

2008 Commencement Bay Marine Sediment Monitoring



Mt. Rainier from the Blair Waterway. (T. Putnam photo)

Sediment Quality Triad Data Summary

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Results

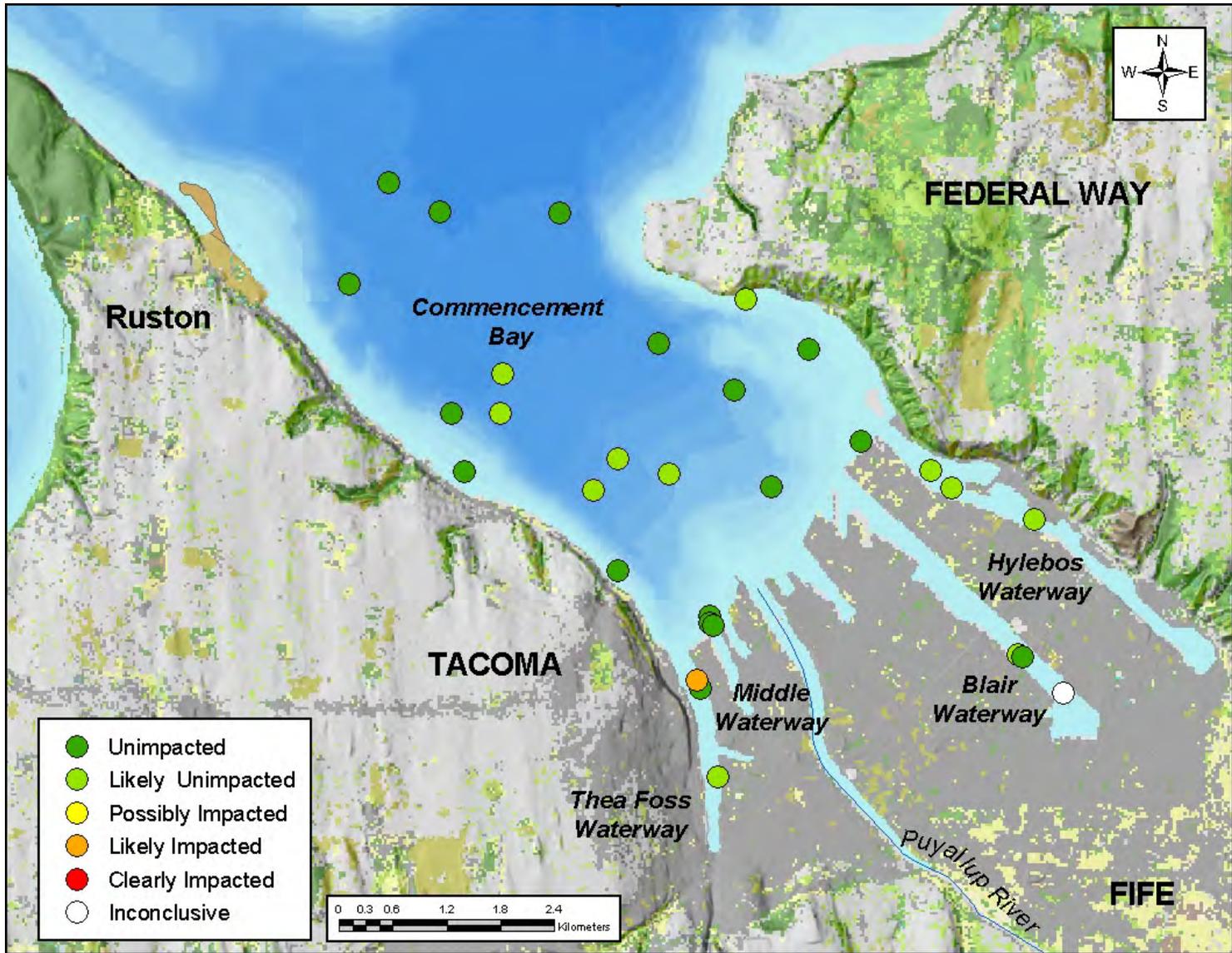
Sediment Triad Quality Index categories identified for stations in the 2008 Urban Waters Initiative sediment survey.

Sample	Location	SCI Category	Toxicity Category	Benthos Hit	SQTI Category
4	N.E. Commencement Bay	Low exposure	Low	No	Unimpacted
88	East Commencement Bay	Minimal exposure	Non-Toxic	No	Unimpacted
222	Outer Commencement Bay	Minimal exposure	Non-Toxic	No	Unimpacted
281	Central Commencement Bay	Minimal exposure	Non-Toxic	No	Unimpacted
282	Central Commencement Bay	Low exposure	Non-Toxic	Adversely affected	Likely unimpacted
283	Outer Commencement Bay	Minimal exposure	Low	No	Unimpacted
284	Outer Commencement Bay	Minimal exposure	Non-Toxic	No	Unimpacted
285	S. Shoreline Commencement Bay	Low exposure	Non-Toxic	No	Unimpacted
286	S. Shoreline Commencement Bay	Low exposure	Non-Toxic	No	Unimpacted
287	S. Shoreline Commencement Bay	Low exposure	Non-Toxic	No	Unimpacted
288	S.E. Commencement Bay	Minimal exposure	Non-Toxic	Adversely affected	Likely unimpacted
289	S.E. Commencement Bay	Minimal exposure	Non-Toxic	Adversely affected	Likely unimpacted
290	S.E. Commencement Bay	Minimal exposure	Non-Toxic	Adversely affected	Likely unimpacted
291	N.E. Commencement Bay	Minimal exposure	Non-Toxic	No	Unimpacted
292	N.E. Commencement Bay	Minimal exposure	Non-Toxic	No	Unimpacted
293	N.E. Commencement Bay	Low exposure	Non-Toxic	Adversely affected	Likely unimpacted
294	Thea Foss Waterway	High exposure	Non-Toxic	No	Likely unimpacted
295	Thea Foss Waterway	Moderate exposure	Non-Toxic	No	Unimpacted
296	Thea Foss Waterway	High exposure	Non-Toxic	Adversely affected	Likely impacted
297	Middle Waterway	Low exposure	Non-Toxic	No	Unimpacted
298	Middle Waterway	Low exposure	Low	No	Unimpacted
299	Middle Waterway	Low exposure	Non-Toxic	No	Unimpacted
300	Blair Waterway	Low exposure	Non-Toxic	Adversely affected	Likely unimpacted
301	Blair Waterway	Low exposure	Low	No	Unimpacted
302	Blair Waterway	Minimal exposure	Low	Adversely affected	Inconclusive

Sample	Location	SCI Category	Toxicity Category	Benthos Hit	SQTI Category
303	Hylebos Waterway	Low exposure	Non-Toxic	Adversely affected	Likely unimpacted
304	Hylebos Waterway	Low exposure	Non-Toxic	Adversely affected	Likely unimpacted
305	Hylebos Waterway	Low exposure	Non-Toxic	Adversely affected	Likely unimpacted
318	Central Commencement Bay	Minimal exposure	Non-Toxic	Adversely affected	Likely unimpacted
380	Outer Commencement Bay	Minimal exposure	Non-Toxic	No	Unimpacted

Spatial extent of Sediment Triad Quality Index categories for the 2008 Commencement Bay survey.

SCI Category	STI Category	Interim SBI Category	SQTI Category	Spatial Extent (% of Area)
Minimum exposure	Non-Toxic	Unaffected	Unimpacted	41.0%
Minimum exposure	Low toxicity	Unaffected	Unimpacted	7.7%
Low exposure	Non-Toxic	Unaffected	Unimpacted	9.9%
Low exposure	Low toxicity	Unaffected	Unimpacted	5.1%
Moderate exposure	Non-Toxic	Unaffected	Unimpacted	0.5%
Minimum exposure	Non-Toxic	Adversely affected	Likely unimpacted	17.6%
Low exposure	Non-Toxic	Adversely affected	Likely unimpacted	15.5%
Maximum exposure	Non-Toxic	Unaffected	Likely unimpacted	0.5%
Maximum exposure	Non-Toxic	Adversely affected	Likely impacted	0.5%
Minimum exposure	Low toxicity	Adversely affected	Inconclusive	1.6%



Spatial patterns of sediment condition in the 2008 Urban Waters Initiative sediment survey.

Incidence and spatial extent of sediment condition in the 2008 Urban Waters Initiative sediment survey.

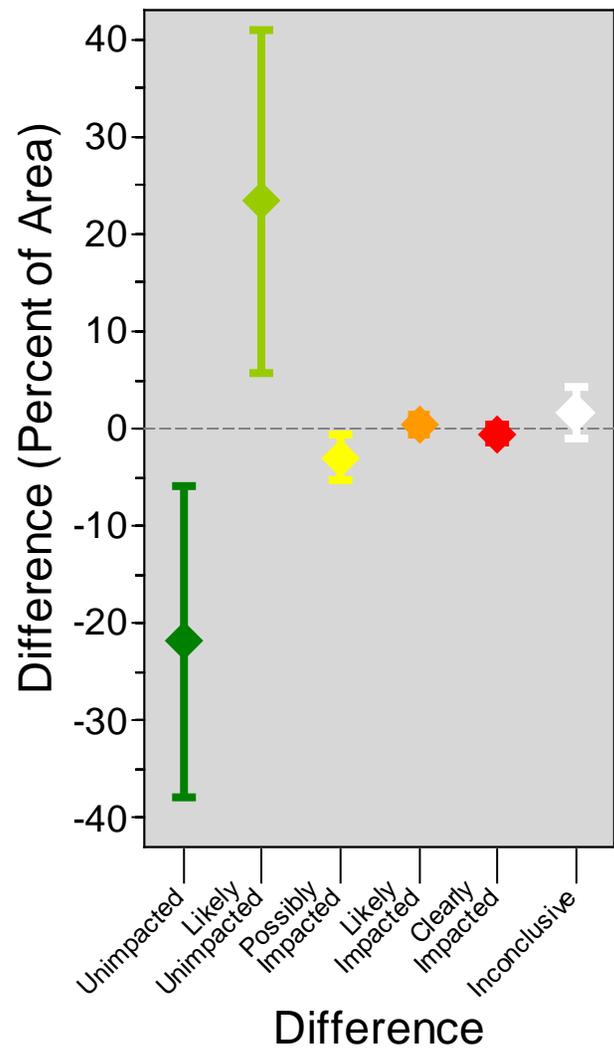
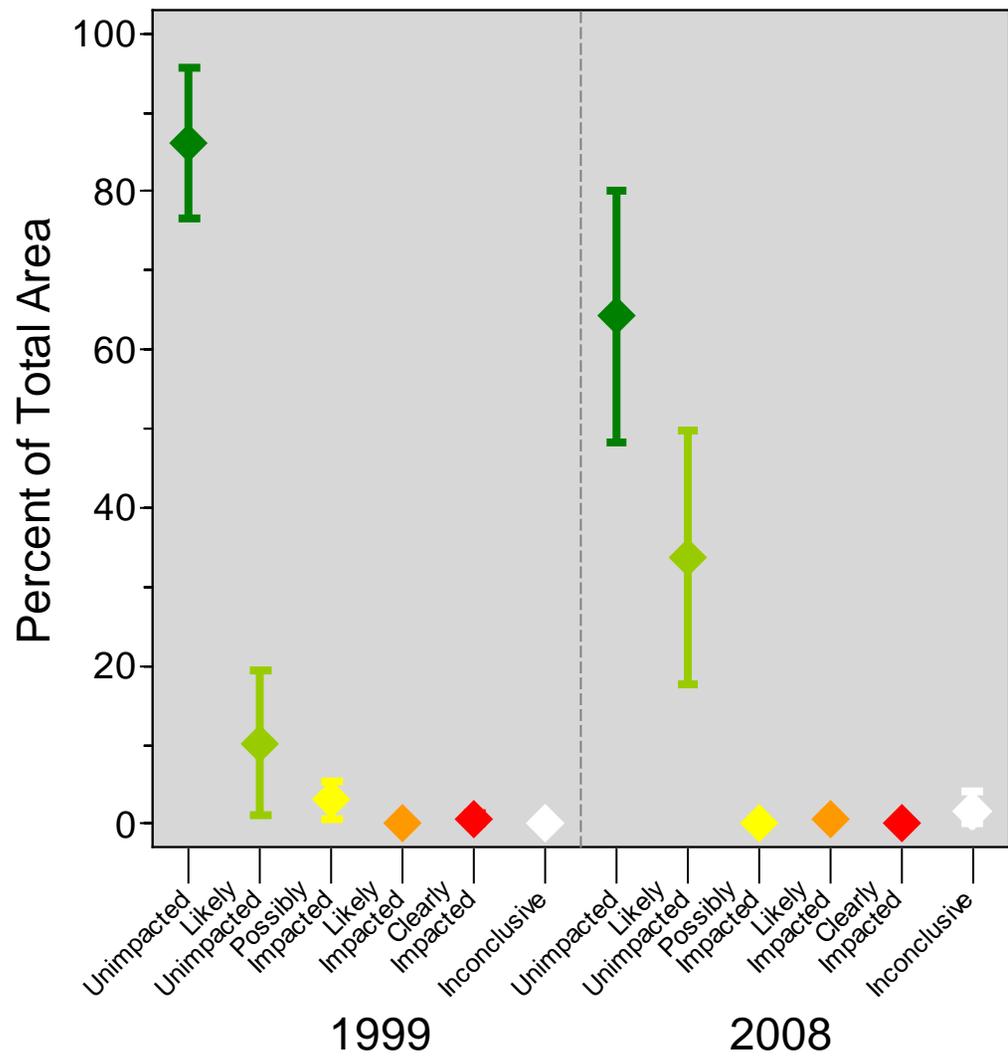
Sediment Triad Index Category	Stations		Area	
	No.	(%)	km ²	(%)
Commencement Bay	30	(100.0)	24.1	(100.0)
Unimpacted	17	(56.7)	15.5	(64.3)
Likely unimpacted	11	(36.7)	8.1	(33.6)
Possibly impacted	0	(0.0)	0.0	(0.0)
Likely impacted	1	(3.3)	0.1	(0.5)
Clearly impacted	0	(0.0)	0.0	(0.0)
Inconclusive	1	(3.3)	0.4	(1.6)

Comparison of Sediment Quality Triad Index Categories by Year

Estimated spatial extent (percent of area) and 95% confidence intervals for each of the SQTI categories for Commencement Bay in 2008, compared to 1999. The differences between the years for the unimpacted and likely unimpacted categories are statistically significant, as indicated by the difference confidence intervals *not* containing the value zero. The differences for the other categories are not statistically significant, as indicated by the difference confidence intervals containing the value zero.

Sediment Quality Triad Index Category	1999			2008			Difference (2008-1999)			* = significantly different (alpha=0.05)
	Estimate	Confidence Limit		Estimate	Confidence Limit		Estimate	Confidence Limit		
		Lower	Upper		Lower	Upper		Lower	Upper	
Unimpacted	86.12	76.69	95.55	64.25	48.27	80.24	-21.87	-37.90	-5.83	*
Likely unimpacted	10.23	1.07	19.40	33.62	17.59	49.65	23.38	5.77	41.00	*
Possibly impacted	3.01	0.68	5.33	0.00	n.a.	n.a.	-3.01	n.a.	n.a.	
Likely impacted	0.09	0.00	0.24	0.52	0.00	1.44	0.44	-0.53	1.40	
Clearly impacted	0.55	0.00	1.45	0.00	n.a.	n.a.	-0.55	-1.45	0.34	
Inconclusive	0.00	n.a.	n.a.	1.61	0.00	4.22	1.61	n.a.	n.a.	

* Olsen et al. (in prep.), $\alpha = 0.05$



Comparison with the Region

Incidence and spatial extent of sediment quality in Commencement Bay, Central Sound monitoring region, and all of Puget Sound, as measured with the Sediment Quality Triad Index.

Sediment Quality Triad Index Category	Regional Baseline				Second Baseline			
	Stations		Area		Stations		Area	
	No.	(%)	km ²	(%)	No.	(%)	km ²	(%)
Commencement Bay	25	(100.0)	24.2	(100.0)	30	(100.0)	24.1	(100.0)
Unimpacted	12	(48.0)	20.9	(86.1)	17	(56.7)	15.5	(64.3)
Likely unimpacted	6	(24.0)	2.5	(10.2)	11	(36.7)	8.1	(33.6)
Possibly impacted	5	(20.0)	0.7	(3.0)	0	(0.0)	0.0	(0.0)
Likely impacted	1	(4.0)	0.0	(0.1)	1	(3.3)	0.1	(0.5)
Clearly impacted	1	(4.0)	0.1	(0.5)	0	(0.0)	0.0	(0.0)
Inconclusive	0	(0.0)	0.0	(0.0)	1	(3.3)	0.4	(1.6)
Central Sound	128	(100.0)	683.9	(100.0)	80	(100.0)	667.4	(100.0)
Unimpacted	76	(59.4)	633.3	(92.6)	53	(66.3)	480.6	(72.0)
Likely unimpacted	34	(26.6)	43.4	(6.4)	11	(13.8)	102.5	(15.4)
Possibly impacted	11	(8.6)	5.1	(0.7)	7	(8.8)	26.8	(4.0)
Likely impacted	6	(4.7)	1.9	(0.3)	6	(7.5)	11.3	(1.7)
Clearly impacted	1	(0.8)	0.1	(0.02)	0	(0.0)	0.0	(0.0)
Inconclusive	0	(0.0)	0.0	(0.0)	3	(3.8)	46.7	(7.0)
Total Study Area	381	(100.0)	2294.1	(100.0)	Available after 2014			
Unimpacted	221	(58.0)	1498.3	(65.3)				
Likely unimpacted	115	(30.2)	695.3	(30.3)				
Possibly impacted	24	(6.3)	72.15	(3.1)				
Likely impacted	16	(4.2)	3.15	(0.1)				
Clearly impacted	2	(0.5)	0.2	(0.0)				
Inconclusive	3	(0.8)	24.98	(1.1)				