

FAUNTLEROY CREEK BENTHIC STUDY

OUR LADY OF GUADALUPE SCHOOL, OCT. 21, 2015 Nathan Franck, teacher

OBJECTIVES

Sixth-grade science students from Our Lady of Guadalupe School sampled sites in upper and lower Fauntleroy Creek for benthic macroinvertebrates (BMIs) and applied their findings, using the EPA-approved Biotic Index of Water Quality, to determine water quality. They gained experience in

- employing teamwork to execute an established scientific protocol
- making site observations
- documenting their work
- posing and answering questions based on their findings
- presenting a summary to watershed and city representatives
- evaluating the experience with an eye toward improvements.

METHODOLOGY

For their analysis, the students began with the research question: "What is the water quality in Fauntleroy Creek, where we will be releasing our salmon?" They then hypothesized:

Fauntleroy Creek is healthy and we will find BMI species that indicate excellent water quality because

- Fauntleroy Creek is in an urban forest.
- Urban forests filter and clean water.
- BMIs that indicate excellent stream quality live in clean water.
- The creek has been healthy the past two years that this school has been testing it.

They identified three types of variables:

- Controlled – sampling methodology using two teams for each job, temperatures taken over one minute, three-trial average for each site description, and sampling timing (mid October)
- Manipulated – location of sample site (varied by a few yards year to year)
- Responding – the number and types of BMIs found

With their teacher, chaperones, and a watershed volunteer, the students followed scientific protocol to collect BMIs using a Surber sampler. The collection team took two samples in the upper creek (Fenton Glen) and two in the lower creek (above the fish ladder). One sample at each location was the official one, taken in a riffle using the Surber and stirring the gravel in the frame for one minute. The other "curiosity" sample was for comparison, consisting of a grab sample of decaying leaves and twigs taken from the creek channel; these samples are not reported here.

The sorting team separated sample elements into Styrofoam trays, then the identification team used a dichotomous key to identify and record the macroinvertebrates. The site-description team documented features of each site and weather conditions. The documentation team took photos.

FINDINGS

SITE CONDITIONS

	Upper Creek	Lower Creek
Air temperature	10.6° C	15.0° C
Water temperature	14.0° C	10.6° C
Water clarity	Very clear	Very clear
Water depth	8.2 cm	10.5 cm
Weather conditions	Overcast; no rain	Overcast; no rain

MACROINVERTEBRATES

	2013		2014		2015	
	Upper Creek	Lower Creek	Upper Creek	Lower Creek	Upper Creek	Lower Creek
Stonefly larvae	1	1	1	2		2
Mayfly larvae				1	1	5
Caddis fly larvae				1	1	19
Aquatic worms		1	2	2	1	5
Black fly larvae			1			
Midge fly larvae						
Water penny			2			
Beetle larvae			1			
Riffle beetle			1			
Snail						4
Too small to ID or unable to ID		3			2	
Total	1	5	8	6	3	35

STUDY CONCLUSIONS

- Students concluded that Fauntleroy Creek is in excellent health because they found six different types of BMIs, four of which can only be found in non-polluted water. They found one additional species that is somewhat sensitive to pollution.
- BMIs are more abundant in the lower creek than in the upper creek, possibly because more nutrients from spawner carcasses were in the lower creek.
- BMIs were more diverse and more abundant this year compared to previous years

QUESTIONS FOR FURTHER STUDY

- What other BMIs might be in Fauntleroy Creek?
- Are other creeks as healthy as Fauntleroy?
- Is the size of BMIs an indicator of creek health; does larger mean healthier?
- What nutrients are feeding the BMIs and where are they coming from?
- What time of year are BMIs most abundant in the creek?
- Can BMIs that are tolerant of pollution also survive in non-polluted water?

SUGGESTIONS FOR NEXT YEAR

- Measure water speed (flow).
- Take two official samples per site for comparison.

For study continuity, following are benthic data collected for nine years by students at Arbor Heights Elementary:

MACROINVERTEBRATES IN UPPER CREEK

	2002	2003	2004	2005	2006	2007	2008	2009	2010
Stonefly larvae	4 (>1.5 cm)	3 (>.5 cm)	3 (>1.5 cm)	2	3	1	6	3	1 (>1 cm)
Mayfly larvae	6 (>1 cm)	2 (>.5 cm)	2 (>1 cm)	0	0	5 (>.25 cm)	0	7	0
Caddis fly larvae	1	1	1	3	0	2	2	0	0
Worms	1	1	1	4	4	1	3	2	0
Black fly larvae	0	2 (>.5 cm)	0	0	0	0	0	1	0
Midge fly larvae	0	2 (>.5 cm)	0	0	0	0	0	0	0
Too small to ID or unable to ID					4	0	1	0	0
Total count	12	11	7	9	11	9	12	13	1

HABITAT CONDITIONS IN UPPER CREEK

	2002	2003	2004	2005	2006	2007	2008	2009	2010
Dissolved oxygen	8 ppm	8 ppm	-----	8-10 ppm	-----	4 ppm	8 ppm		Data not provided by school
Nitrite	0 ppm	0 ppm	-----	-----	-----	5 ppm	5 ppm		
pH	-----	-----	-----	-----	7.8	8	8		
Phosphates						>1 ppm	0		
Water temp.	52F/11C	50F/10C	55F/18C	59F/15C	57F/14C	55F/13C	50F/10C	56F/24C	
Water depth	6 cm	4-7 cm	8 cm	5-1/4 cm	?	17 cm	11 cm	15.2 cm	
Channel width	.76 m	1 m	1.25 m	1.12 m	?	.72 m	1.5 m	.9 m*	

*Estimate