

Des Plaines River Wetland Demonstration Project -- Field Trip Data and Results Interpretation

Sampling Site -- Mill Creek

Date: 29 Oct 2011

Recorder: M. B. Radeck

Site Characteristics: Tributary of the Des Plaines River in the upper part of the watershed. Sampling site was within the Lake County Forest Preserve and a managed wetland complex; natural stream banks with trees, grasses, and shrubs in the riparian zone. Creek receives wastewater effluent from the nearby sewage treatment plant. Levels of nitrate and phosphate are not regulated, but ammonia is converted to nitrate in the wastewater treatment process to minimize ammonia in waterway. No floating or submerged macro-vegetation. Silty bottom sediment gives water a brown appearance. Sunny conditions and seasonably warm (45F).

Test	Expected Range	Test Value	Sampling Comments and Results Interpretation
Bacteria	50-100,000 colonies/100ml (for Chicago River)	LaMotte: positive	Not surprising since there is a wastewater treatment plant that discharges effluent upstream of the Mill Creek sampling site.
Chlorine (Free and Total)	0.2-5ppm in tap water	Hach (free): 0ppm Hach (total): 0ppm LaMotte (total): NA	Total chlorine is always = or > free chlorine. Not surprising values are low here, since there is no final disinfection of wastewater effluent.
Copper	< 0.03ppm in tap water	LaMotte: 0ppm	A heartening result but not surprising, since copper is found in small amounts in natural bodies of water.
Dissolved Oxygen	1-12ppm	<u>Hach</u> : <ul style="list-style-type: none"> • Concentration: 10ppm • % Saturation: 90% LaMotte: <ul style="list-style-type: none"> • Concentration: 4ppm • % Saturation: 38% 	Note disparities in values here. What might account for this? (Consider the sampling conditions as well as different level of precision in measurement techniques in the Hach Surface Waters kit and the LaMotte Urban Waters kit. The latter allows estimates of 0, 4, or 8ppm, so is much less precise.) Hach Q value: 95/100 (for 90% saturation)*
Hardness	up to 100+ppm	LaMotte: 0ppm	
Iron	<0.2ppm in tap water	LaMotte: 1ppm	Iron is naturally present in many water sources, and is an important nutrient for plants as well as animals.

Nitrate	0.2-8ppm (Chicago River)	Hach: 0ppm	This is what we want to see for nitrate. Q value = 100 for nitrate. The ammonia level is probably acceptable, since the waters in the creek are fairly neutral pH.
Ammonia		Hach: 0.1ppm	According to the USGS National Water Quality Assessment Program , "The EPA has established criteria for maximum ammonia concentrations in surface water based on danger to aquatic organisms such as fish. These criteria vary with acidity and water temperature, which affect both the toxicity of ammonia and the form in which it occurs. In most natural surface waters, total ammonia concentrations greater than about 2 mg/L exceed the chronic exposure criteria for fish. In alkaline water at high temperature, the criteria can be exceeded by total ammonia concentrations less than 0.1 mg/L. The natural conversion of ammonia to nitrate in streams removes oxygen from water and, therefore, can also adversely affect fish."
pH	6-8.5 (Chicago River)	LaMotte: 7 Hach: 8.3	Neutral solution, within the optimal range for living organisms. Disparity between the LaMotte index and portable Hach gauge indicates the latter might need calibration. Q value = 90/100 (for pH of 7)
Phosphate	0.1-2.5ppm (Chicago River)	Hach: 1.5ppm LaMotte:	Well above threshold for high quality. Q value = 30/100
Temperature	Varies with season, weather, depth of sample	Reading 1: 10.1C Reading 2: Reading 3:	
Turbidity	2-140cm	Sample 1: 55cm Sample 2: 43cm Sample 3: 51cm Sample 4: 45cm Average: 49cm (24 NTU)	Q value = 57/100

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Sampling Site -- Des Plaines River

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Site Characteristics: Streamside location just upstream of the confluence of the river with Mill Creek (see above data). No direct wastewater effluent inputs, but run-off from far northern suburban communities. No floating or submerged macro-vegetation. Silty bottom sediment gives water a brown appearance. Sunny conditions and seasonably warm (45F).

Test	Expected Range	Test Value	Sampling Comments and Results Interpretation
Bacteria	50-100,000 colonies/100ml (for Chicago River)	LaMotte: NA	
Chlorine (Free and Total)	0.2-5ppm in tap water	Hach (free): 0ppm Hach (total): 0ppm LaMotte (total): NA	Total chlorine is always = or > free chlorine. Not surprising values are low here, since there is no final disinfection of wastewater effluent.
Copper	< 0.03ppm in tap water	LaMotte: 0.75ppm	A heartening result but not surprising, since copper is found in small amounts in natural bodies of water.
Dissolved Oxygen	1-12ppm DO levels downstream of riffle dam should be higher than upstream	<u>Hach</u> : <ul style="list-style-type: none"> • Concentration: NA • % Saturation: NA LaMotte : <ul style="list-style-type: none"> • Concentration: 4ppm upstream, 8ppm downstream • % Saturation: 38% / 70% 	Hach titration for DO failed due to getting water bubbles in the BOD bottle prior to adding final reagent. No time for a repeat test, unfortunately. At 38% saturation, Q value = 23/100 (poor) Downstream of riffle dam site, the LaMotte kit registered 8ppm (70%) saturation, for a Q value of 72/100. This is an indication that the riffle dam significantly oxygenates the water.
Hardness	up to 100+ppm	LaMotte: 0ppm	
Iron	<0.2ppm in tap water	LaMotte: 1ppm	Iron is naturally present in many water sources, and is an important nutrient for plants

			as well as animals.
Nitrate Ammonia	0.2-8ppm (Chicago River)	Hach: 0ppm Hach: 0.1ppm	This is what we want to see for nitrate. Q value = 100 for nitrate. The ammonia level is probably acceptable, since the waters in the creek are fairly neutral pH.
pH	6-8.5 (Chicago River)	LaMotte: 7 Hach: 8.4	Neutral solution, within the optimal range for living organisms. Disparity between the LaMotte index and portable Hach gauge indicates the latter might need calibration.
Phosphate	0.1-2.5ppm (Chicago River)	Hach: 1.6ppm LaMotte: 1pm	Q scored of 30/100
Temperature	Varies with season, weather, depth of sample	Reading 1: 10.0C Reading 2: Reading 3:	
Turbidity	2-140cm	Sample 1: 61cm Sample 2: 64cm Sample 3: 57cm Sample 4: Average: 61cm (7 NTU)	While slightly turbid, this is a good water quality indicator. 7 NTU corresponds to an 83/100 quality (Q) rating

* Q value calculations are drawn from the water quality test procedure documents from Friends of the Chicago River. This is a rough estimate of how particularly test values correspond to an assessment of water quality on a 0-100 scale (where 100 is optimal).

-- Data collected by members of SUST 220 Water and PLS 391 Seminar in Natural Science --