	100	50	50	50
Maximum	16000	4400	300	850	320

Table 5.4: Weighted average geometric means in the Palmer River

Station	Dry Weather Geometric Mean (fc/100 ml)	Number of samples, dry weather	Wet Weather Geometric Mean (fc/100 ml)	Number of samples, wet weather	Weighted Average Geometric Mean fc/100 ml	Percent of values > 49 fc/100 ml
6A	62	44	1400	4	1066*	59%*
6	18	54	582	5	441*	30%*
7	10	55	82	5	64*	17%*
7A	14	53	105	5	82*	8%
8	10	62	54	5	43*	6%

*indicates violation of water quality criteria for fecal coliform bacteria

Table 2: Weighted average geometric mean values for pollutant sources to the Palmer River.

Section of River	Sources	Weighted Average Geometric Mean fc/100 ml	Dry Weather Sources	Wet Weather Sources
Upper Palmer River	Station 6A	1066	Farms, domestic animals, wildlife, and waterfowl.	Farms, agricultural lands, domestic animals, wildlife, waterfowl and failing septic systems
Lower Palmer River	Upper Palmer River and Belcher Cove (Station 7)	64	None	Storm water runoff
Belcher Cove	Belcher Stream East	5753	None	Cattle farm, wildlife, waterfowl, domestic animals, storm runoff from urban and suburban sources
	Belcher Stream West	3888	Pet Waste	Pet Waste, runoff from roadways and commercial properties
Warren and Barrington Rivers	Palmer River, Narragansett Bay	6	None	Urban/ suburban runoff

RIDEM's Proposed Implementation Measures for the Upper Palmer River

The upper Palmer River lies in the Commonwealth of Massachusetts. High dry and wet weather fecal coliform concentrations enter the Palmer River in Rhode Island from upstream in Massachusetts. As outlined in this TMDL, Massachusetts will need to meet the water quality standard of 14 fc/100 ml at the Rhode Island State line in order to avoid impacting Rhode Island shellfishing waters. RIDEM studies in the MA portion of the Palmer River watershed have determined that significant loads were associated with agricultural operations adjacent to the Palmer River and Rocky Run (RIDEM, 1999b). A summary of current and proposed work in the upper Palmer River is presented in Table 8.1.

For the three farms located on Davis and Mason Street listed in Table 8.1 RIDEM recommends that the Commonwealth of Massachusetts Department of Environmental Protection (MADEP) conduct confirmatory sampling to evaluate the effectiveness of the pollution control measures in reducing bacteria concentrations. This confirmatory sampling should include samples taken upstream and downstream of the farms during dry weather and also during storms. Additionally, RIDEM recommends that MADEP conduct additional investigations into identifying and mitigating other bacterial sources. Investigations should focus on areas upstream of stations with high fecal coliform concentrations as seen in Figure 4.1. Other areas to focus on should include streams flowing through and runoff from agricultural areas, runoff from golf courses, and failing septic systems.

Lastly, Massachusetts Department of Food and Agriculture is encouraged to continue its work with local farmers to implement Best Management Practices (BMPs) including development of nutrient management plans. The work that the Massachusetts Department of Food and Agriculture has completed is very promising for the future of the Palmer River and the continuation of this work will ensure a cleaner Palmer River.

Table 8.1: Summary of current and proposed work in the upper Palmer River

Known (K) or Potential (P) pollution source	Jurisdiction	Abatement measure	Status
Davis Street Farm (K)	MADFA	Install fence to remove cows from stream	Farmer installed fence. Needs continuous maintenance
Mason Street & I-195 Farm (K)	MADFA	-Manure management -Cement base for milking area -Culvert into stream needs cement base with side wall and vegetative buffer	Completed March 2000
Mason Street Farm (P)	MADFA	Buffer cattle from stream that flows directly into Palmer River	Fence installed keeping cows from stream completed 2001.
Other potential sources (P)	MADEP	Investigate and mitigate other potential sources of fecal coliform. For specific locations see Figure 4.1	MADEP is currently conducting preliminary TMDL sampling for other potential sources of fecal coliform in the watershed.