

# Floating water quality islands in Hicklin Lake, White Center

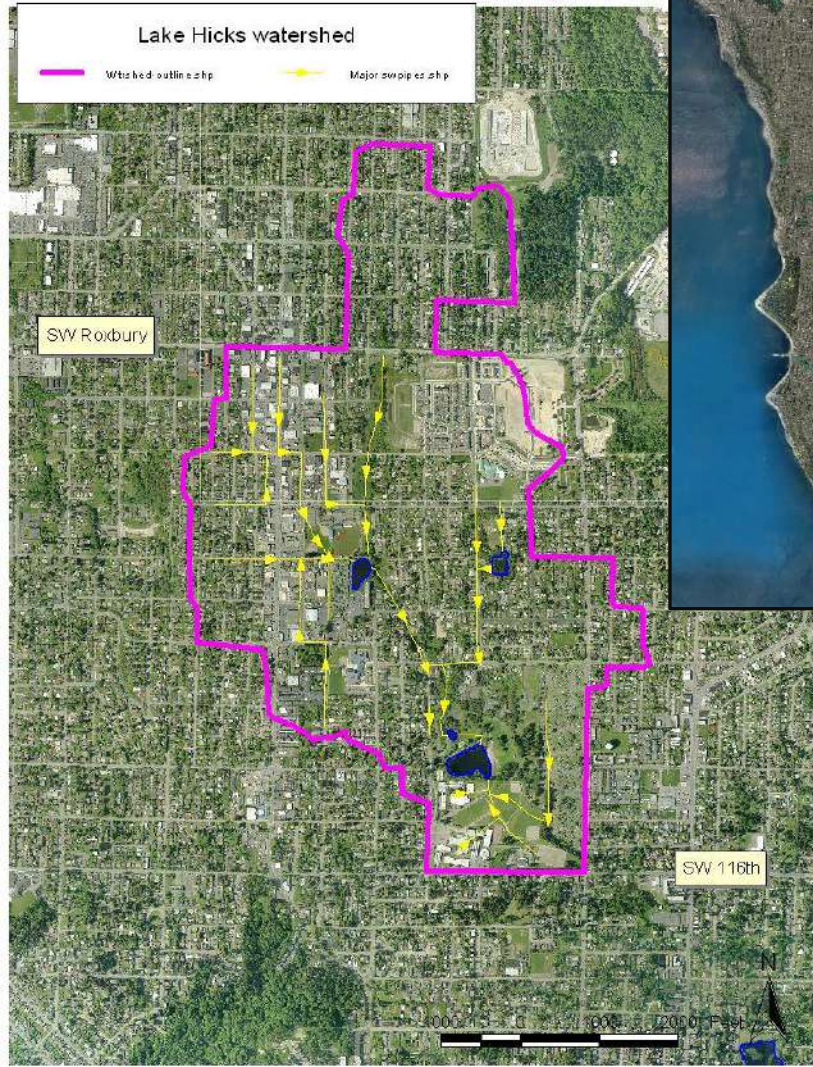
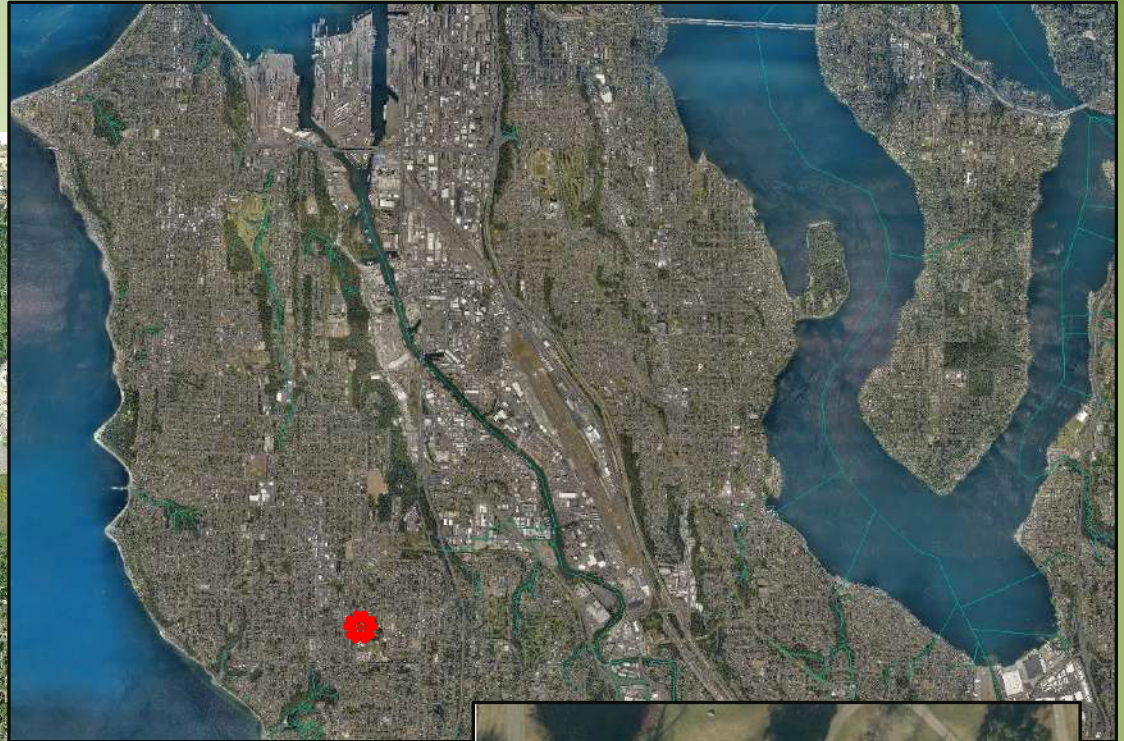


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# Where is Hicklin Lake and its islands?



# A brief(!) history of Hicklin (Hicks, Garrett) Lake:

- Open water wetland dredged for storage capacity for golf course in the 1930s.
- King County purchased in the 1940s and created Lakewood Park, including swim beach and fishing dock.
- Combined sewer system split into two systems in late 1950s – old lines used for storm water and rerouted into Hicklin Lake.
- High bacterial counts found in the 1960s Beach closed recurrently; becoming permanent in 1991.
- Flooding during winter storm events. Pump installed to control water levels; water goes to Puget Sound.
- WDFW fish stocking ended in 1992. Dock dismantled 2012.
- Nuisance and toxic algae concerns result in first alum treatment in 2005, followed by a second treatment in 2011. Floating islands in 2013.

# Floating islands project – the dry details:

- Friends of Hicklin Lake asks for floating islands as an alternative to future alum treatments.
- Island suitability was investigated: water quality benefits, habitat enhancement, costs, maintenance.
- Funding leveraging a WDOE algae control grant with supplementary King County project funding, affording 2 islands of 600 ft<sup>2</sup> each and WQ monitoring for 2 years.
- Biomatrix Water / Herrera Environmental selected to provide platforms and direct installation in July 2013.
- Planting design by King County staff, combining sedges, rushes, and bullrush with willows and native ornamentals such as Nootka Rose, Ninebark and red-twig dogwood (FOHL request : make them pretty!).

# Installation: a community event

- King County staff and contractors,
- Washington Conservation Corps team,
- KC Youth Source interns, and
- University of Washington students



The lake level was LOW! Note lack of emergent vegetation around shoreline.



# Installation: anchoring in place



# Maintenance and lessons learned:

- Annual weeding in late spring sufficient; check-back in fall.
- Mortality less than 10%, mostly small sedges planted high.
- The shrubs will need to be pruned regularly.
- Blown-in weeds can establish quickly.
- As the plants grow, it's harder to maintain the plants ...need chest waders to get on the islands.
- Ducks stopped by fencing, but do rest on the edges.
- Kids throw rocks! Center placement helps.

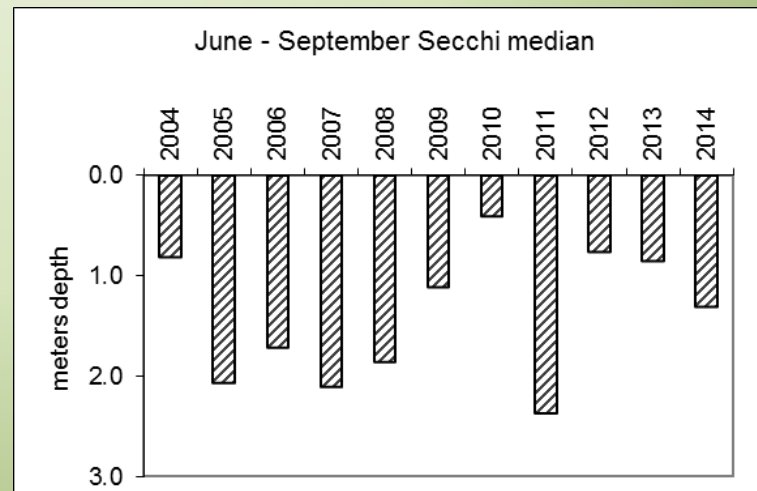
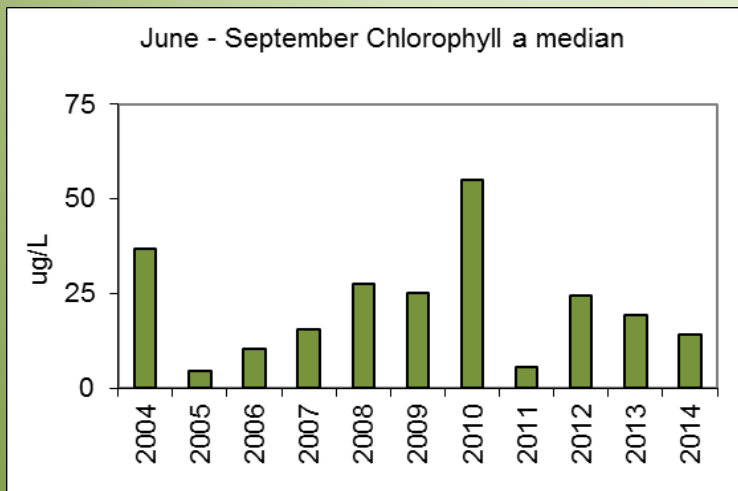
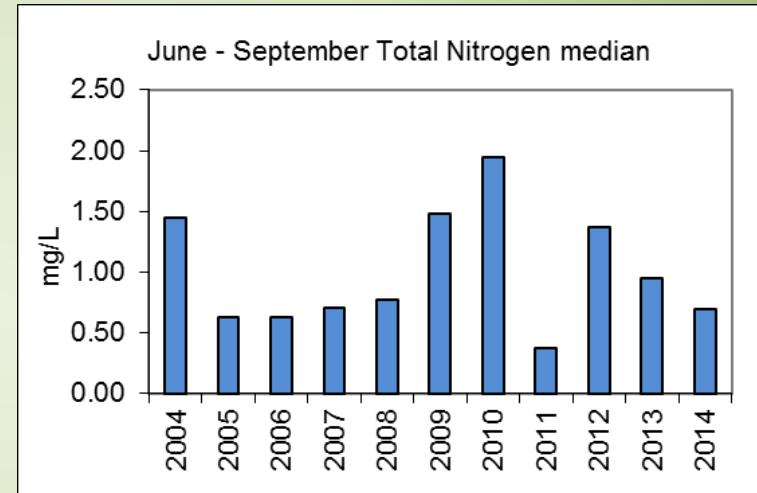
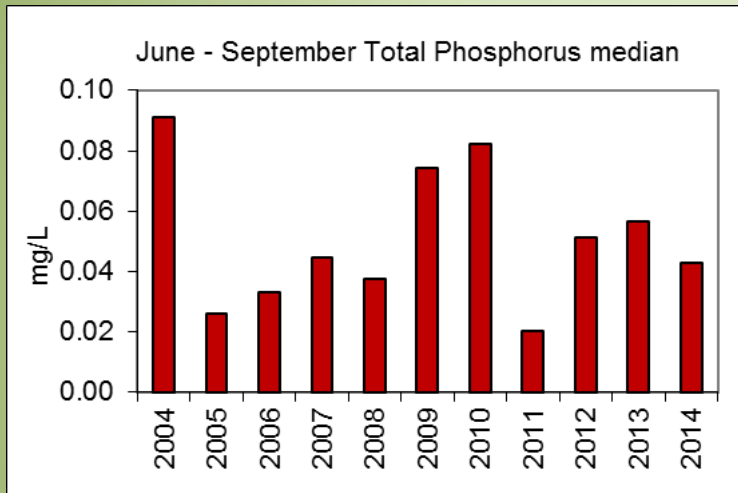


*Two photos by Matt MacDonald*



# Water quality monitoring:

Important dates: April 2005 first alum;  
May 2011 second alum;  
July 2013 floating islands





# Dynamic media columns:

- Inert material to create underwater surface area like root systems.
- Can remove and squeeze material off to measure N and P content.
- One column from each island, June and September in 2014.
- Measurements from one column in Fall 2013 produced similar values.
- NOTE: Observation of large root systems at the edges suggest that more biofilm may be on living roots than on the columns.

		Total mg / media column	
		Total N	Total P
East island	6/10/2014	11.85	1.67
	9/16/2014	66.56	10.24
	<b>Increase %</b>	<b>562</b>	<b>613</b>
West island	6/10/2014	9.94	1.37
	9/16/2014	54.75	8.71
	<b>Increase %</b>	<b>551</b>	<b>635</b>



# Metals and water quality standards:

A745-1m Element 5/14/13 6/11/13 7/8/13 8/20/13 9/17/13 10/15/13




2013		5/14/13	6/11/13	7/8/13	8/20/13	9/17/13	10/15/13
hardness		20.3	21.4	22.1	20.8	21.2	18.5
pH		6.58	6.82	7.6	9.29	6.72	6.74
Deg-C		18.4	20.8	24.0	22.8	19.5	12.0
Arsenic	<b>As</b>	1.36	1.75	2.31	3.03	2.63	1.53
Cadmium	<b>Cd</b>	0.05	0.05	0.05	0.05	0.05	0.05
Chromium	<b>Cr</b>	0.38	0.34	0.37	0.31	0.40	0.44
Copper	<b>Cu</b>	4.17	3.03	3.97	3.05	3.92	4.29
Lead	<b>Pb</b>	2.63	2.83	2.82	3.04	2.8	2.17
Nickel	<b>Ni</b>	0.92	0.88	1.25	0.82	0.99	0.98
Selenium	<b>Se</b>	0.50	0.50	0.50	0.50	0.50	0.50
Silver	<b>Ag</b>	0.04	0.04	0.04	0.04	0.04	0.04
Zinc	<b>Zn</b>	24.1	21.1	27.6	6.74	21.6	25.7

June-October % above standard		2013 median
> chronic	> acute	
0%	0%	2.31
0%	0%	0.05
0%	0%	0.37
60%	40%	3.92
100%	0%	2.82
0%	0%	0.98
0%	0%	0.5
0%	0%	0.04
20%	0%	21.6

Element 5/13/14 6/10/14 7/15/14 8/19/14 9/16/14 10/14/14

2014		5/13/14	6/10/14	7/15/14	8/19/14	9/16/14	10/14/14
hardness		21	21.5	22.6	22.3	21.4	20.7
pH		7.79	7.31	7.24	9.26	7.38	6.18
Deg-C		17.8	21.4	25.4	23.4	18.6	16.1
Arsenic	<b>As</b>	0.847	1.16	1.72	2.14	2.18	1.83
Cadmium	<b>Cd</b>	0.05	0.05	0.05	0.05	0.05	0.05
Chromium	<b>Cr</b>	0.33	0.29	0.23	0.23	0.33	0.32
Copper	<b>Cu</b>	3.65	3.08	2.86	3.53	3.13	3.10
Lead	<b>Pb</b>	1.23	1.3	1.31	1.24	1.95	1.69
Nickel	<b>Ni</b>	0.804	0.78	0.66	0.67	0.62	0.765
Selenium	<b>Se</b>	0.50	0.50	0.50	0.50	0.50	0.50
Silver	<b>Ag</b>	0.04	0.04	0.04	0.04	0.04	0.04
Zinc	<b>Zn</b>	25.9	7.6	10.8	8.43	9.83	9.27

June-October % above standard		median	change
> chronic	> acute		
0%	0%	1.83	<
0%	0%	0.05	
0%	0%	0.29	<
60%	0%	3.10	<
100%	0%	1.31	<
0%	0%	0.67	<
0%	0%	0.5	
0%	0%	0.04	
0%	0%	9.27	<

 exceeds or could exceed acute standard  
 exceeds or could exceed chronic standard  
 **0.50** red, bold font indicates <MDL

# Future of the project and the islands:

- Recently catalogued as a KC stormwater facility.
- Remove tenacious reed canary grass plant: drowning and black plastic?
- Monitor water quality into the near future to separate directional changes from year-to-year variability.
- Follow biofilm nutrient sequestration on dynamic media columns.
- Sample root mass for biofilm nutrients?
- Evaluate planted species for ultimate size, growth rate, and ease of maintenance.
- Evaluate island structural components for longevity and durability.
- Add to our frisbee and rock collections.

