

**Adopt Your Waterway  
March 1, 2016 through February 28, 2017 Progress Report**

- a. Collaborators:** This project brought together three FLOW Science Committee members that had not collaborated on a project before: Friends of the Lower Olentangy Watershed (FLOW), Sierra Club’s Ohio Chapter and the Ohio Water Resources Center. Our collaboration has been successful and yielded significant amounts of coordination, knowledge and resources leveraged. Joe Bevan and later in the summer Danielle Johnson, FLOW student contractors, did most of the program coordination this reporting period. They are both FLOW volunteers and had experience in water sampling. The collaboration between FLOW, the Sierra Club and the Ohio Water Resources Center continues to be a success. Sierra Club has donated the Water Alert Reporting Network (WARN) Training Materials and Water Sentinel Chemistry Sampling kits as match. They are pleased to have so many new steam monitoring volunteers but were happy with FLOW finding suitable sampling locations. Ohio Water Resources Center is helping coordinate volunteers’ involvement and interest in water resources by organizing sampling and data dissemination while getting staff support and volunteer recruitment and organization from FLOW.
- b. Project Activities:** The list of our main activities since last reporting period are presented in the table below, more detailed description follows.

Activity	Description	Frequency	#Participants
<b>Coordination meeting</b>	Meeting between FLOW, Ohio WRC and Sierra Club Central Ohio Chapter to discuss program coordination	1	6
<b>FLOW Water Steward Facebook Group</b>	Private Facebook group for only water stewards, used for sharing photos, materials, sampling inquiries etc.	4 posts /month	42
<b>Scouting Tributaries</b>	Finding new sampling locations on new tributaries for our program	3	3
<b>FLOW Public Meeting</b>	What is watershed and Adopt Your Waterway program introduction	1	30
<b>WARN Training</b>	Water Alert Reporting Network – broad public education on watershed issues, organized in conjunction with Ohio Chapter of Sierra Club	3	50
<b>Water Sentinel Training</b>	Hands-on volunteer training to use Sierra Club equipment for measurement of physical and chemical water quality parameters	3	39
<b>Macro-invertebrates Training</b>	Hands-on volunteer training to sample and recognize macroinvertebrates	1	17
<b>Train the Trainer Session</b>	Training the new trainers in FLOW and Sierra Club methods, preparing training materials for trainers	1	6
<b>Spring Stream Monitoring</b>	We sampled the four tributaries and eight locations from last year – some volunteers asked for trainers helps. We also sampled additional 9 tributaries, some of them having two locations. These were coordinated with trainers and provided additional training for the volunteers.	23	52

<b>Summer Stream Monitoring</b>	We sampled 21 locations at 11 tributaries (some have two locations) between 7/7/2016 to 9/5/2016	23	46
<b>Fall Stream Monitoring</b>	We sampled 21 locations at 11 tributaries (some have two locations) between 9/15/2016 – 11/10/2016. Volunteers send data files to FLOW and record it on Sierra Club's Water Sentinel page	23	46
<b>WARN Events</b>	Possible pollution events were sent to FLOW and Laura Fay contacted appropriate people to investigate	3	3
<b>Survey of Volunteers</b>	Online survey was sent to volunteers (n=44) to give us feedback about the program	1	18
<b>Newsletter</b>	Article in the Fall FLOW newsletter delivered to 500 members. E-Newsletter is also available on-line	1	500
<b>Water Steward Annual Meeting</b>	Meeting with our volunteers to present the sampling results and discuss program and plans for next year	1	20

**Coordination Meeting** – the proposal collaborators FLOW, Ohio WRC and Ohio Chapter Sierra Club met in March to discuss and coordinate this year's program

**FLOW Water Stewards' Facebook group** posts were for sampling reminders, sampling photos and occasional communication. By the end of the year some people posted macroinvertebrate photos to help with identification and others posted requests for sampling coordination (i.e. looking for sampling help). During our water steward annual meeting, we discussed broader use of the group or other "group platform" to create a photo album of our area macroinvertebrates and communicate more frequently about sampling help, macroinvertebrate identification and other training opportunities.

**Scouting Tributaries** – new sampling tributaries and their location were identified early in the season (February, March), so we have location to sample for all our new volunteers. In total 19 new sampling locations were identified. We created online sign in sheet for volunteers so they can pick desirable sites. Once the volunteers were divided into sampling groups (after the sentinel training), we assigned a trainer to each of the groups that coordinated the sampling, went with first time volunteers to sample, made sure data are recorded and transferred to FLOW and Sierra Club websites.

**FLOW Public Meeting** – FLOW organized public meeting in March about the Adopt Your Watershed program. Many people who signed via FLOW website to volunteer for FLOW attended this meeting and were recruited for the program. FLOW also presented information about all of our local programs to Stone Laboratory staff and students in November 2015, resulting in new 2016 volunteers from the Buckeye Friends of Stone Lab.

**WARN Training** – Ohio Chapter Sierra Club conducted 3 separate Water Alert Reporting Network training for our program, where about 50 citizens attended. The first WARN training in 2016 was organized in January, second in March and third in the beginning of May. We advertised the first two WARN trainings broadly via emails and program presentations.

**Water Sentinel Training** – two of these were conducted by Ohio Chapter Sierra Club for our program. We trained 39 volunteers on methods of chemical and physical water monitoring using meter and testing strips. Volunteers were put into preliminary sampling groups and the sentinel sampling kits were distributed.

**Macroinvertebrates Training** – We conducted one hands-on macroinvertebrates training by Adena Brook in early May. 17 volunteers attended this training. The volunteers were additionally trained at their sites by trainer during their first sampling session in the spring.

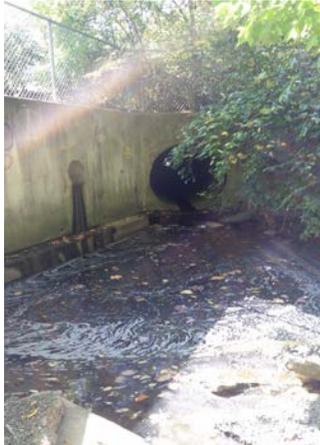
**Train the Trainer Session** – We met with our trainers (see table below) and discussed the program and their responsibilities. We created trainer guidance document for trainers (Appendix A).

Trainer	Tributaries
<b>Zuzana Bohrerova</b> – last year’s group	Glen Echo A+B, Adena Brook A+B, Turkey Run A and Kempton Run A+B
<b>Doug Berube</b>	Rush Run A+B
<b>Kris McKinnon</b>	Slyh Run A+B and Turkey Run B
<b>Joe Bevan</b>	Bill Moose Run A+B and Walhalla
<b>Erin Monaco</b>	Ackerman Run A+B
<b>Kim Banks</b>	Coe Ditch and Fisher Run
<b>Marci Bird</b>	Wildcat Run A+B and Big Run A+B
<b>Danielle Johnson</b>	All

**Spring, Summer and Fall Stream Monitoring** - Our volunteers sampled 21 locations at 11 tributaries (Appendix B). Most of the locations have been sampled three times (2016’s new locations) during this grant, some of them already have five sampling points (2015 locations). Photos from the sampling are attached by the end of the document. Although there is a limited amount of data to perform analysis on or talk about trends, the data generally seem in good agreement with scientific literature (Appendix C). Some of the chemical parameters were correlated (such as conductivity and salinity, pH and alkalinity and free and total chlorine), the macroinvertebrate index was influenced strongly by water conductivity and we saw seasonal difference in macroinvertebrate diversity and differences between the different sites. Most of the sites had a fair to poor macroinvertebrate index throughout the year. The highest macroinvertebrate index/diversity was found in Adena brook, the poorest at Ackerman Run site B, Rush Run site A and Slyh Run site A (see Appendix A for some of the data summaries).

Some volunteers were able to sample independently, while other asked for additional help from a trainer. Some of the trainers became more involved in the program, helping multiple groups of volunteers and filling in when help was needed (Zuzana Bohrerova, Erin Monaco, Joe Bevan), while others were less active with the program. In the survey and during our meeting volunteers indicated scheduling problems when planning sampling and better interconnectivity and “filling in” is desired. Furthermore, some

volunteers feel unsure about proper identification of macroinvertebrate and different solutions were discussed (such as photo album, fast identification via Facebook post etc.).



Slyh Run - soap like pollution

**WARN Events** - Our volunteers reported three separate Water Alert Reporting Network pollution events, two of them were resolved. These events were on Kempton Run, Slyh Run and Adena Brook, two of the concerns were about soap scum pollution (see photo on the left) and one “milk” type pollution, respectively.

**Survey of Volunteers** - In November, we conducted an online survey of our volunteers – see the survey questions in Appendix D. The survey participation rate was 41% - 18 out of 44 of our volunteers responded to the survey. Although the participation was not large, at least one person participated per location. Survey questions are in Appendix B. As for the program, the

majority of volunteers that filled out the survey were satisfied with the program (see table below). There was some comments about the training session and we plan to add a more thorough macroinvertebrate identification training in spring. We also will post on the Facebook page more educational materials, such as training sampling videos, photos of macroinvertebrates etc.

### Stream Quality Monitoring Volunteer Survey Results 2016

#	Field	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Total
1	Volunteer training sessions at FLOW were convenient	0.00% 0	0.00% 0	0.00% 0	26.67% 4	73.33% 11	15
2	The training sessions were very useful	0.00% 0	6.25% 1	0.00% 0	50.00% 8	43.75% 7	16
3	It was easy to get along with the volunteers in my group	0.00% 0	0.00% 0	6.67% 1	6.67% 1	86.67% 13	15
4	The staff at FLOW was friendly	0.00% 0	0.00% 0	0.00% 0	6.25% 1	93.75% 15	16
5	I felt appreciated by my volunteer supervisors	0.00% 0	0.00% 0	0.00% 0	0.00% 0	100.00% 15	15
6	The facebook water steward site was useful	0.00% 0	0.00% 0	6.67% 1	33.33% 5	60.00% 9	15

**Water Steward Annual Meeting** – We held our annual meeting on the first Monday of December in order to appreciate the work of our volunteers, network, present this year data sampling results and discuss the program with our volunteers. Additionally, during the fall we also discovered that some of the Sierra Club Water Sentinel testing strips were expiring, so we asked volunteers to return their kits in order to update them and exchange expired parts. We awarded a Water Steward Certificate to volunteers that sampled with us for at least two years (Appendix E), to show our appreciation and motivate this year’s volunteers to continue. We also prepared short presentation (Appendix F) during which present volunteers asked many questions and gave us important suggestion. We talked

about the best social platform for communication and will further explore this topic. We discussed our plans of presenting the monitoring results in a more publically digestible form, such as a watershed score card, and got a lot of input and some volunteers were interested in helping with this part of the program. We also heard about some of the problems volunteers encountered, such as difficulty finding common time with their sampling partner, or difficulty in identification. It was suggested that there are people “on call” that can jump in and sample if needed. This was already somewhat done this sampling season, but could be formalized and improved by more having more people in this position. The meeting was a big success, the volunteers that attended showed high interest in the program.

- c. Attendance** – Per our proposal, the trainers were following up with volunteers and reminding them to sample in the summer and fall, record data on Sierra Club’s website and send data sheets to FLOW. We lost contact with one of the trainers (Kim Banks), and one sampling event after that we did not manage to keep the contact with the volunteers at her sites (Coe Ditch and Fisher Run) and the sites ceased being monitored. This experience made it clear for us that trainers are an integral part of the program and maintaining the program without trainers or “site champions” would be hard.

Furthermore, many site volunteers from last year (about half) needed help on their sampling site due to their uncertainty with the sampling protocols, or due to unexpected circumstances or their site volunteers ceasing monitoring. In those instances, trainer would help with sampling and that helped with consistent monitoring of those sites. More connectivity between the trainers and the citizen monitors will be important for the project longevity and volunteer retention.

Currently our volunteers are a diverse group of people including retirees, young professionals, OSU students, and Upper Arlington high school students along with their science teacher. Seven Science Classes at Upper Arlington High School are each monitoring a location on Turkey Run and helping us with other educational projects like videos, calendars and write ups for our Watershed Wiki! We also have two OSU student organizations involved in our program – TerAqua and Buckeye Friends of the Stone Lab (BFOSL). The Ohio Sea Grant (Erin Monaco) is coordinating BFOSL students, but also helped as a trainer with macroinvertebrate identification, training and sampling on other sites.

- d. Highlights** – The majority of our sampling sites had active volunteers and were monitored three times this year. Some of the trainers went above and beyond their responsibilities (like Erin Monaco and Joe Bevan) and helped the program tremendously. One of the biggest highlights of this reporting period was the Water Stewards meeting, where volunteers were discussing the program and coming up with practical solutions and ideas to make the program continuing success.
- e. Educational objectives:** We managed to train large number of citizens in Sierra Club’s WARN (Water Alert Reporting Network) and water quality monitoring

methods. Over 45 of these in classroom and hands on trained volunteers did at least one additional in field monitoring with a trainer and with other volunteers. About 30 volunteers have been consistently sampling the whole season and gained additional experience in understanding their stream and the monitoring technique. Additional training materials were posted on the Facebook page, ranging from book recommendations, and data ranges for chemical parameter in healthy streams. After each sampling season the results were posted in an easy map format as well. We are further working on making the data more accessible for our volunteers but also for their neighbors and broader public. Some volunteers became more interested in their stream quality and noticed some of the stormwater effects – like erosion – and relationships between maintained lawns and high nutrients concentrations. Surprisingly, many of the volunteers did not feel confident in macroinvertebrate identification after the training and hands on sampling with trainer and needed further help and involvement of trainers or more experienced volunteers. In the survey, volunteers suggested that pairing less experienced with more experienced volunteers would be helpful. Additionally, many of the longer term volunteers were not interested in becoming trainers or getting more involved possibly due to their uncertainty with the methods and time limitations. In the survey, our volunteers indicated that they talked about the program with their neighbors and friends, which is a desirable outcome of our program. Surveyed volunteers indicated interest in further education to understand their watersheds or measured variables, which we will try to enable them to do by posting educational events of other partners in the watershed.

**f. Listing Materials Produced**

Volunteer Survey

Flow Water Steward Facebook Page

FLOW Water Steward Certificate

Public Meeting Water Steward Program Presentation

FLOW Fall 2016 Newsletter

## Appendix A. Trainer Responsibilities Instructions

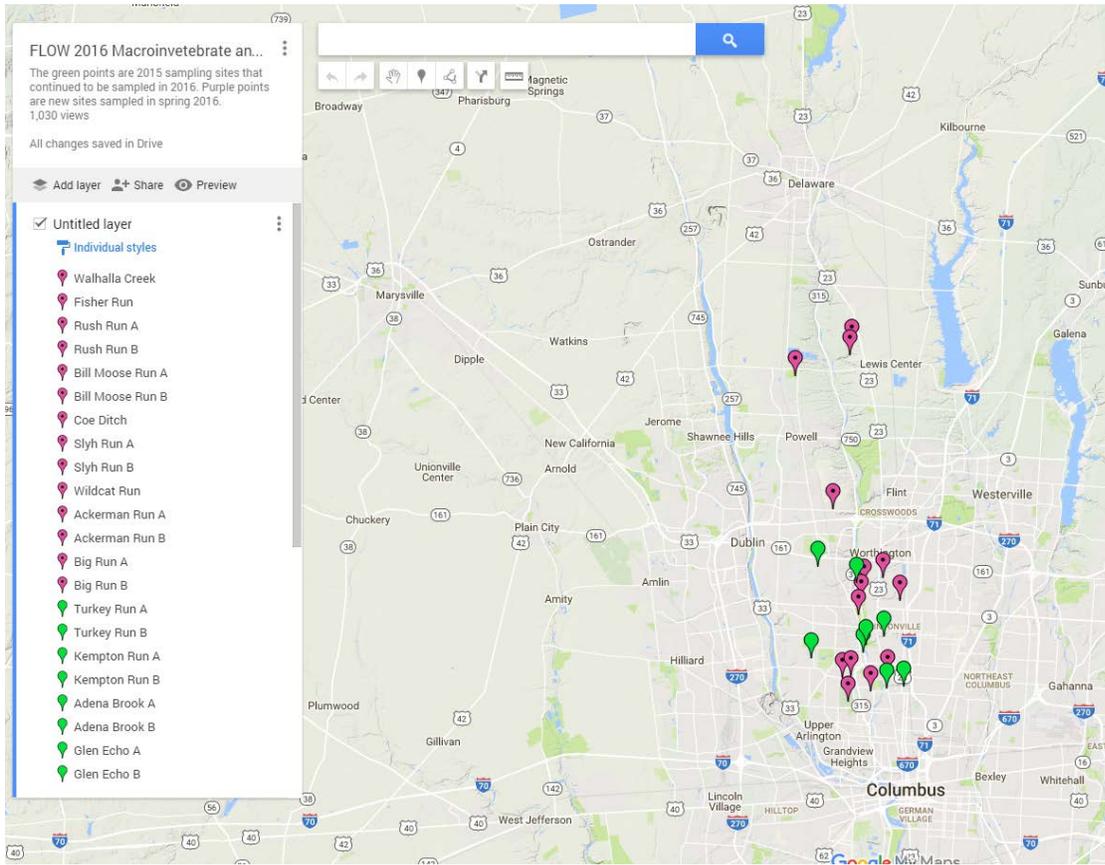
### FLOW Water Steward Area Leader Role and Responsibility

- 1) **Site selection** – You will be assigned a site (or several sites) with volunteers by FLOW. Please make sure whether you need to contact someone on the site prior going to sample (such as Ohio School for Deaf on Bill Moose Run B) – it is always good to make sure people know that FLOW volunteers are sampling. You can check with FLOW about the conditions of your particular sites.
- 2) **First Sampling** – You will need to go with your team(s) to their site and do a complete sampling with them, as this is the final phase of their training. This will include...
  - a. Distributing sampling kits – 1 sentinel and 1 macro kit per site, volunteers can decide who wants to hold what. Kits owners MUST sign lease forms.
  - b. Measuring out a 100 foot reach within which they will sample. The teams will take a picture, set a gps coordinate or find a tree or other fixed object to remember the start and finish points of the reach so that the data over the years is consistently taken within these points.
  - c. Add immediately GPS coordinates into sampling sheets and use them consistently.
  - d. Helping (working with) the Water Sentinel Trained team members to do the water chemistry sampling.
  - e. Training those team members that need macro invert training and working with others that need to have help with their ID'ing.
  - f. Showing the folks how to tally the data and fill in the forms.
- 3) **Additional Sampling:**
  - a. Follow up with teams to make sure that they are getting out to do the sampling 3 times a year (once per spring, summer, fall season)
  - b. Make sure that teams are submitting their data to FLOW at: [info@olentangywatershed.org](mailto:info@olentangywatershed.org) via a camera shot or scan. AND that they are submitting their data to the Water Sentinel system of the Sierra Club <https://docs.google.com/forms/d/1wEfJWrUPKCDYxxdq3YMui2fIXOFFbje11uyv5j0IEMO/viewform?formkey=dGEtZG1aQU12VHdnY1VEMFVgMmo1Nmc6MQ#gid=0>
  - c. Answer questions from your team regarding timing of sampling
    - i. 48hours after rain is not always required depending on the rain event. Typical months to sample: May, July and September
    - ii. We would rather get three samples per year than not so if the dates are not 2 months apart, it is generally OK.
  - d. Help team problem solve
    - i. How to ID a macro that is hard to ID
    - ii. How to replace equipment that is broken (intermediary with FLOW)
  - e. Act as a substitute or correlate a substitute from another of your teams when necessary

**Remember, be available for the volunteers and take tons of photos!!!**

## Appendix B – Sampling Location Map:

[https://www.google.com/maps/d/u/0/edit?mid=1OCXPHgUi5R4aHf\\_9iITGAz5MBS0&ll=40.15001641395445%2C-83.00653957355956&z=11](https://www.google.com/maps/d/u/0/edit?mid=1OCXPHgUi5R4aHf_9iITGAz5MBS0&ll=40.15001641395445%2C-83.00653957355956&z=11)

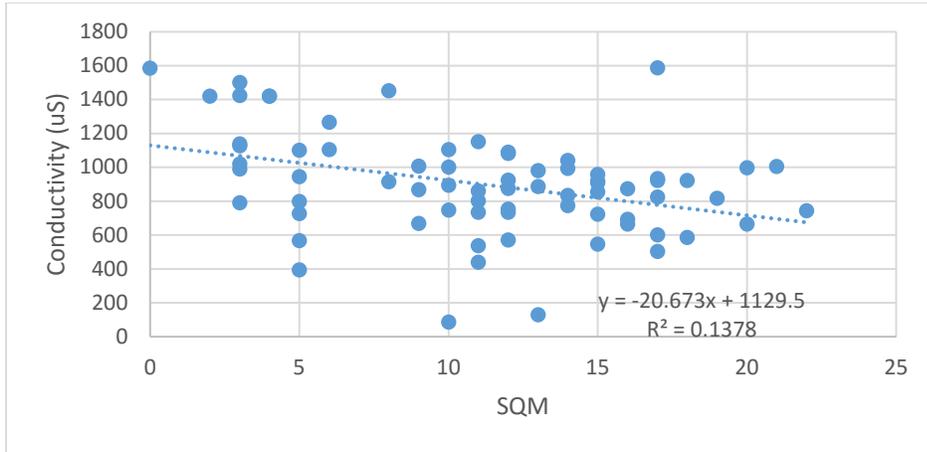


## Appendix C – Data summary and analysis

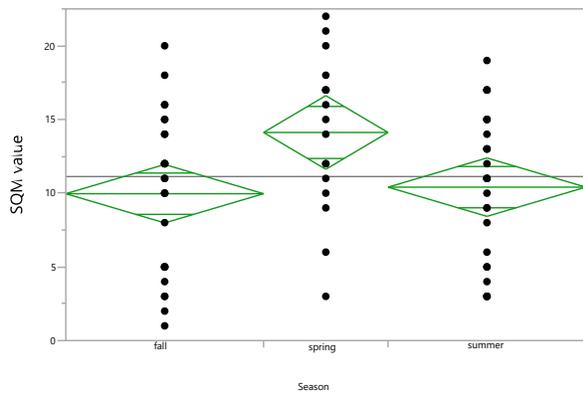
Average Values of Selected Parameters (SQM= macroinvertebrates)

Location	SQM	Phosphate	Nitrate	TDS	Conduct
Adena Brook A	17	1.0	0.7	528	755
Adena Brook B	17	5.0	0.8	437	725
Wildcat Run C	15	6.7	0.5	470	927
Kempton Run A	14	0.0	2.8	333	672
Kempton Run B	13	6.0	0.5	549	784
Ackerman Run A	13	5.0	8.3	551	633
Bill Moose Run A	12	13.3	0.1	696	991
Walhalla	12	28.3	0.5	709	956
Rush Run B	12	5.0	0.0	841	1048
Wildcat Run B	12	0.0	1.5	678	967
Glen Echo B	12	5.0	1.1	619	766
Turkey Run B	11	12.5	0.4	836	942
Slyh Run B	11	5.0	2.0	971	1343
Big Run A	10	0.0	2.0	541	763
Big Run B	9	0.0	2.0	526	766
Bill Moose Run B	9	3.3	0.2	575	796
Glen Echo A	8	8.8	0.3	713	1021
Turkey Run A	7	8.8	0.8	564	755
Rush Run A	5	0.0	0.3	813	1079
Slyh Run A	5	18.5	2.8	815	1422
Ackerman Run B	3	8.3	0.2	697	1446

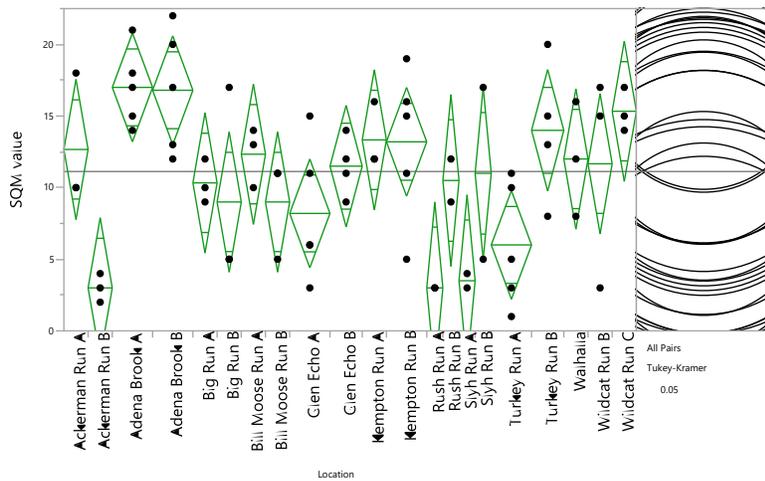
## Conductivity vs SQM



## Seasonal Differences – all sites pooled together



## SQM Index by location



## Appendix D – Survey Questions for Stream Quality Monitoring Volunteers

FLOW Water Stewards Survey – Name \_\_\_\_\_

Q1 What prompted you to participate in the program?

Q2 What support, tools or practices have been most helpful in your time as a volunteer with the program?

Q3 Please provide a specific example of a hurdle you faced in volunteering with this program? What do you think would have helped you?

Q4 Have you encouraged others to get involved with the program? If so how?

Q5 What suggestions would you offer volunteers new to the program?

Q6 If you could change one thing about the program, what would it be?

Q7 How much of an impact do you feel your volunteer work had?

- A great deal (1)
- A lot (2)
- A moderate amount (3)
- A little (4)
- None at all (5) \_\_\_\_\_

Q8 Please fill in this table how you agree or disagree with the statement

	Disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Agree (5)	N/A (6)
Volunteer training sessions at FLOW were convenient (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The training sessions were very useful (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It was easy to get along with the volunteers in my group (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The staff at FLOW was friendly (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt appreciated by my volunteer supervisors (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The Facebook water steward site was useful (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q9 Overall, were you satisfied with your volunteer experience with FLOW?

- Extremely satisfied (1)
- Quite satisfied (2)
- Somewhat satisfied (3)
- Neither satisfied nor dissatisfied (4)
- Somewhat dissatisfied (5)
- Quite dissatisfied (6)
- Extremely dissatisfied (7)

Q10 How likely are you to continue volunteering at FLOW in the future?

- Extremely likely (1)
- Quite likely (2)
- Moderately likely (3)
- Slightly likely (4)
- Not at all likely (5)

Q11 How likely are you to recommend FLOW to others as a place to volunteer?

- Extremely likely (1)
- Quite likely (2)
- Moderately likely (3)
- Slightly likely (4)
- Not at all likely (5)

Q12 How hard was it to coordinate sampling dates/times with other volunteers at your site?

- Extremely easy (1)
- Slightly easy (2)
- Neither easy nor difficult (3)
- Slightly difficult (4)
- Extremely difficult (5)

Q13 Do you need additional volunteers/help at your site?

- Yes (1) \_\_\_\_\_
- Maybe (2)
- No (3)

Q14 Do you recommend your site for future sampling?

- Yes (1)
- Maybe (2)
- No (3) \_\_\_\_\_

Q15 Are you willing to sample for FLOW next year?

- Yes (1)
- Maybe (2)
- No (3) \_\_\_\_\_

Q16 Are you satisfied with your sampling site?

- Yes (1)
- Maybe (2)
- No (3) \_\_\_\_\_

Q17 Do you need additional supplies for sampling?

- Yes (1) \_\_\_\_\_
- Maybe (2)
- No (3)

Q18 Other Comments

**Appendix E. FLOW water steward certificate**



*Certificate of Appreciation*

This certificate is awarded to **FLOW WATER STEWARD**

**KYLIENNE CLARK**

in recognition of valuable contributions towards water quality monitoring of Olentangy River tributaries, Columbus OH

*Luzana Bohrerova, FLOW Science Committee*

*12/5/2016*

*Photo of Big Run, Olentangy River Tributary*

# Appendix F. Public Meeting Water Steward Program Presentation

**FLOW Water Stewards program**

Friends of the Lower Olentangy  
Sierra Club - Ohio Chapter  
Ohio Water Resources Center  
Citizen Scientists

### Program Overview

<p><b>2015 – summer, fall</b></p> <ul style="list-style-type: none"> <li>• 4 tributaries, 2 sites each</li> <li>• About 14 volunteers and 2 student groups</li> <li>• Dedicated FLOW staff (Roxanne)</li> </ul>	<p><b>2016 – spring, summer, fall</b></p> <ul style="list-style-type: none"> <li>• 11 tributaries, 21 sites</li> <li>• About 38 volunteers and 3 student groups BFOSL, TerrAqua and UA highschool</li> <li>• Dedicated FLOW staff – Marci, Joe, Danielle</li> <li>• Trainers – Zuzana, Lisa, Marci, Kristen, Joe</li> </ul>
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### Data

- [Water Sentinel Maps](http://www.sierraclub.org/ohio/water-sentinel-maps)  
<http://www.sierraclub.org/ohio/water-sentinel-maps>
- [FLOW SQM](#)
- [FLOW Wiki](http://wiki.oleantangywatershed.org/home)  
<http://wiki.oleantangywatershed.org/home>

### Locations

South of 270 - inner      North of 270

Legend  
SQM  
● Good  
● Fair  
● Poor

### Location, location - Macro

- Adena Brook both locations consistently best in terms of macroinvertebrates
- Turkey Run A, Slyh Run A and Rush Run A (upstream) and Ackerman Run B worse

### Season Macro

1 year data! Not conclusive year specific etc.

## Chemistry – Sierra Club sentinel

Optimum Values	Tributaries
pH 6.5 – 9.0	None lower than 6.5, strips measure until 8.4
Conductivity 150-500 uS	All higher than 500 uS, Ackerman Run B year average 1446 (worse), Adena Brook A year average 755 (best)
Salinity <1000 ppm (desirable <500 ppm)	None higher than 1000, 33% samples higher than 500
TDS 50-250 mg/L healthy (<500)	Almost all higher than 250, majority higher than 500
Hardness 15-375 ppm	Most samples within this range
Alkalinity 20-260 mg/L	Most 180 or 240 or higher
Nitrate <0.6 mg/L (1.0 mg/L Ohio EPA, 1.5 mg/L eutrophic streams)	30% samples more than 0.5, in average 33% locations eutrophic, Kempton Run A and Slyh Run A 2.8 mg/L, Ackerman Run A highest 8.3 mg/L
Phosphate <0.1 mg/L	54% of samples higher than 0.1

## Chemical Parameters vs SQM

	Temperature	TDS mg/L	Conductivity µS	Salinity ppm	Total Hardness ppm	Total Chloride ppm	Free Chlorine	Alkalinity	pH	Nitrate ppm	Phosphate ppm	SQM Index	
Temperature	1.0000												
TDS mg/L	0.3003	1.0000											
Conductivity µS	0.0864	0.5764	1.0000										
Salinity ppm	0.3097	0.6963	0.6488	1.0000									
Total Hardness ppm	-0.0566	0.3703	0.3776	0.4211	1.0000								
Total Chloride ppm	-0.1329	-0.1734	0.0909	-0.0797	-0.2112	1.0000							
Free Chlorine	-0.1747	0.0328	0.2235	-0.0119	-0.0635	0.5346	1.0000						
Alkalinity	0.1220	0.2305	0.2916	0.2605	-0.1271	-0.0266	-0.0618	1.0000					
pH	0.2402	0.3205	0.3489	0.1905	0.2054	-0.2964	-0.0220	0.0664	1.0000				
Nitrate ppm	0.0070	0.0087	-0.0130	-0.0553	0.0563	0.0536	0.0607	-0.0775	-0.0449	1.0000			
Nitrite	-0.0739	0.1385	0.0969	0.0882	0.0240	0.0755	-0.0481	0.1175	0.1238	-0.0260	1.0000		
Phosphate ppm	0.0050	0.2373	0.3311	0.3827	-0.0194	-0.0070	0.0642	-0.1763	0.0573	-0.1688	0.1278	1.0000	
SQM value	-0.0763	-0.2328	-0.2798	-0.3897	-0.0815	-0.0870	-0.0270	-0.0159	-0.1946	-0.0419	-0.0423	-0.0488	1.0000

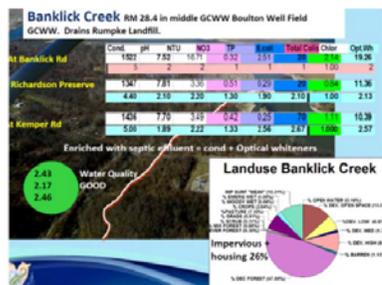
## Chemical Parameters vs SQM

- Conductivity (as well as TDS and salinity) had significant effect on the SQM value (macroinvertebrates diversity)
- Flow (low versus high) had marginal effect on SQM value



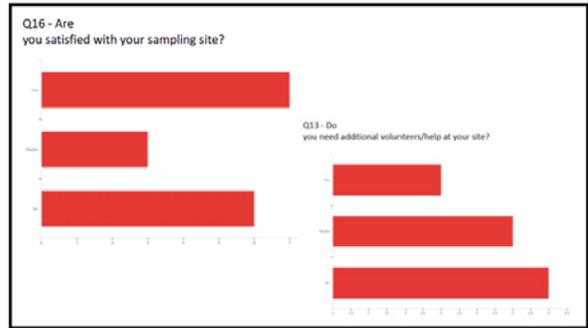
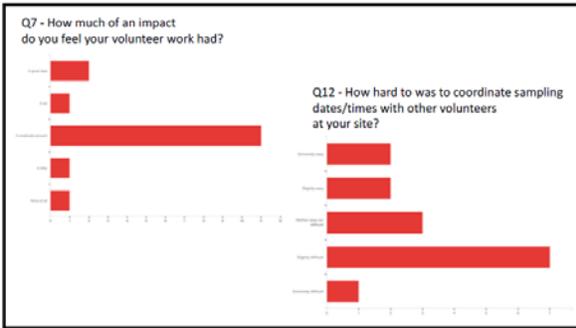
## How are these data valuable?

- Getting people to the streams – more eyes on the streams – “WARN” events
- Getting first peak on tributaries water quality and hope to see improving trend (Blue Print Columbus, FLOW honeysuckle removal, Ackerman run future restoration etc.)
- Data will guide FLOW activities by identification of critical areas/hot spots
- In process of writing grant to create easily digestible “score card” about water quality that can be distributed more widely



## Survey preliminary results/remarks

- Survey sent to 44 people, about 17 responses so far
- Most respondent satisfied with volunteering experience and will continue to monitor next year, will recommend FLOW to other volunteers.



### 2017 Plan

- Not adding additional sites
- Training more volunteers to fill in sites that need help
- Changing sites for those who need it
- Renewing supplies for sites
- Preparing more materials for volunteers and sites – educational materials
- Letting you know about additional training opportunities



### Other

- Let us know if you won't be able to sample next year
- Please make sure you are part of the FLOW Water Steward facebook page – a lot of information is published there
- Please fill in the survey if you did not do so yet...





## Photos



Marcoinvertibrate Hands-On Training, May 2016



Water Sentinel sampling on Ackerman Run, spring 2016



Rush Run macroinvertebrates sampling, fall 2016



Volunteer Stream Quality Monitoring Feedback Session, December 2016