



THE BLACK CREEK WATERSHED WIRE

News from Black Creek Watershed, Cary, NC

January 2008

Visit the project website at www.ncsu.edu/WECO/blackcreek

Black Creek Highlights November

The Black Creek Watershed Association (BCWA) met on Nov. 19 at Bond Park Community Center. Thanks to Matt Flynn for securing the location.

The BCWA heard a thorough and interesting update from Diane Norris and Shelby Gull-Laird about the watershed monitoring and assessment activities and results.

BCWA updated each other on various items, including a new grant to assist with outreach activities and materials. Marilyn Grolitzer informed the group of a new program sponsored by the Neuse River Foundation, called Muddy Water Watch. The program trains citizens to monitor construction sites

to pass along information to enforcement officials. www.muddywaterwatch.org

The next BCWA meeting is scheduled for January 28 at Bond Park Community Center. We will discuss how to move forward with implementing activities for the new outreach grant. There will be open discussion time as well.

Finally, regarding outreach to your own community members, we are happy to provide extra copies of this newsletter or any past newsletters for you to give to other members of your community or the organization that you represent.



The Black Creek Watershed Association meets on the last Monday of the month.

Next meeting:

Monday, January 28

6:15-8:30 p.m.

(Social time 6:15-6:30)

LOCATION:

Bond Park , Oak Room at the Community Center

Agenda:

- ◆ Outreach planning: logo contest for students
- ◆ Updates from participants

~~ IMPORTANT ~~

the February meeting will be WEDNESDAY February 27, 2008

At Page Walker Center. The agenda includes and update on the geodatabase and discussion about potential analysis.

BCWA Receives Cary Community Foundation Grant

The Cary Community Foundation- Founders Fund Campaign, a component fund of the North Carolina Community Foundation, has provided the BCWA a \$1,000 grant for educational outreach in the watershed. NCSU applied for the grant on behalf of the BCWA, through the NCSU Agricultural Foundation. The Agricultural Foundation is a 501 c(3) organization that is able to apply for and administer non-profit grants. This is important since the BCWA is not incorporated right now.

The grant will fund a logo design contest for the Black Creek Watershed. This logo will be used on educational/outreach materials to be distributed at events throughout the Town.

The grant proposed included additional funds for materials for backyard landscaping work-

shops, but we did not receive that full amount. The BCWA decided in November to use the funds for the logo contest and materials, because we may be able to find other funds for landscaping workshops.

BCWA members also suggested installing a dog waste station along the greenway, and attaching a sign to the monitoring box.

WECO staff will create a sign to attach to the monitoring box.

The BCWA decided to plan the logo contest details at their January meeting. The grant funds must be spent by December, 2009.

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Watershed Assessment Update

Shelby Gull Laird and Diane Norris provided an update on their GIS mapping and monitoring activities. The powerpoint presentation is on line for viewing. The assessments include:

- ◆ Benthic Macroinvertebrates
- ◆ Physical water parameters
- ◆ Nutrients
- ◆ Bacteria
- ◆ Organic contaminants
- ◆ Channel condition

Benthic macroinvertebrates

Definitions and techniques can be found online in Diane's presentation. The study uses tolerance and abundance values for three orders of sensitive benthic macroinvertebrates: Ephemeroptera, Plecoptera and Trichoptera (Mayflies, Stoneflies and Caddisflies). This EPT technique is used to calculate a Biotic Index for each stream, and to classify it as excellent, good, fair or poor for biological integrity.

In Black Creek, data supports the idea that EPT scores have leveled out- the Fall 2007 values were similar to spring 2007 samples- yielding "fair" ratings. If they had used the same abbreviated method as NCDWQ uses, the scores would be "poor". The full sampling method she used resulted in a score of "fair". Diane showed pictures of species that had been found in Black Creek, including many that are no longer found.

Two categories, shredders and predators are almost completely absent. Two theories for this absence are:

- ◆ Lack of shredders may be due to stormflows washing leaves out of stream.
- ◆ Potential for pollutant bioaccumulation - predators are higher on food chain, accumulating more pollutants.



At left *Chimarra sp.* Diane anointed this caddisfly species, as the "star of your show", as it was previously rare but now abundant in Black Creek (a mystery!).

Benthic macroinvertebrate summary

- ◆ Main stem has not seen dramatic declines.
- ◆ Possible adaptation to urban development.
- ◆ Feeding type: collector/gatherers predominate. Why few

shredders, predators?

- ◆ BC's tributaries are too small to be fairly evaluated by macros.
 - ⇒ Don't maintain good year round flows.
 - ⇒ Both maintain similar tolerant populations
 - ⇒ Method for smaller streams is in development

Physical water parameters- include turbidity, pH, temperature, dissolved oxygen (DO), and conductivity.

pH standard for aquatic life is between 6-9, here it is 7.

Turbidity:

- ◆ A measure of light transmission
- ◆ Water Quality Standards for aquatic life are <25 NTU.
- ◆ Affected by erosion, runoff, detritus, phytoplankton
- ◆ At high stormwater levels can have a "scour" effect

Temperature and DO are inversely related.

Black Creek turbidity is bad during storm flows:					
Site	WF1	EF1	WF2	EF2	MS1
Baseflow NTU	9	10	6	5	5
Stormflow NTU	97	95	66	80	119

- ◆ Temperature affects conductivity and DO
- ◆ Warmer water holds less oxygen
- ◆ BC's range of temperature: 4 - 25.5 degrees C
- ◆ Potential DO: 13 to 8 mg/L
- ◆ Critical DO levels for aquatic life: 4- 5 mg/L

Trees along the tributaries and mainstem help with these issues (although not with the stormwater runoff from streets since pipes connect directly to the streams).

Conductivity - U.S. streams that support good fisheries range between 150- 500 μ S (microsiemens/cm).

Black Creek had conductivity between 41-67 during stormflows.

- ◆ Are stormflow decreases due mainly to dilution, or are oil contaminants a factor?

Nutrients

- ◆ In normal flows, nutrient levels are well within acceptable ranges
- ◆ Exception: Upper reaches of East Fork are high in or-

Watershed Assessment Update

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- ◆ ganic N and ammonia
- ◆ 3 fold increase during storm events is probably more of an issue for Lake Crabtree
- ◆ Nearly 6 fold stormflow increase in ammonia may be a concern for macroinvertebrates?

Bacteria

- ◆ Fecal coliform is used as an indicator for fecal-borne pathogens
- ◆ The human health standard for fecal coliform is a geomean of 200 cfu/100 ml. * (14 cfu/100ml salt water)
- ◆ CFU = Colony Forming Units
- ◆ The mean is used due to erratic spikes in the data. 5 samples within 30 day period
- ◆ The geomean of the 5 Black Creek sites ranged from 104 - 1268. High levels are not unexpected in an urban stream.

Comments: Jay Levine is studying bacteria impacts in Falls Lake.

A sewage leak would be indicated by higher numbers. Some homes on Chapel Hill Rd. also may still have septic tanks. Matt said the Town is investigating old lines as part of their Phase II stormwater permit– he will have more information later.

Organic Contaminants

Diane began sampling 3 core sites in July 2007, monthly and during rain events. She uses cages of inert materials that contain permeable membrane devices (PMDs) that simulate bioaccumulation of hydrophobic organic contaminants. She had 2 collections at 2 sites, before water got too low, (West Fork 2 and Mainstem 1).

Initial findings:

- ◆ DEET found in WF1 sample
 - ⇒ No insects found in small stagnant pools , just tolerant lunged snails
 - ⇒ East Fork contained mosquitoes & midges
- ◆ Variety of phthalates (plastics) found, sources could include: plastics, insect repellants, personal care products with fragrance, plasticizers, varnish, perfumed mosquito repellent, cosmetics, liquid soap, detergents.
- ◆ Prenatal exposure of phalates has been implicated as an interference of male reproductive development. The

effect on macroinvertebrates is unknown.

- ◆ PAHs (polycyclic aromatic hydrocarbons– from combustion, coal-based parking lot sealants) is shown to have negative impacts on macroinvertebrates.

The group questioned how DEET is getting into headwater streams. Seventy three percent of streams contain DEET. Although DEET is not removed during wastewater treatment, this should only matter below treatment plants. Someone suggested that Cary's reclaimed water may have DEET in it, although users are not supposed to use enough to have it run off into streams (Silverton and Weston use reclaimed water for irrigation).

Diane is looking forward to obtaining results on petroleum and PAHs.

Black Creek GIS Analysis & Modeling

Shelby Gull–Laird presented this section.

A rain gauge was installed at Cary Academy. It had not rained more than 1.6" between installation and the November BCWA meeting. The **stream gauge** (pictured below) was installed 8/17/07. This takes water height measurements to calculate flow, and takes stormflow samples when water gets above a certain height. Some data was received, but a piece of equipment was damaged during a storm and needs replacing (some flow data is in Shelby's presentation).

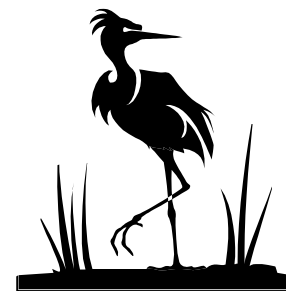
GIS Analysis: Shelby will present an update of the geodatabase development at the February 2008 meeting.

Channel Condition

Methodology



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- ◆ Stream Condition Assessment, developed by NCSU Water Quality Group, measures:
 - ◆ Streambank stability
 - ◆ Bedform macrohabitat
 - ◆ Cover and refuge
 - ◆ Floodplain condition
- ◆ Each parameter rated Excellent (4), Good (3), Fair (2) or Poor (1)
- ◆ Watershed divided into 8 approx. equal sectors
- ◆ 2 confluences in each sector chosen
- ◆ Volunteers from BCWA and NCSU, trained by Dr. Jim Gregory and Dr. Greg Jennings, evaluated 200 ft. of both upstream reaches of each confluence. A total of 32 reaches, 6,400 ft. of stream, was evaluated in 2 days.

Results (numbers are averages)

- ◆ Bank stability 2.4. Fair
- ◆ Bedform, habitat 2.8. Good
- ◆ Cover & refuge (instream) 2.3. Fair
- ◆ Floodplain condition 2.6. Good
- ◆ Average- 2.5125. Good
- ◆ These were smaller tributaries, with little or no buffer from lawns/ roads
- ◆ Monitored sites EF2, WF2 and Mainstem have better buffers and stability

Summary

- ◆ Stable bedrock, large cobbles and low siltation mitigate the high storm-flow effects on macroinvertebrates.
- ◆ High flows remove snags, leaf packs. This may be why shredder macroinvertebrates are rare
- ◆ Organic contaminants may be a major factor in species reductions
- ◆ Lack of predator macroinvertebrates may be a function of these contaminants bioaccumulating in the foodchain.

November Meeting Evaluation

John Stephens, UNC-Chapel Hill, brought students from his public policy dispute resolution class to observe and comment on the meeting. They provided their observations to Christy and Patrick afterwards. Let us know if you are interested in seeing their feedback- we are happy to share it. Thanks to John and his students for providing this useful service!

November Meeting Participants

Patrick Beggs, *WECO; NCSU*
Colleen Bockhan, *Crabtree Park*
Nathan Cobb, *Beechtree*
Susan Davenport, *Beechtree, Cary*
PRCR
Amin Davis, *Beechtree resident*
Bill Dupont, *North Raleigh*
Matt Flynn, *Town of Cary*
Jim Gregory, *NCSU*
Marilyn Grolitzer, *North Raleigh*
Shelby Gull Laird, *NCSU*
Elena Horvath, *Silverton*
Pat Hudson, *Cary Rotary*
Eric Kulz, *North Harrison Trace, DWQ*
Vickie Maxwell, *Wessex HOA*
Bob Morris, *Silverton HOA, Cary*
Greenways Committee
Diane Norris, *NCSU*
Christy Perrin, *WECO, NCSU;*
Windchase at Beechtree
John Stephens and students Riddick and Hickey, *UNC- Chapel Hill*
Shirley Wasson, *Northwoods*

