

# The Center for Watershed Research and Service

Newsletter  
Fall 2016



## Our Mission

*The mission of the Center for Watershed Research and Service is to provide expert assistance and labor to amplify the watershed restoration efforts of domestic and international nonprofit organizations and to advance the watershed restoration body of knowledge. Our projects range from simple road clean-ups and tree plantings to complex engineering trouble-shooting and design. We also help to match nonprofit partners in need of technical assistance with faculty and students from various academic schools and degree programs at Saint Francis University.*



## Inside This Issue

Community Service Projects	2
Partnership Spotlight	3, 4
Summer Research	5, 6
Faculty and Student Spotlight	7



## New Student Chapter of ASMR Links with Local Engineering Firm

In June 2016, the American Society of Mining and Reclamation (ASMR) annual conference was held in Spokane, WA, and a group of Saint Francis University engineering students and faculty attended. ASMR is a professional society that includes representatives of mining companies, corporate offices, consulting services, academic institutions, state and federal regulatory agencies, and students. Those who attended presented on a variety of topics, won quite a few awards, and in general had a great time! The conference provided a plethora of opportunities for students and faculty to learn more about mining reclamation as well as network with professionals in the field.

After returning from the conference, Hannah Patton (ENVE senior) filed with the national ASMR in order to found a Saint Francis University ASMR Student Chapter. The objective of the student chapter is to provide undergraduate students in the environmental engineering field the opportunity to better acquaint themselves with mining and reclamation work including

processes. Additionally, the group is to provide students with a means of discussing and applying their understanding of these ideas with peers and faculty in a real world setting. The student chapter meets monthly and participates in community service events at least once per semester.

In October, the Saint Francis University ASMR Student Chapter participated in volunteer work in Clearfield, PA. The community service entailed helping BioMost, an environmental consulting firm, plant an acid mine drainage passive treatment wetland. A group of seven members of the student chapter helped to plant nearly 2,000 bare-root plants at the wetland site and then seeded cattail. This volunteer work proved to be both fun and educational as the group members received a tour of the entire treatment operation and insight on what is required when designing passive treatment wetlands. Additionally, BioMost was also very thankful for the help at their site and offered to provide the student chapter with future volunteer opportunities.



## Community Service Projects

### Field Measurements Lab Helps Local Watershed Understand AMD Discharges

Local organization Clearfield Creek Watershed Association (CCWA) has given The Center the opportunity to take quarterly samples of Brubaker Run and the abandoned mine discharges along it. Brubaker Run flows between abandoned underground clay mines as well as abandoned surface coal mines. With the data from these sample events, CCWA hopes to understand the significance of the smaller discharges along the Brubaker Run compared to that of a large discharge. The findings from this study will provide CCWA with the technical backing to apply for Abandoned Mine Lands funding to build a treatment system for Brubaker Run, a significant contributor of pollutants to Clearfield Creek. Because of this connection between The Center and CCWA, sophomore Environmental Engineering students in Field Measurements Lab are gaining valuable field experience. Not only will the students' work aid in the information The Center can provide for CCWA, but the students had a great time in the field learning new water quality and remediation study techniques - valuable skills for their future as environmental engineers.



### CWRS Joins Clearfield Creek Watershed Association for Stream Cleanup

On April 17, 2016, Saint Francis University students took to Route 53 and Clearfield Creek in search of litter. This is not what the volunteers might have preferred to do early on a Sunday morning, but it was an opportunity to do something good for the community and surrounding ecosystem, and for that they decided to labor.

The CWRS coordinated volunteers for the Clearfield Creek Watershed Association's annual Spring road and stream clean-up, which involves nine miles of road and five miles of stream altogether. The community coordinators and volunteers were grateful to have the opportunity to help.





## Partnership Spotlight

### Collaboration with Virginia Tech Sheds Light on Conductivity Processes in AMD Treatment

Drs. Rachel Wagner and Bill Strosnider are collaborating with Drs. Leigh-Anne Krometis and Tess Wynn at Virginia Tech and former post-doc in environmental engineering at Saint Francis, Dr. Pete Smyntek (now at St. Vincent's College), to explore conductivity changes in vertical flow bioreactors (VFBs) for acid mine drainage treatment. Funded by the Appalachian Research Initiative for Environmental Science (ARIES), a study exploring historical conductivity data in these systems was published in the *Journal of Environmental Quality* in January 2017. Also underway is work to examine the microbial communities that are present in VFBs and contribute to AMD treatment. Students in Professor Wagner's special topics course (Spring 2016) worked on understanding and gather and interpret data for this project. Students Stephan Long (ENVE), Derek Civis (3+2 engineering), and lab manager Kelsea Green were essential in bringing both grit and joy to the field sampling.





## A Heart for Service

### Fundraising for Engineers in Action through Fasting and Festivities

Part of the Center's mission is to employ service learning for water quality improvement across the globe.

Engineers in Action (EIA) is a Bolivian organization focused on partnering Bolivian engineers, working on community-driven engineering projects, with groups from the US interested in working in Bolivia. The Center has partnered with EIA since 2010 for work on AMD treatment in the Rio Juckucha watershed in the Andes Mountains. Through this partnership, the students gain a deeper understanding of mine water issues, which have similar characteristics in both Bolivia and Pennsylvania.



Donate here:  
[bit.ly/SFUEIAFast](http://bit.ly/SFUEIAFast)

Every year, Center members, student, faculty and volunteers alike, participate in EIA's Clean Water Fast. Fasters refrain from eating for 36 hours, encouraging donors to consider the value of easily accessible clean water and food. Last year, Center members raised \$6,000! This year, EIA, the Center, and SFU Environmental Engineering teamed up for the first annual EIA Fast Festival on November 14<sup>th</sup>, a fun-filled evening to raise awareness of our work in Bolivia and to encourage participation through fasting and donations.



## NEWSFLASH!!!

*Our annual Clean Water Fast fundraiser for Engineers in Action (EIA) still needs you! EIA is our long-time partner for our engineering study abroad trips to Bolivia. Dr. Bill Strosnider has worked with them for many years for support and development of the acid mine drainage research that many CWRs's have participated in. Please consider joining us in future fasts or donating to one of our fasters and make a meaningful contribution to clean water for those in need: [bit.ly/SFUEIAFast](http://bit.ly/SFUEIAFast)*



## Summer 2016 Research

### Biologists Study AMD effects on Biodiversity

This summer, a team of SFU Biology students and faculty studied the effects of Abandoned Mine Drainage (AMD) pollution on freshwater biodiversity. AMD occurs when acidic, metal-rich water emerges at the surface after passing through abandoned mines. These metals then precipitate in a thick, orange sludge called “yellow boy” that can smother life in streams and ponds. Dr. Lane Loya and Dr. Justin Merry teamed with a group of four biology students, Alyssa Bartlebaugh, Jade Canak, Alyssa Rozich, and Gabriella Scott, as well as faculty in the Environmental Engineering department to study whether passive AMD remediation systems are effective in creating habitat.



Passive AMD remediation systems typically involve a series of retention ponds that catch AMD sediment before it enters waterways, and are connected by small limestone-lined channels that buffer the pH. The SFU team sampled aquatic insect communities in six AMD remediation sites around Cambria and Somerset counties, along with several control sites. The specimens were brought back to the lab for identification, allowing the researchers to compare species diversity and abundance between AMD sites and unaffected sites. They found that, despite still having visible yellow boy present, AMD remediation sites did create insect habitat that contained good species richness and diversity.

This was more than just another summer job for the students involved in this project. “I have always enjoyed being outside, but I honestly had no idea about the diversity of invertebrates,” reflected Junior Alyssa Rozich. “There is something really unique about being in the field with a group of students and professors who share similar interests and are all working towards a common goal.”

### Anthropogenic Effects on Streams Examined in Diatom Study



This past May and June, four biology research students, Alayna Hawkins, Colleen Nager, Katherine Meurer, and Cassandra Asberry, collected and identified diatoms from four local streams with biology professors, Dr. Irene Wolf and Mr. Andrew Scanlan. Diatoms are small unicellular algae containing silicon and can be used as indicator species for water quality. Diatoms were identified to species level and placed into environmental indices for nitrogen, phosphorus, and acid mine drainage levels to assess stream health. The streams were selected to reflect a range of various anthropogenic disturbances, such as being near wastewater treatment plants and acid mine drainage sources.

The diatoms identified in this study had weak correlations with their respective nutrient and acid mine drainage indices. Future work will include larger sample sizes to improve statistical relevance. The students learned important lab techniques that they can carry on to future careers and research. They learned methods for collecting, preserving, and identifying samples from the field, and for processing them in the lab. This was a great opportunity for them to learn skills and perform environmental research.

## Summer 2016 Research

### Students Investigate Hormone Effects on Zebrafish Fin Regeneration

Regeneration is a common area of study in zebrafish (*Danio rerio*), due to their natural ability to regenerate their fins. Studies have shown steroid hormones can affect the rate of regeneration.<sup>1</sup> For example, glucocorticoids were sufficient at blocking caudal fin regeneration. The effects of other steroid hormones on fin regeneration remains unknown. Due to the high use of contraceptive medications containing estrogen and/or progesterone and increasing use of testosterone in males to treat erectile dysfunction, these hormones have been found in wastewaters and receiving streams. The levels of these hormones in streams near urban environments are reportedly increasing.<sup>2</sup> This project investigates the effects of estrogen, progesterone, and testosterone on caudal fin regeneration.

The zebrafish were housed in 1 liter tanks with increasing levels of estrogen: 0 ng/L, 1 ng/L, 5ng/L and 10 ng/L, levels similar to those found in urban waters. The fish were anesthetized using MS-222

100 mg/mL) and the caudal fin was amputated using a clean scalpel. Regeneration was measured by weekly observations of the growth of the caudal fin. Caudal fin regeneration was complete after the third week. Preliminary results suggest increasing amounts of estrogen retard the regeneration rates of the caudal fin. More trials must be completed to determine if this delay in growth is statistically significant. Furthermore, future studies will determine if progesterone and/or testosterone play a role in caudal fin regeneration.

1. Lijoy, M. K., Sengupta, S., Kawakami, A., Andreasen, E. A., Lohr, C. V., Loynes, C. A., . . . Tanguay, R. L. (2007). Unraveling Tissue Regeneration Pathways Using Chemical Genetics. *The Journal of Biological Chemistry*, 282
2. Zucchi, S., Castiglioni, S., & Fent, K. (2012). Progestins and Antiprogestins Affect Gene Expression in Early Development in Zebrafish (*Danio rerio*) at Environmental Concentrations. *Environmental Science & Technology*, 46 (9), 5183-5192.



## Partnerships for Funding

### CWRS Helps Non-Profits receive \$500K+ Growing Greener Grant for Passive System

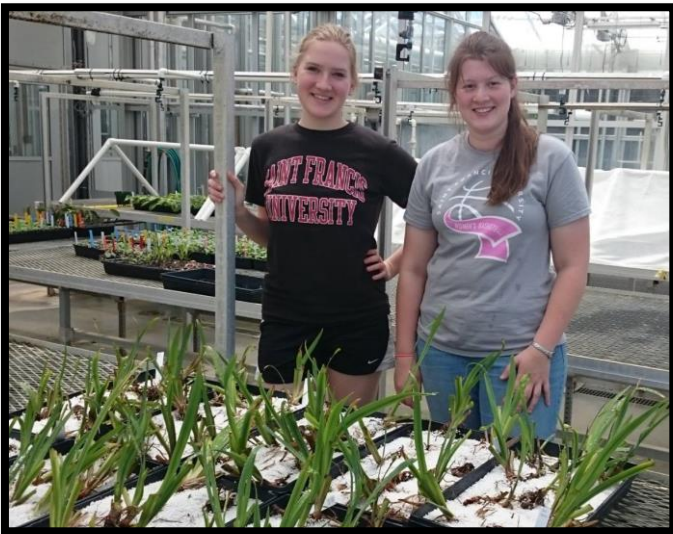
The Center partnered with Stream Restoration, Inc., and Trout Run Watershed Association's Dennis Beck and receive a Pennsylvania DEP Growing Greener Grant for the reconstruction of an abandoned mine passive treatment system in Portage, PA. When initially built, the Puritan Mine passive treatment system was designed to treat 100 gallons-per-minute of flow; the flow from the mine often exceeds this and enters the stream untreated. With this funding, a rehabilitation effort will treat all of the discharge from Puritan mine into Trout Run. Senior environmental engineering students developed preliminary designs for the system in their capstone design course and presented their work at the ASMR national conference in Spokane, WA. We hope to see Trout Run become a trout-worthy stream again!





## Student, Alumni, and Faculty Spotlight

### Staci Wolfe and Ashley Rovder



Staci Wolfe and Ashley Rovder (environmental engineering sophomores) worked during the summer at Clemson University with Dr. Sarah White and her graduate students. They examined ways to safely recycle plant nursery wastewater using plants themselves to clean the water.

**Dr. Bill Strosnider**, CWRS director, is currently serving his sabbatical as a visiting scientist at the Clemson University Baruch Institute of Coastal Ecology & Forest Science. He is participating in an \$8.7M, multi-university, USDA-funded project to improve the water management at large plant nurseries. He is collaborating closely with research and extension scientists Drs. Dan Hitchcock and Sarah White, primary investigators on the grant.

Dr. Strosnider (below) storm-proofed a floating treatment wetland experiment ahead of Tropical Storm Hermine. As you can see from his expression, he is not sure it is going to be able to handle the storm!



#### The Center for Watershed Research and Service Directors:

Dr. William Strosnider, Director  
Dr. Joel Bandstra, Associate Director  
Dr. Denise Damico, Associate Director  
Ms. Kelsea Green, Associate Director



### Cristina Marcillo



Congratulations to Cristina Marcillo (environmental engineering class of 2016) who has begun work on her PhD in the Biological Systems Engineering department with Dr. Leigh-Anne Krometis at Virginia Tech. She will also be part of the Interfaces of Global Change program on a prestigious George Washington Carver Assistantship.

Cristina is a great example of a student taking advantage of what our CWRS can offer students experientially: assisting on research at SFU in the lab and abroad in Bolivia, presenting at national conferences, and co-authoring scientific journal articles. Cristina's hard work led to this awesome opportunity and we are excited to find out where her career goes from here!

**For more information**, please contact Dr. William Strosnider at 814-471-1144 or [wstrosnider@francis.edu](mailto:wstrosnider@francis.edu)

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