

Table 10. Physical properties of sampling locations and chemical analyses of groundwater samples collected from pond-bottom piezometers near a pond-bottom permeable reactive barrier, Ashumet Pond, Cape Cod, Massachusetts, August 2004–August 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 phosphorus and nitrogen data are listed in table 1. USGS, U.S. Geological Survey; ft, foot; m, meter; μS/cm, microsiemens per centimeter at 25 degrees Celsius; <, actual value less than value shown; --, no data; E, estimated value for constituent detected in the sample below the laboratory reporting level. Altitude of pond stage during each sampling period is listed in table 1. Locations of sites shown in figure 8]

USGS station name	USGS site ID	Easting (m)	Northing (m)	Latitude (° ′ ″)	Longitude (° ′ ″)	Altitude of bottom of screen (ft)	Date sampled	Altitude of water level inside piezometer (ft)
MA-FSW 633-P01-0010	413805070322301	280050.906	820982.598	41 38 05.69	70 32 23.22	34.02	8/4/04	44.08
							11/3/04	43.61
							7/20/05	45.52
							8/9/06	46.29
							7/13/07	45.85
							8/5/08	45.27
							7/21/09	--
8/3/10	46.91							
MA-FSW 633-P01-0030	413805070322302	280050.212	820982.590	41 38 05.69	70 32 23.25	14.44	8/4/04	44.11
							11/3/04	43.62
							7/20/05	45.56
							8/9/06	46.33
							7/13/07	45.94
							8/5/08	45.37
							7/21/09	--
8/3/10	46.85							
MA-FSW 633-P01-0060	413805070322303	280049.756	820981.968	41 38 05.67	70 32 23.27	-15.56	8/4/04	44.14
							11/3/04	43.63
							7/20/05	45.61
							8/9/06	46.29
							7/13/07	46.27
							8/5/08	--
							7/21/09	--
8/3/10	--							
MA-FSW 633-P01-0100	413805070322304	280049.069	820981.343	41 38 05.65	70 32 23.30	-55.56	8/4/04	44.16
							11/3/04	43.64
							7/20/05	45.66
							8/9/06	--
							7/13/07	--
							8/5/08	--
							7/21/09	--
8/3/10	--							
MA-FSW 635-P01-0010	413805070322305	280061.201	820972.841	41 38 05.37	70 32 22.78	31.65	8/4/04	44.01
							11/3/04	--
							7/20/05	--
							8/9/06	46.29
							7/13/07	45.91
							8/5/08	44.87
							7/21/09	--
8/3/10	--							
MA-FSW 635-P01-0030	413805070322306	280061.664	820972.846	41 38 05.37	70 32 22.76	6.65	8/4/04	44.05
							11/3/04	43.56
							7/20/05	45.51
							8/9/06	46.28
							7/13/07	45.88
							8/5/08	44.98
							7/21/09	--
8/3/10	--							

Table 10. Physical properties of sampling locations and chemical analyses of groundwater samples collected from pond-bottom piezometers near permeable reactive, Ashumet Pond, Cape Cod, Massachusetts, October 2004–August 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 phosphorus and nitrogen data are listed in table 1. USGS, U.S. Geological Survey; ft, foot; m, meter; μS/cm, microsiemens per centimeter at 25 degrees Celsius; <, actual value less than value shown; --, no data; E, estimated value for constituent detected in the sample below the laboratory reporting level. Altitude of pond stage during each sampling period is listed in table 1. Locations of sites shown in figure 8]

USGS station name	Date sampled	Measured in field, unfiltered				Measured in laboratory, filtered				
		Specific conductance (μS/cm)	Oxygen, dissolved (mg/L)	pH (standard units)	Orthophosphate (mg/L as P)	Phosphorus (mg/L as P)	Nitrite plus nitrate (mg/L as N)	Nitrite (mg/L as N)	Nitrate (mg/L as N)	Ammonia (mg/L as N)
MA-FSW 633-P01-0010	8/4/04	108.4	0.130	5.98	<0.098	1.939	1.427	0.139	--	<0.040
	11/3/04	127	8.90	6.03	.310	1.46	.959	.008	--	<0.040
	7/20/05	176	.035	6.42	1.44	1.34	<0.060	<0.008	--	.191
	8/9/06	196	.005	6.14	1.24	1.08	<0.060	<0.002	--	.596
	7/13/07	197	.380	6.57	1.63	1.75	--	<0.007	<0.030	.968
	8/5/08	179	.020	6.23	1.27	1.41	--	<0.007	.407	<0.030
	7/21/09	227	5.96	6.52	1.34	1.38	<0.040	<0.002	--	.600
	8/3/10	176	.443	6.55	1.20	1.09	.093	.002	--	.327
MA-FSW 633-P01-0030	8/4/04	162	.065	6.75	.571	2.25	<0.060	<0.008	--	1.16
	11/3/04	147	2.73	6.55	.244	2.07	<0.060	<0.008	--	1.18
	7/20/05	187	.005	6.87	1.45	1.40	<0.060	<0.008	--	1.04
	8/9/06	176	.025	6.28	1.48	1.32	1.41	.011	--	.630
	7/13/07	107	.105	6.63	.864	.967	--	<0.007	.533	.201
	8/5/08	154	.174	6.66	1.35	1.56	--	<0.007	<0.030	.332
	7/21/09	260	6.97	6.99	.672	.640	.759	.003	--	.390
	8/3/10	218	4.65	6.23	.344	.288	.604	<0.002	--	.123
MA-FSW 633-P01-0060	8/4/04	131	7.38	6.94	.571	.493	1.85	<0.008	--	2.47
	11/3/04	138	9.27	6.71	<0.098	<0.020	<0.060	<0.008	--	3.68
	7/20/05	136	.700	--	.147	.015	<0.060	<0.008	--	3.51
	8/9/06	118	.655	6.94	.310	.293	<0.060	<0.002	--	.923
	7/13/07	117	.640	7.48	<0.098	.162	--	<0.007	.149	1.49
	8/5/08	90.8	1.35	7.27	<.244	.010	--	<0.007	.044	.795
	7/21/09	128	--	--	--	--	--	--	--	--
	8/3/10	112	8.04	--	<.244	.044	<0.040	<0.002	--	.325
MA-FSW 633-P01-0100	8/4/04	65.8	5.38	6.87	--	<0.010	.761	<0.008	--	<0.040
	11/3/04	85.1	5.54	7.14	<0.098	<0.020	.494	<0.008	--	.167
	7/20/05	75.3	8.53	--	<0.098	<0.020	<0.060	<0.008	--	.500
	8/9/06	76.3	.575	8.24	<0.098	<0.020	1.08	<0.002	--	.408
	7/13/07	81.0	5.77	8.92	<0.098	<0.040	--	<0.007	.115	.378
	8/5/08	--	--	--	--	--	--	--	--	--
	7/21/09	--	--	--	--	--	--	--	--	--
	8/3/10	--	--	--	--	--	--	--	--	--
MA-FSW 635-P01-0010	8/4/04	183	.005	6.67	.391	.392	1.76	.087	--	2.21
	11/3/04	191	.615	6.61	.343	.477	<0.060	<0.008	--	.997
	7/20/05	133	5.67	6.37	.522	.467	2.03	<0.008	--	.117
	8/9/06	102	.050	6.17	.799	.637	2.14	<0.002	--	1.54
	7/13/07	105	.050	6.54	.528	.568	--	<0.007	1.80	1.35
	8/5/08	148	1.31	6.01	.212	.211	--	<0.010	.761	<0.030
	7/21/09	85.1	7.35	5.88	<.244	.172	.693	<0.002	--	<0.020
	8/3/10	106	7.65	6.62	<.244	.124	.643	<0.002	--	<0.020
MA-FSW 635-P01-0030	8/4/04	104	.010	6.63	.326	.337	2.18	.025	--	2.12
	11/3/04	176	.275	6.29	.522	.288	1.67	<0.008	--	2.74
	7/20/05	107	.165	6.36	.440	.320	2.17	<0.008	--	.504
	8/9/06	95.6	.135	6.06	.294	.173	2.14	<0.008	--	2.15
	7/13/07	73.4	5.16	6.42	.244	.102	--	<0.007	.908	<0.030
	8/5/08	73.9	5.61	5.79	.244	.088	--	<0.010	.626	<0.030
	7/21/09	76.2	8.06	6.15	--	.066	.700	<0.002	--	<0.020
	8/3/10	84.3	7.89	5.96	<.244	.066	.616	<0.002	--	<0.020

Table 10. Physical properties of sampling locations and chemical analyses of groundwater samples collected from pond-bottom piezometers near permeable reactive, Ashumet Pond, Cape Cod, Massachusetts, October 2004–August 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 phosphorus and nitrogen data are listed in table 1. USGS, U.S. Geological Survey; ft, foot; m, meter; μS/cm, microsiemens per centimeter at 25 degrees Celsius; <, actual value less than value shown; --, no data; E, estimated value for constituent detected in the sample below the laboratory reporting level. Altitude of pond stage during each sampling period is listed in table 1. Locations of sites shown in figure 8]

USGS station name	USGS site ID	Easting (m)	Northing (m)	Latitude (° ′ ″)	Longitude (° ′ ″)	Altitude of screen bottom of (ft)	Date sampled	Altitude of water level inside piezometer (ft)
MA-FSW 635-P01-0060	413805070322307	280062.351	820973.471	41 38 05.39	70 32 22.73	-18.50	8/4/04	44.10
							11/3/04	43.59
							7/20/05	45.55
							8/9/06	46.34
							7/13/07	45.92
							8/5/08	45.04
							7/21/09	--
8/3/10	--							
MA-FSW 635-P01-0100	413805070322308	280063.039	820974.096	41 38 05.41	70 32 22.70	-58.60	8/4/04	44.11
							11/3/04	43.61
							7/20/05	45.57
							8/9/06	46.37
							7/13/07	45.94
							8/5/08	45.61
							7/21/09	--
8/3/10	--							
MA-FSW 636-P01-0010	413805070322201	280075.234	820960.041	41 38 04.95	70 32 22.18	26.30	8/4/04	44.04
							11/3/04	43.52
							7/20/05	45.49
							8/9/06	46.28
							7/13/07	45.85
							8/5/08	44.92
							7/21/09	--
8/3/10	--							
MA-FSW 636-P01-0030	413805070322202	280075.234	820960.041	41 38 04.95	70 32 22.18	6.30	8/4/04	44.04
							11/3/04	43.53
							7/20/05	45.52
							8/9/06	46.29
							7/13/07	45.39
							8/5/08	44.99
							7/21/09	--
8/3/10	--							
MA-FSW 636-P01-0060	413805070322203	280075.234	820960.041	41 38 04.95	70 32 22.18	-23.70	8/4/04	44.07
							11/3/04	43.55
							7/20/05	45.54
							8/9/06	46.31
							7/13/07	45.91
							8/5/08	--
							7/21/09	--
8/3/10	--							
MA-FSW 636-P01-0100	413805070322204	280075.234	820960.041	41 38 04.95	70 32 22.18	-63.70	8/4/04	44.08
							11/3/04	43.54
							7/20/05	45.41
							8/9/06	46.29
							7/13/07	45.91
							8/5/08	45.31
							7/21/09	--
8/3/10	--							

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USGS station name	Date sampled	Measured in field, unfiltered				Measured in laboratory, filtered				
		Specific conductance (μS/cm)	Oxygen, dissolved (mg/L)	pH (standard units)	Orthophosphate (mg/L as P)	Phosphorus (mg/L as P)	Nitrite plus nitrate (mg/L as N)	Nitrite (mg/L as N)	Nitrate (mg/L as N)	Ammonia (mg/L as N)
MA-FSW 635-P01-0060	8/4/04	93.8	.025	6.31	<.098	.028	2.94	.066	--	1.89
	11/3/04	101	.035	6.39	<.098	.031	2.81	.034	--	1.74
	7/20/05	95.1	.015	6.36	<.098	.033	2.43	.026	--	1.51
	8/9/06	98.6	.045	5.77	<.098	.031	2.50	.008	--	.878
	7/13/07	88.0	4.96	6.65	<.098	<.040	--	<.007	1.02	<.030
	8/5/08	90.5	4.88	6.03	<.098	.023	--	<.010	.826	<.030
	7/21/09	110	8.28	6.24	<.244	<.020	.579	<.002	--	.037
	8/3/10	113	2.76	6.53	<.244	<.020	<.040	<.002	--	.048
	MA-FSW 635-P01-0100	8/4/04	79.6	.220	6.38	<.098	.043	2.56	.120	--
11/3/04		76.5	.070	6.47	<.098	.049	2.16	.086	--	1.70
7/20/05		71.5	8.41	6.07	<.098	.030	.908	<.008	--	.061
8/9/06		72.7	8.84	5.55	<.098	.032	.624	<.002	--	.011
7/13/07		83.0	5.81	6.35	<.098	<.040	--	<.007	.453	<.030
8/5/08		82.6	5.45	6.02	<.098	.033	--	<.010	.565	<.030
7/21/09		78.8	6.06	5.91	<.244	.047	.528	<.002	--	<.020
8/3/10		--	--	--	--	--	--	--	--	--
MA-FSW 636-P01-0010		8/4/04	108	.120	6.30	<.098	<.010	.861	.012	--
	11/3/04	111	.700	6.08	<.098	<.020	3.01	<.008	--	3.10
	7/20/05	116	.000	6.04	<.098	<.020	2.62	<.008	--	2.76
	8/9/06	106	.245	5.98	<.098	^E .012	2.61	.001	--	1.89
	7/13/07	77.1	7.71	6.32	<.098	<.040	--	<.007	.614	<.030
	8/5/08	95.3	.242	5.93	<.098	<.010	--	<.010	2.19	.097
	7/21/09	93.5	.430	5.85	<.244	<.020	2.53	<.002	--	.166
	8/3/10	80.1	5.93	5.97	<.244	<.020	.533	<.002	--	<.020
	MA-FSW 636-P01-0030	8/4/04	105	.130	6.55	<.098	.021	2.77	.035	--
11/3/04		106	.625	6.33	<.098	.025	2.96	.017	--	1.70
7/20/05		117	1.12	6.03	<.098	^E .014	2.95	<.008	--	.504
8/9/06		91.6	8.74	5.43	<.098	<.020	.855	<.002	--	<.040
7/13/07		83.5	9.14	6.06	<.098	<.040	--	<.007	.542	<.030
8/5/08		115	.000	5.79	<.098	<.010	--	<.010	2.11	<.030
7/21/09		102	8.29	6.48	<.244	<.020	.699	^E .001	--	<.020
8/3/10		109	4.20	5.89	<.244	<.020	.344	^E .001	--	.030
MA-FSW 636-P01-0060		8/4/04	72.3	9.54	6.21	<.098	.160	.654	<.008	--
	11/3/04	77.1	10.21	6.01	<.098	<.020	.709	<.008	--	<.040
	7/20/05	104	9.29	6.05	<.098	^E .010	2.43	.026	--	1.51
	8/9/06	88.0	9.28	5.82	<.098	<.020	.704	.003	--	<.040
	7/13/07	169	6.21	6.14	<.098	<.040	--	<.007	.615	<.030
	8/5/08	--	--	--	<.098	--	--	--	--	--
	7/21/09	87.3	7.09	6.20	<.244	<.020	.410	<.002	--	.021
	8/3/10	87.8	4.99	6.09	<.244	^E .011	.316	^E .002	--	.031
	MA-FSW 636-P01-0100	8/4/04	143	5.18	6.65	<.098	<.010	2.95	<.008	--
11/3/04		91.3	9.32	5.89	<.098	<.020	.730	<.008	--	<.040
7/20/05		114	7.35	6.00	<.098	.013	.847	<.008	--	.041
8/9/06		102	7.64	5.76	<.098	<.020	.562	<.002	--	<.040
7/13/07		121	1.26	7.01	<.098	<.040	--	<.007	.195	<.030
8/5/08		104	5.09	6.34	<.098	.012	--	<.010	.404	<.030
7/21/09		84.2	2.38	7.07	<.244	<.020	<.040	.003	--	.032
8/3/10		--	--	--	--	--	--	--	--	--