

FAUNTLEROY CREEK BENTHIC STUDY

OUR LADY OF GUADALUPE SCHOOL, OCT. 17, 2014 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

- executing 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 stream quality where we will be releasing our tank-raised salmon in the spring?" They then hypothesized:

- Benthic macroinvertebrates can be indicators of stream quality because some species are intolerant of pollution.
- If Fauntleroy Creek has excellent water quality, we will find BMIs there that are intolerant of pollution.

They identified three types of variables:

- Controlled - surrounding habitat and sampling timing (mid October) have been the same year to year.
- Manipulated – sampling location has varied by a few feet year to year.
- Responding – the number and types of BMIs found have varied year to year.

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 sample was for comparison, consisting of a grab sample of decaying leaves and twigs taken from the creek channel.

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

BMIs	2013 – Riffle Samples		2014 Samples			
	Upper Creek	Lower Creek	Upper Creek Riffle	Upper Creek Leaves/Twigs	Lower Creek Riffle	Upper Creek Leaves/Twigs
Stonefly larvae	1	1	1	2	2	3
Mayfly larvae	0	0	0	1	1	2
Caddis fly larvae	0	0	0	1	1	0
Aquatic worms	0	1	2	9	2	4
Black fly larvae	0	0	1	0	0	0
Midge fly larvae	0	0	0	0	0	0
Water penny	0	0	2	0	0	0
Beetle larvae	0	0	1	0	0	0
Riffle beetle	0	0	1	0	0	0
Too small to ID or unable to ID	0	3	0	0	0	0
Total	1	5	8	13	6	9

Official (riffle) samples: In the upper creek, 4 out of 8 BMIs showed excellent water quality, which means that half were intolerant of pollution. In the lower creek, 4 out of 6 BMIs showed excellent water quality, which means that two thirds were intolerant of pollution.

Unofficial (leaves/twigs) samples: In the upper creek, 4 out of 13 BMIs showed excellent water quality, which means that nearly one third were intolerant of pollution. In the lower creek, 5 out of 9 BMIs showed excellent water quality, which means that just over half were intolerant of pollution.

STUDY CONCLUSIONS

- Fauntleroy Creek is a healthy stream because we found stoneflies, mayflies, and caddisflies, all of which are intolerant of pollution.
- This finding supports our hypothesis because we found lots of BMIs that are intolerant of pollution.

OUTSTANDING QUESTIONS

- What is the amount of oxygen in the creek?
- How can we determine the movement of water in the creek?
- How might we monitor the creek so it won't be polluted?

SUGGESTIONS FOR NEXT YEAR

- Try to sample on a drier day and bring umbrellas if it does rain.
- Be careful with the tools to avoid dropping them in the creek.
- Try to find creatures in the creek that eat BMIs to see if that impacts the number of BMIs found.

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