Dix River Watershed Council Meeting
January 29, 2008

Meeting Notes

Attendees: Malissa McAlister (UK KWRRI); Preston Miles (landowner); Mary Ann Sharp (NRCS-Boyle Co.); Bill Hundley (Boyle Co. Conservation Board); Tony White (Mercer County Health Dept.); Rose-Marie Roessler (CREEC); John Webb (Ky. Division of Water); Bill Payne (landowner); Dave Jewett (landowner); Ken Douglass (landowner)

Watershed Activities

- Several Dix Council members attended the Kentucky River Watershed Watch Conference, which was held on January 26th at Midway College. Participants heard presentations on sampling results from 2007 and learned about pertinent water quality issues in Kentucky, such as impacts of mountaintop removal coal mining on headwater streams.
- Preston Miles' winter term chemistry class conducted water quality sampling along Clark's Run and analyzed the samples for nitrates, orthophosphate, chlorophyll a, and E coli.
- The first "Growth Readiness" workshop for the four-county region of Anderson, Boyle, Mercer, and Washington Counties is being held in Harrodsburg on February 4th. The counties are interested in learning more about low impact development and will be assessing local ordinances relating to development practices. They will be working to improve the ability of ordinances to enable, rather than hinder, development practices which reduce impacts on local water quality, preserve greenspace, and increase the overall desirability of the community.

Updates

- A review of the sampling records showed that dissolved oxygen readings were taken throughout the day between 9:00 a.m. and 4:00 p.m. Thus, the readings did not capture the lowest oxygen levels that are typically observed in early mornings during the summer months when water is warm, photosynthesis in not yet taking place, and lower flow levels are observed. It was noted that the data could still be reviewed for instances when higher dissolved oxygen levels occur on warm afternoon days in the summer—indicating that there is an abundance of algal growth.

Water Quality Data Review

For the benefit of those who missed the previous meeting and as a reminder to those who were present, John and Malissa reviewed the water quality sampling results covered at the December meeting. During the meeting, the sampling results for the nutrient parameters (nitrate and orthophosphate) were examined more closely. The highest nutrient levels were found to occur at sampling sites downstream of sewage treatment plant discharges for Danville, Lancaster and Stanford. Several other sites "of concern" were found on Clark's Run in Boyle County. Council members requested that they be able to review the discharge reports submitted by the sewage treatment plants. John Webb noted that he thought a phosphorus limit of 1.0 was specified in the sewage discharge permits.

E coli Results

Next, the E coli sampling results were examined more closely. High E coli levels were observed throughout the Dix River watershed, with the greatest results in the Hanging Fork subwatershed and on Ball's Branch of Clark's Run in Boyle County.

Graphs showing E coli concentrations and instream flows over time were reviewed. The intent of these graphs was to portray times of the year when higher concentrations were observed and to better understand if pollutant concentrations related to instream flow levels. If high pollutant levels coincide with high flows, and if these high flows occurred soon after a rain event, it is likely that the pollutant is being carried into the waterbody via stormwater runoff (nonpoint sources). If the high pollutant levels are occurring during low flow periods, it is more likely that the source if from a specific discharge point, such as an industrial discharge pipe, sewage pipe leak, or sewage treatment plant discharge pipe (point sources). It was noted that there could be a significant lagtime between a rainfall event and instream flow increases, thus pollutants could have already been carried downstream once higher flows are observed.

These graphs were presented for E coli findings throughout the watershed. For the most part, E coli concentrations did not seem to correspond to variations in instream flow levels. Linear regression analysis also did not support a link between flow and E coli concentration. The closest correlation ($R^2 = 0.6$) occurred at the Gilbert's Creek sampling site between Stanford and Lancaster.

The following table summarizes observations made from reviewing the E coli map and graphs.

Subwatershed	E. coli
E coli Concentration Levels of Concern (Geometric mean rankings from summary maps)	Green (acceptable) 0 – 240 cfu/100 ml Yellow (exceeds swimming standard) 241 – 1,000 cfu/100 ml Pink (of concern) 1,001 – 2,000 cfu/100 ml Red (problematic) 2,001 – 3,000 cfu/100 ml Black (exceptionally problematic) 3,001 – 5,000 cfu/100 ml
Hanging Fork	High levels throughout the subwatershed, with the possible exception of the Junction City and Frog Branch sites. There is a mix of grazing agriculture and low density rural housing throughout much of the subwatershed, so it is uncertain whether the sources are mainly livestock or human. One of the high E coli sites is located downstream of a sewage package plant discharge for the Hustonville Elderly Apartments.
Clark's Run	Water quality standard for swimming exceeded at all sampling sites, with worst sites at Balls Branch West, Balls Branch Mouth and Corporate Drive. The new sewage line connecting a Junction City pump station to the treatment plant should reduce E coli levels in Balls Branch. Danville's sewage treatment plant does not seem to be contributing to elevated E coli levels in Clark's Run.
Dix River	High E coli levels were observed at the sampling site located downstream of Stanford's sewage treatment plant discharge. The Drakes Creek subwatershed also produced exceptionally high E coli results.

Many questions were raised in order to better understand the E coli findings, including the following:

- Could the high E coli levels found at the Corporate Drive, Clark's Run site be due to residential sewage? A leaking sewer line? Livestock access to the creek?
- Could leachate from the abandoned landfill in Alum Spring be contributed to the elevated E coli levels downstream on Clark's Run?
- There seem to be higher E coli values on the 7/6 and 9/18 sampling dates. What could be causing this observation?
- When did the storm sampling events (by Third Rock) take place?
- How would you find localized rainfall data for the sampling sites of concern?
- Are there scientific studies on the correlation of flow, E coli, and precipitation?
- Site visits to the White Oak and Logan Creek watersheds would be helpful to better understanding potential land use sources of E coli in the waterways.
- Is there a correlation between nutrients and E coli, since both are frequently contributed by sewage or livestock waste?
- Where does Crab Orchard discharge its sewage treatment plant effluent?
- What is the lifespan of E coli? (microbiologist input?)

Some of these questions will best be considered once the microbial source tracking results are available in 2008. The MST study will begin by assessing about 60 sites in the Hanging Fork and Clark's Run subwatersheds to find the highest E coli concentration sites for subsequent MST tracking at a subset of 30 sites. These 30 sites will each be sampled three times, twice during wet weather and once during dry weather. Findings will differentiate between human, bovine and other sources.

Several different GIS coverages were added to the mapped E coli findings, including sewage package plants, water lines, roadways, sinkholes and inhabited areas. Council members were trying to discern if higher E coli levels were observed in areas where there is a greater human presence.

It was decided that most of the Council's focus would be on those sampling sites that produced mean concentrations greater than 2,000 cfu/100 ml (red and black labeled sites). These mean values are at least an order of magnitude greater than Kentucky's safe swimming standard of 240 cfu/100 ml.

Direction for Next Meeting:

- Graphs of Chlorophyll a and Total Suspended Solids / Flow vs. time
- Land use codes/maps
- Google Earth maps?

For future meetings:

The next meeting of the Dix River Watershed Council was scheduled for Tuesday, February 26th at 6:00 p.m. at Danville's City Hall.