Table 7. Physical properties of sampling locations and chemical analyses of groundwater samples collected from vertical multilevel samplers in and near a pond-bottom permeable reactive barrier, Ashumet Pond, Massachusetts, July 2004–July 2010.

[Easting and Northing: State plane coordinates are for North American Datum of 1983 (NAD83). Latitude and longitude in degrees (°), minutes (′), and seconds (″). Altitude refers to distance above or below the National Geodetic Vertical Datum of 1929. Sources of laboratory data listed in table 1. ft, foot; m, meter; µS/cm, microsiemens per centimeter at 25 degrees Celsius; <, actual value less than value shown; >, actual value greater than value shown;--, no data; E, estimated value for constituent detected in the sample below the laboratory reporting level. Pond stages during each sampling period listed in table 1. Locations of sites shown in figure 8]

									Measured in field, unfiltered	
USGS station name	USGS site ID	Easting (m)	Northing (m)	Latitude (° ′ ″)	Longitude (° ′ ″)	Depth below pond bottom (ft)	Port altitude (ft)	Date sampled	Specific conduct-ance (µS/cm)	Oxygen, dissolved (mg/L)
MA–FSW 639–P01–0000	413805070322401	280035.999	820958.504	41 38 04.91	70 32 23.88	0.02	42.8	7/20/04	94.6	8.300
								10/29/04	101	10.2
								7/18/05	99.0	2.31
								8/1/06	99.1	7.85
								7/9/07	112	8.30
								8/5/08	106	>1.30
								7/24/09	225	.339
								7/21/10	110	7.51
MA–FSW 639–P01–0000.8	413805070322402	280035.999	820958.504	41 38 04.91	70 32 23.88	0.82	42.0	7/20/04	153	--
								10/29/04	233	1.32
								7/18/05	179	.215
								8/1/06	106	.225
								7/9/07	195	.401
								8/5/08	225	.339
								7/24/09	181	.123
								7/21/10	172	6.36
MA–FSW 639–P01–0001.6	413805070322403	280035.999	820958.504	41 38 04.91	70 32 23.88	1.62	41.2	7/20/04	138	--
								10/29/04	227	2.44
								7/18/05	180	.145
								8/1/06	103	1.62
								7/9/07	195	.066
								8/5/08	225	.268
								7/24/09	181	.098
								7/21/10	171	6.73
MA–FSW 639–P01–0002.2	413805070322404	280035.999	820958.504	41 38 04.91	70 32 23.88	2.22	40.6	7/20/04	120	2.10
								10/29/04	221	2.86
								7/18/05	181	.200
								8/1/06	105	1.66
								7/9/07	196	.315
								8/5/08	228	.330
								7/24/09	182	.068
								7/21/10	173	6.89
MA–FSW 639–P01–0003.4	413805070322405	280035.999	820958.504	41 38 04.91	70 32 23.88	3.42	39.4	7/20/04	94.6	8.30
								10/29/04	216	6.83
								7/19/05	178	.435
								8/1/06	118	1.44
								7/9/07	195	.163
								8/5/08	222	.287
								7/24/09	181	.562
								7/21/10	184	7.05
MA–FSW 640–P01–0000	413805070322406	280041.672	820968.084	41 38 05.22	70 32 23.63	0.02	43.2	7/21/04	97.6	8.44
								10/29/04	107	2.82
								4/20/05	199	--
								7/18/05	192	2.11
								11/10/05	281	--
								8/1/06	173	.390
								7/9/07	89.2	.712
								8/4/08	316	.000
								7/24/09	278	.043
								7/21/10	143	.449
MA–FSW 640–P01–0000.8	413805070322407	280041.672	820968.084	41 38 05.22	70 32 23.63	0.82	42.4	7/21/04	153	.700
								10/29/04	119	.170
								4/20/05	197	.000
								7/18/05	210	.060
								11/10/05	300	--
								8/1/06	184	3.67
								7/9/07	92.4	.365
								8/4/08	306	>1.30
								7/24/09	266	.046
								7/21/10	162	2.55

Table 7. Physical properties of sampling locations and chemical analyses of groundwater samples collected from vertical multilevel samplers in and near a pond-bottom permeable reactive barrier, Ashumet Pond, Massachusetts, July 2004–July 2010—*continued*

[Easting and Northing: State plane coordinates are for North American Datum of 1983 (NAD83). Latitude and longitude in degrees (°), minutes ('), and seconds ("). Altitude refers to distance above or below the National Geodetic Vertical Datum of 1929. Sources of laboratory data listed in table 1. ft, foot; m, meter; µS/cm, microsiemens per centimeter at 25 degrees Celsius; <, actual value less than value shown; >, actual value greater than value shown;--, no data; E, estimated value for constituent detected in the sample below the laboratory reporting level. Pond stages during each sampling period listed in table 1. Locations of sites shown in figure 8]

		Measured in field, unfiltered		Measured in laboratory, filtered							
USGS station name	Date sampled	pH (standard units)	Orthophos-phate (mg/L as P)	Phosphorus (mg/L as P)	Boron (mg/L)	Iron (mg/L)	Manga-nese (mg/L)	Nitrite plus nitrate (mg/L as N)	Nitrite (mg/L as N)	Nitrate (mg/L as N)	Ammonia (mg/L as N)
MA–FSW 639–P01–0000	7/20/04	6.94	<.200	<0.010	--	--	--	<0.060	<0.008	--	<0.040
	10/29/04	--	<.200	.026	--	--	--	--	--	--	--
	7/18/05	--	<.200	.039	--	--	--	--	--	--	--
	8/1/06	--	<.200	<.020	--	--	--	--	--	--	--
	7/9/07	7.00	<.200	<.040	0.016	0.014	0.026	--	<.007	.140	<.030
	8/5/08	7.04	.652	.674	.046	.012	3.66	--	<.007	<.030	<.030
	7/24/09	6.64	<.224	<.020	--	--	--	<.040	<.002	--	<.020
	7/21/10	7.02	<.224	E.014	--	--	--	--	--	--	--
MA–FSW 639–P01–0000.8	7/20/04	--	<.200	<.010	--	--	--	2.45	<.008	--	<.040
	10/29/04	--	.538	.649	--	--	--	--	--	--	--
	7/18/05	--	.733	.729	--	--	--	--	--	--	--
	8/1/06	--	1.37	1.10	--	--	--	--	--	--	--
	7/9/07	6.17	.864	.741	.028	<.005	2.44	--	<.007	.887	<.030
	8/5/08	6.22	.701	.651	.045	.050	3.64	--	<.007	<.030	<.030
	7/24/09	6.17	.714	.812	--	--	--	<.040	<.002	--	.051
	7/21/10	5.73	.548	.492	--	--	--			--	
MA–FSW 639–P01–0001.6	7/20/04	5.91	<.200	<.010	--	--	--	--	--	--	--
	10/29/04	--	.489	.743	--	--	--	--	--	--	--
	7/18/05	--	.848	.795	--	--	--	--	--	--	--
	8/1/06	--	1.27	1.09	--	--	--	--	--	--	--
	7/9/07	6.15	.783	.724	.027	<0.005	2.51	--	<.007	1.09	<.030
	8/5/08	6.26	.636	.691	.046	<0.005	3.71	--	<.007	<.030	<.030
	7/24/09	6.18	.708	.829	--	--	--	<.040	<.002	--	.042
	7/21/10	5.85	.561	.460	--	--	--	--	--	--	--
MA–FSW 639–P01–0002.2	7/20/04	5.98	.555	<.010	--	--	--	--	--	--	--
	10/29/04	--	.570	.728	--	--	--	--	--	--	--
	7/18/05	--	.848	.760	--	--	--	--	--	--	--
	8/1/06	--	1.34	1.08	--	--	--	--	--	--	--
	7/9/07	6.11	.750	.709	.027	<0.005	2.46	--	<.002	1.27	<.020
	8/5/08	6.21	.603	.706	.046	.008	3.66	--	<.007	<.030	<.030
	7/24/09	6.20	.800	.802	--	--	--	<.040	<.002	--	.033
	7/21/10	5.91	.518	.448	--	--	--	--	--	--	--
MA–FSW 639–P01–0003.4	7/20/04	6.94	<.200	<.010	--	--	--	3.22	<.008	3.22	<.040
	10/29/04	--	.587	.800	--	--	--	--	--	--	--
	7/19/05	--	.783	.811	--	--	--	--	--	--	--
	8/1/06	--	1.32	1.11	--	--	--	--	--	--	--
	7/9/07	6.14	.750	.669	.025	<0.005	2.66	--	<.007	1.32	<.030
	8/5/08	6.20	.652	.674	.016	.033	.057	--	<.007	<.030	<.030
	7/24/09	6.20	<.224	.798	--	--	--	<.040	<.002	--	<.020
	7/21/10	6.01	.464	.418	--	--	--	--	--	--	--
MA–FSW 640–P01–0000	7/21/04	7.23	<.200	.200	--	--	--	--	--	--	--
	10/29/04	--	<.200	.019	--	--	--	--	--	--	--
	4/20/05	--	<.200	.075	--	--	--	--	--	--	--
	7/18/05	--	.228	.110	--	--	--	--	--	--	--
	11/10/05	--	<.200	--	--	--	--	--	--	--	--
	8/1/06	--	.669	.094	--	--	--	--	--	--	--
	7/9/07	7.07	<.200	.262	.022	.699	.996	--	<.007	.119	<.030
	8/4/08	6.97	.294	.069	.080	26.5	5.11	--	<.007	.109	<.030
	7/24/09	6.87	<.200	<.020	--	--	--	E.031	.014	--	.083
	7/21/10	6.60	.420	.216	--	--	--	--	--	--	--
MA–FSW 640–P01–0000.8	7/21/04	6.48	1.35	1.67	--	--	--	.137	E.005	--	E.035
	10/29/04	--	<.200	.075	--	--	--	--	--	--	--
	4/20/05	--	.228	.461	--	--	--	--	--	--	--
	7/18/05	--	.228	.170	--	--	--	--	--	--	--
	11/10/05	--	<.200	--	--	--	--	--	--	--	--
	8/1/06	--	.473	.147	--	--	--	--	--	--	--
	7/9/07	7.32	.260	.236	.021	1.31	1.01	--	<.007	.210	<.030
	8/4/08	6.85	.228	.132	.070	19.2	6.55	--	<.007	.723	<.030
	7/24/09	6.98	<.224	.091	--	--	--	.144	E.011	--	.068
	7/21/10	6.68	.247	.138	--	--	--	--	--	--	--

Table 7. Physical properties of sampling locations and chemical analyses of groundwater samples collected from vertical multilevel samplers in and near a pond-bottom permeable reactive barrier, Ashumet Pond, Massachusetts, July 2004–July 2010—continued

[Easting and Northing: State plane coordinates are for North American Datum of 1983 (NAD83). Latitude and longitude in degrees (°), minutes (′), and seconds (″). Altitude refers to distance above or below the National Geodetic Vertical Datum of 1929. Sources of laboratory data listed in table 1. ft, foot; m, meter; µS/cm, microsiemens per centimeter at 25 degrees Celsius; <, actual value less than value shown; >, actual value greater than value shown;--, no data; E, estimated value for constituent detected in the sample below the laboratory reporting level. Pond stages during each sampling period listed in table 1. Locations of sites shown in figure 8]

									Measured in field, unfiltered	
USGS station name	USGS site ID	Easting (m)	Northing (m)	Latitude (° ′ ″)	Longitude (° ′ ″)	Depth below pond bottom (ft)	Port altitude (ft)	Date sampled	Specific conduct-ance (µS/cm)	Oxygen, dissolved (mg/L)
MA–FSW 640–P01–0001.6	413805070322408	280041.672	820968.084	41 38 05.22	70 32 23.63	1.62	41.6	7/21/04	162	.900
								10/29/04	126	.750
								4/20/05	181	.025
								7/18/05	203	.000
								11/10/05	232	--
								8/1/06	188	.145
								7/9/07	92.2	.748
								8/4/08	252	1.26
								7/24/09	219	.039
								7/21/10	138	5.27
MA–FSW 640–P01–0002.2	413805070322409	280041.672	820968.084	41 38 05.22	70 32 23.63	2.22	41.0	7/21/04	160	.700
								10/29/04	128	3.77
								4/20/05	157	.250
								7/18/05	192	.160
								11/10/05	185	--
								8/1/06	184	.290
								7/9/07	93.3	.313
								8/4/08	257	.700
								7/24/09	215	.124
								7/21/10	136	6.24
MA–FSW 640–P01–0003.4	413805070322410	280041.672	820968.084	41 38 05.22	70 32 23.63	3.42	39.8	7/21/04	129	7.60
								10/29/04	156	1.93
								4/20/05	157	.155
								7/18/05	187	.165
								11/10/05	168	--
								8/1/06	183	.670
								7/9/07	92.6	.774
								8/4/08	245	.410
								7/24/09	218	.420
								7/21/10	135	6.50
MA–FSW 641–P01–0000	413805070322309	280054.484	820973.004	41 38 05.38	70 32 23.07	0.02	41.6	7/21/04	97.3	8.37
								10/29/04	97.0	--
								7/19/05	95.8	6.97
								8/1/06	98.8	7.84
								7/10/07	79.8	5.15
								8/4/08	105	>1.30
								7/24/09	111	2.56
								7/21/10	174	3.58
MA–FSW 641–P01–0000.8	413805070322310	280054.484	820973.004	41 38 05.38	70 32 23.07	0.82	40.8	7/21/04	160	2.10
								10/29/04	162	.580
								7/19/05	131	.920
								8/1/06	98.5	.115
								7/10/07	78.5	3.15
								8/4/08	122	.360
								7/24/09	242	5.80
								7/21/10	108	5.98
MA–FSW 641–P01–0001.6	413805070322311	280054.484	820973.004	41 38 05.38	70 32 23.07	1.62	40.0	7/21/04	162	.525
								10/29/04	167	.655
								7/19/05	127	.060
								8/1/06	104	.005
								7/10/07	102	4.56
								8/4/08	117	.607
								7/24/09	101	7.79
								7/21/10	110	7.11
MA–FSW 641–P01–0002.2	413805070322312	280054.484	820973.004	41 38 05.38	70 32 23.07	2.22	39.4	7/21/04	161	.500
								10/29/04	165	.645
								7/19/05	122	.050
								8/1/06	103	.125
								7/10/07	106	1.14
								8/4/08	146	.000
								7/24/09	310	.017
								7/21/10	162	.212

Table 7. Physical properties of sampling locations and chemical analyses of groundwater samples collected from vertical multilevel samplers in and near a pond-bottom permeable reactive barrier, Ashumet Pond, Massachusetts, July 2004–July 2010—continued

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		Measured in field, unfiltered		Measured in laboratory, filtered							
USGS station name	Date sampled	pH (standard units)	Orthophos-phate (mg/L as P)	Phosphorus (mg/L as P)	Boron (mg/L)	Iron (mg/L)	Manga-nese (mg/L)	Nitrite plus nitrate (mg/L as N)	Nitrite (mg/L as N)	Nitrate (mg/L as N)	Ammonia (mg/L as N)
MA–FSW 640–P01–0001.6	7/21/04	6.49	1.58	1.20	--	--	--	--	--	--	--
	10/29/04	--	<.200	.072	--	--	--	--	--	--	--
	4/20/05	--	.457	.772	--	--	--	--	--	--	--
	7/18/05	--	1.11	.890	--	--	--	--	--	--	--
	11/10/05	--	<.200	--	--	--	--	--	--	--	--
	8/1/06	--	.359	.307	--	--	--	--	--	--	--
	7/9/07	6.77	.767	.387	.021	.569	1.14	--	<.007	.454	<.030
	8/4/08	6.28	.440	.361	.046	1.67	5.35	--	<.007	2.65	<.030
	7/24/09	6.20	.437	.371	--	--	--	.574	.004	--	<.020
	7/21/10	6.02	.362	.314	--	--	--	--	--	--	--
MA–FSW 640–P01–0002.2	7/21/04	6.58	1.35	1.15	--	--	--	--	--	--	--
	10/29/04	--	.750	.955	--	--	--	--	--	--	--
	4/20/05	--	.492	1.51	--	--	--	--	--	--	--
	7/18/05	--	1.17	1.06	--	--	--	--	--	--	--
	11/10/05	--	.848	--	--	--	--	--	--	--	--
	8/1/06	--	.701	.679	--	--	--	--	--	--	--
	7/9/07	6.42	.750	<.040	.021	.075	1.42	--	<.007	.946	<.030
	8/4/08	6.22	.554	.556	.044	.312	5.18	--	<.007	3.59	.078
	7/24/09	6.11	.437	.546	--	--	--	.791	.006	--	<.020
	7/21/10	5.85	.444	.365	--	--	--	--	--	--	--
MA–FSW 640–P01–0003.4	7/21/04	6.64	1.29	1.06	--	--	--	<.060	<.008	--	.410
	10/29/04	--	.979	1.42	--	--	--	--	--	--	--
	4/20/05	--	1.14	1.51	--	--	--	--	--	--	--
	7/18/05	--	1.19	1.03	--	--	--	--	--	--	--
	11/10/05	--	.864	--	--	--	--	--	--	--	--
	8/1/06	--	.816	.749	--	--	--	--	--	--	--
	7/9/07	6.77	.946	.910	.021	<0.005	1.47	--	<.007	.942	<.030
	8/4/08	6.19	.652	.648	.045	<0.005	5.40	--	<.007	4.22	<.030
	7/24/09	6.05	.962	.634	--	--	--	.940	.015	--	<.020
	7/21/10	5.81	.448	.377	--	--	--	--	--	--	--
MA–FSW 641–P01–0000	7/21/04	7.29	<.200	.060	--	--	--	--	--	--	--
	10/29/04	--	<.200	<.020	--	--	--	--	--	--	--
	7/19/05	--	<.200	E.020	--	--	--	--	--	--	--
	8/1/06	--	<.200	<.020	--	--	--	--	--	--	--
	7/10/07	5.95	.343	<.040	.016	<0.005	1.53	--	<.007	.644	<.030
	8/4/08	6.70	<.200	.319	.018	.016	.956	--	<.007	.799	<.030
	7/24/09	7.00	<.224	<.020	--	--	--	<.040	E.001	--	<.020
	7/21/10	6.54	.302	.166	--	--	--	--	--	--	--
MA–FSW 641–P01–0000.8	7/21/04	6.66	.962	1.20	--	--	--	<.060	<.008	--	.790
	10/29/04	--	.995	1.23	--	--	--	--	--	--	--
	7/19/05	--	.228	.160	--	--	--	--	--	--	--
	8/1/06	--	<.200	<.020	--	--	--	--	--	--	--
	7/10/07	6.63	<.200	<.040	.016	.177	.879	--	<.007	.508	<.030
	8/4/08	5.90	<.200	.096	.017	.033	.950	--	<.007	.630	<.030
	7/24/09	5.82	<.224	.242	--	--	--	.863	<.002	--	<.020
	7/21/10	5.92	.288	.260	--	--	--	--	--	--	--
MA–FSW 641–P01–0001.6	7/21/04	6.94	1.39	1.04	--	--	--	--	--	--	--
	10/29/04	--	.864	1.03	--	--	--	--	--	--	--
	7/19/05	--	.261	.200	--	--	--	--	--	--	--
	8/1/06	--	<.200	.036	--	--	--	--	--	--	--
	7/10/07	6.75	<.200	<.040	.019	3.71	.480	--	<.007	.219	<.030
	8/4/08	5.84	<.200	<.040	.019	.456	.975	--	<.007	.502	<.030
	7/24/09	7.20	<.224	<.020	--	--	--	<.040	<.002	--	<.020
	7/21/10	6.38	<.224	.097	--	--	--	--	--	--	--
MA–FSW 641–P01–0002.2	7/21/04	6.63	1.21	1.00	--	--	--	--	--	--	--
	10/29/04	--	.620	.358	--	--	--	--	--	--	--
	7/19/05	--	.424	.280	--	--	--	--	--	--	--
	8/1/06	--	<.200	.081	--	--	--	--	--	--	--
	7/10/07	7.07	<.200	.096	.022	8.39	.911	--	<.007	.115	<.030
	8/4/08	7.05	<.200	<.040	.027	7.36	1.12	--	<.007	<.030	<.030
	7/24/09	6.98	<.224	.038	--	--	--	.119	.012	--	.040
	7/21/10	6.79	<.224	.024	--	--	--	--	--	--	--

Table 7. Physical properties of sampling locations and chemical analyses of groundwater samples collected from vertical multilevel samplers in and near a pond-bottom permeable reactive barrier, Ashumet Pond, Massachusetts, July 2004–July 2010—continued

[Easting and Northing: State plane coordinates are for North American Datum of 1983 (NAD83). Latitude and longitude in degrees (°), minutes (′), and seconds (″). Altitude refers to distance above or below the National Geodetic Vertical Datum of 1929. Sources of laboratory data listed in table 1. ft, foot; m, meter; µS/cm, microsiemens per centimeter at 25 degrees Celsius; <, actual value less than value shown; >, actual value greater than value shown;--, no data; E, estimated value for constituent detected in the sample below the laboratory reporting level. Pond stages during each sampling period listed in table 1. Locations of sites shown in figure 8]

									Measured in field, unfiltered	
USGS station name	USGS site ID	Easting (m)	Northing (m)	Latitude (° ′ ″)	Longitude (° ′ ″)	Depth below pond bottom (ft)	Port altitude (ft)	Date sampled	Specific conduct-ance (µS/cm)	Oxygen, dissolved (mg/L)
MA–FSW 641–P01–0003.4	413805070322313	280054.484	820973.004	41 38 05.38	70 32 23.07	3.42	38.2	7/21/04	159	.100
								10/29/04	144	.530
								7/19/05	133	2.31
								8/1/06	95.6	.380
								7/10/07	109	8.38
								8/4/08	122	.331
								7/24/09	229	5.72
								7/21/10	108	6.32
MA–FSW 642–P01–0000	413806070322301	280057.364	820984.858	41 38 05.76	70 32 22.94	0.02	43.6	7/21/04	101	8.40
								10/29/04	--	--
								7/18/05	99.0	2.11
								8/1/06	100	7.35
								7/10/07	105	8.59
								8/4/08	109	>1.30
								7/22/09	105	9.37
								7/21/10	113	6.90
MA–FSW 642–P01–0000.8	413806070322302	280057.364	820984.858	41 38 05.76	70 32 22.94	0.82	42.8	7/21/04	148	.700
								10/29/04	135	.385
								7/18/05	159	.355
								8/1/06	274	.115
								7/10/07	158	.085
								8/4/08	212	.410
								7/22/09	256	--
								7/21/10	305	.184
MA–FSW 642–P01–0001.6	413806070322303	280057.364	820984.858	41 38 05.76	70 32 22.94	1.62	42.0	7/21/04	154	.400
								10/29/04	160	2.63
								7/18/05	178	.060
								8/1/06	311	.080
								7/10/07	161	.240
								8/4/08	309	.060
								7/22/09	263	.000
								7/21/10	383	.000
MA–FSW 642–P01–0002.2	413806070322304	280057.364	820984.858	41 38 05.76	70 32 22.94	2.22	41.4	7/21/04	142	.700
								10/29/04	140	.260
								7/18/05	178	.065
								8/1/06	283	.035
								7/10/07	157	.085
								8/4/08	290	.063
								7/22/09	260	.000
								7/21/10	363	.000
MA–FSW 642–P01–0003.4	413806070322305	280057.364	820984.858	41 38 05.76	70 32 22.94	3.42	40.2	7/21/04	149	--
								10/29/04	--	--
								7/18/05	158	.315
								8/1/06	--	--
								7/10/07	159	7.36
								8/4/08	--	--
								7/22/09	--	--
								7/21/10	--	--
MA–FSW 643–P01–0000	413806070322306	280064.002	820994.228	41 38 06.06	70 32 22.65	0.02	43.8	7/22/04	103	7.80
								11/1/04	149	3.12
								4/20/05	523	--
								7/19/05	141	2.16
								11/10/05	136	--
								8/1/06	184	2.75
								7/10/07	225	1.82
								8/4/08	187	2.75
								7/22/09	156	4.37
								7/20/10	215	4.68

Table 7. Physical properties of sampling locations and chemical analyses of groundwater samples collected from vertical multilevel samplers in and near a pond-bottom permeable reactive barrier, Ashumet Pond, Massachusetts, July 2004–July 2010—continued

[Easting and Northing: State plane coordinates are for North American Datum of 1983 (NAD83). Latitude and longitude in degrees (°), minutes ('), and seconds ("). Altitude refers to distance above or below the National Geodetic Vertical Datum of 1929. Sources of laboratory data listed in table 1. ft, foot; m, meter; µS/cm, microsiemens per centimeter at 25 degrees Celsius; <, actual value less than value shown; >, actual value greater than value shown;--, no data; E, estimated value for constituent detected in the sample below the laboratory reporting level. Pond stages during each sampling period listed in table 1. Locations of sites shown in figure 8]

		Measured in field, unfiltered		Measured in laboratory, filtered							
USGS station name	Date sampled	pH (standard units)	Orthophos-phate (mg/L as P)	Phosphorus (mg/L as P)	Boron (mg/L)	Iron (mg/L)	Manga-nese (mg/L)	Nitrite plus nitrate (mg/L as N)	Nitrite (mg/L as N)	Nitrate (mg/L as N)	Ammonia (mg/L as N)
MA–FSW 641–P01–0003.4	7/21/04	6.86	.343	1.12	--	--	--	<.060	<.008	--	.860
	10/29/04	--	.995	1.21	--	--	--	--	--	--	--
	7/19/05	--	1.04	.860	--	--	--	--	--	--	--
	8/1/06	--	.538	.431	--	--	--	--	--	--	--
	7/10/07	7.15	.555	.319	.017	.014	.035	--	<.007	.145	<.030
	8/4/08	5.89	<.200	<.040	.015	.030	.043	--	<.007	<.030	<.030
	7/24/09	5.84	.298	.317	--	--	--	.853	<.002	--	<.020
	7/21/10	6.46	.381	.342	--	--	--	--	--	--	--
MA–FSW 642–P01–0000	7/21/04	7.23	.440	.330	--	--	--	<.060	<.008	--	<.040
	10/29/04	--	--	--	--	--	--	--	--	--	--
	7/18/05	--	<.200	.030	--	--	--	--	--	--	--
	8/1/06	--	<.200	<.020	--	--	--	--	--	--	--
	7/10/07	7.13	<.200	.060	.017	.029	.084	--	<.007	.150	<.030
	8/4/08	6.98	<.200	.046	.016	.105	.187	--	<.007	.067	<.030
	7/22/09	7.48	<.224	.042	--	.016	--	<.040	<.002	--	E.017
	7/21/10	7.13	<.224	.081	--	.047	--	--	--	--	--
MA–FSW 642–P01–0000.8	7/21/04	6.61	1.70	1.46	--	--	--	<.060	<.008	--	.040
	10/29/04	--	<.200	.037	--	--	--	--	--	--	--
	7/18/05	--	1.84	1.50	--	--	--	--	--	--	--
	8/1/06	--	1.27	.965	--	--	--	--	--	--	--
	7/10/07	6.62	2.12	2.00	.035	1.86	1.25	--	<.007	<.030	.493
	8/4/08	6.16	1.30	1.07	.042	4.01	3.22	--	.150	1.78	<.030
	7/22/09	6.59	2.75	2.15	--	3.39	--	<.040	E.002	--	.039
	7/21/10	6.54	.760	.712	--	3.18	--	--	--	--	--
MA–FSW 642–P01–0001.6	7/21/04	6.66	1.81	1.45	--	--	--	<.060	<.008	--	E.004
	10/29/04	--	<.200	<.020	--	--	--	--	--	--	--
	7/18/05	--	.995	.060	--	--	--	--	--	--	--
	8/1/06	--	<.200	<.020	--	--	--	--	--	--	--
	7/10/07	7.33	.261	.163	.036	3.72	.788	--	<.007	<.030	.728
	8/4/08	7.04	.245	.035	.084	36.2	3.58	--	<.007	<.030	<.030
	7/22/09	7.38	<.224	.077	--	8.03	--	<.040	.003	--	.905
	7/21/10	7.41	--	.033	--	18.7	--	--	--	--	--
MA–FSW 642–P01–0002.2	7/21/04	6.61	.979	1.45	--	--	--	<.060	<.008	--	.040
	10/29/04	--	.603	<.020	--	--	--	--	--	--	--
	7/18/05	--	.571	.050	--	--	--	--	--	--	--
	8/1/06	--	<.200	<.020	--	--	--	--	--	--	--
	7/10/07	7.49	<.200	.093	.038	2.64	.868	--	<.007	<.030	.692
	8/4/08	7.09	.261	.013	.076	29.9	3.46	--	<.007	<.030	<.030
	7/22/09	7.36	<.224	.915	--	6.94	--	<.040	.003	--	.915
	7/21/10	7.55	--	.037	--	8.17	--	--	--	--	--
MA–FSW 642–P01–0003.4	7/21/04	6.65	1.39	1.38	--	--	--	<.060	<.008	--	.040
	10/29/04	--	--	--	--	--	--	--	--	--	--
	7/18/05	--	1.35	1.20	--	--	--	--	--	--	--
	8/1/06	--	--	--	--	--	--	--	--	--	--
	7/10/07	6.71	1.89	1.88	.036	.502	1.44	--	<.007	<.030	.707
	8/4/08	--	--	--	--	--	--	--	--	--	--
	7/22/09	--	--	--	--	--	--	--	--	--	--
	7/21/10	--	--	--	--	--	--	--	--	--	--
MA–FSW 643–P01–0000	7/22/04	6.43	.277	.140	--	--	--	--	--	--	--
	11/1/04	6.90	.277	<.020	--	--	--	<.060	<.008	--	.052
	4/20/05	6.92	<.200	<.060	--	--	--	<.060	<.008	--	<.040
	7/19/05	7.02	.261	.104	--	--	--	<.060	<.008	--	E.021
	11/10/05	--	<.200	--	--	--	--	--	--	--	--
	8/1/06	5.74	.245	.164	--	--	--	<.060	<.002	--	.573
	7/10/07	6.93	.245	.117	.043	11.5	3.21	--	<.007	.123	.675
	8/4/08	6.70	1.63	.164	.035	5.98	2.12	--	<.007	.073	<.030
	7/22/09	6.85	2.29	.296	--	2.49	--	E.021	.003	--	.266
	7/20/10	6.84	.793	.209	--	2.45	--	<.040	E.001	--	.021

Table 7. Physical properties of sampling locations and chemical analyses of groundwater samples collected from vertical multilevel samplers in and near a pond-bottom permeable reactive barrier, Ashumet Pond, Massachusetts, July 2004–July 2010—continued

[Easting and Northing: State plane coordinates are for North American Datum of 1983 (NAD83). Latitude and longitude in degrees (°), minutes (′), and seconds (″). Altitude refers to distance above or below the National Geodetic Vertical Datum of 1929. Sources of laboratory data listed in table 1. ft, foot; m, meter; µS/cm, microsiemens per centimeter at 25 degrees Celsius; <, actual value less than value shown; >, actual value greater than value shown;--, no data; E, estimated value for constituent detected in the sample below the laboratory reporting level. Pond stages during each sampling period listed in table 1. Locations of sites shown in figure 8]

									Measured in field, unfiltered	
USGS station name	USGS site ID	Easting (m)	Northing (m)	Latitude (° ′ ″)	Longitude (° ′ ″)	Depth below pond bottom (ft)	Port altitude (ft)	Date sampled	Specific conduct-ance (µS/cm)	Oxygen, dissolved (mg/L)
MA–FSW 643–P01–0000.8	413806070322307	280064.002	820994.228	41 38 06.06	70 32 22.65	0.82	43.0	7/22/04	63.6	7.30
								11/1/04	--	--
								4/20/05	262	--
								7/19/05	160	.060
								8/1/06	--	--
								7/10/07	269	3.66
								8/4/08	--	--
								7/22/09	--	3.66
								7/20/10	--	--
MA–FSW 643–P01–0001.6	413806070322308	280064.002	820994.228	41 38 06.06	70 32 22.65	1.62	42.2	7/22/04	70.2	8.20
								11/1/04	142	.375
								4/20/05	199	.000
								7/19/05	164	.015
								11/10/05	158	--
								8/1/06	214	.725
								7/10/07	277	.010
								8/4/08	250	.725
								7/22/09	235	.010
								7/20/10	275	.046
MA–FSW 643–P01–0002.2	413806070322309	280064.002	820994.228	41 38 06.06	70 32 22.65	2.22	41.6	7/22/04	196	7.80
								11/1/04	94.7	3.84
								4/20/05	146	.280
								7/19/05	136	.220
								11/10/05	128	--
								8/1/06	205	.330
								7/10/07	221	.185
								8/4/08	208	.330
								7/22/09	226	.185
								7/20/10	257	.118
MA–FSW 643–P01–0003.4	413806070322310	280064.002	820994.228	41 38 06.06	70 32 22.65	3.42	40.4	7/22/04	244	8.10
								11/1/04	86.7	8.22
								4/20/05	148	--
								7/19/05	135	.220
								11/10/05	128	--
								8/1/06	204	.440
								7/10/07	215	.395
								8/4/08	207	.440
								7/22/09	233	.395
								7/20/10	263	.127
MA–FSW 644–P01–0000	413806070322201	280070.882	820989.998	41 38 05.92	70 32 22.35	0.02	42.7	7/22/04	121	5.50
								10/29/04	283	10.51
								7/19/05	96.1	7.61
								8/1/06	102	7.90
								7/10/07	102	8.58
								8/4/08	105	>1.30
								7/22/09	101	9.24
								7/20/10	118	6.71
MA–FSW 644–P01–0000.8	413806070322202	280070.882	820989.998	41 38 05.92	70 32 22.35	0.82	41.9	7/22/04	153	.700
								10/29/04	162	.735
								7/19/05	156	.885
								8/1/06	91.5	.885
								7/10/07	99.4	.195
								8/4/08	158	.000
								7/22/09	220	.000
								7/20/10	175	.054
MA–FSW 644–P01–0001.6	413806070322203	280070.882	820989.998	41 38 05.92	70 32 22.35	1.62	41.1	7/22/04	154	2.20
								10/29/04	164	.820
								7/19/05	159	.205
								8/1/06	89.7	1.81
								7/10/07	97.4	.520
								8/4/08	150	.104
								7/22/09	208	4.78
								7/20/10	154	4.21

Table 7. Physical properties of sampling locations and chemical analyses of groundwater samples collected from vertical multilevel samplers in and near a pond-bottom permeable reactive barrier, Ashumet Pond, Massachusetts, July 2004–July 2010—continued

[Easting and Northing: State plane coordinates are for North American Datum of 1983 (NAD83). Latitude and longitude in degrees (°), minutes ('), and seconds ("). Altitude refers to distance above or below the National Geodetic Vertical Datum of 1929. Sources of laboratory data listed in table 1. ft, foot; m, meter; µS/cm, microsiemens per centimeter at 25 degrees Celsius; <, actual value less than value shown; >, actual value greater than value shown;--, no data; E, estimated value for constituent detected in the sample below the laboratory reporting level. Pond stages during each sampling period listed in table 1. Locations of sites shown in figure 8]

		Measured in field, unfiltered		Measured in laboratory, filtered							
USGS station name	Date sampled	pH (standard units)	Orthophos-phate (mg/L as P)	Phosphorus (mg/L as P)	Boron (mg/L)	Iron (mg/L)	Manga-nese (mg/L)	Nitrite plus nitrate (mg/L as N)	Nitrite (mg/L as N)	Nitrate (mg/L as N)	Ammonia (mg/L as N)
MA–FSW 643–P01–0000.8	7/22/04	6.02	.394	.260	--	--	--	<.060	<.008	--	<.040
	11/1/04	--	--	--	--	--	--	--	--	--	--
	4/20/05	6.75	<.200	<.020	--	--	--	<.060	<.008	--	.079
	7/19/05	7.15	<.200	.032	--	--	--	<.060	<.008	--	<.040
	8/1/06	--	--	--	--	--	--	--	--	--	--
	7/10/07	6.86	.620	.466	.047	17.6	3.89	--	<.007	<.030	.781
	8/4/08	--	--	--	--	--	--	--	--	--	--
	7/22/09	6.86	--	.466	--	--	--	--	--	--	--
	7/20/10	--	--	--	--	--	--	--	--	--	--
MA–FSW 643–P01–0001.6	7/22/04	6.36	.440	.280	--	--	--	--	--	--	--
	11/1/04	6.95	<.200	.040	--	--	--	<.060	<.008	--	<.040
	4/20/05	7.10	.620	.356	--	--	--	<.060	<.008	--	E.029
	7/19/05	7.13	.245	.156	--	--	--	<.060	<.008	--	E.039
	11/10/05	--	<.200	--	--	--	--	--	--	--	--
	8/1/06	5.00	.228	.183	--	--	--	<.060	<.002	--	.767
	7/10/07	7.10	.489	.379	.048	18.3	4.11	--	<.007	<.030	.825
	8/4/08	5.00	2.22	2.04	.052	13.0	3.73	--	<.007	.148	<.030
	7/22/09	7.10	2.76	2.74	--	4.53	--	<.040	E.002	--	.586
	7/20/10	6.54	2.09	2.20	--	6.02	--	E.032	.004	--	.037
MA–FSW 643–P01–0002.2	7/22/04	6.27	.570	.520	--	--	--	--	--	--	--
	11/1/04	5.81	<.200	.220	--	--	--	<.060	<.008	--	<.040
	4/20/05	6.46	.913	2.66	--	--	--	<.060	<.008	--	<.040
	7/19/05	6.60	1.76	1.68	--	--	--	<.060	<.008	--	.079
	11/10/05	--	1.30	--	--	--	--	--	--	--	--
	8/1/06	5.45	1.50	1.41	--	--	--	<.060	<.002	--	.792
	7/10/07	6.38	1.14	1.21	.036	.695	4.26	--	<.007	<.030	.821
	8/4/08	5.45	1.13	1.41	.037	.431	2.94	--	<.007	1.70	<.030
	7/22/09	6.38	1.51	1.45	--	.184	--	<.040	<.002	--	.599
	7/20/10	6.22	.866	.916	--	.184	--	.281	E.001	--	E.010
MA–FSW 643–P01–0003.4	7/22/04	6.40	1.57	1.05	--	--	--	.330	<.008	--	<.040
	11/1/04	5.79	.277	.350	--	--	--	<.060	<.008	--	<.040
	4/20/05	6.32	--	2.84	--	--	--	<.060	<.008	--	<.040
	7/19/05	6.56	1.89	1.84	--	--	--	<.060	<.008	--	.145
	11/10/05	--	1.37	--	--	--	--	--	--	--	--
	8/1/06	--	1.76	1.46	--	--	--	<.060	<.002	<.060	.818
	7/10/07	6.47	1.29	1.30	.040	.005	4.41	--	<.007	<.030	.816
	8/4/08	--	1.13	1.46	.037	.009	3.03	--	<.007	1.86	<.030
	7/22/09	6.47	1.44	1.39	--	.014	--	<.040	<.002	--	.610
	7/20/10	6.18	.788	.798	--	--	--	.407	<.002	--	<.020
MA–FSW 644–P01–0000	7/22/04	7.02	.783	.487	--	--	--	--	--	--	--
	10/29/04	--	<.200	.031	--	--	--	--	--	--	--
	7/19/05	--	<.200	.021	--	--	--	--	--	--	--
	8/1/06	--	<.200	<.020	--	--	--	--	--	--	--
	7/10/07	7.16	<.200	<.040	.017	.017	.025	--	<.007	.131	<.030
	8/4/08	7.06	<.200	.031	.015	.076	.061	--	<.007	.036	<.030
	7/22/09	7.33	<.224	<.020	--	--	--	<.040	<.002	--	<.020
	7/20/10	7.11	<.224	.021	--	--	--	--	--	--	--
MA–FSW 644–P01–0000.8	7/22/04	6.50	1.16	1.71	--	--	--	<.060	<.008	--	1.25
	10/29/04	--	.212	.145	--	--	--	--	--	--	--
	7/19/05	--	.294	.186	--	--	--	--	--	--	--
	8/1/06	--	<.200	.088	--	--	--	--	--	--	--
	7/10/07	7.03	<.200	.077	.017	1.25	4.09	--	<.007	<.070	<.030
	8/4/08	7.22	<.200	.145	.022	4.46	2.49	--	<.007	<.030	<.030
	7/22/09	7.14	.237	.075	--	--	--	<.040	.008	--	.046
	7/20/10	7.13	<.224	.060	--	--	--	--	--	--	--
MA–FSW 644–P01–0001.6	7/22/04	6.81	1.47	1.70	--	--	--	--	--	--	--
	10/29/04	--	.619	.847	--	--	--	--	--	--	--
	7/19/05	--	.489	.263	--	--	--	--	--	--	--
	8/1/06	--	.359	.143	--	--	--	--	--	--	--
	7/10/07	6.70	.212	.099	.018	3.52	.684	--	<.007	.273	<.030
	8/4/08	6.72	.277	.847	.021	3.04	.290	--	<.007	<.030	<.030
	7/22/09	6.31	<.224	.170	--	--	--	.277	<.002	--	E.015
	7/20/10	6.30	<.224	.207	--	--	--	--	--	--	--

Table 7. Physical properties of sampling locations and chemical analyses of groundwater samples collected from vertical multilevel samplers in and near a pond-bottom permeable reactive barrier, Ashumet Pond, Massachusetts, July 2004–July 2010—continued

[Easting and Northing: State plane coordinates are for North American Datum of 1983 (NAD83). Latitude and longitude in degrees (°), minutes (′), and seconds (″). Altitude refers to distance above or below the National Geodetic Vertical Datum of 1929. Sources of laboratory data listed in table 1. ft, foot; m, meter; µS/cm, microsiemens per centimeter at 25 degrees Celsius; <, actual value less than value shown; >, actual value greater than value shown;--, no data; E, estimated value for constituent detected in the sample below the laboratory reporting level. Pond stages during each sampling period listed in table 1. Locations of sites shown in figure 8]

									Measured in field, unfiltered	
USGS station name	USGS site ID	Easting (m)	Northing (m)	Latitude (° ′ ″)	Longitude (° ′ ″)	Depth below pond bottom (ft)	Port altitude (ft)	Date sampled	Specific conduct-ance (µS/cm)	Oxygen, dissolved (mg/L)
MA–FSW 644–P01–0002.2	413806070322204	280070.882	820989.998	41 38 05.92	70 32 22.35	2.22	40.5	7/22/04	150	.100
								10/29/04	162	.790
								7/19/05	156	.240
								8/1/06	83.1	.530
								7/10/07	85.8	3.03
								8/4/08	140	.308
								7/22/09	180	7.25
								7/20/10	150	6.02
MA–FSW 644–P01–0003.4	413806070322205	280070.882	820989.998	41 38 05.92	70 32 22.35	3.42	39.3	7/22/04	148	4.90
								10/29/04	154	--
								7/19/05	156	.960
								8/1/06	83.8	3.38
								7/10/07	84.0	3.25
								8/4/08	141	1.19
								7/22/09	191	5.69
								7/20/10	152	6.33
MA–FSW 645–P01–0000	413806070322206	280078.725	820993.792	41 38 06.04	70 32 22.01	0.02	40.7	7/22/04	92.3	8.30
								11/1/04	93.2	10.53
								4/20/05	86.9	>1.30
								7/19/05	98.0	8.42
								8/2/06	99.1	7.85
								7/11/07	105	7.58
								8/5/08	147	>1.30
								7/22/09	214	4.85
								7/21/10	84.5	4.76
MA–FSW 645–P01–0000.8	413806070322207	280078.725	820993.792	41 38 06.04	70 32 22.01	0.82	39.9	7/22/04	89.1	4.60
								11/1/04	101	6.03
								4/20/05	83.4	>1.30
								7/19/05	143	.885
								8/2/06	98.1	.694
								7/11/07	98.4	6.24
								8/5/08	154	>1.30
								7/22/09	212	4.70
								7/21/10	80.2	6.24
MA–FSW 645–P01–0001.6	413806070322208	280078.725	820993.792	41 38 06.04	70 32 22.01	1.62	39.1	7/22/04	90.3	1.90
								11/1/04	173	5.28
								4/20/05	87.1	>1.30
								7/19/05	143	.480
								8/2/06	94.5	.133
								7/11/07	91.3	6.96
								8/5/08	151	>1.30
								7/22/09	180	5.61
								7/21/10	82.4	5.97
MA–FSW 645–P01–0002.2	413806070322209	280078.725	820993.792	41 38 06.04	70 32 22.01	2.22	38.5	7/22/04	88.3	7.30
								11/1/04	183	4.63
								4/20/05	89.9	>1.30
								7/19/05	147	.370
								8/2/06	95.7	1.16
								7/11/07	85.1	6.51
								8/5/08	156	>1.30
								7/22/09	182	5.15
								7/21/10	80.2	5.87
MA–FSW 645–P01–0003.4	413806070322210	280078.725	820993.792	41 38 06.04	70 32 22.01	3.42	37.3	7/22/04	92.0	7.60
								11/1/04	179	9.45
								4/20/05	91.2	>1.30
								7/19/05	138	.375
								8/2/06	96.4	.725
								7/11/07	91.5	7.16
								8/5/08	156	>1.30
								7/22/09	147	6.73
								7/21/10	84.6	6.57
MA–FSW 646–P01–0000	413807070322201	280072.137	821008.498	41 38 06.52	70 32 22.29	0.02	43.5	7/22/04	121	5.80
								10/29/04	--	--
								7/20/05	144	2.35
								8/2/06	128	5.92
								7/10/07	108	7.61
								8/4/08	111	>1.30
								7/22/09	114	8.88
								7/20/10	113	7.17

Table 7. Physical properties of sampling locations and chemical analyses of groundwater samples collected from vertical multilevel samplers in and near a pond-bottom permeable reactive barrier, Ashumet Pond, Massachusetts, July 2004–July 2010—continued

[Easting and Northing: State plane coordinates are for North American Datum of 1983 (NAD83). Latitude and longitude in degrees (°), minutes ('), and seconds ("). Altitude refers to distance above or below the National Geodetic Vertical Datum of 1929. Sources of laboratory data listed in table 1. ft, foot; m, meter; µS/cm, microsiemens per centimeter at 25 degrees Celsius; <, actual value less than value shown; >, actual value greater than value shown;--, no data; E, estimated value for constituent detected in the sample below the laboratory reporting level. Pond stages during each sampling period listed in table 1. Locations of sites shown in figure 8]

		Measured in field, unfiltered		Measured in laboratory, filtered							
USGS station name	Date sampled	pH (standard units)	Orthophos-phate (mg/L as P)	Phosphorus (mg/L as P)	Boron (mg/L)	Iron (mg/L)	Manga-nese (mg/L)	Nitrite plus nitrate (mg/L as N)	Nitrite (mg/L as N)	Nitrate (mg/L as N)	Ammonia (mg/L as N)
MA–FSW 644–P01–0002.2	7/22/04	6.83	1.60	1.61	--	--	--	--	--	--	--
	10/29/04	--	.978	1.33	--	--	--	--	--	--	--
	7/19/05	--	.571	.451	--	--	--	--	--	--	--
	8/1/06	--	.440	.369	--	--	--	--	--	--	--
	7/10/07	6.06	.343	.306	.015	.000	.066	--	<.007	.785	<.030
	8/4/08	6.10	.408	1.33	.017	.073	.133	--	<.007	<.030	<.030
	7/22/09	5.83	.375	.346	--	--	--	.828	<.002	--	<.020
	7/20/10	5.93	.302	.335	--	--	--	--	--	--	--
MA–FSW 644–P01–0003.4	7/22/04	6.65	2.15	1.71	--	--	--	<.060	<.008	--	1.23
	10/29/04	--	1.61	2.03	--	--	--	--	--	--	--
	7/19/05	--	1.29	1.07	--	--	--	--	--	--	--
	8/1/06	--	1.27	.584	--	--	--	--	--	--	--
	7/10/07	5.99	.571	.501	.015	.000	.028	--	<.007	.764	<.030
	8/4/08	6.13	.620	2.03	.018	.017	.084	--	<.007	<.030	<.030
	7/22/09	5.94	.509	.404	--	--	--	.849	<.002	--	<.020
	7/20/10	5.85	.287	.373	--	--	--	--	--	--	--
MA–FSW 645–P01–0000	7/22/04	7.19	.864	.590	--	--	--	.682	<.008	--	<.040
	11/1/04	5.95	<.200	.020	--	--	--	.051	<.008	--	<.040
	4/20/05	6.32	.359	.345	--	--	--	.934	<.008	--	<.040
	7/19/05	6.95	.212	.020	--	--	--	--	--	--	--
	8/2/06	--	<.200	<.020	--	--	--	<.060	<.002	--	E.010
	7/11/07	7.00	<.200	.067	.017	.042	.084	--	<.007	.272	.016
	8/5/08	5.91	.408	.338	.013	.014	.225	--	<.007	.428	<.030
	7/22/09	5.50	1.07	.174	--	--	--	1.03	<.002	--	<.020
	7/21/10	6.15	<.224	.123	--	--	--	.475	E.002	--	E.014
MA–FSW 645–P01–0000.8	7/22/04	6.66	.799	.690	--	--	--	.813	<.008	--	<.040
	11/1/04	6.20	<.200	.364	--	--	--	.795	<.008	--	<.040
	4/20/05	5.67	.424	.405	--	--	--	.958	<.008	--	<.040
	7/19/05	6.25	.570	.440	--	--	--	1.66	.043	--	<.040
	8/2/06	--	.881	.464	--	--	--	2.00	<.002	--	1.21
	7/11/07	6.47	.767	.706	.019	.122	.547	--	<.007	1.35	.300
	8/5/08	5.81	.343	.352	.013	.010	.192	--	<.007	.804	<.030
	7/22/09	5.52	<.224	.175	--	--	--	1.05	<.002	--	<.020
	7/21/10	5.73	<.224	.119	--	--	--	.682	<.002	--	<.020
MA–FSW 645–P01–0001.6	7/22/04	6.48	.799	.700	--	--	--	.820	<.008	--	<.040
	11/1/04	6.36	.294	.430	--	--	--	.845	<.008	--	<.040
	4/20/05	6.32	.375	.357	--	--	--	.902	<.008	--	<.040
	7/19/05	6.20	.587	.420	--	--	--	1.90	.043	--	<.040
	8/2/06	--	.620	.633	--	--	--	2.13	<.002	--	1.51
	7/11/07	6.45	.652	.645	.018	.150	.653	--	<.007	.981	<.030
	8/5/08	5.97	.294	.271	.013	.131	.267	--	<.007	.690	<.030
	7/22/09	5.72	.423	.167	--	--	--	.973	<.002	--	<.020
	7/21/10	5.74	<.224	.122	--	--	--	.633	<.002	--	<.020
MA–FSW 645–P01–0002.2	7/22/04	6.64	.799	.630	--	--	--	.835	<.008	--	<.040
	11/1/04	6.35	<.200	.420	--	--	--	.816	<.008	--	<.040
	4/20/05	6.00	.555	.398	--	--	--	.984	<.008	--	<.040
	7/19/05	6.15	.701	.500	--	--	--	1.84	.031	--	<.040
	8/2/06	--	.538	.588	--	--	--	1.97	<.002	--	1.45
	7/11/07	6.43	.636	.673	.019	.193	.717	--	<.007	.968	<.030
	8/5/08	5.90	.310	.306	.013	.156	.360	--	<.007	.806	<.030
	7/22/09	5.68	.251	.165	--	--	--	1.01	<.002	--	<.020
	7/21/10	5.72	<.224	.117	--	--	--	0.65	<.002	--	<.020
MA–FSW 645–P01–0003.4	7/22/04	6.98	.538	.150	--	--	--	.167	<.008	--	<.040
	11/1/04	6.32	<.200	.400	--	--	--	.692	<.008	--	<.040
	4/20/05	6.64	.718	.313	--	--	--	.923	<.008	--	<.040
	7/19/05	6.12	.603	.460	--	--	--	1.80	.025	--	<.040
	8/2/06	--	.718	.638	--	--	--	2.12	<.002	--	1.59
	7/11/07	6.45	1.08	.696	.019	.154	.933	--	<.007	.987	<.030
	8/5/08	5.92	.724	.302	.013	.235	.341	<.030	<.007	.830	<.030
	7/22/09	5.97	.656	.127	--	--	--	.759	<.002	--	<.020
	7/21/10	5.85	<.224	.098	--	--	--	.582	E.001	--	<.020
MA–FSW 646–P01–0000	7/22/04	6.42	1.22	.770	--	--	--	--	--	--	--
	10/29/04	--	<.200	--	--	--	--	--	--	--	--
	7/20/05	--	.375	.229	--	--	--	--	--	--	--
	8/2/06	--	.310	.097	--	--	--	--	--	--	--
	7/10/07	7.09	<.200	.096	.018	.317	.343	--	<.007	.132	<.030
	8/4/08	6.95	.424	.017	.015	.699	.188	--	<.007	.038	<.030
	7/22/09	7.16	.458	.046	--	.056	--	<.040	E.001	--	<.020
	7/20/10	7.15	<.224	.037	--	.055	--	--	--	--	--

Table 7. Physical properties of sampling locations and chemical analyses of groundwater samples collected from vertical multilevel samplers in and near a pond-bottom permeable reactive barrier, Ashumet Pond, Massachusetts, July 2004–July 2010—continued

[Easting and Northing: State plane coordinates are for North American Datum of 1983 (NAD83). Latitude and longitude in degrees (°), minutes (′), and seconds (″). Altitude refers to distance above or below the National Geodetic Vertical Datum of 1929. Sources of laboratory data listed in table 1. ft, foot; m, meter; µS/cm, microsiemens per centimeter at 25 degrees Celsius; <, actual value less than value shown; >, actual value greater than value shown;--, no data; E, estimated value for constituent detected in the sample below the laboratory reporting level. Pond stages during each sampling period listed in table 1. Locations of sites shown in figure 8]

									Measured in field, unfiltered	
USGS station name	USGS site ID	Easting (m)	Northing (m)	Latitude (° ′ ″)	Longitude (° ′ ″)	Depth below pond bottom (ft)	Port altitude (ft)	Date sampled	Specific conduct-ance (µS/cm)	Oxygen, dissolved (mg/L)
MA–FSW 646–P01–0000.8	413807070322202	280072.137	821008.498	41 38 06.52	70 32 22.29	0.82	42.7	7/22/04	151	.600
								10/29/04	242	1.44
								7/20/05	180	.010
								8/2/06	221	.661
								7/10/07	207	.005
								8/4/08	282	.330
								7/22/09	228	.089
								7/20/10	285	.237
MA–FSW 646–P01–0001.6	413807070322203	280072.137	821008.498	41 38 06.52	70 32 22.29	1.62	41.9	7/22/04	150	1.40
								10/29/04	212	.770
								7/20/05	189	.035
								8/2/06	220	.795
								7/10/07	191	.105
								8/4/08	120	>1.30
								7/22/09	113	9.46
								7/20/10	115	7.37
MA–FSW 646–P01–0002.2	413807070322204	280072.137	821008.498	41 38 06.52	70 32 22.29	2.22	41.3	7/22/04	147	--
								10/29/04	195	1.37
								7/20/05	188	.125
								8/2/06	221	2.55
								7/10/07	193	.320
								8/4/08	217	.920
								7/22/09	230	.320
								7/20/10	288	.190
MA–FSW 646–P01–0003.4	413807070322205	280072.137	821008.498	41 38 06.52	70 32 22.29	3.42	40.1	7/22/04	116	.200
								10/29/04	195	4.27
								7/20/05	193	--
								8/2/06	217	2.11
								7/10/07	187	.165
								8/4/08	240	.292
								7/22/09	230	.158
								7/20/10	292	.103
MA–FSW 647–P01–0000	413807070322206	280085.138	821016.427	41 38 06.77	70 32 21.72	0.02	42.5	7/23/04	71.8	6.50
								11/1/04	92.2	10.60
								7/20/05	94.9	8.36
								8/2/06	101	8.29
								7/11/07	102	7.95
								8/5/08	107	>1.30
								7/22/09	108	7.01
								7/20/10	133	6.05
MA–FSW 647–P01–0000.8	413807070322207	280085.138	821016.427	41 38 06.77	70 32 21.72	0.82	41.7	7/23/04	69.9	6.20
								11/1/04	121	.945
								7/20/05	78.0	.550
								8/2/06	100	.000
								7/11/07	109	.030
								8/5/08	134	.000
								7/22/09	140	.000
								7/20/10	260	.009
MA–FSW 647–P01–0001.6	413807070322208	280085.138	821016.427	41 38 06.77	70 32 21.72	1.62	40.9	7/23/04	69.8	6.20
								11/1/04	117	2.10
								7/20/05	85.0	.000
								8/2/06	104	.255
								7/11/07	110	.145
								8/5/08	117	.287
								7/22/09	122	4.20
								7/20/10	231	3.66

Table 7. Physical properties of sampling locations and chemical analyses of groundwater samples collected from vertical multilevel samplers in and near a pond-bottom permeable reactive barrier, Ashumet Pond, Massachusetts, July 2004–July 2010—continued

[Easting and Northing: State plane coordinates are for North American Datum of 1983 (NAD83). Latitude and longitude in degrees (°), minutes ('), and seconds ("). Altitude refers to distance above or below the National Geodetic Vertical Datum of 1929. Sources of laboratory data listed in table 1. ft, foot; m, meter; µS/cm, microsiemens per centimeter at 25 degrees Celsius; <, actual value less than value shown; >, actual value greater than value shown;--, no data; E, estimated value for constituent detected in the sample below the laboratory reporting level. Pond stages during each sampling period listed in table 1. Locations of sites shown in figure 8]

		Measured in field, unfiltered		Measured in laboratory, filtered							
USGS station name	Date sampled	pH (standard units)	Orthophos-phate (mg/L as P)	Phosphorus (mg/L as P)	Boron (mg/L)	Iron (mg/L)	Manga-nese (mg/L)	Nitrite plus nitrate (mg/L as N)	Nitrite (mg/L as N)	Nitrate (mg/L as N)	Ammonia (mg/L as N)
MA–FSW 646–P01–0000.8	7/22/04	6.17	1.66	1.37	--	--	--	<.060	<.008	--	E.003
	10/29/04	--	.505	.042	--	--	--	--	--	--	--
	7/20/05	--	.881	.610	--	--	--	--	--	--	--
	8/2/06	--	1.91	.339	--	--	--	--	--	--	--
	7/10/07	7.10	1.17	.906	.043	7.31	3.13	--	<.007	<.070	.693
	8/4/08	6.88	2.06	1.03	.069	31.8	3.28	--	<.007	<.030	<.030
	7/22/09	6.36	1.57	1.35	--	1.48	--	<.040	<.002	--	.582
	7/20/10	6.43	.951	.910	--	1.19	--	--	--	--	--
MA–FSW 646–P01–0001.6	7/22/04	6.34	1.76	1.40	--	--	--	--	--	--	--
	10/29/04	--	.261	.102	--	--	--	--	--	--	--
	7/20/05	--	2.84	2.79	--	--	--	--	--	--	--
	8/2/06	--	1.83	1.48	--	--	--	--	--	--	--
	7/10/07	6.74	1.61	1.64	.038	1.56	2.94	--	<.007	<.070	.688
	8/4/08	6.74	.261	.045	.016	.652	.253	--	<.007	.038	<.030
	7/22/09	7.02	.692	.069	--	.054	--	<.040	<.002	--	E.019
	7/20/10	7.17	<.224	.033	--	.032	--	--	--	--	--
MA–FSW 646–P01–0002.2	7/22/04	6.43	.636	1.05	--	--	--	--	--	--	--
	10/29/04	--	.228	.243	--	--	--	--	--	--	--
	7/20/05	--	3.20	3.08	--	--	--	--	--	--	--
	8/2/06	--	1.57	1.46	--	--	--	--	--	--	--
	7/10/07	6.55	1.57	1.67	.038	.325	2.98	--	<.007	<.070	.674
	8/4/08	6.26	.489	.342	.034	4.32	3.39	--	<.007	1.31	.138
	7/22/09	6.35	1.76	1.10	--	.494	--	<.040	<.002	--	.568
	7/20/10	6.32	.757	.761	--	.375	--	--	--	--	--
MA–FSW 646–P01–0003.4	7/22/04	6.25	.816	1.45	--	--	--	<.060	<.008	--	.430
	10/29/04	--	.685	.923	--	--	--	--	--	--	--
	7/20/05	--	2.97	2.65	--	--	--	--	--	--	--
	8/2/06	--	1.21	1.37	--	--	--	--	--	--	--
	7/10/07	6.57	1.47	1.66	.035	.009	2.70	--	<.007	<.070	.689
	8/4/08	6.22	.995	.964	.028	.112	3.47	--	<.007	2.53	.379
	7/22/09	6.31	1.52	1.10	--	.160	--	<.040	<.002	--	.539
	7/20/10	6.34	1.11	.699	--	--	--	--	--	--	--
MA–FSW 647–P01–0000	7/23/04	6.53	.457	.730	--	--	--	.470	<.008	--	<.040
	11/1/04	7.14	<.200	<.020	--	--	--	<.060	<.008	--	<.040
	7/20/05	6.99	<.200	E.010	--	--	--	<.060	<.008	--	<.040
	8/2/06	--	<.200	<.020	--	--	--	<.060	<.002	--	E.008
	7/11/07	7.22	<.200	<.040	.016	.017	.026	--	<.007	.123	<.030
	8/5/08	6.77	<.200	.000	.014	.069	.046	--	<.007	.039	<.030
	7/22/09	7.02	.343	<.020	--	--	--	<.040	<.002	--	<.020
	7/20/10	6.66	<.224	<.020	--	--	--	<.040	E.001	--	<.020
MA–FSW 647–P01–0000.8	7/23/04	6.43	1.14	.720	--	--	--	.480	<.008	--	<.040
	11/1/04	6.92	.245	.096	--	--	--	<.060	<.008	--	<.040
	7/20/05	7.00	<.200	.050	--	--	--	<.060	.011	--	<.040
	8/2/06	--	<.200	E.015	--	--	--	<.060	E.001	--	.012
	7/11/07	7.05	<.200	<.040	.016	5.91	.307	--	<0.007	<.070	<.030
	8/5/08	7.05	<.200	.000	.023	8.24	.315	--	<.007	<.030	<.030
	7/22/09	7.08	.252	<.020	--	--	--	<.040	.010	--	.039
	7/20/10	6.77	<.224	<.020	--	--	--	<.040	E.005	--	.040
MA–FSW 647–P01–0001.6	7/23/04	6.57	.946	.710	--	--	--	.470	<.008	--	<.040
	11/1/04	7.07	<.200	.090	--	--	--	<.060	<.008	--	<.040
	7/20/05	7.07	<.200	.030	--	--	--	<.060	.016	--	E.020
	8/2/06	--	<.200	<.020	--	--	--	E.040	.003	--	.016
	7/11/07	6.89	<.200	<.040	.016	5.03	.080	--	<.007	.146	<.030
	8/5/08	6.51	<.200	.000	.017	3.11	.075	--	<.007	.089	<.030
	7/22/09	6.03	<.224	.032	--	--	--	.334	.003	--	<.020
	7/20/10	5.80	<.224	E.019	--	--	--	.571	.004	--	<.020

Table 7. Physical properties of sampling locations and chemical analyses of groundwater samples collected from vertical multilevel samplers in and near a pond-bottom permeable reactive barrier, Ashumet Pond, Massachusetts, July 2004–July 2010—continued

[Easting and Northing: State plane coordinates are for North American Datum of 1983 (NAD83). Latitude and longitude in degrees (°), minutes (′), and seconds (″). Altitude refers to distance above or below the National Geodetic Vertical Datum of 1929. Sources of laboratory data listed in table 1. ft, foot; m, meter; µS/cm, microsiemens per centimeter at 25 degrees Celsius; <, actual value less than value shown; >, actual value greater than value shown;--, no data; E, estimated value for constituent detected in the sample below the laboratory reporting level. Pond stages during each sampling period listed in table 1. Locations of sites shown in figure 8]

									Measured in field, unfiltered	
USGS station name	USGS site ID	Easting (m)	Northing (m)	Latitude (° ′ ″)	Longitude (° ′ ″)	Depth below pond bottom (ft)	Port altitude (ft)	Date sampled	Specific conduct-ance (µS/cm)	Oxygen, dissolved (mg/L)
MA–FSW 647–P01–0002.2	413807070322209	280085.138	821016.427	41 38 06.77	70 32 21.72	2.22	40.3	7/23/04	69.9	6.00
								11/1/04	116	.420
								7/20/05	79.0	2.15
								8/2/06	101	2.58
								7/11/07	102	3.23
								8/5/08	117	.375
								7/22/09	140	5.52
								7/20/10	247	2.90
MA–FSW 647–P01–0003.4	413807070322210	280085.138	821016.427	41 38 06.77	70 32 21.72	3.42	39.1	7/23/04	69.7	6.00
								11/1/04	148	5.28
								7/20/05	71.5	6.47
								8/2/06	94.2	6.49
								7/11/07	95.6	6.38
								8/5/08	107	>1.30
								7/22/09	125	5.54
								7/20/10	235	4.57
MA–FSW 648–P01–0000	413807070322211	280084.569	821029.386	41 38 07.19	70 32 21.74	0.02	43.3	7/23/04	94.9	6.77
								11/1/04	--	--
								7/20/05	95.7	9.10
								8/2/06	146	.075
								7/11/07	134	2.19
								8/5/08	168	>1.30
								7/22/09	133	4.41
								7/20/10	233	.710
MA–FSW 648–P01–0000.8	413807070322212	280084.569	821029.386	41 38 07.19	70 32 21.74	0.82	42.5	7/23/04	100	4.40
								11/1/04	155	.890
								7/20/05	161	.060
								8/2/06	137	1.91
								7/11/07	144	1.86
								8/5/08	173	.600
								7/22/09	138	4.80
								7/20/10	248	.088
MA–FSW 648–P01–0001.6	413807070322213	280084.569	821029.386	41 38 07.19	70 32 21.74	1.62	41.7	7/23/04	104	2.65
								11/1/04	205	2.39
								7/20/05	160	.125
								8/2/06	135	4.32
								7/11/07	148	4.56
								8/5/08	169	.290
								7/22/09	141	6.44
								7/20/10	247	.308
MA–FSW 648–P01–0002.2	413807070322214	280084.569	821029.386	41 38 07.19	70 32 21.74	2.22	41.1	7/23/04	102	2.10
								11/1/04	247	1.90
								7/20/05	157	.240
								8/2/06	137	4.87
								7/11/07	149	4.87
								8/5/08	172	.450
								7/22/09	136	6.89
								7/20/10	246	.089
MA–FSW 648–P01–0003.4	413807070322215	280084.569	821029.386	41 38 07.19	70 32 21.74	3.42	39.9	7/23/04	101	2.30
								11/1/04	121	1.96
								7/20/05	137	4.64
								8/2/06	134	6.74
								7/11/07	147	5.06
								8/5/08	170	.520
								7/22/09	136	7.59
								7/20/10	247	.216

Table 7. Physical properties of sampling locations and chemical analyses of groundwater samples collected from vertical multilevel samplers in and near a pond-bottom permeable reactive barrier, Ashumet Pond, Massachusetts, July 2004–July 2010—continued

[Easting and Northing: State plane coordinates are for North American Datum of 1983 (NAD83). Latitude and longitude in degrees (°), minutes ('), and seconds ("). Altitude refers to distance above or below the National Geodetic Vertical Datum of 1929. Sources of laboratory data listed in table 1. ft, foot; m, meter; µS/cm, microsiemens per centimeter at 25 degrees Celsius; <, actual value less than value shown; >, actual value greater than value shown;--, no data; E, estimated value for constituent detected in the sample below the laboratory reporting level. Pond stages during each sampling period listed in table 1. Locations of sites shown in figure 8]

		Measured in field, unfiltered		Measured in laboratory, filtered							
USGS station name	Date sampled	pH (standard units)	Orthophos-phate (mg/L as P)	Phosphorus (mg/L as P)	Boron (mg/L)	Iron (mg/L)	Manga-nese (mg/L)	Nitrite plus nitrate (mg/L as N)	Nitrite (mg/L as N)	Nitrate (mg/L as N)	Ammonia (mg/L as N)
MA–FSW 647–P01–0002.2	7/23/04	6.23	.897	.710	--	--	--	.470	<.008	--	<.040
	11/1/04	7.00	<.200	.030	--	--	--	.044	<.008	--	<.040
	7/20/05	6.56	<.200	<.020	--	--	--	.299	E.004	--	<.040
	8/2/06	--	<.200	<.020	--	--	--	.358	.007	--	<.010
	7/11/07	6.34	<.200	<.040	.013	2.47	.143	--	<.007	.368	<.030
	8/5/08	6.52	<.200	.028	.018	4.15	.386	--	<.007	.185	<.030
	7/22/09	6.32	<.224	.039	--	--	--	.533	.005	--	<.020
	7/20/10	6.24	<.224	.039	--	--	--	.618	.012	--	<.020
MA–FSW 647–P01–0003.4	7/23/04	6.45	.946	.730	--	--	--	.470	<.008	--	<.040
	11/1/04	4.86	.522	.630	--	--	--	.303	<.008	--	<.040
	7/20/05	5.72	.587	.550	--	--	--	.602	<.008	--	<.040
	8/2/06	--	.489	.412	--	--	--	.713	<.002	--	<.010
	7/11/07	5.85	.391	.364	.012	.018	.007	--	<.007	.514	<.030
	8/5/08	5.88	.522	.522	.013	.063	.010	--	<.007	.292	<.030
	7/22/09	5.74	.416	.310	--	--	--	.727	<.002	--	<.020
	7/20/10	5.59	<.224	.209	--	--	--	.775	E.001	--	<.020
MA–FSW 648–P01–0000	7/23/04	6.21	.881	.510	--	--	--	--	--	--	--
	11/1/04	--	<.200	--	--	--	--	--	--	--	--
	7/20/05	--	<.200	E.020	--	--	--	--	--	--	--
	8/2/06	--	<.200	.027	--	--	--	--	--	--	--
	7/11/07	6.16	.799	.074	.015	1.12	.234	--	<.007	.178	<.030
	8/5/08	6.18	.685	.259	.031	2.45	.062	--	<.007	.044	<.030
	7/22/09	6.09	.610	.192	--	--	--	.109	<.002	--	E.011
	7/20/10	5.58	.414	.198	--	--	--	--	--	--	--
MA–FSW 648–P01–0000.8	7/23/04	6.01	.864	.700	--	--	--	.450	<.008	--	<.040
	11/1/04	--	.245	<.020	--	--	--	--	--	--	--
	7/20/05	--	<.200	.040	--	--	--	--	--	--	--
	8/2/06	--	<.200	<.020	--	--	--	--	--	--	--
	7/11/07	5.82	.245	.226	.014	.007	.031	--	<.007	.517	<.030
	8/5/08	6.10	.620	.473	.038	1.53	.062	--	<.007	<.030	<.030
	7/22/09	5.83	.577	.488	--	--	--	.455	<.002	--	<.020
	7/20/10	5.55	<.224	.183	--	--	--	--	--	--	--
MA–FSW 648–P01–0001.6	7/23/04	6.11	1.06	.830	--	--	--	--	--	--	--
	11/1/04	--	<.200	<.020	--	--	--	--	--	--	--
	7/20/05	--	<.200	.040	--	--	--	--	--	--	--
	8/2/06	--	.277	.162	--	--	--	--	--	--	--
	7/11/07	5.89	.522	.376	.014	.011	.018	--	<.007	.737	<.030
	8/5/08	6.02	.652	.542	.038	.849	.029	--	<.007	<.030	<.030
	7/22/09	5.79	.620	.501	--	--	--	.572	<.002	--	<.020
	7/20/10	5.48	<.224	.194	--	--	--	--	--	--	--
MA–FSW 648–P01–0002.2	7/23/04	6.15	1.04	.920	--	--	--	--	--	--	--
	11/1/04	--	<.200	<.020	--	--	--	--	--	--	--
	7/20/05	--	<.200	.050	--	--	--	--	--	--	--
	8/2/06	--	<.200	.075	--	--	--	--	--	--	--
	7/11/07	5.70	.245	.246	.014	.193	.031	--	<.007	.733	<.030
	8/5/08	6.00	.636	.519	.038	1.31	.024	--	<.007	<.030	<.030
	7/22/09	5.70	.528	.485	--	--	--	.617	<.002	--	<.020
	7/20/10	5.51	<.224	.170	--	--	--	--	--	--	--
MA–FSW 648–P01–0003.4	7/23/04	6.24	.946	.940	--	--	--	.350	<.008	--	<.040
	11/1/04	--	.522	.303	--	--	--	--	--	--	--
	7/20/05	--	<.200	.090	--	--	--	--	--	--	--
	8/2/06	--	.343	.334	--	--	--	--	--	--	--
	7/11/07	5.71	.391	.417	.013	.009	.013	--	<.007	.783	<.030
	8/5/08	5.96	.571	.591	.038	.469	.007	--	<.007	<.030	<.030
	7/22/09	5.77	.595	.557	--	--	--	.648	<.002	--	<.020
	7/20/10	5.56	<.224	.250	--	--	--	--	--	--	--