2015 Bainbridge Basin Marine Sediment Monitoring

Physical Sediment Characteristics Data Summary

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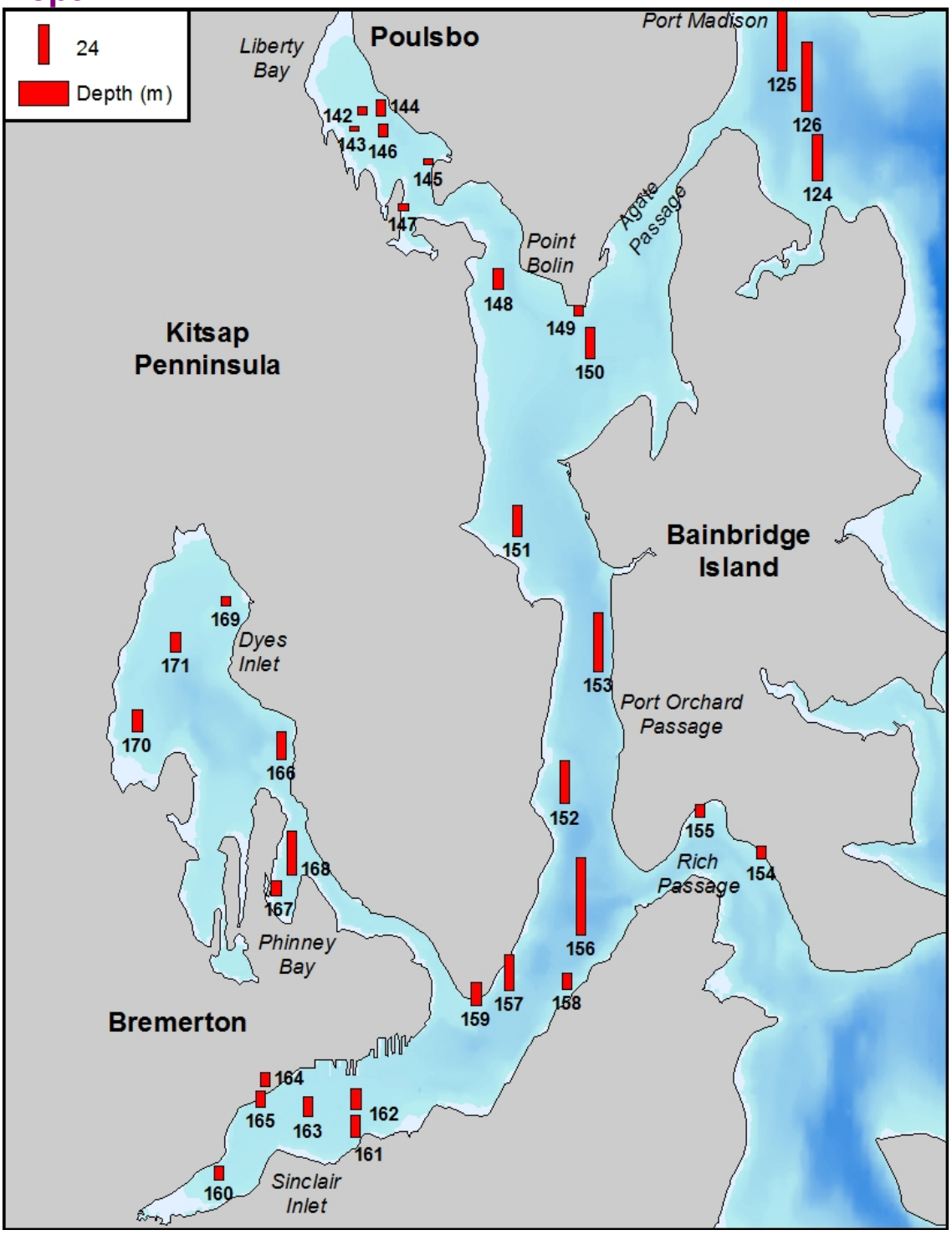
Depth



Water depths at the 33 sediment stations sampled for the 2015 Urban Bays Monitoring Program.

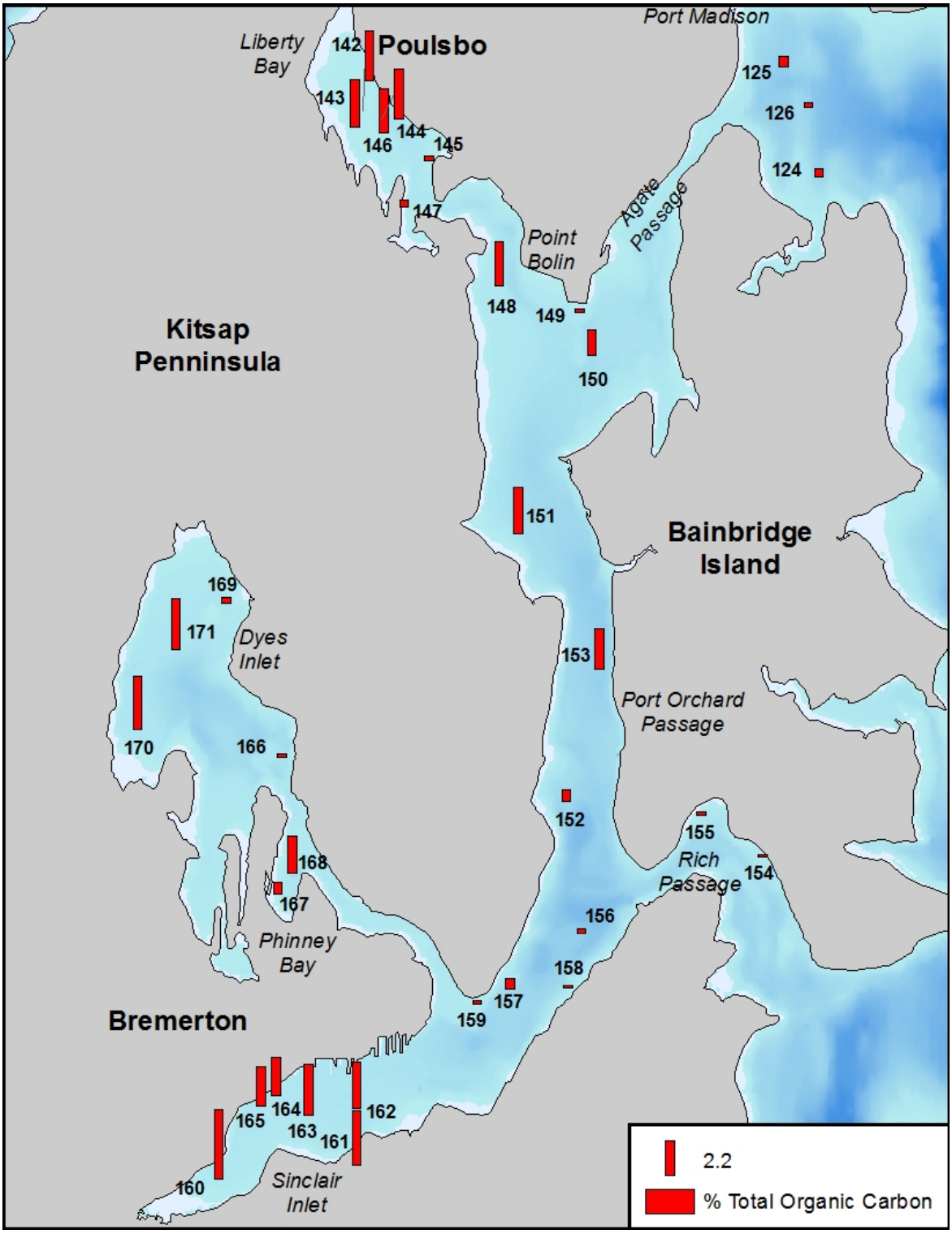
The numbers on the map are the station identifications.

Total Organic Carbon

Results of total organic carbon analyses of sediments collected for the 2015 Urban Bays Monitoring Program.

Station	Location	Percent Total Organic Carbon	
		(70º)	(104º)
124	Port Madison	0.48	0.48
125	Port Madison	0.62	0.62
126	Port Madison	0.3	0.3
142	Liberty Bay	3.17	3.2
143	Liberty Bay	3.05	3.07
144	Liberty Bay	3.25	3.28
145	Liberty Bay	0.35	0.35
146	Liberty Bay	2.88	2.91
147	Liberty Bay	0.45	0.45
148	Southeast of Keyport	2.89	2.93
149	North Port Orchard, Pt. Bolin	0.17	0.17
150	North Port Orchard	1.67	1.68
151	North Port Orchard, E. of Brownsville	2.97	3.03
152	Port Orchard, Illahee	0.74	0.75
153	Port Orchard	2.65	2.7
154	Rich Pass, Pleasant Beach	0.21	0.21
155	Rich Pass, Lynwood Center	0.23	0.23
156	South Port Orchard	0.26	0.26
157	South Port Orchard, East Bremerton	0.64	0.64
158	South Port Orchard	0.18	0.18
159	South Port Orchard, Pt. Herron	0.22	0.22
160	Sinclair Inlet	4.49	4.6
161	Sinclair Inlet	3.47	3.5
162	Sinclair Inlet	2.98	3.01
163	Sinclair Inlet	3.32	3.43
164	Sinclair Inlet	2.47	2.51
165	Sinclair Inlet	2.55	2.56
166	Dyes Inlet, Tracyton	0.23	0.23
167	Phinney Bay	0.71	0.71
168	Phinney Bay	2.4	2.45
169	Dyes Inlet, SE of Silverdale	0.36	0.36

Station	Location	Percent Total Organic Carbon	
		(70°)	(104°)
170	Dyes Inlet, North Chico Bay	3.45	3.48
171	Dyes Inlet	3.26	3.29



Spatial patterns in total organic carbon (70º) for the 2015 Urban Bays Monitoring Program.

The numbers on the map are the station identifications.

Summary statistics for concentrations of total organic carbon in sediments collected for the 2015 Urban Bays Monitoring Program**.**

Chemical	N	Mean	Std. Dev.	Median	Minimum	Maximum	No. of un-detected	Percent detected
Total Organic Carbon (70°)	33	1.72	1.40	1.67	0.17	4.49	0	100
Total Organic Carbon (104°)	33	1.75	1.42	1.68	0.17	4.60	0	100

Grain Size

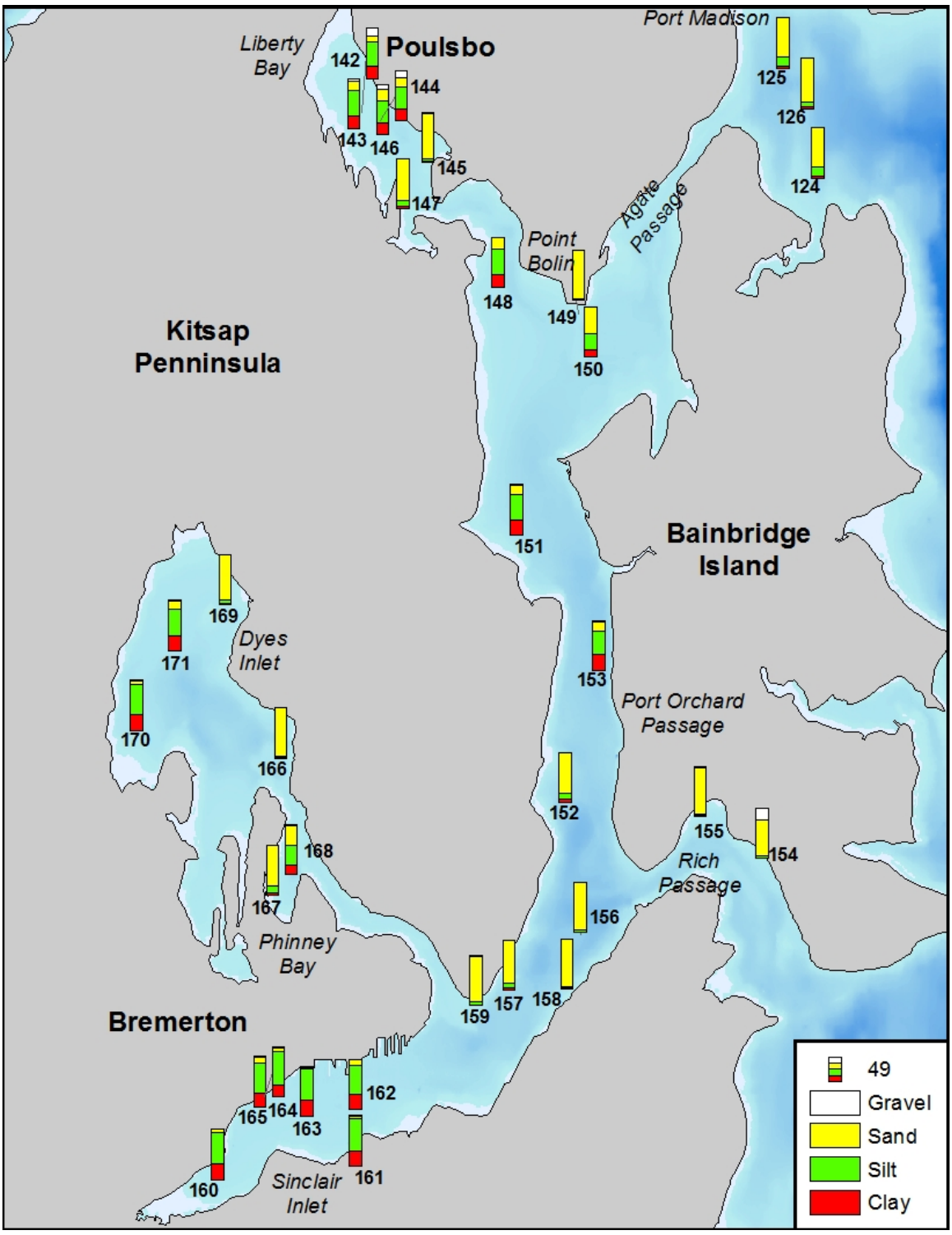
Results of grain size analyses of sediments collected for the 2015 Urban Bays Monitoring Program.

Station	Location	Gravel	Very coarse sand	Coarse sand	Medium sand	Fine sand	Very fine sand	Total sand	Total silt	Total clay
124	Port Madison	0.25	0.56	1.68	11.08	22.75	41.14	77.21	18.99	3.55
125	Port Madison	0.1	0.32	1.47	16.86	48.51	11.79	78.95	16.58	4.38
126	Port Madison	0.42	0.06	0.41	8.36	61.76	16.9	87.49	9.28	2.8
142	Liberty Bay	14.56	6.69	0.65	0.74	0.71	1.9	11.69	48.63	25.12
143	Liberty Bay	6.13	9.76	2.29	0.94	1.61	3.92	18.52	50.08	25.27
144	Liberty Bay	13.79	10.61	3.07	1.4	1.68	2.34	19.1	43.4	23.71
145	Liberty Bay	1.19	4.23	10.52	33	38.74	3.67	90.16	5.6	3.05
146	Liberty Bay	8.61	9.19	3.82	2.04	3.26	5.12	23.43	44.45	23.51
147	Liberty Bay	1.76	5.14	11.31	31.18	29.1	5.18	81.9	13	3.34
148	Southeast of Keyport	0.42	4.63	5.08	2.35	3.22	7.55	22.83	51	25.75
149	North Port Orchard, Pt. Bolin	0.73	2.21	13.54	51.02	26.3	2.5	95.57	2.71	1
150	North Port Orchard	0.05	2.21	2.46	3.53	13.14	32.2	53.54	31.81	14.61
151	North Port Orchard, E. of Brownsville	1.83	5.79	3.59	2.8	2.08	2.46	16.73	50.76	30.68
152	Port Orchard, Illahee	0.84	0.36	1.1	6.79	45.07	26.58	79.91	11.89	7.36
153	Port Orchard	2.34	4.62	2.74	2.49	2.11	6.07	18.03	46.09	33.54
154	Rich Pass, Pleasant Beach	22.09	7.11	12.08	22.65	26.26	4.57	72.68	3.99	1.25
155	Rich Pass, Lynwood Center	2.54	4.53	12.92	39.08	32.64	3.61	92.77	3.13	1.56
156	South Port Orchard	0.18	0.5	4.89	47.9	37.26	3.85	94.4	3.48	1.94
157	South Port Orchard, East Bremerton	2.1	1.99	9.22	30.02	39.37	10.98	91.58	4.84	1.47
158	South Port Orchard	0.2	0.84	4.57	29.72	54.52	5.31	94.95	2.99	1.86
159	South Port Orchard, Pt .Herron	0.92	0.24	0.55	4.76	58.1	21.4	85.04	8.95	5.09
160	Sinclair Inlet	0.06	0.41	0.72	2.22	1.38	1.5	6.23	62.94	30.78
161	Sinclair Inlet	0.25	0.53	0.49	1.02	0.88	2.56	5.47	64.36	29.93
162	Sinclair Inlet	0.37	1.04	1.07	1.16	2.38	4.83	10.48	58.96	30.18
163	Sinclair Inlet	0.89	0.18	0.49	0.95	1	1.7	4.32	60.32	34.46

Station	Location	Gravel	Very coarse sand	Coarse sand	Medium sand	Fine sand	Very fine sand	Total sand	Total silt	Total clay
164	Sinclair Inlet	1.25	0.84	0.9	0.64	0.92	5.2	8.5	67.13	23.13
165	Sinclair Inlet	0.51	1.2	1.11	0.88	1.3	6.92	11.41	61.94	26.14
166	Dyes Inlet, Tracyton	0.19	0.32	4.56	48.87	37.06	4.25	95.06	3.23	1.52
167	Phinney Bay	0.13	0.4	2.75	18.19	40.64	20.17	82.15	12.43	5.28
168	Phinney Bay	1.68	1.66	1.19	3.7	14.82	19.19	40.56	39.01	18.75
169	Dyes Inlet, SE of Silverdale	0.94	1.35	8.18	34.78	39.48	6.33	90.12	5.7	3.24
170	Dyes Inlet, North Chico Bay	0.32	0.98	1.17	1.38	1.36	3.97	8.85	59.37	31.45
171	Dyes Inlet	0.87	1.49	1.42	1.36	3.08	9.84	17.19	52.82	29.11

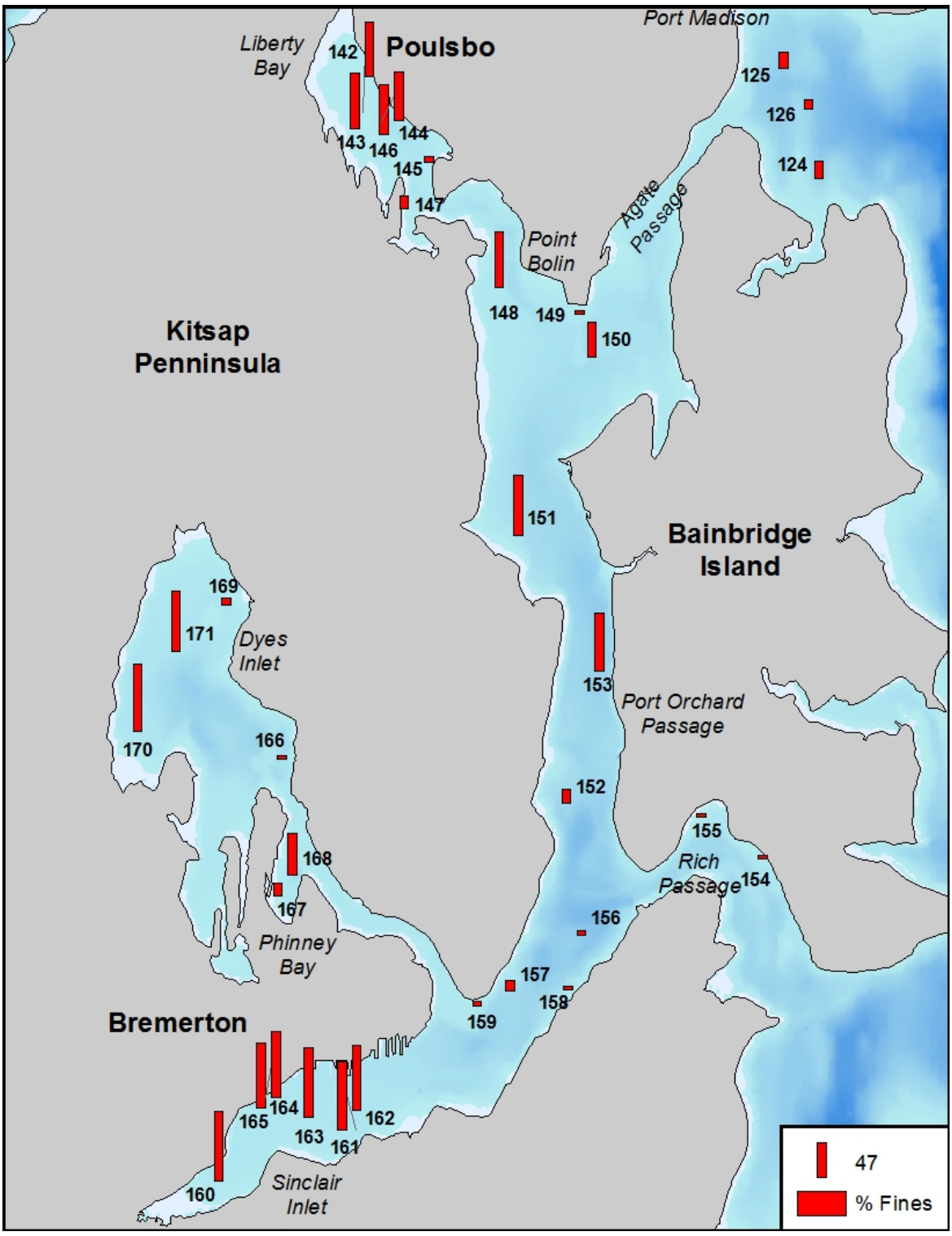
Sediment types characterizing the samples collected for the 2015 Urban Bays Monitoring Program.

Sediment type	Percent sand	Range of percent gravel for sediment type	No. of stations with this sediment type	Spatial extent (km^2)	Percent of total study area
Sand	> 80	0.13-2.54	12	30.47	37.23
Silty sand	60 to 80	0.10-22.09	4	17.85	21.81
Mixed	20 to 60	0.05-8.61	4	10.69	13.06
Silt + clay	< 20	0.06-14.56	13	22.84	27.90



Spatial patterns in particle size classes (percent gravel, sand, silt and clay) for the 2015 Urban Bays Monitoring Program.

The numbers on the map are the station identifications.



Spatial patterns in percent fines for the 2015 Urban Bays Monitoring Program.

The numbers on the map are the station identifications.

Comparisons over Time

Summary of pairwise statistical comparisons[1,2] of physical parameters measured for the 1998 PSAMP/NOAA, 2009 Urban Waters, and 2015 Urban Bays Monitoring Programs.

↓ = decrease; ↑ = increase; -- = no change

Parameter	Change from 1998 to 2009	Change from 1998 to 2015	Change from 2009 to 2015
Grain Size			
Percent fines	--	--	--
Organic Carbon Content			
Total organic carbon	--	--	--

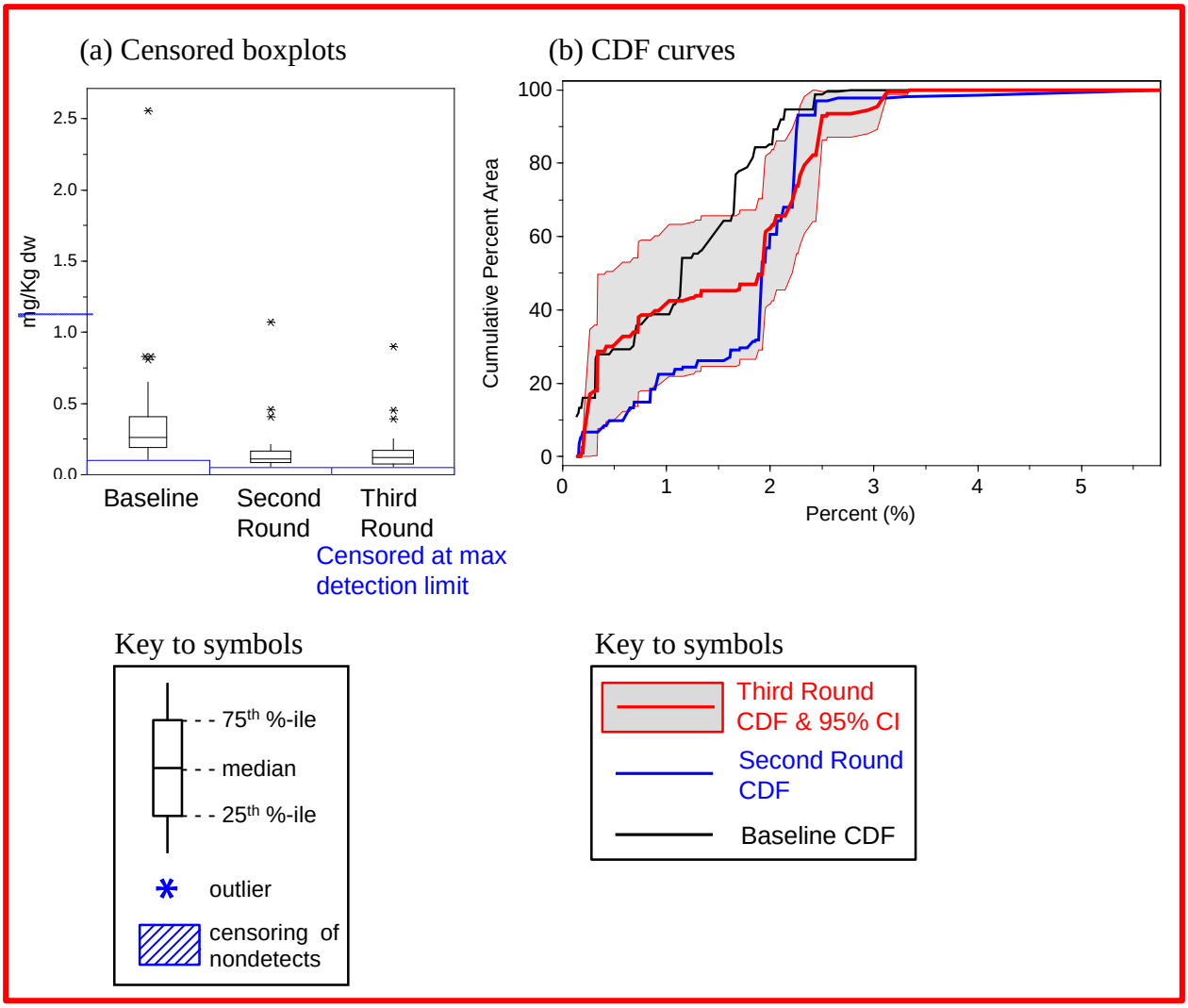
[1] Medians (unweighted) compared by Kruskal-Wallis test when all results detected, or by the Generalized Wilcoxon test when nondetects present (α = 0.05).

[2] CDFs (weighted) compared by Wald F test (α = 0.05).

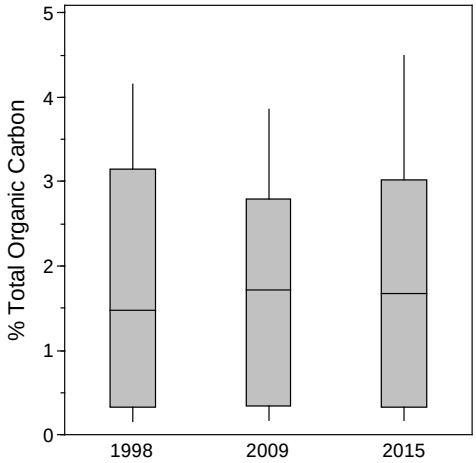
Comparison of physical parameters in sediments sampled in the 1998, 2009, and 2015 surveys of the Bainbridge Basin.

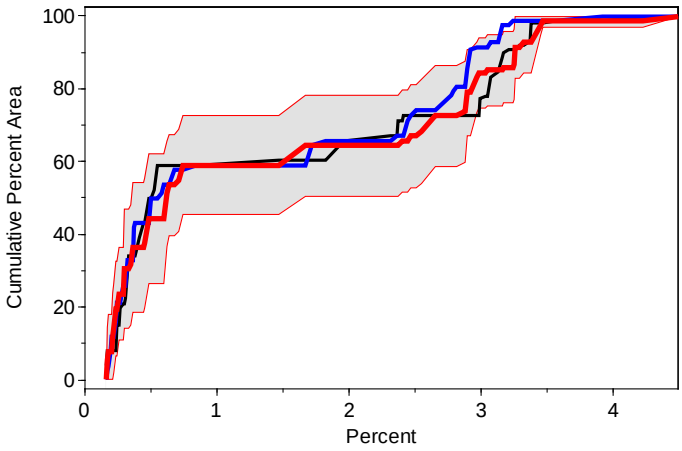
The graphical displays include two types of graphs:

(a) Censored boxplots display the distributions of the data unweighted by sample area.
(b) Cumulative distribution function (CDF) curves display the cumulative distributions of the data weighted by sample area. Confidence intervals are shown for the 2015 CDF curves only.

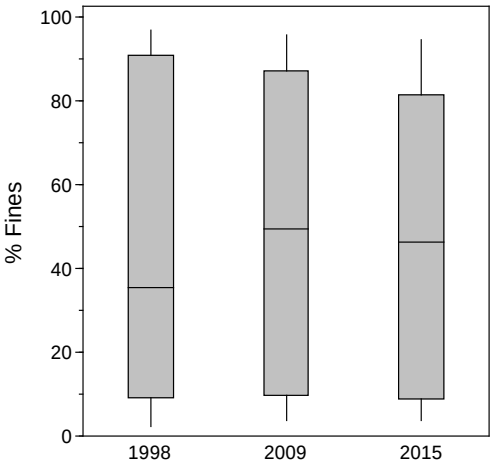


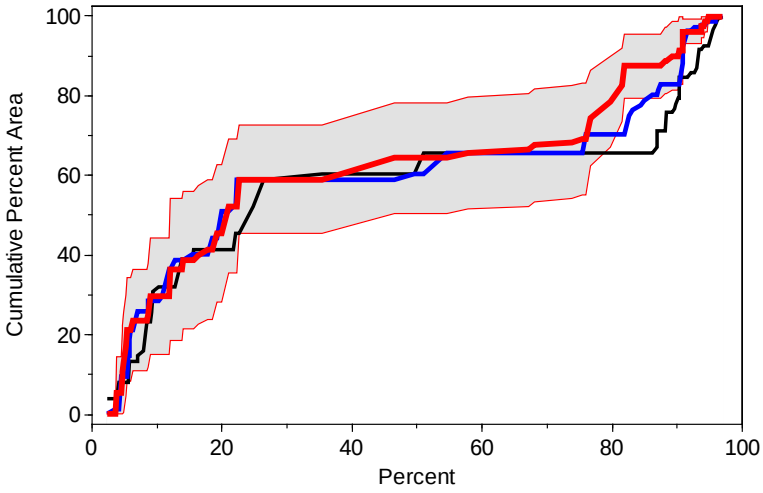
Total Organic Carbon





Percent Fines





Field Notes

Field notes for the 2015 Urban Bays Monitoring Program.

Station	Location	Meter wheel depth (m)	Pene-tration (cm)	Overlying sediment color	Underlying sediment color	Com-position	Odor	Odor intensity	Shell hash	Wood fragment	Salinity (ppt)	Sediment Temp-erature (°C)	Sheen
124	Port Madison	28.0	10	Brown	Gray	Sand with fines	None	None	No	No	30	11.2	No
125	Port Madison	38.0	13	Brown	Brown	Sand with fines	None	None	No	No	31	10.5	No
126	Port Madison	42.0	8	Brown	Brown	Sand with fines	None	None	No	No	30	11.3	No
142	Liberty Bay	5.0	12	Olive	Olive	Silt/Clay	H	Moderate	No	No	31	13.5	No
143	Liberty Bay	3.0	15	Olive	Gray	Silt/Clay	H	Slight	No	No	31	13.7	No
144	Liberty Bay	10.0	17	Olive	Olive	Silt/Clay	H	Slight	No	No	30	13.3	No
145	Liberty Bay	4.0	8	Brown	Brown	Sand with fines	H	Strong	No	No	30	14.4	No
146	Liberty Bay	8.0	17	NR	NR	Silt/Clay	NR	NR	No	No	30	13.5	No
147	Liberty Bay	4.0	11	Brown	Gray	Sand with fines	H	Strong	No	No	30	14	No
148	Southeast of Keyport	13.0	17	Olive	Olive	Silt/Clay	H	Moderate	No	No	31	11.9	No
149	North Port Orchard, Pt. Bolin	6.0	5	Brown	Gray	Sand	None	None	No	No	30.5	12.5	No
150	North Port Orchard	19.0	16	Olive	Gray	Silt/Clay	H	Moderate	No	No	30.5	11.6	No
151	North Port Orchard, E. of Brownsville	19.0	17	Olive	Gray	Silt/Clay	H	Slight	Yes	Yes	31	11.5	No
152	Port Orchard, Illahee	26.0	13.5	Olive	Olive	Silt/Clay	None	None	No	No	31	11.8	No
153	Port Orchard	36.0	17	Olive	Gray	Silt/Clay	H	Moderate	Yes	No	30	11.7	No
154	Rich Pass, Pleasant Beach	8.0	8.5	Brown	Brown	Gravel and Sand	None	None	Yes	Yes	30	11.9	No

Station	Location	Meter wheel depth (m)	Pene-tration (cm)	Overlying sediment color	Underlying sediment color	Com-position	Odor	Odor intensity	Shell hash	Wood fragment	Salinity (ppt)	Sediment Temp-erature (°C)	Sheen
155	Rich Pass, Lynwood Center	8.0	6.5	Brown	Gray	Gravel and Sand	O	Slight	No	Yes	30	11.8	No
156	South Port Orchard	47.0	5	Brown	Brown	Sand	None	None	No	No	30	11.8	No
157	South Port Orchard, East Bremerton	22.0	8.5	Brown	Brown	Sand	None	None	No	No	30	11.7	No
158	South Port Orchard	10.0	10	Brown	Black	Sand with fines	H	Slight	No	No	30	12.3	No
159	South Port Orchard, Pt. Herron	14.0	-99	Brown	Brown	Cobble Gravel Sand	None	None	No	No	-99	-99	No
160	Sinclair Inlet	8.0	17	Gray	Gray	Silt/Clay	H	Strong	No	Yes	30.5	11.9	No
161	Sinclair Inlet	13.0	17	Black	Black	Silt/Clay	H	Strong	No	No	29	12.2	No
162	Sinclair Inlet	13.0	14	Gray	Black	Silt/Clay	None	None	Yes	No	30	11.8	No
163	Sinclair Inlet	12.0	17	Black	Black	Silt/Clay	H	Strong	No	No	-99	11.7	No
164	Sinclair Inlet	8.0	15	Olive	Black	Silt/Clay	H	Slight	Yes	No	28	11.9	No
165	Sinclair Inlet	10.0	17	Olive	Olive	Silt/Clay	H	Slight	Yes	No	30	12.1	No
166	Dyes Inlet, Tracyton	17.0	5.5	Olive	Brown	Sand	None	None	Yes	Yes	30	12.5	No
167	Phinney Bay	9.0	9.5	Brown	Brown	Sand with fines	None	None	No	No	30	12.5	No
168	Phinney Bay	27.0	14	Gray	Black	Sand with fines	H	Moderate	Yes	No	30	12.1	No
169	Dyes Inlet, SE of Silverdale	6.0	6.5	Olive	Gray	Sand	None	None	No	No	30	13.1	No
170	Dyes Inlet, North Chico Bay	13.0	17	NR	Black	Silt/Clay	H	Strong	No	No	30	12.8	No
171	Dyes Inlet	12.0	17	Olive	Black	Silt/Clay	H	Strong	No	No	28	12.6	No

Case Narrative

2015 Urban Waters Grain Size case narrative.pdf

2015 Urban Waters TOC Case Narrative.pdf