FRIENDS OF DECKERS CREEK - The CLEAN CREEK PROGRAM[1]

James Nutaitis[2]

Abstract: The Friends of Deckers Creek's (FODC) Clean Creek Program (CCP) began in the fall of 2002. Through the CCP, FODC has been monitoring chemical and biological conditions at 13 sites throughout the watershed. We monitor water quality quarterly, and we assess fish and macro-invertebrate communities annually. It is important to monitor all of these sites so that we are able to assess the overall health of the Deckers Creek watershed to guide our restoration efforts. Large amounts of stream data are required to start new remediation project while monitoring the effects of past projects. However, due to the complexity of analyzing fish and macro-invertebrate community data, this paper will only focus on the water quality aspect of the CCP. The methods for testing water through the CCP include measuring pH, conductivity, temperature, and dissolved oxygen using handheld electronic devises calibrated daily. Along with these measurements, FODC takes three samples of water from each of the 13 sites that are analyzed at the National Research Center for Coal and Energy Analytical Laboratory. These three samples are used to determine the levels of nutrients, metals and potentially harmful bacteria in the water. Specifically, the samples are tested for total iron, aluminum, manganese, hot acidity, alkalinity, sulfate, and fecal coliform bacteria. The water quality results for 2007 have been collected and compiled. Through the CCP we are able to monitor the success of our remediation projects and find sites for future remediation.

---

[1] Paper was presented at the 2008 National Meeting of the American Society of Mining and Reclamation, Richmond, VA, ***New Opportunities to Apply Our Science*** June 14-19, 2008. R.I. Barnhisel (Ed.) Published by ASMR, 3134 Montavesta Rd., Lexington, KY 40502

[2] James Nutaitis, Americorps OSM/VISTA, Friends of Deckers Creek, Morgantown, WV, 26505.

Proceedings America Society of Mining and Reclamation, 2008 pp 756-769
DOI: 10.21000/JASMR08010756
http://dx.doi.org/10.21000/JASMR08010756

INTRODUCTION

The mission of Friends of Deckers Creek (FODC) is to improve the natural qualities of, increase public concern for, and promote the enjoyment of the Deckers Creek Watershed. Deckers Creek is a key part of the local communities and environment. With remediation, it has the potential to become a valuable asset to the local economy. By becoming a tourist destination for fishing and boating the creek could help decrease the poverty of the communities in its watershed. The Deckers Creek watershed is plagued by three general problems: AMD, bacteria, and litter. The AMD from the many abandoned mines throughout the watershed is an FODC priority. Bacteria resulting from poor sewage maintenance and storm water runoff, is primarily dealt with through education and public outreach. Litter, a constant problem, is best addressed by educating the community.

To help fulfill the FODC mission, the Clean Creek Project (CCP) was created in the fall 2002 to gather current chemical and biological stream conditions which are then used to steer restoration efforts throughout the watershed. The OSM/VISTA program working with the FODC staff has the responsibility of collecting the data for the CCP and helps in analyzing this data. Collecting this data required more than one person, therefore the OSM/VISTA recruit volunteers to assist with this water monitoring, ultimately building the capacity of our organization. Once the data is acquired, we disseminate the information gathered through the CCP in our annual State of the Creek report which we disperse to state and local representatives, local schools, organizations and community members.

Thirteen sites within the CCP, are monitored quarterly for water quality. In the field, we measure pH, specific conductivity, dissolved oxygen, temperature, and flow. We also take three samples of water at each site, which are then taken to the NRCCE laboratory at WVU. This analyses the samples for total Fe, Al, Mn, hot acidity, alkalinity, SO_4^{2-}, and fecal coliform bacteria. Although the CCP encompasses biological factors such fish and macroinvertebrate sampling once a year, these results will not be discussed in this paper.

The help of FODC's OSM/VISTA and many volunteers allows the CCP to continue and be a successful program. In addition to water monitoring the OSM/VISTA's responsibilities also include recruiting a strong volunteer by reaching those individuals who are interested in FODC and contacting WVU programs (Fisheries and Wlildlife) that share interests with FODC. New

partnerships are constantly being formed, expanding the reach of our organization and the types of volunteers that are recuited.

FODC, along with NRCS and WVDEP have been initiating successful remediation projects since 2002 guided by the CCP. The CCP has allowed us to target and monitor problem areas in order to improve stream quality one section or tributary at a time. The information gathered from the CCP is vital to assessing the overall health of the Deckers Creek Watershed and steering our remediation efforts. Although the CCP is not directly responsible for started remediation projects, or funding them, it supplies a steady stream of information to justify new remediation projects and monitor the success of current ones. With continued monitoring, successful remediation projects, education and outreach, we expect to see an increase in stream health from previous years and hope to get a better understanding of the processes that affect the health of the watershed.

METHODS

The Thirteen sites of the FODC CCP were carefully chosen and have remained constant from the beginning of the project (See Figs. 1 and 2). The sites were chosen for multiple reasons: to show trends in water chemistry as you travel up Deckers Creek, to monitor areas frequently encountered by people, and to monitor tributaries that affect Deckers Creek. The 13 CCP sites include:

1. Deckers Creek at Valley Crossing – representative of the lower reaches of Deckers Creek, and most accurately shows what is flowing into the Mon River.
2. Aarons Creek next to Greenbag Road –shows low pollution, but contains sediment issues, indicating poor construction practices
3. Deckers Creek in Sabraton – a visible section of the creek that displays the damage from the abandoned Richard mine
4. Deckers Creek at the Dellslow Bridge – one of the best sites for fish in the watershed
5. Tibbs Run – enters Deckers Creek above Dellslow, is a refuge for fish when surges of acidic water make it down the stream. Occasionally high levels of bacteria
6. The Deckers Creek Gorge – steepest and most scenic section of the creek
7. Deckers Creek at the county line – differs from the gorge because the water has not passed through the limestone mines

8. Deckers Creek at Masontown – site of a large reclaimed area
9. Dillan Creek – has severe AMD in upper reaches, which is neutralized before entering Deckers Creek
10. Deckers Creek at Kingwood Pike – channelized low gradient section of Deckers Creek
11. Kanes Creek just downstream from Rt 92 – many AMD sources within the Kanes Creek watershed, which ultimately leads to Deckers Creek
12. Reedsville Airstrip – although there is no airstrip, this site resembles that of Kingwood Pike because it is channelized
13. Deckers Creek near Zinn Chapel – the headwaters of Deckers Creek.

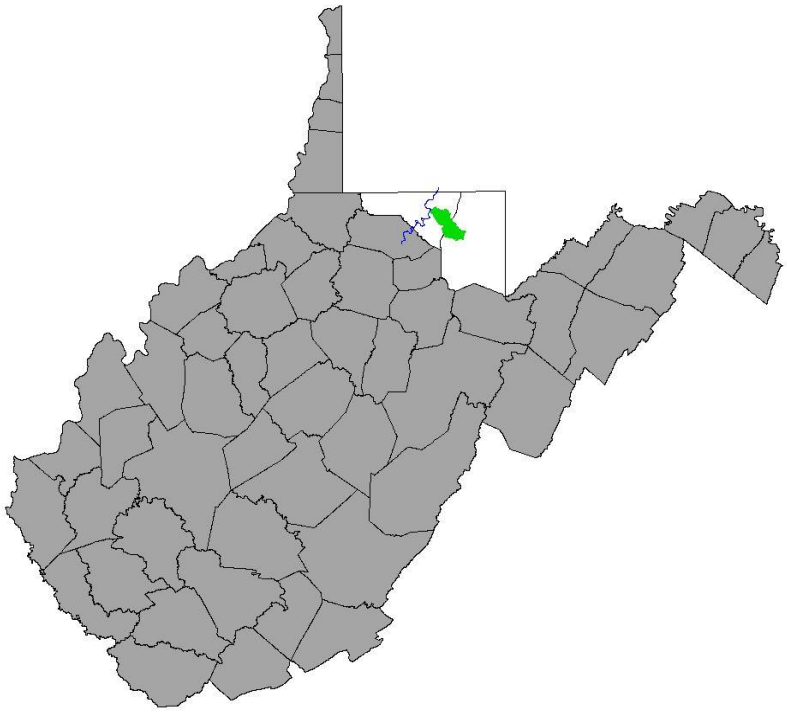


Figure 1. Map of West Virginia with the Deckers Creek Watershed highlighted.

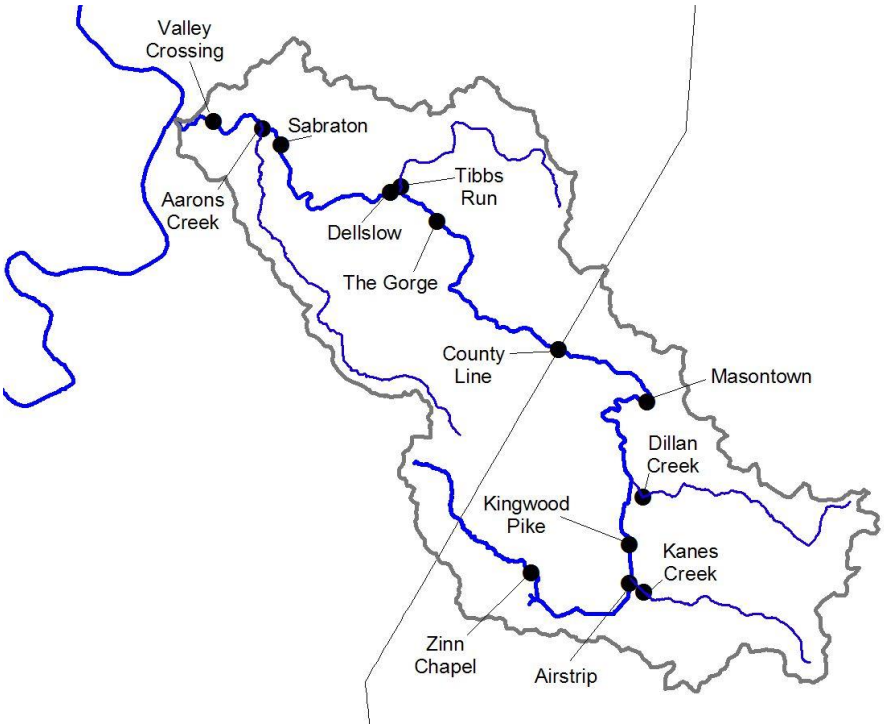


Figure 2. Map of Deckers Creek Watershed with the thirteen CCP sites.

Field monitoring includes: pH, specific conductance (SC), temperature, dissolved oxygen (DO), and flow. These measurements are taken with equipment owned by FODC, which is calibrated before each use. Field measurements such as pH, SC, temperature and DO are taken using hand held meters. FLOW is measured at equal distances along a stream cross section using a Marsh McBirney FlowMate and wading rod.

pH –Indicates of the effects of AMD and proximity of sources.

Specific Conductivity –Indicates amount of dissolved metals in the water. A high specific Conductivity is a result of AMD and damaging to the stream.

Dissolved Oxygen - The amount of dissolve oxygen in a stream is controlled by temperature and is unaffected by AMD. However this is an important factor in maintaining life in the creek.

Temperature – Knowing the temperature ranges of the water in Deckers Creek allows FODC to have an idea of what fish would most likely inhabit the creek in ideal conditions.

Flow – Many of the previous measurements are useless, unless you document flow. This allows FODC to calculate loading, the total amount of pollutants in the creek (lb/day). High and low flow events are usually responsible for outliers in the data.

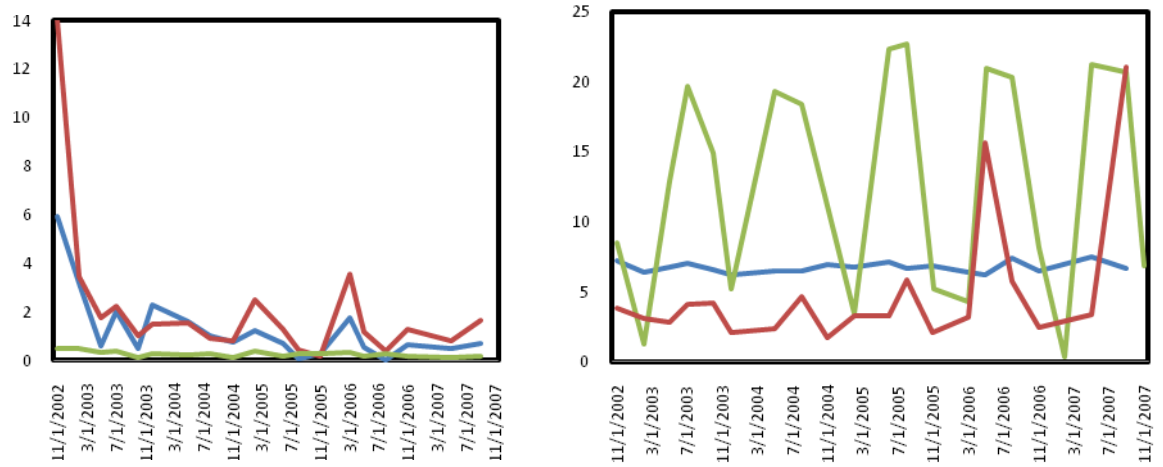
In addition to the onsite measurements, three sterile bottles are filled with creek water, for laboratory analyses of fecal coliform, total Fe, Al, etc. Concentrated HNO_3 is added to one of the sample bottles in order to preserve the metals being tested. Data on Fecal Coliform levels, total Fe, Al, Mn, hot acidity, alkalinity, and SO_4^{2-}.

Fecal Coliform – High levels of Bacteria resulting from straight piping and storm runoff is a considerable threat to Deckers Creek.

RESULTS

Data collected from the CCP from 2002-2007 is compiled in the graphs below. Aluminum, Fe, and Mn are compared on the left hand side, while pH, SpC (from lab), and temperature, are compared on the right for seven sampling points, Fig, 2, 3, and 4.

Valley Crossing



Sabraton

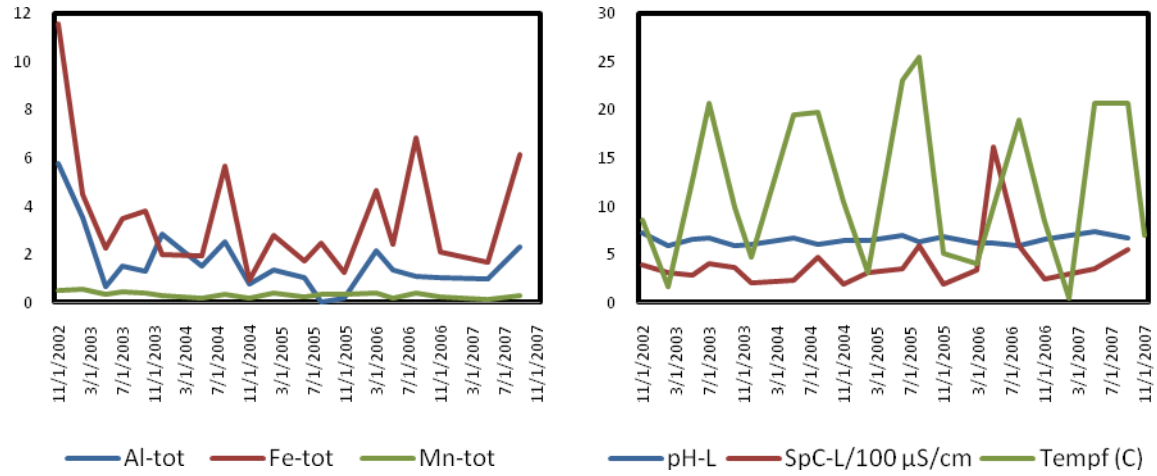
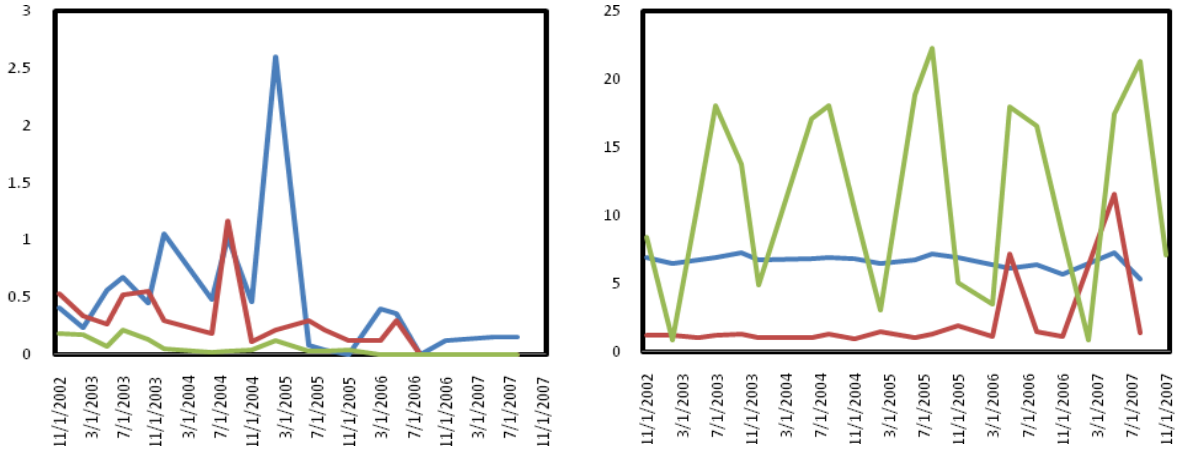


Figure 2. Concentrations of total aluminum (Al-tot), total iron (Fe-tot) and total manganese (Mn-tot) on the left hand side and pH, conductivity, and temperature levels on the right hand side for Deckers Creek at Valley Crossing, and Sabraton.

Tibbs Run



Dellsow

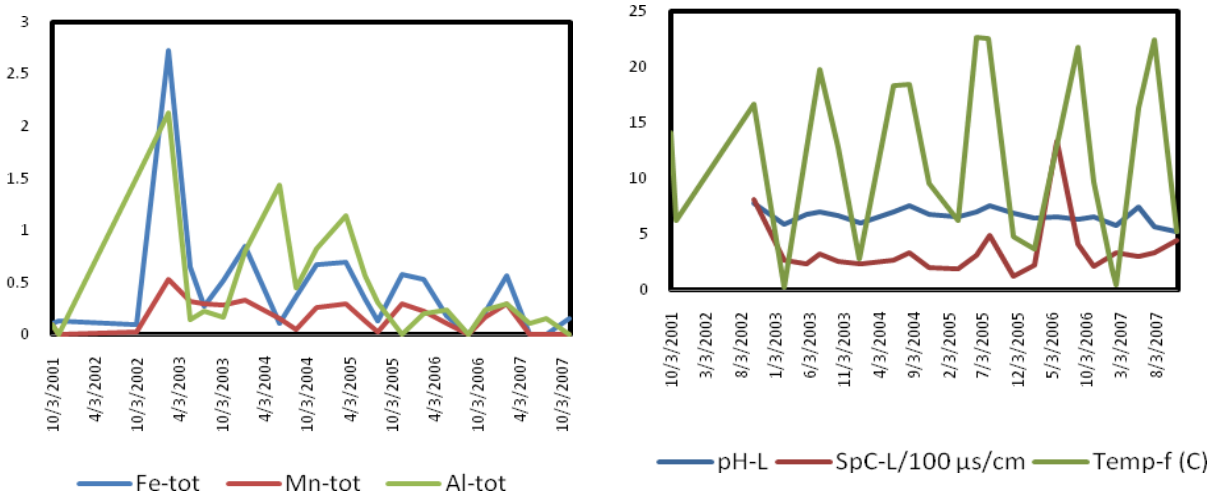
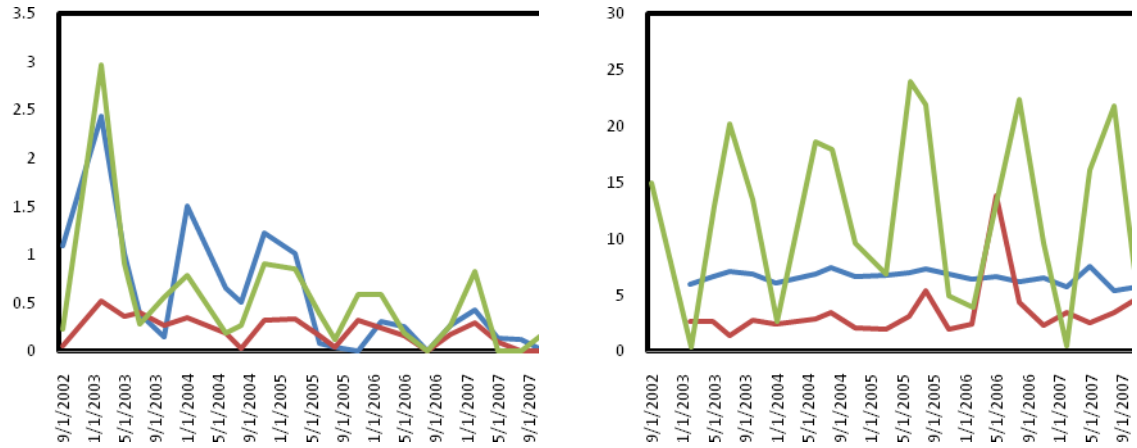


Figure 3. Concentrations of total aluminum (Al-tot), total iron (Fe-tot) and total manganese (Mn-tot) on the left hand side and pH, conductivity, and temperature levels on the right hand side for Deckers Creek at Tibbs Run and Dellslow

Gorge



County Line

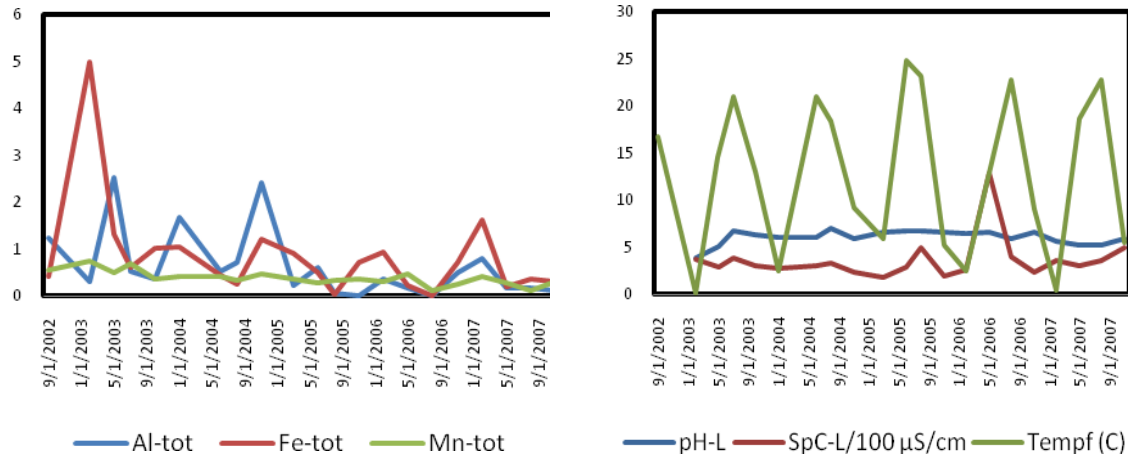


Figure 4. Concentrations of total aluminum (Al-tot), total iron (Fe-tot) and total manganese (Mn-tot) on the left hand side and pH, conductivity, and temperature levels on the right hand side for Deckers Creek at Gorge and County Line

In 2003, five portals were wet sealed at Slabcamp Run, which is upstream from the Masontown CCP site, Fig. 5. These five portals were drained into an open limestone channel (OLC). During this year the Elkins Coal and Coke land was also reclaimed. OLCs were created

along with other remediation work, and a few outdated building were torn down, which probably did not affect water quality.

In 2006, the Natural Resources Conservation Service (NRCS) built the Goat #2 AMD remediation project. This project is located directly upstream from the Masontown CCP site. The Goat #2 Project consists of OLCs and a limestone-lined settling pond.

Masontown

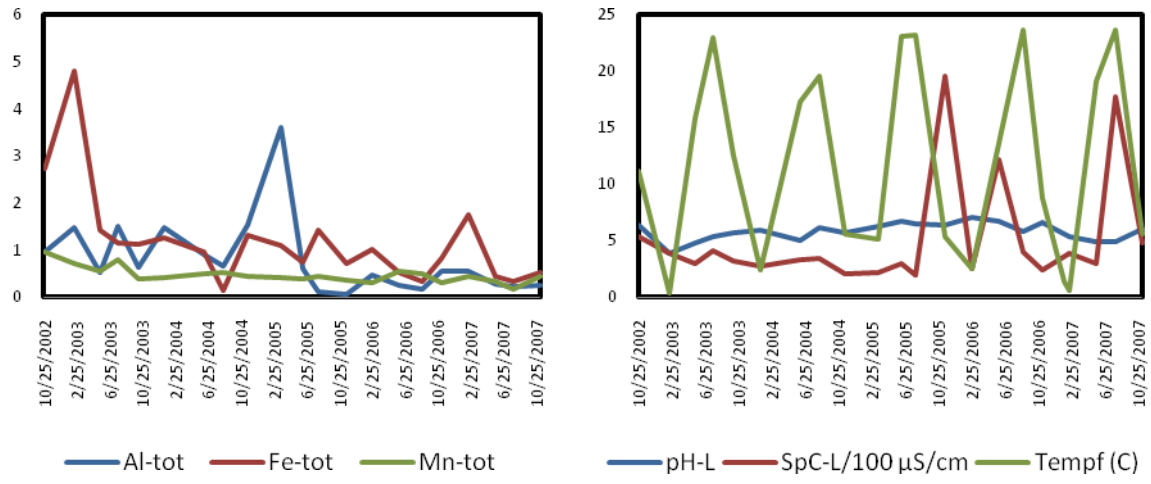
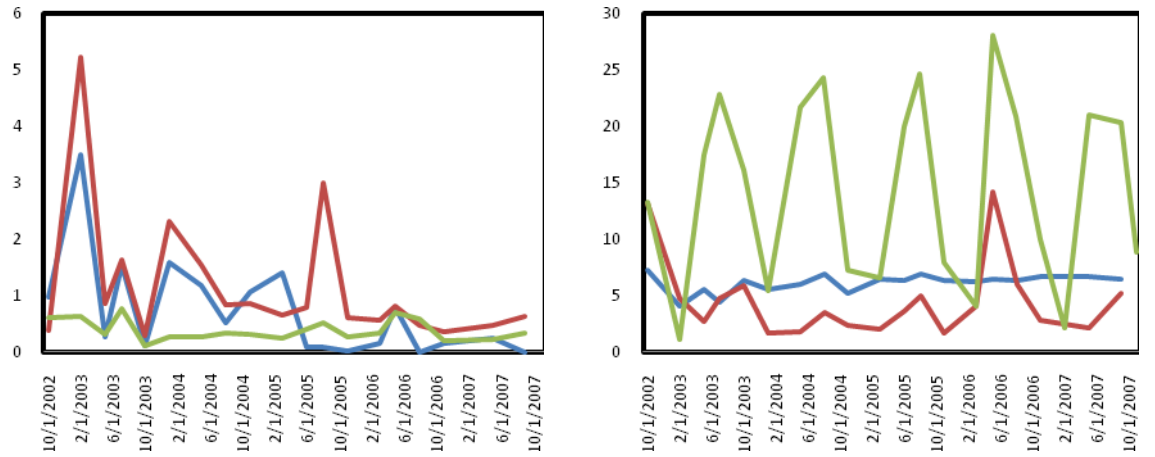


Figure 5. Concentrations of total aluminum (Al-tot), total iron (Fe-tot) and total manganese (Mn-tot) on the left hand side and pH, conductivity, and temperature levels on the right hand side for Deckers Creek at Masontown

In 2007, FODC, along with funding assistance from the WVDEP, built an addition to the original Slabcamp Run project including a steel slag bed, hoping to increase its remediation capacity.

According to data collected through the Clean Creek Program, metal concentrations in Masontown have steadily declined since 2002. This is most likely due to the successful AMD remediation projects in this area, Fig. 6 and 7.

Kingwood Pike



Airstrip

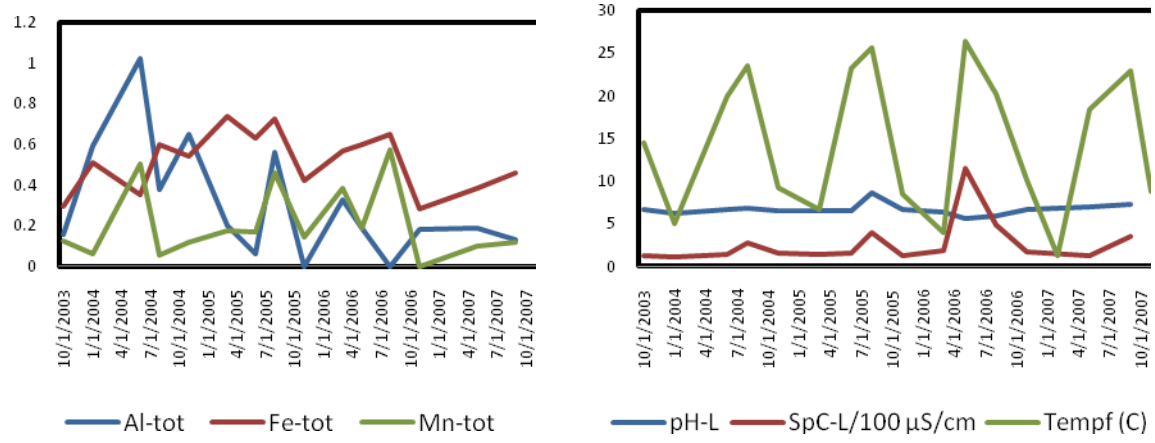
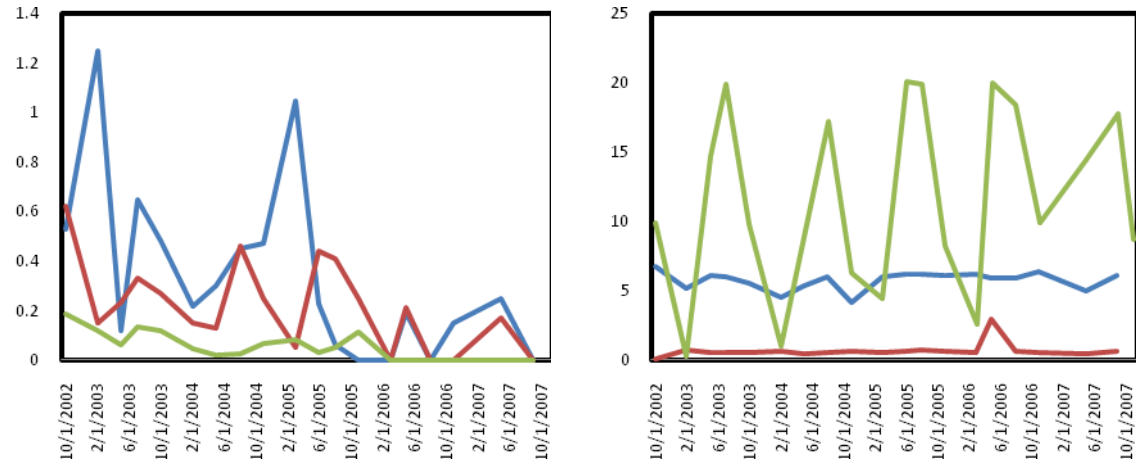


Figure 6. Concentrations of total aluminum (Al-tot), total iron (Fe-tot) and total manganese (Mn-tot) on the left hand side and pH, conductivity, and temperature levels on the right hand side for Deckers Creek at Kingwood Pike and Airstrip

Zinn Chapel



Aarons Creek

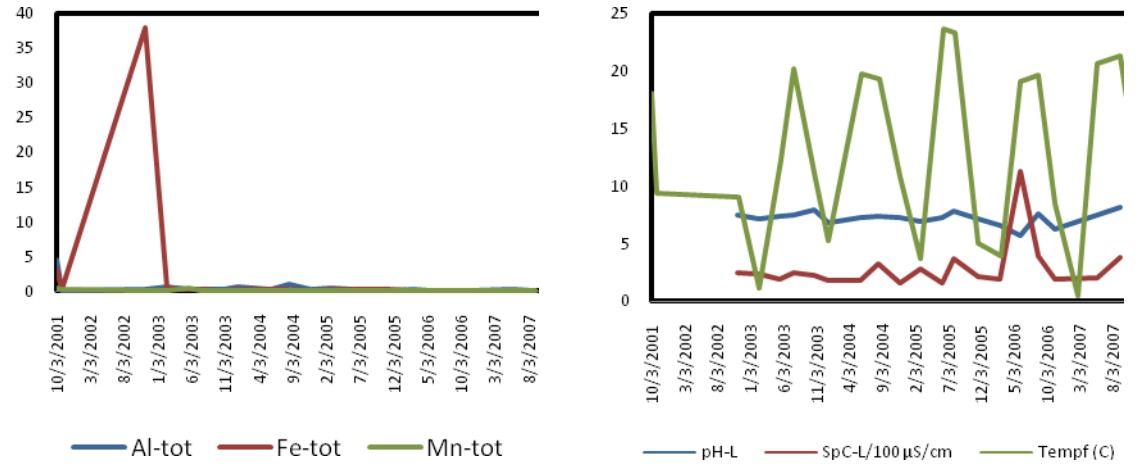


Figure 7. Concentrations of total aluminum (Al-tot), total iron (Fe-tot) and total manganese (Mn-tot) on the left hand side and pH, conductivity, and temperature levels on the right hand side for Deckers Creek at Zinn Chapel and Aarons Creek

In 2004, the abandoned mine land surrounding Dillan Creek was reclaimed using open limestone channels (OLCs). Possible affects of this project can be seen on the graphs above. On the left there is an immediate drop in Al, and a delayed drop in Fe and Mn. On the right, this treatment is noticeable in a rise in pH during this time, however it appears to be short lived.

In 2007, NRCS built the Dillan Creek diversion project. Through this project, the AMD is run through an OLC, which prevents it from entering a pile of spoil. During 2007, metal levels appear to be dropping in Dillan Creek Fig. 8, while pH is on the rise, potentially due to this diversion project.

Although there is evidence for these treatments having some positive effects on water quality, there are still many areas along Dillan Creek that need remediation for any major changes to be made. Although there are no current plans for remediation on these areas, FODC hopes to eventually address these sites.

Dillan Creek

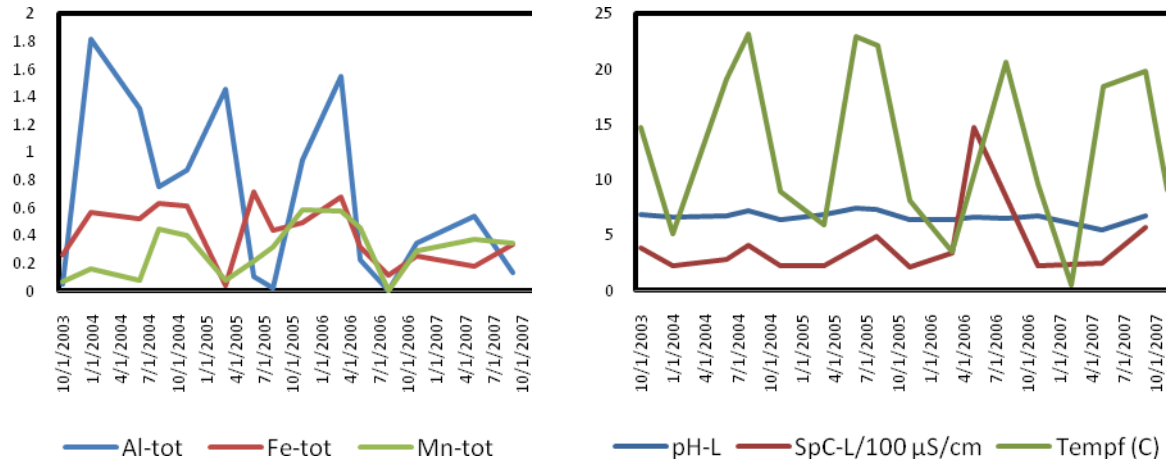


Figure 8. Concentrations of total aluminum (Al-tot), total iron (Fe-tot) and total manganese (Mn-tot) on the left hand side and pH, conductivity, and temperature levels on the right hand side for Deckers Creek at Dillan Creek

Through funding from the West Virginia Department of Environmental Protection 319 Program and the Office of Surface Mining Watershed Cooperative Agreement Program, FODC is currently working on the Valley Point 12 AMD remediation project which will alleviate some of the AMD pollution in the Kanes Creek watershed Fig. 9.

After analyzing the data it is clear that there are some common trends in the data. Levels of all metals appear to be dropping in all sites. Many of these changes correlate with the addition of remediation projects upstream from the site. However some remediation projects seem to have little or no effect at all on the overall water quality. Some forms of remediation such as OLCs usually have little affected on water chemistry, however they are and inexpensive technique that

is used often. Other projects such as Slabcamp, which utilize settling ponds and steal slag are shown to be more effective.

Kanes Creek

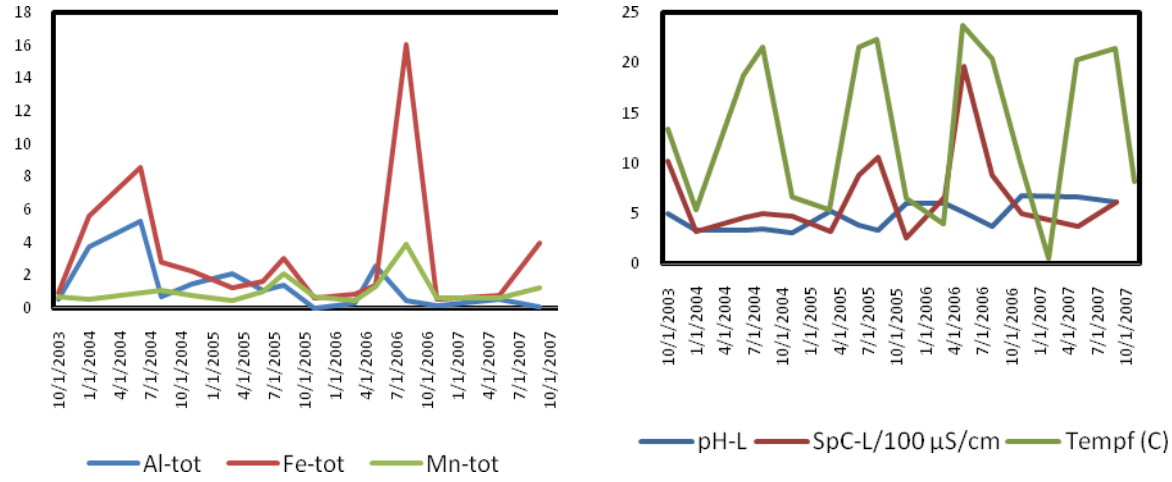


Figure 9. Concentrations of total aluminum (Al-tot), total iron (Fe-tot) and total manganese (Mn-tot) on the left hand side and pH, conductivity, and temperature levels on the right hand side for Deckers Creek at Kanes Creek

CONCLUSION

The CCP is an effective way to monitor the health of the Deckers Creek watershed. The data shows the progress of our remediation efforts, and what areas need to be addressed. However it is apparent that there are many factors outside the scope of the CCP. Some of these factors are groundwater levels and the ratio of mine flow to creek flow, which can lead to unexpected results. These factors are mostly controlled by recent precipitation which is not taken into account in this program. Because FODC does not get daily data from these sites, it is possible that there are values, which are accurate but might misrepresentative to average stream condition. These factors can make interpreting the data difficult at certain times. Overall the CCP has given FODC new information on the health of the Deckers Creek Watershed that was not available before. This data would not have been possible to obtain without the help of an OSM/VISTA and countless volunteers.