Evaluation Report

The Watershed Academy (WA) evaluation plan generated evidence of the program's success by 1) focusing on the number and type of participants, evaluating levels of satisfaction with their experience and reflections of instructors and 2) improvements in participants' knowledge, skills, attitudes and behaviors through pre- and post-assessments of program content and the collection/recording of stream monitoring data.

Primary intended evaluation outcomes:

1) Assess change in knowledge of water quality and monitoring procedures
2) Assess growth of stewardship capabilities/intention expressed in everyday attitudes, behaviors, future intentions, skills and capacity to work with others.
3) Evaluate number participants and determine levels of satisfaction with participation.

Evaluation Tools:

The following evaluation tools were developed with assistance from Lisa Marckini, Civic Research Services, Inc. in June 2015. Additional surveys were developed by staff for specific purposes and are described below. Each of the four sections are organized as follows:

Brief description of evaluation tool, number, age, and identity of participants, conditions of administration, copy of evaluation tool, collected data, conclusions and recommendations. Evaluation tools are listed in general sequence of delivery.

Biology/Science Student Survey – Administered during promotional visit to all biology students, meant to engage students, check simple understanding and introduce water resource concepts. Discussion of answers increased interest and participation in mini-labs focused on the key components of the program experience.

Administered to 669 biology/science students (age 14-18 yrs.) during regularly scheduled science class period in classroom by WA staff.

Biology Student Survey

1. A watershed is _____
   A. The headwaters, tributaries and mouth of the river
   B. All of the land area that drains water to a lake or river
   C. A drainage basin
   D. Both B and C

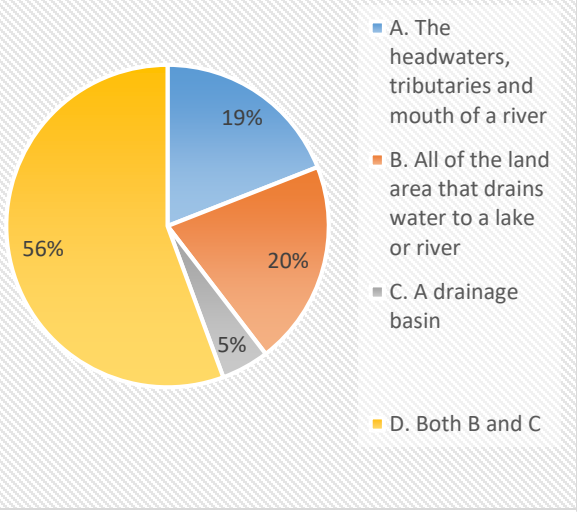
2. Where does the water in our watershed come from?
   A. Glaciers
   B. Great Lakes
   C. Underground
   D. Rainfall/Snowmelt in Northern Michigan

3. Water pollution may occur from _____
   A. Dumping garbage
   B. Erosion
   C. Cutting down shoreline trees
   D. Fertilizing shoreline lawns
   E. All of the above

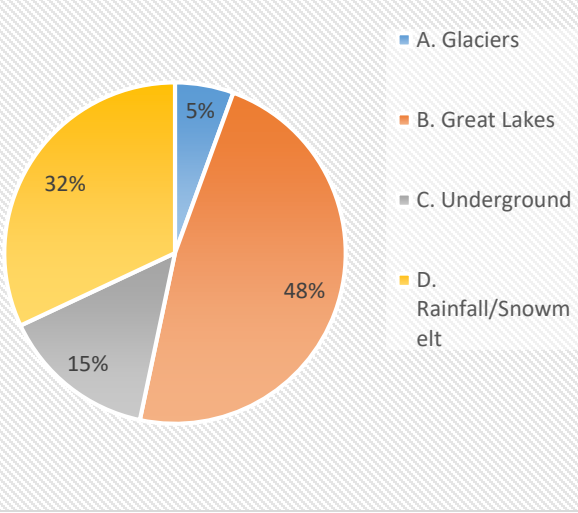
4. How many *average* gallons of water do you personally use per day, not counting water used to make the products you use and the food you eat? _____ Gallons

5. Do you think your watershed is generally healthy? Yes/No – Why or why not?

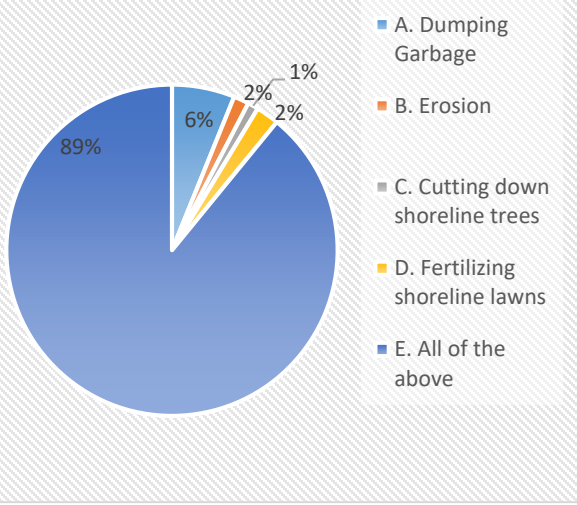
1. What is a watershed?



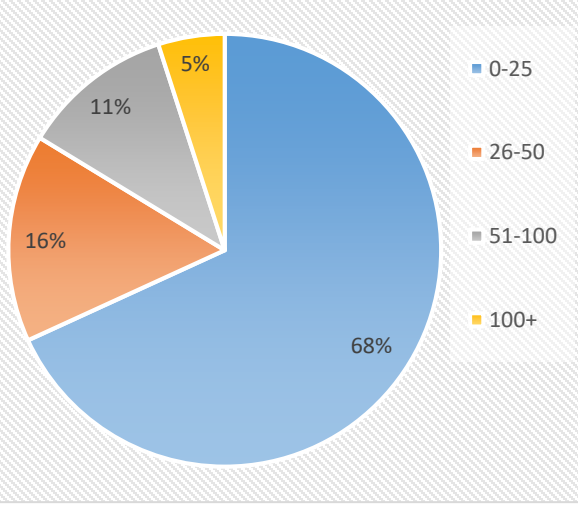
2. Where does the water in our watershed come from?

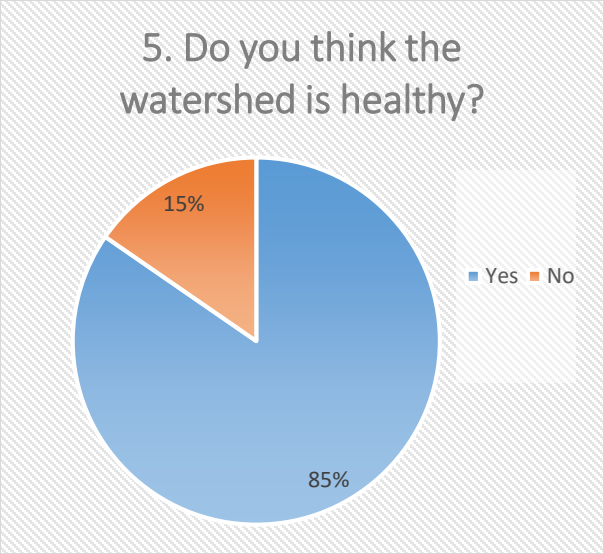


3. What causes water pollution?



4. Estimated Average Daily Water Use (gallons)





Conclusions:

The benefit of this survey was to help students understand their knowledge at that time, and to act as a springboard for discussion.

Question 1. Over half of the students could define a watershed.

Question 2. This was confusing to students because each of the answers can contain water.

Question 3. The majority of students selected all of the above, the question was too simple.

Question 4. Students were surprised by how much they underestimated their daily use of water.

Question 5. Students' perception of their watershed being healthy may stem from the idea that you can tell water quality by looking at it (clear water is clean water).

Recommendations:

Continue to utilize survey as an engagement tool for biology populations, but revise questions to get more specific answers.

Watershed Knowledge and Opinion survey – Administered pre/post survey during first training session and after field experience for assessment of participant understanding of watershed knowledge, opinions or behaviors about their watershed before and after participation in the Watershed Academy. Both online and paper surveys were given, determined by availability of technology.

Pre/post surveys were not matched up to exclude those w/o a matched pair. (Individual student data was not matched pre/post). Collected data was compared in general, within program year.

Administered to 259 biology/science students (14-18 yrs.) during a specific scheduled class period outside the regular classroom but within school building. Teams received training by WA staff over three class periods, either on different days or a 3-hour training.

*It is important to note that with students constantly being tested, member completing both pre and post survey had a high level “wanting to get it right” instead of sharing what they know at the time of the survey. Each time the survey was given members tried to share answers. This may have caused high pre-survey scores and may not accurately reflect their knowledge.

Watershed Knowledge and Opinion Survey

Watershed Knowledge

1. Which statement best describes how water quality standards are used?
   A. Water quality standards make sure that all water is clean enough to drink
   B. Water quality standards describe how to remove pollutants from water
   C. State and federal water quality standards remove pollutants from water
   D. A and B
2. Water pollution may occur from _____
   F. Dumping garbage
   G. Erosion
   H. Cutting down shoreline trees
   I. Fertilizing shoreline lawns
   J. All of the above

3. If you find only pollution-tolerant macroinvertebrates in a stream, what does that indicate?
   A. The water quality of the stream has been degraded
   B. Fish ate all of the pollution-sensitive macro-invertebrates
   C. You can drink the water
   D. You don't need to test other parts of the stream
   E. All of the above

4. Which of the following is the best way to determine the health of a stream?
   A. Measure the pH and the temperature of the water
   B. Count the number and types of macroinvertebrates living in the stream
   C. Count the number and types of trees, shrubs, grass, and other plant species growing near a stream
   D. Count the number and types of fish, amphibians and other aquatic animals living in a stream
   E. C and D

5. Which of the following lists of products ALL require water to produce?
   A. Blue jeans, automobiles, computers, paper
   B. Gasoline, plastic bags, electricity, glass
   C. Hamburger, apples, medicines, milk
   D. B and C
   E. All of the above

6. Which of the following is a source of NON-point source pollution?
   A. The water from a sewage treatment plant flowing out of a pipe directly into a lake.
   B. Rainwater runoff carrying fertilizers, pesticides, and sediment from a farm field or lawn into a river.
   C. A power plant discharging very warm water from a pipe into the Great Lakes.
   D. Oil leaking from a damaged or broken underwater oil pipeline.
   E. C and D

7. Your watershed quality impacts your drinking water.
   A. True
   B. False

8. Which of the following could contaminate drinking water in wells?
   A. Too much fertilizer on lawns and crops.
   B. Leaking underground gasoline storage tanks at gas stations.
   C. Animal wastes from a livestock feedlot.
   D. Failing septic systems nearby.
   E. All of the above

Watershed Opinions

9. What is *one thing* that students like you can do to improve your watershed?

10. Do you think you have an effect on our watershed? Y/N – Why or why not?

11. What would you be willing to do **this year** to improve the quality of our watershed? *(Check all letters that apply.)*
    A. Talk to you friends and family about their behaviors that are harmful to the watershed.
    B. Volunteer for a beach cleanup
    C. Volunteer for water quality monitoring activities
    D. Do more walking and biking and less driving
    E. Other (please specify)_____

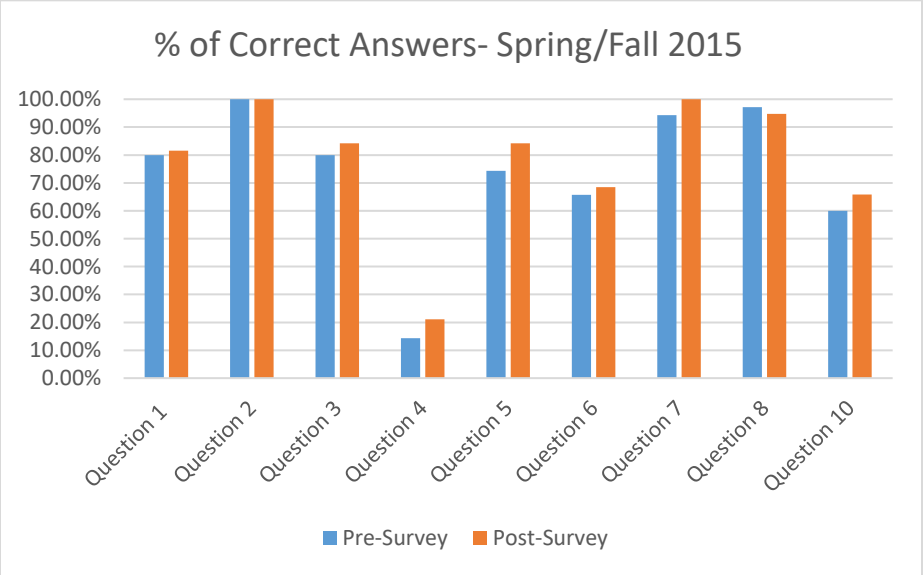
12. What activities do we use our watershed for? (*Check all letters that apply.)*
    A. Motorized boating
    B. Canoeing/kayaking
    C. Swimming
    D. Camping
    E. Hunting
    F. Fishing
    G. Other (Please Specify)_____

_____

Spring/Fall 2015

79 out of 92 students completed pre/post surveys during 2015.

Spring/Fall 2015	Pre-Survey	Post-Survey	% Change
Question 1	80.00%	81.58%	1.58%
Question 2	100%	100.00%	0.00%
Question 3	80.00%	84.21%	4.21%
Question 4	14.29%	21.05%	6.76%
Question 5	74.29%	84.21%	9.92%
Question 6	65.71%	68.42%	2.71%
Question 7	94.14%	100.00%	5.86%
Question 8	97.14%	94.74%	-2.49%
Question 10	60.00%	65.79%	5.79%
	73.95%	77.78%	3.82%



Conclusions:

The number of correct pre-survey answers were high, indicating easy questions.

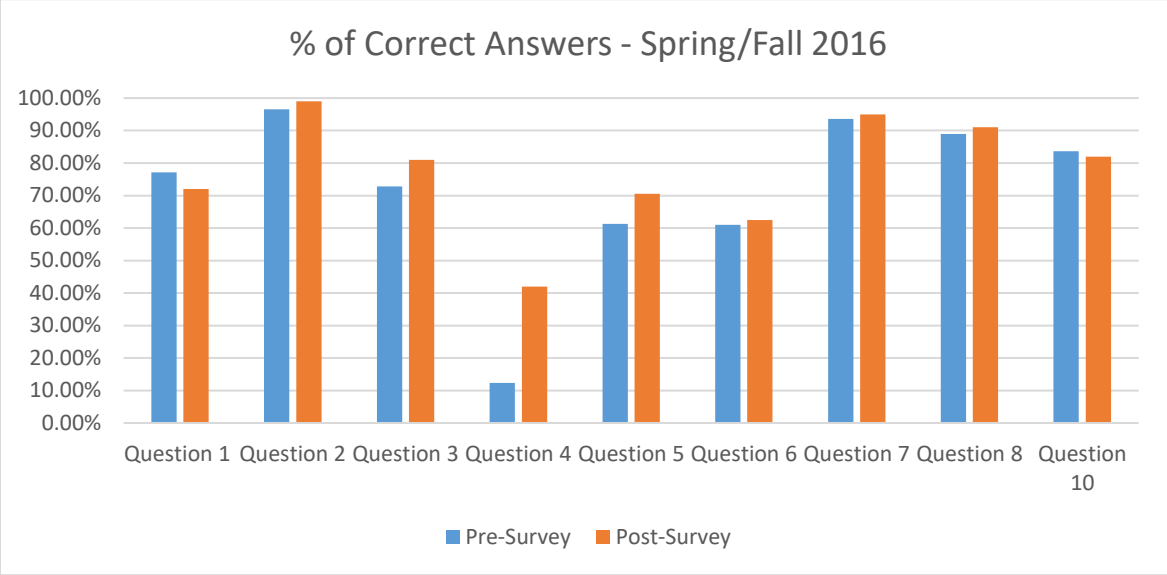
The largest percent change was in question 5, which indicates a slight level of difficulty.

Post-survey answers to question 4 indicate that the students' participation did not translate as knowledge on a test item. It is possible that students were confused by the other options in the question.

Spring/Fall 2016

152 out of 167 students completed pre/post surveys during 2016.

Spring/Fall 2016	Pre-Survey	Post-Survey	% Change
Question 1	77.15%	72.00%	-5.15%
Question 2	96.51%	99.00%	2.49%
Question 3	72.85%	81.00%	8.15%
Question 4	12.37%	42.00%	29.63%
Question 5	61.29%	70.50%	9.21%
Question 6	61.02%	62.50%	1.48%
Question 7	93.55%	95.00%	1.45%
Question 8	88.98%	91.00%	2.02%
Question 10	83.61%	82.00%	-1.61%
	71.93%	77.22%	5.30%



Conclusions:

Overall, students' performance on the various items was generally consistent with that of the first group: questions 2, 7, and 8 were answered correctly by most students; questions 4 and 6 were the most difficult in both groups.

The largest percent change was in question 4, which indicates that participants in 2016 showed an increased understanding in the connection between stream macroinvertebrates and water quality. This is a much more substantial gain than demonstrated by students in the 2015 wave of participants.

Short response summary from Question 9

9. What is *one thing* that students like you can do to improve your watershed?

In pre-survey results, forty-five percent of responses focused on not polluting, preventing others from polluting and picking up garbage in the watershed. Other responses included becoming more informed or informing others about actions to improve the watershed (15%), personally reducing, reusing and recycling (20%), controlling use of fertilizers (5%) and a non-specific statement of "helping the environment" (15%).

In post-survey results, thirty-five percent of responses focused again on not polluting, preventing others from polluting and picking up garbage. Different responses included cleaning up pet waste (10%), walk more and carpool (20%), be careful of disposing of household cleaners, oil and pesticides/fertilizers (15%), educate homeowners living by water (10%) and inform the public of the importance of taking care of the watershed (10%).

The answers in the post-survey period demonstrate learning through the academy: several of these specific issues, including pet waste, careful disposal of household liquids, and shoreline owner responsibilities were discussed. Overall, in the post-program survey, 10% of students shifted away from general comments related to pollution and garbage pickup toward more specific dos and don'ts for watershed health.

Short Response Summary from Question 10

10. Do you think you have an effect on our watershed? Y/N – Why or why not?

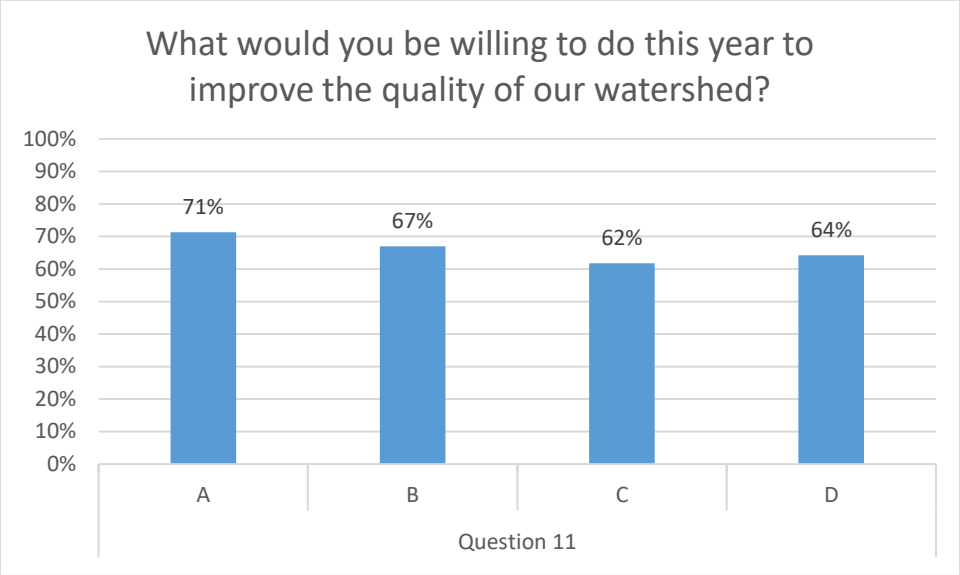
In pre-survey results, eighty-four percent responded "Yes" and four percent responded "No" to having an effect on our watershed. Twelve percent did not respond.

"Yes" responses stated that everyone effects the watershed in some way – everyday living, not being careful with actions, small impacts add up (90%), effect through spreading awareness and education (7%) and no additional comments (3%). "No" responses included not living in the area, no lawn treatment, did not pollute

In post-survey results, eighty-two percent responded "Yes" to having an effect on our watershed and (0%) "No" responses. Eighteen percent did not respond.

Post-survey "Yes" responses were specific when describing the effect they had on the watershed. Polluting, littering, lawn care, water use and car emissions (80%), general activity statements (15%) and volunteering and education of public (5%), no additional comments (5%).

Percent of responses from Question 11



*E. Other – no responses

Conclusions:

Over 60% of the students surveyed indicated that they would be willing to take each of the listed actions to improve the quality of their watershed.

Question 12

Given the issues with the language in question 12 (use of we instead of you), we are unable to draw conclusions from the student responses.

Pre/Post Survey Recommendations:

Recommendations related to the test itself:

In future programs where pre/post surveys and tests are utilized, the difficulty of the questions should be increased to provide a better opportunity to demonstrate skills and knowledge gained in the program.

Pre/post tests should be matched, by student, using the name or a code unique to each student, to ensure that the pre-to-post change is a valid measurement of student knowledge growth, and not driven by change in the underlying groups of students taking the test.

Recommendations related to the findings:

Findings suggest that students may not be fully appreciating the purposes and science behind water sampling; although gains were seen in the percentage of students able to identify the best way to monitor creek health, ideally a greater proportion of participating students would answer this question successfully. Program operators should review the lessons and process through which students are gaining an understanding of water-quality monitoring processes to see if the materials can be strengthened.

Member Program evaluation - Administered evaluation at the end of the program, after project presentation either during culminating event (WA Summit or Gathering) or by teacher in classroom and online (email). Members/teams not able to attend event were sent both online and paper evaluation. Evaluations were collected by WA staff, reviewed and used for improving program experience.

198 members completed evaluations in 2015-2016.

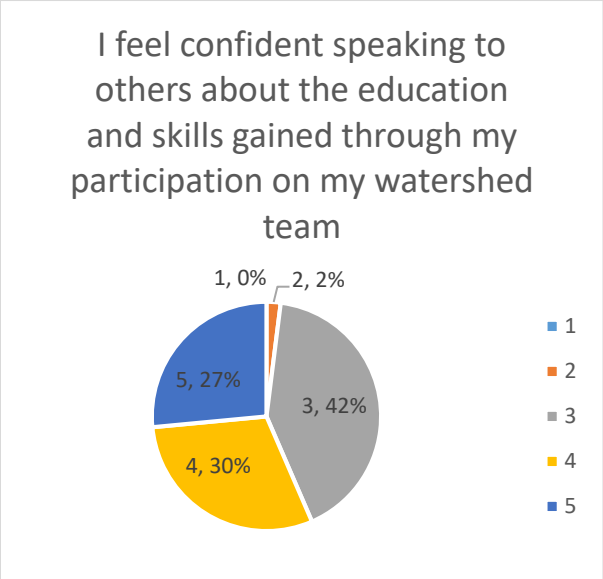
Program Evaluation

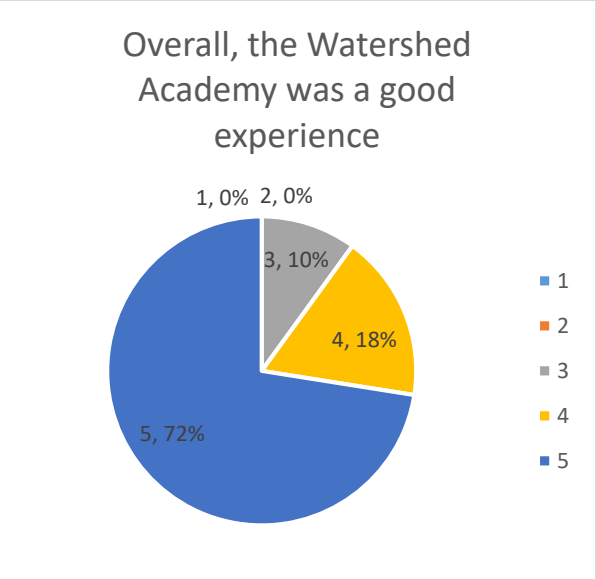
	Strongly disagree				Strongly agree
I feel confident speaking to others about the education and skills gained through my participation on my watershed team.	1	2	3	4	5
Overall, the Watershed Academy was a good experience.	1	2	3	4	5
The learning sessions were well organized.	1	2	3	4	5
The sessions offered enough time for learning and working on our project.	1	2	3	4	5
My team had the support we needed from Watershed Academy staff.	1	2	3	4	5
The student teams were about the right size.	1	2	3	4	5
I was prepared for the stream monitoring experience.	1	2	3	4	5
The information in our resource binder and power point was useful and helpful with our project.	1	2	3	4	5
The final watershed project was a useful learning experience for me.	1	2	3	4	5
*The field trip at nature preserve increased my understanding of the connection between land conservation and water quality.	1	2	3	4	5
*The field trip at nature preserve was a valuable experience.	1	2	3	4	5

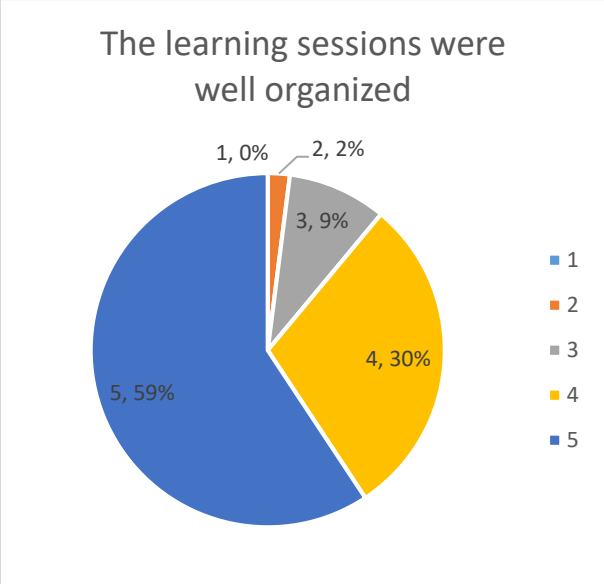
******Please take time to respond to the questions below with detailed answers.**

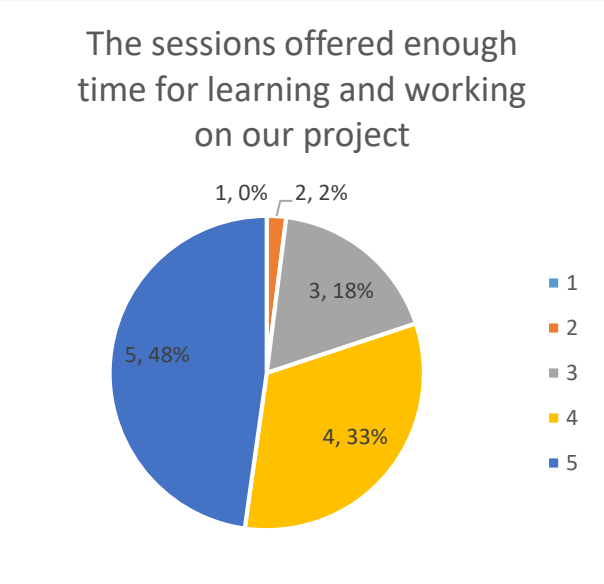
1. What is the most important thing that you learned, or learned how to do, in this program?
2. Did any of your ideas or feelings about nature, your watershed, or the state of the environment change? *If yes,* what changed, and in what way?
3. What was your favorite part of this program?
4. What was your least favorite part of this program?
5. Do you think the final watershed project is the *best way* to share your Watershed Academy experience with other students and the community? Why or why not?
6. Would you recommend participation in the Watershed Academy to classmates? Why or why not?
7. Please describe in **some detail** any changes that you feel would improve the Watershed Academy.

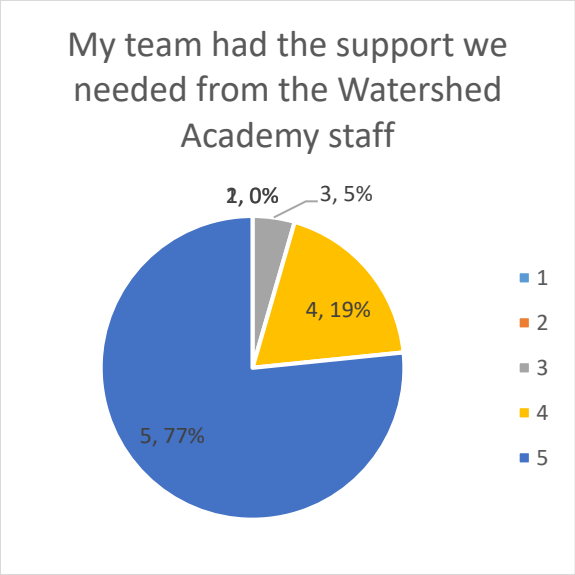
Five Point Scale Statements (5-strongly agree – 1-strongly disagree)

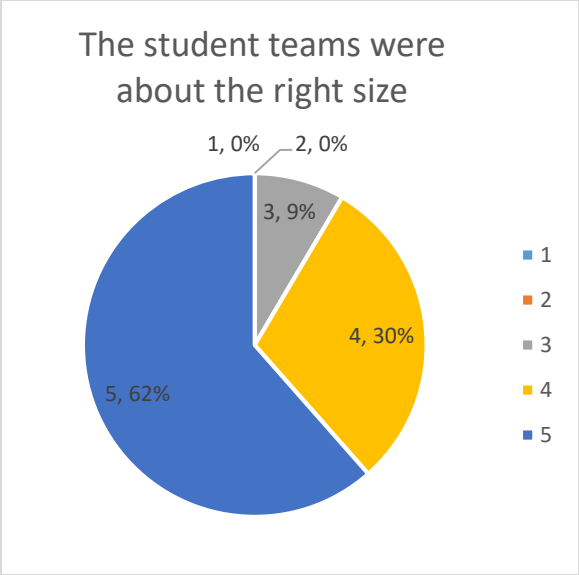


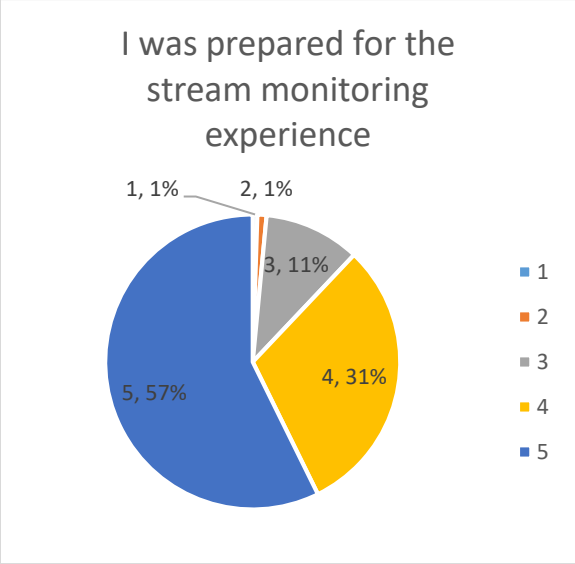


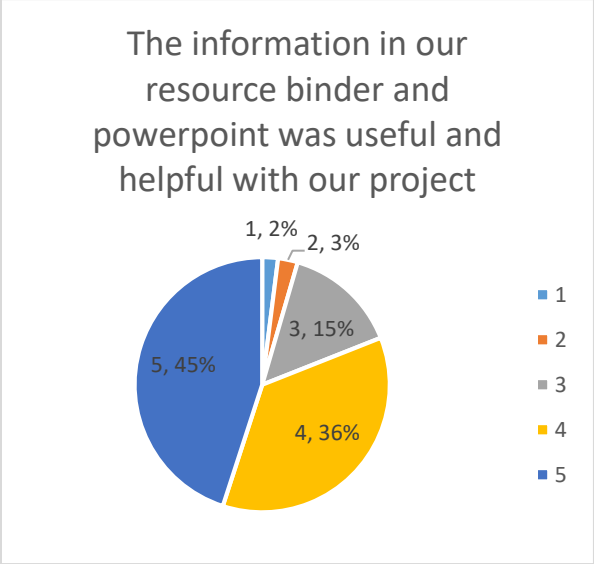


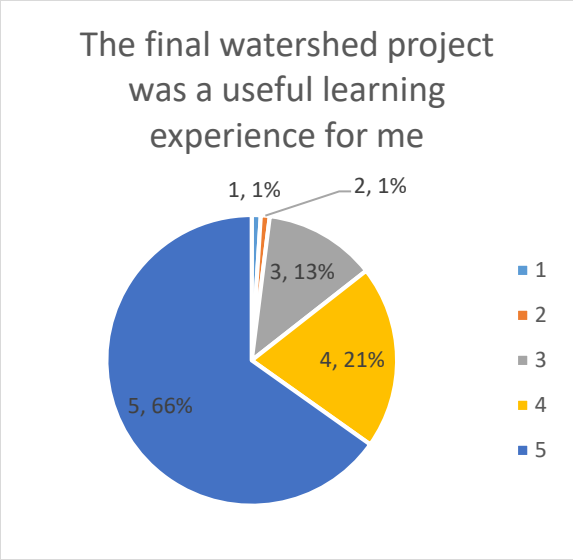



My team had the support we needed from the Watershed Academy staff
2, 0%
3, 5%
4, 19%
5, 77%
1
2
3
4
5


The student teams were about the right size
1, 0%
2, 0%
3, 9%
4, 30%
5, 62%
1
2
3
4
5


I was prepared for the stream monitoring experience
1, 1%
2, 1%
3, 11%
4, 31%
5, 57%
1
2
3
4
5


The information in our resource binder and powerpoint was useful and helpful with our project
1, 2%
2, 3%
3, 15%
4, 36%
5, 45%
1
2
3
4
5

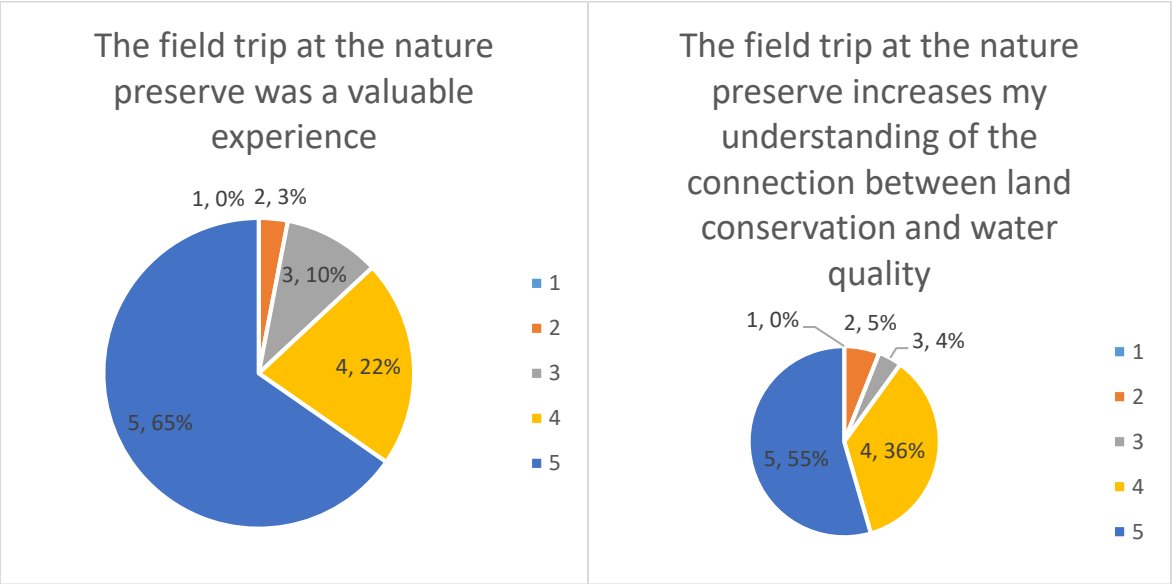


Feedback from Academy members

- Most of the students felt that the overall Watershed Academy experience was positive.
- Students' response to public speaking indicated that many felt less than fully prepared.
- 90% of academy members enjoyed the overall experience of the program; rating it a 4 or 5 out of a 1 to 5 scale
- 89% of the students felt that the learning sessions were well organized, 81% felt they offered enough time for learning and working on projects, and 96% felt they had the support they needed from WA staff.
- Most students also felt prepared for the stream monitoring experience, and felt the watershed project was useful.

Nature preserve Feedback:

The 5 pilot schools partnered with LTC on their nature preserves to provide an after monitoring experience to establish the land water connection. The data reflects responses from only the teams that participated in 2015.



Conclusions:

- Between 80% and 90% of students found the field trip at the nature preserve to be valuable and to increase their understanding.

Conclusions from the short answers:

- Members' most important thing learned was the action of monitoring. This includes walking in waders, collecting macroinvertebrates, water chemistry, etc.
- Most of the students felt more informed involved about the state of their local water resources and the environment.
- Nearly all of the students' favorite part of the program was the field monitoring experience
- Majority of the students claimed that the least favorite part of the program was training that took place in the classroom.
- Most of the students felt that the final project was a good way to share their findings, and were excited to share with community members outside of the school.
- Nearly all of the students would recommend participation because they felt it was a unique experience, they had fun with their friends and learned new skills.
- Most of the students wanted more sessions to learn about and identify macroinvertebrates and would love to monitor in better weather

Teacher program evaluation - Administered evaluation to 30 participating teachers (several evaluated the program 2-4 seasons) at the end of the program, after culminating event (WA Summit or Gathering) both on paper and online (email). Members/teams not able to attend event were sent both online and paper evaluation.

Of the 30 teachers that were sent the survey, 20 teachers responded. With three out of five teachers responding in spring of 2015, four out of five teachers responding in fall of 2015, six out of nine teachers responding in spring of 2016, and nine out of ten teachers responding in fall of 2016.

Watershed Academy - Program Evaluation- Biology Teacher

Please provide us with feedback on the Watershed Academy by sharing your experience and observations of your student's experience. Your responses are important and will help improve future programming.

***Please describe in detail your responses to all questions, in particular "yes or no" questions. If you have participated previously, please respond with current reflections.*

Student Focus:

1. What do you believe were the motivations for student participation in the Watershed Academy?
2. Did Watershed Academy member participation cause any unintended effects in the regular classroom population, whether positive or negative?
3. Do you have any evidence (observation, discussion, etc.) that students participating in the Watershed Academy have increased their **knowledge of water quality and skills** in monitoring water quality?
4. Do you have any evidence (observation, discussion, etc.) that students participating in the Watershed Academy have changed their **attitudes and behaviors** regarding water resource stewardship?
5. Did you feel Watershed Academy members were adequately prepared for the field experience?
6. What was the time investment for students/members (number of hours) and is this an appropriate amount of time?

Program Focus:

7. Did the initial visit and "mini-labs" experience appeal to the students and help promote the program?
8. Was the program organized well and was there clear communication of program goals?
9. What was the time investment for you as the biology teacher (number of hours) and was this an appropriate amount of time?
10. In an effort to minimize school disruption, please consider what training option(s) would you choose for your team:

    - Three separate class room sessions
    - Two extended class room sessions (current schedule)

- One ½ day training (includes all sessions)
- Afterschool session(s)
- Other?

Briefly explain your selection(s):

11. Would you recommend participation in the Watershed Academy to other school districts? Why or why not?
12. Please describe in some detail any suggestions or ideas you have to improve the program or its fit in your district.

Summary of teacher responses:

1. Teachers believed that motivations for student participation were:

- Teacher encouragement
- Prior academy participant encouragement
- Hands-on opportunities
- Volunteer service hours
- Learning about local watersheds
- Learn about possible future career paths
- Experience to add to resume/applications

2. Teachers felt that unintended positive effects on students involved in the Watershed Academy included pride at having participated in the Watershed Academy and excitement to share experience with peers.

Teachers felt that unintended negative effects on students involved in the Watershed Academy included students missing core classes multiple times, tension or anxiety about not having the project ready in time, and jealousy for students that did not participate.

3. 86% of teachers had evidence that students increased their knowledge of water quality and skills in monitoring water quality.

- Their discussions in class with other students have shown me their knowledge and interest has increased regarding water quality and preservation
- Most definitely. Students have worked on their project in my classroom after school and I am witnessing them learn as they work (through discussion, observation and their project). They have done countless hours of research and made phone calls in attempt to collect research/information.
- After talking with students before and after they have gained considerable knowledge in the understanding of how a watershed works and how to monitor the quality of the water. When first discussing their project ideas they had to pause every once in a while to remember terms, but on the day of the summit they were discussing each of the presentations and commenting about the other water monitoring areas using their experiences. It was amazing to hear how much they had grown!

- Yes, they could discuss stream monitoring during our ecology unit.
- I do believe that this experience increased their knowledge. Just by listening to what they talk about, seeing the presentation, and watching them in the field, I can see them using those experiences and connecting them with their everyday life.

4. 80% of teachers had evidenced that that students changed their attitudes and behaviors regarding water resources stewardship. 6% of teachers claimed that students already aware of water resources and were active stewards.

- Their discussions indicate they are more aware and now more concerned for water quality in our region. They realize how important it is to maintain high quality water resources for us and for our environment

5. Teachers felt that the students were prepared for the field experience.

6. In 2015, teachers felt that time investment for students was too high. Then in 2016, program was condensed to keep student time investment lower, around 10-12 hours. Teachers felt this was much more appropriate.

7. The majority of the teachers felt that the promotional visit was useful and helped to draw students to the Watershed Academy program.

8. All teachers felt that the program was well organized and well communicated.

9. Teachers felt that their time investment was appropriate and manageable.

10. In 2015 only one method of scheduling training sessions was offered (3 separate sessions prior to field experience). This training schedule did not work well in all school districts. So, in 2016, the training schedule was made more flexible by adding the opportunity for teachers to select the training option that fits into their schedule best.

11. All teachers would recommend the program to other districts.

12. Suggestions from fall 2015: vary meeting times so students don't miss the same class every month. Make sessions longer and reduce how many there are.

Suggestions from spring 2016: Hold summit during the week, after school.

Suggestions from fall 2016: have the wrap-up at the gathering focus more on having students look at data and make a claim.

Recommendations:
Teacher engagement is essential to student involvement. In those teams where the teacher was excited and engaged about the program, students were consistently successful and had high value for the program. In future programs, identify engaged teachers and support their participation by making the program flexible to school schedule and population.