

Big Back Yard Park Crew Summative Evaluation

July 2008

Prepared by Amy Grack Nelson, Sarah Cohn,
Claire Philippe, and Gina Navoa Svarovsky



This work was supported by the STC program of the National Science Foundation via the National Center for Earth-surface Dynamics under the agreement Number EAR- 0120914.



Table of Contents

Overview of the Evaluation	3
Data Collection Methods.....	3
Evaluation Workshops	4
Results & Discussion	
Overall Park Crew Experience	4
Experience Working in the Big Back Yard.....	6
Park Crew Activities	6
Watershed Walk Activity	7
Macroinvertebrates Activity.....	15
Fossils Activity	20
Elwha Dam Activity.....	21
Key Findings & Recommendations.....	24
Park Crew Goal 1: Knowledge of Earth Surface Processes.....	24
Park Crew Goal 2: Teaching Skills.....	24
Park Crew Goal 3: STEM Careers	27
Additional Findings and Recommendations.....	27
Youths' Recommendations	28
Appendices	
Appendix A.....	30
Appendix B.....	33

Appendix C	34
Appendix D.....	36
Appendix E	37
Appendix F	38
Appendix G	40
Appendix H	42
Appendix I.....	44
Appendix J.....	47
Appendix K.....	49
Appendix L	51

Overview of the Evaluation

The Kitty Andersen Youth Science Center (KAYSC) Park Crew is an important asset to the Science Museum of Minnesota's (SMM) Big Back Yard (BBY). The Park Crew provides visitors with hands-on activities that build on the Earth Systems Science topics presented in the BBY's mini-golf course and accompanying exhibits. These activities include Watershed Walk, Macroinvertebrates, Fossils, and Elwha Dam. As part of the Park Crew, youth not only provide experiences for visitors in the BBY, they also visit schools to teach children about Earth Science through hands-on activities. There are three overarching goals of the Park Crew.

- 1) Youth will learn about earth surface processes, specifically water related processes and the role humans play in affecting the processes.
- 2) Youth will learn teaching skills so they can educate the public (museum guests and school outreach groups) about the processes described in goal one.
- 3) Youth will learn about science, technology, engineering, and math (STEM) careers and get a chance to explore these career opportunities.

During the summer of 2007, a summative evaluation was carried out of the Park Crew program to measure the three goals. A mixed-methods design was used to gather evaluative data. The design included observations and interviews at both the beginning and end of the summer, as well as an interview with the Park Crew Program Manager to help inform recommendations. A total of 11 youth (sophomore through seniors) were in the Park Crew in 2007 with seven new youth and four veterans, or returning youth. The number of youth that participated in each evaluation activity varied depending on the method as described below.

Data Collection Methods

Observations

Observations were collected in July when youth first started working in the BBY and again at the end of August. Two of the four activities, Watershed Walk and Macroinvertebrates, were observed. These two activities were chosen because of their different presentation styles. Watershed Walk is a demonstration that is presented every half hour. Macroinvertebrates is a free-choice activity where visitors lead their own exploration of the macros. Pre and post-observations for both activities were compared to examine changes in each youths' ability to convey educational content and interact with visitors.

Five out of the seven new youth were observed (one youth didn't work during the summer, another had a very limited schedule). Observations only focused on the experience of new youth due to budget constraints. Evaluators planned to gather three observations at each activity for each youth, however there were some instances at the end of the summer in which youth did not work or had a limited schedule. A total of 16 pre-observations (5 youth) and 11 post-observations (4 youth) were gathered for Watershed Walk. Macroinvertebrates had a total of 15 pre-observations (5 youth) and 9 post-observations (3 youth).

Interviews

Youth were interviewed at both the beginning and end of summer. All 11 youth participated in pre-interviews. Only nine participated in post-interviews. The youth that did not work during the summer was not interviewed, and one of the youth had a personal matter that limited her involvement in the Park Crew at the end of the summer, so she was unavailable for a post-interview.

Pre-interviews took place in June after youth were trained in the four Park Crew activities, but before they began working in the BBY. Pre-interviews asked youth about their overall Park Crew experience up until that point and what they wanted visitors to learn from each of the four activities.

Post-interviews took place at the end of August during their last week working in the BBY. Post-interview questions focused on the overall impact of the Park Crew, youths' experience working in the BBY, and their comfort level presenting the four activities. To help measure changes in knowledge, they were again asked what they wanted visitors to learn from each of the four activities.

Evaluation Workshops

In April 2008, both new Park Crew youth and veteran youth from the previous summer (who were involved in the summative evaluation) participated in four evaluation workshops facilitated by SMM evaluator, Amy Grack Nelson, and the Park Crew program manager, Robby Callahan Schreiber. The workshops had four goals:

- 1) Teach youth about evaluation;
- 2) Give youth an opportunity to make their own meaning of evaluation data;
- 3) Increase youths' understanding of BBY activities; and
- 4) Allow youth to take more ownership and control of their work.

Over the course of four three-hour workshops, youth learned about evaluation, reflected on their activities' learning objectives, interpreted the summative evaluation data and created recommendations for the upcoming summer. Included in this report are the youths' reflections of the four activities, their interpretations of some of the evaluation data, and their recommendations to improve their work in the BBY. For a detailed description of the participatory evaluation workshops and benefits to the individuals involved see Grack Nelson & Callahan Schreiber, 2009¹.

Results & Discussion

Overall Park Crew Experience

At the end of the summer, youth were asked to reflect on changes in their knowledge and interest in science, their interest in teaching, and their awareness and interest in Earth Science careers. This reflective method was used since comparative data before youth started the Park Crew was unavailable. As shown in Table 1, all youth felt the Park Crew had an effect on their knowledge and interest in science. However, youth rated how much they learned about science higher than their change in interest about science. Only one youth reported that the Park Crew increased their interest in science "a great deal." Over half the youth felt the Park Crew had "a great deal" of influence in increasing their interest in teaching.

¹ Grack Nelson, A. & Callahan Schreiber, R. (2009). Participatory evaluation: A case study of involving stakeholders in the evaluation process. *Visitor Studies*, 12(2), 199 – 213.

One of the Park Crew goals is to provide opportunities for youth to learn about STEM careers. The Park Crew affected all youths' awareness of Earth Science careers, with over half stating that their awareness increased "a great deal." None of the youth said the Park Crew had "not much" of an impact on their awareness. The Park Crew had less of an effect on increasing youths' interest in Earth Science careers, with responses spread across the four ratings. However, the fact that five of the youth said it increased their interest "quite a bit" or a "great deal" is notable.

Table 1: Impact of Park Crew on Interests, Awareness, and Knowledge (n=9)

	Not Much	Some	Quite a Bit	A Great Deal
How much <u>science</u> would you say you have <u>learned</u> so far in the Park Crew?	0	1	4	4
How much has the Park Crew helped you become more <u>interested</u> in <u>science</u> ?	0	3	5	1
How much has the Park Crew helped you become more <u>interested</u> in <u>teaching</u> ?	1	1	2	5
How much has the Park Crew helped you become more <u>aware</u> of <u>Earth Science careers</u> ?	0	1	3	5
How much has the Park Crew helped you become more <u>interested</u> in <u>Earth Science careers</u> ?	1	3	3	2

At the beginning of the summer, youth were asked to reflect on their favorite and least favorite aspects of being a part of the Park Crew, which included the school outreaches, field trips, and training to work in the BBY. A total of 11 youth participated in these interviews. A majority of the youth (6 out of 11) said their favorite aspect was teaching others, primarily during the outreaches. Youth also mentioned the field trips, learning about science, and working with people their own age. *"Getting to know people my own age. I think at first, when we all met, when we all first started, some of us weren't as interested in Earth Science as much as we thought we would be, so it was kinda nice learning together."* Youths' least favorite aspects of the Park Crew were related to leading activities. Many youth mentioned that they felt unprepared/uncomfortable leading the activities. Other youth mentioned the process of learning the activities. *"Reading and rewriting scripts. That was my least favorite. Cause it's just like school, basically. And we just read all them pages and then rewrite 'em over in our own words."* Finally, two youth said they did not have a least favorite part of the Park Crew. To read all responses regarding youths' favorite and least favorite aspects of being part of the Park Crew, see Appendix A.

Youth were asked if they had any suggestions to improve the Park Crew. Four of the youth offered suggestions (See Appendix B). Most of the suggestions were related to experiences with other youth within the Park Crew and the KAYSC as a whole. For example, one youth stated, *"Fun having more people; maybe a bigger group, but not too big."*

At the end of the pre-interview, a few youth volunteered additional comments about the positive experiences they had with the KAYSC and Park Crew.

- *“I think it's a real great opportunity to learn a lot of different things. I think it helps with a lot of leadership skills. I think it helps with just learning things you haven't learned maybe. If you need to sharpen your social skills, being able to talk in front of a crowd - that is something you need (laughs) in order to be on Park Crew, and you can learn it, you can learn it working here too.”*
- *“It's a nice place to be at and to develop things that you just, at first just hate it, but now you just looking at it real differently. Like, just the way things happen in life. At first I used to always just throw stuff down (polluting). Now I be thinking like Oh. Then it changes me to have me to tell other people to stop doing that. Then it changes me at the same time.”*
- *“It (Park Crew) is a great opportunity. I would suggest it to people if they are into science or outdoor activities.”*

Experience Working in the Big Back Yard

At the end of the summer, youth talked about their favorite and least favorite aspects of working in the BBY. A majority of the youth (5 out of 9) said their favorite aspect was interacting with visitors. *“The kids with the funny questions and so excited about the activity.” “Meeting visitors who come here.”* Youth also like being outside, leading certain activities, and interacting with other youth. Youth mentioned a variety of things that were their least favorite including the heat, cleaning up after visitors, and waiting for visitors to come to their activity. One youth said he/she did not have a least favorite part of working in the BBY. To read all responses regarding youths’ favorite and least favorite aspects of working in the BBY, see Appendix C.

Youth were asked if they had any advice for future Park Crew members working in the BBY. Seven of the nine youth provided advice. Most of the youth stressed the importance of learning the activities. *“...learn as much as you can about them and try and get to know them like the back of your hand because you're gonna be doing them the whole time you're working there.” “Know your material, I guess, cause a lot of people ask a lot of questions.”* Youth also mentioned having a positive attitude and being open-minded. To read all of the youths’ advice, see Appendix D.

Youth provided suggestions of how KAYSC staff could improve their experience working in the BBY. Youth most frequently mentioned providing additional training on the activities and adding more activities. Youth also mentioned continuing to provide positive feedback, hiring more youth, and providing more college prep help. One youth felt that nothing needed to be improved. To read all suggestions for improvement, see Appendix E.

Park Crew Activities

Youth sign up for the activity they will present during each of their BBY shifts. Park Crew staff stress that youth should teach all four activities and not just focus on their favorite one(s). By teaching all four activities, youth have an opportunity to increase their knowledge of a variety of Earth Systems Science topics (one of the Park Crew goals). Summer schedules were reviewed to see how often youth taught each activity. As illustrated in Table 2, there were a number of youth that did certain activities only one or two times during the summer, but did one of the other activities over ten times (See Youth 1, Youth 5, and Youth 9). For most youth, there was one activity they signed up for more frequently. However, that “favorite” activity varied among the youth and “favorites” were spread across all four activities (see bolded numbers in Table 2).

Table 2: Frequency of Signing Up For Various Activities (n=10)

	Fossils	Elwha Dam	Watershed Walk	Macros
Youth 1	8	10	1	2
Youth 2	8	3	4	10
Youth 3	4	4	4	7
Youth 4	10	5	3	5
Youth 5	7	1	15	4
Youth 6	3	5	9	4
Youth 7 (Veteran)	5	9	5	3
Youth 8 (Veteran)	5	7	5	9
Youth 9 (Veteran)	13	1	2	8
Youth 10 (Veteran)	3	3	2	2
Total	66	48	50	54

Watershed Walk Activity

Visitor Experience

A total of 27 visitor groups (during both the pre and post) were observed participating in the Watershed Walk activity. Visitors who stopped at the model but did not participate in the Walk were not included in this sample. Almost all visitors participating in the activity were in groups that included both adults and children (See Table 3).

Table 3: Group Composition (n=27)

	Percent of Visitors
Adults and children	96%
Adults only	4%

As illustrated in Table 4, visitors were highly engaged with the activity, participating in the Watershed Walk for a median total time of 8 minutes, 44 seconds (Note: The times are only for visitors who actually participated in a Walk, not those that may have stopped and looked at the model when Walks were not being presented). For comparison, visitors spend a median total time of 4 minutes, 30 seconds in the BBY's Prairie Maze and 4 minutes in the BBY's Native American gardens area².

² Grack Nelson, A., Janetski, B., & Weinhagen, L. (2007). *Big Back Yard studies: Summer 2006*. St. Paul, MN: Science Museum of Minnesota.

Table 4: Total Time at Watershed Walk (n=27)

Total Time	
Median time	8 minutes, 44 seconds
Minimum time	4 minutes, 32 seconds
Maximum time	24 minutes, 38 seconds

Additional groups frequently stopped at the watershed model while the youth were presenting to other visitors (8 out of 13 pre, 8 out of 11 post). In most cases, the youth kept on presenting and didn't pause to talk to these new visitors (See Table 5).

Table 5: Behavior When New Group Approached Model (n=8)

	Pre	Post
Kept on with presentation; didn't pause to talk to visitors	6	5
Paused to talk to new visitors; encouraged them to interact	2	3

Presenting Watershed Walk Activities

As mentioned earlier, four youth were observed at the beginning and end of the summer for a total of 16 pre and 11 post-observations. All of the youth talked to visitors about the three environments (urban, neighborhood, farm) and types of pollution (fertilizer, dirt, litter, grass, oil, dog droppings, bird droppings, soap) present in each environment. Most cups, representing different types of pollution, were included in all of the presentations. However, there were a few cups that were included with less frequency. The "n" values in Table 6 indicate the number of presentations in which youth included at least one cup for that type of pollution. For most types of pollution, there was not an increase from pre to post in the frequency of talking about reasons and prevention (See Table 6). In fact, there was a decrease in frequency for most types of pollution from the beginning to the end of summer.

During both the pre- and post-observations, youth most frequently talked about why fertilizer and dirt are considered pollutants and what visitors can do to prevent polluting aquatic environments with litter. During the post, youth also talked about how to prevent grass pollution three-quarters of the time. For the other types of pollution, youth talked about why they were considered pollution and corresponding preventative actions less than half of the time. Throughout the summer, youth rarely provided visitors with descriptions of why litter, dog droppings, soap and bird droppings are problems in the environment or actions they can take to prevent pollution from dirt and soap.

Table 6: How Often Youth Talked About Reasons for Pollution and Prevention

	Why considered pollution/problem it causes in the environment	What people can do to prevent that kind of pollution
Fertilizer		
Pre (n=15)	73% (11)	27% (4)
Post (n=11)	82% (9)	18% (2)
Dirt		
Pre (n=16)	69% (11)	13% (2)
Post (n=11)	55% (6)	0%
Litter		
Pre (n=16)	19% (3)	75% (12)
Post (n=11)	0%	82% (9)
Grass		
Pre (n=15)	47% (7)	33% (5)
Post (n=11)	18% (2)	73% (8)
Oil		
Pre (n=16)	19% (3)	44% (7)
Post (n=11)	9% (1)	36% (4)
Dog Droppings		
Pre (n=10)	20% (1)	50% (5)
Post (n=7)	0%	14% (1)
Soap		
Pre (n=9)	22% (2)	0%
Post (n=4)	0%	0%
Bird Droppings		
Pre (n=10)	0%	20% (2)
Post (n=2)	0%	0%

There were a total of eight pollutants that youth could talk about during the Watershed Walk. In addition to how frequently youth provided visitors information about each individual type of pollutant (as illustrated in Table 6), evaluators noted the total number of instances in which youth mentioned a reason for why something was considered pollution and what people can do to prevent that particular kind of pollution. As shown in Table 7, youth more frequently shared higher numbers of reasons and actions with visitors at the beginning of the summer than the end. However, only one presentation included reasons for more than four pollutants and none of the presentations talked about more than five actions. There were some presentations in which youth failed to mention any reasons and/or actions.

Table 7: Number of Reasons and Actions Discussed During Walks

	Pre (n=16)	Post (n=11)
Reasons		
None	19% (3)	9% (1)
One	13% (2)	45% (5)
Two	25% (4)	27% (3)
Three	19% (3)	18% (2)
Four	19% (3)	0%
Five	0%	0%
Six	0%	0%
Seven	6% (1)	0%
Actions		
None	19% (3)	9% (1)
One	13% (2)	18% (2)
Two	25% (4)	36% (4)
Three	13% (2)	27% (3)
Four	25% (4)	0%
Five	6% (1)	9% (1)

The indoor portion of the Watershed Walk also included showing visitors visual aids such as picture cards and a sample of a drain tile. As illustrated in Table 8, youth used the drain tile and storm sewer props more frequently at the end of the summer than at the beginning, however the rain garden picture card was rarely used throughout the summer (this could be explained by the low percentage of youth presenting the outdoor portion of the walk as described below).

Table 8: Use of Cards and Props

	Pre (n=16)	Post (n=11)
Drain tile tubing	38% (6)	73% (8)
Storm sewer picture card	31% (5)	73% (8)
Drain tile picture card	19% (3)	45% (5)
Rain garden picture card	13% (2)	0%

The Watershed Walk also included an outside activity to illustrate pervious and impervious surfaces. A quarter of the visitor groups (4 out of 16) at the beginning of the summer and only one visitor group at the end of the summer were invited outside during the walk. For the youth that brought their groups outside, they did the watering can demonstration but did not talk about rain gardens. Evaluation staff noted behaviors that might explain why youth did not invite visitors outdoors. After all pollution cups were placed in the fish bowl, youth often acted as though the walk was done, in some cases thanking visitors for their time. Other times, youth did

not let the visitors know there was more to the Watershed Walk when visitors assumed the activity was over after the pollution demonstration. At the end of the summer, some youth did not even fill up the watering cans, suggesting that they weren't planning on inviting visitors outside in the first place.

Visitor Objectives for Watershed Walk

To gauge the youths' understanding of the Watershed Walk's objectives, they were asked what they personally wanted visitors to learn from the activity. As shown in Table 9, most youth wanted visitors to learn how our waters get polluted and actions visitors can take to prevent pollution (See Appendix F for youth responses related to each theme). Although a majority of youth felt these were important topics for visitors to learn, the topics were often not discussed in great detail as was illustrated in Tables 6 & 7.

Table 9: What Youth Want Visitors to Learn from Watershed Walk Activity (n=9)

Theme	Pre	Post
How our waters get polluted	6	7
Actions people can take to prevent pollution	5	6
Other	1	2

Comfort Level Presenting Watershed Walk

During the post-interviews, youth were asked about their comfort level presenting the Watershed Walk and answering visitors' questions. As illustrated in Table 10, youth were more comfortable presenting the content than answering visitors' questions. One youth felt "somewhat uncomfortable" presenting information because he/she didn't know much about the activity and felt reading the script more would have helped. Two youth felt "somewhat uncomfortable" answering visitors' questions about the Watershed Walk, specifically citing questions related to residential water waste and where it goes. "It be a lot of questions that I don't really know about 'cuz the Watershed Walk I don't really understand quite yet. Like, they ask me what's the difference with a storm drain and a drain like ... that come from the toilets and everything else. I don't know." "I didn't know a lot about what visitors would ask. (For example) Something about where the waste goes in Minneapolis. She wanted to know where it went. I didn't know." During pre and post observations, visitors' questions about the Watershed Walk and youths' responses were noted (see Appendix G). Visitors' questions were most frequently related to dirt as a form of pollution, waste water systems, and ways to prevent pollution.

Table 10: Comfort Level Presenting Watershed Walk (n=9)

	Uncomfortable	Somewhat Uncomfortable	Somewhat Comfortable	Comfortable
Presenting the information	0	1	2	6
Answering visitors questions	0	2	3	4

The youth that felt some discomfort presenting the activity and answering visitors' questions provided ideas of how KAYSC staff could help them become more comfortable. The youth that felt "somewhat uncomfortable" presenting the information felt they should be encouraged to read the script more. To better address visitors' questions, one youth suggested breaking the activity down into smaller pieces and learning one piece at a time instead of all at once. For instance, first learn about the different pollutants, then why they are considered pollutants, how they affect the water, and finally the storm drains and other topics. The other youth stressed learning more about the facts that are on the model itself. "... I didn't know anything about that stuff because we didn't learn everything. The information that is on the watershed (model) already we didn't read it and go over it as a group. That was where the sewer question (from a visitor) came from."

Interacting With Visitors

One of the outcomes of the Park Crew is for youth to acquire skills and confidence interacting with museum visitors. These skills were measured by observing youths' interactions with visitors passing by and/or stopping at the watershed model. As illustrated in Table 11, youth rarely said anything to groups walking past the model, with no increase from pre to post. In fact, there was a decrease in interaction. Observations were noted to explain what youth were doing when they did not interact with visitors as they passed by. In most cases, youth were setting up the model and did not pause to acknowledge the visitors. One Park Crew veteran even acknowledged to another veteran that he/she only interacts with visitors about the Watershed Walk on the half hour. The other veteran youth replied by encouraging the youth to go back inside and talk to visitors about the Walk even when it is not the half hour.

Table 11: Youth Interaction with Visitor Groups Passing the Watershed Model

	Pre (n=122)	Post (n=163)
Said nothing to the group at all.	75%	86%
Only greeted the group, said nothing related to the model.	11%	14%
Said something related to the model.	13%	0%

Youth were then observed to see how they interacted with visitor groups that stopped at the model, regardless if the youth had spoke to them in passing. As illustrated in Table 12, of the groups that stopped at the model, around half the time during both pre and post-observations, youth said nothing to the visitor about what they were looking at. Around a third of the time, visitors were invited to participate in the Watershed Walk presentation. Observations were also noted to explain what youth were doing when visitors' stopped at the model. During cases when youth did not say anything to visitors when they stopped, youth were doing a variety of things including reading notes about the walk, watching visitors but not saying anything, and in one case closing her/his eyes as if napping. In one instance, a visitor group with a toddler stopped at the model and the youth said later that he/she couldn't do the walk with the two year old because he was too little.

Table 12: Youth Interaction with Visitor Groups Stopping at the Watershed Model

	Pre (n=66)	Post (n=63)
Said nothing at all about model.	47%	54%
Invited visitors to listen to walk and/or presented walk.	35%	29%
Talked about model right after visitor approached (although didn't mention presentation).	15%	2%
Said nothing about model until asked by visitor.	3%	16%

Walks were advertised to take place on the half hour. However, presentations rarely occurred according to this schedule. Of all the visitors passing the watershed model, 23 visitors during the pre and 25 during the post stopped at the model within five minutes of the half hour. However, the walk was rarely presented to these visitors who stopped close to the scheduled walk time (22% during pre, 12% during post). In fact, most of the presentations took place outside of this time frame. As illustrated in Table 13, of the walks observed for the evaluation, a majority of them occurred outside of the advertised time.

Table 13: Time Frame When Walks Presented

	Pre (n=16)	Post (n=11)
Within five minutes of half hour	31% (5)	27% (3)
Other times	69% (11)	73% (8)

Walks were advertised a number of ways. Signs next to the museum elevators advertised the watershed walk along with the rest of the day's events. Youth provided additional advertising by writing on the sidewalk in the BBY. The observed youth did minimal additional advertising at the beginning of the summer (2 out of 7 instances observed), but none during the end of the summer.

Youths' Reflections of Watershed Walk

During the evaluation workshop, youth reflected back on their experience leading the Watershed Walk and did their own analysis of some of the summative evaluation data. Listed below is what youth wanted to keep and change about the Watershed Walk activity. Items with a star (*) were written after looking at summative evaluation data.

Youth felt leading the Watershed Walk activity worked well and they liked being indoors where it wasn't as hot. They wanted to change the schedule of the Watershed Walks, how the walks were advertised, the location of the watershed model, aspects of leading the activities, and their interactions with visitors.

What worked well with the Watershed Walk? What would you keep?

Leading the Activity

- Leading was easy because I knew what I was doing.
- Everything worked good.
- I would keep all our learning points.
- I enjoy showing the watershed.
- Like taking them outside.
- Going outside allows visitors to see the real thing rather than just the model.
- We were there to give info to the visitors other than making them read. *
- At the end when people say things like you can be a teacher or other things.

Weather

- Keeping cool – no sun so I don't get that hot or black.
- Keep watershed inside – it's cool inside.

Other

- Pertains a lot to the Big Back Yard.

What didn't seem to work so well about Watershed Walk? What would you change?

Demonstration Schedule & Advertising

- The times we showed them should have been longer – one time an hour.
- Change times more often.
- Have the show times closed after you have started speaking.
- Do when ready or when you get visitors (not on a schedule).*
- Loudspeaker announcement.
- Make more signs telling about the watershed.

Leading the Activity

- Specify more on types of pollutants from different places. Instead of having just dirt be from everywhere, specify where dirt is from.
- Need more training on pollution.*
- We don't have all our facts correct.
- Find out why soap is a pollutant.*
- People showed the pollutant but did not talk about them so more facts about watershed.*
- When we talked about a pollutant we didn't always talk about action(s) to prevent that type of pollution.*
- Always talk about a certain amount of pollutants; don't overwhelm unless person is engaging.*
- People should see all cards at once.*
- We want a 100% in every card – show them every time.*
- Rain garden should be shown the most often.*
- We should pour the water on the model so we won't have to walk nowhere.*
- Dig deeper into info; more research in not common research places.

Visitors

- Putting pollutions in the cups and getting everything together made it hard to talk to visitors.*
- We should invite people instead of having them ask what it was.*
- Sometimes people wouldn't stop by to look at it.
- People coming in the middle of the show (negative).
- Keep going with presentation when people walk up during presentation.*

Location

- I will change where I would want it to be - we are upstairs on the floor.
- Have two Watershed Walks – one up on the floor, one in the hall of the BBY.

Fees for program

- Add tip jars.
- Make people pay for it.

Other

- Have two people work at a time so they can learn more than one way to do the watershed.
- The clean up is hard cause the sink be acting crazy.

Macroinvertebrate Activity

Visitor Experience

A total of 24 visitor groups were observed interacting with the Macroinvertebrate activity throughout the summer. Most visitors stopping at the activity were in groups that included both adults and children (See Table 14).

Table 14: Group Composition (n=24)

	Percent of Visitors
Adults and children	79%
Adults only	8%
Adult alone	8%
Children only	4%

Visitors were highly engaged with the Macroinvertebrate activity, participating for a median total time of 8 minutes, 24 seconds (See Table 15). This time is similar to the median time visitors spent at the Watershed Walk.

Table 15: Total Time at Macroinvertebrates (n=24)

	Total Time
Median time	8 minutes, 24 seconds
Minimum time	1 minutes, 9 seconds
Maximum time	53 minutes, 54 seconds

Additional groups sometimes stopped at the Macroinvertebrates activity while other visitors were using the microscopes (3 out of 12 pre, 5 out of 9 post). Youth often encouraged these new visitors to interact with the activity (See Table 16).

Table 16: Behavior When New Group Approached Activity

	Pre (n=3)	Post (n=5)
Kept on with presentation; didn't pause to talk to visitors.	2	1
Paused to talk to new visitors; encouraged them to interact	1	4

Presenting the Macroinvertebrate Activity

The Macroinvertebrate activity gave visitors an opportunity to investigate organisms that live in aquatic environments. The activity had three visitor objectives (this was the only activity, out of the four Park Crew activities, to have formal objectives defined by staff). As a result of participating in the Macroinvertebrate activity, visitors will know: 1) what macros are; 2) where macros are; and 3) why macros are important to us.

Youth were observed to see if they were leading the activity in a way that addressed these objectives. As illustrated in Table 17, youth most frequently addressed the first objective, talking to visitors about what macros are. A majority of the time they helped visitors find a macro to look at. They explained to visitors what they were looking at over half the time during the pre, and almost all the time during the post. They often helped visitors use the microscope, but this occurred less frequently at the end of the summer. They helped visitors identify a macro using the key a third of the time or less. One youth mentioned in an interview that the team should have more time to practice using the keys to identify macros. Youth talked about where macros live (the second objective) more during the post than the pre; this objective was only addressed a little over half the time at the end of the summer. Youth were not observed telling visitors how they could find macros in their own local water source. Youth rarely addressed the third objective about why macros are important to us. At the end of the summer, the youth talked about how macros are indicators of water quality only a third of the time. Youth failed to talk about types of pollution and what people can do to keep water sources clean. Overall, for most behaviors in Table 17, youth were observed interacting with visitors more at the end of the summer than the beginning.

Table 17: Youth Interactions with Visitors at Macroinvertebrates Activity

	Pre (n=15)	Post (n=9)
Helped visitor find a macro under the microscope or gave them a large macro to look at (e.g. red worm, leech, larvae)	80% (12)	89% (8)
Helped visitor use microscope or asked if visitor needed help using microscope (for example, focus microscope)	80% (12)	56% (5)
Let visitors find their own macros to look at	67% (10)	89% (8)
Explained to visitors what they are looking for (macros/bugs that live in the water)	60% (9)	89% (8)
Showed visitors the id keys	40% (6)	67% (6)
Told visitor what they were looking at <u>without first</u> helping them identify the macro (for example, here is a flatworm to look at)	40% (6)	56% (5)
Helped visitor identify a macroinvertebrate using the key (asked visitors questions about what they are seeing related to id key – i.e. shell or no shell?)	27% (4)	33% (3)
Talked about where the macros live/their habitat (ponds, lake, creeks, etc)	13% (2)	56% (5)
Explained how macros are indicators of water quality (tolerant & intolerant species)	13% (2)	33% (3)
Explained how to use the key to id a macroinvertebrate	0%	22% (2)
Talked about types of pollution in water that affects water quality	0%	0%
Talked about actions people can take to keep the water clean	0%	0%
Talked about finding macros in their own local water source	0%	0%

Visitor Objectives for Macroinvertebrates Activity

To gauge youths' understanding of Macroinvertebrates' objectives, they were asked what they personally wanted visitors to learn from the activity. As shown in Table 18, most youth wanted visitors to learn why macros are important, with more youth mentioning this at the end of the summer than the beginning. Although youth wanted visitors to learn about the importance of macros, they were rarely observed talking about this topic with visitors (see Table 17). A little over half the youth said that they wanted visitors to learn what macros are, which is positively reflected by the observed interactions with visitors. The low number of youth saying they want visitors to learn where macros live mirrors what was seen in the pre-observations, but is much lower than its occurrence during the post-observations. See Appendix H for responses for each theme.

Table 18: What Youth Want Visitors to Learn from Macroinvertebrates Activity (n=9)

Theme	Pre	Post
Why macros are important to us	5	8
What macros are	5	5
Where macros live	3	1
Other	1	0

Comfort Level Presenting Macroinvertebrates Activity

Overall, youth felt more comfortable presenting information than answering questions related to the Macroinvertebrate activity (See Table 19). One youth felt “somewhat uncomfortable” answering visitors’ questions about the activity.

Well, it's kind of uncomfortable because once they find a bug in the bucket they'll ask us what it is...I mean there's a lot of animals on the sheet, but I think if we knew more of which ones are their names just by looking at them...it'd just look a lot better instead of them asking what it is and then us, well, let's take a look at the key (laughs), so that's what I had in mind.

The youths’ comment is opposite of what Park Crew staff were hoping youth would do with visitors: not tell them what the macroinvertebrate was but help visitors use the key to identify the organism. To help youth become more comfortable identifying macros, the youth felt KAYSC staff could do a sorting activity with youth, “...get the animals and sort them out to which names they are and see how great we are with them, so practice identifying them.” During pre and post observations, visitors’ questions about the Macroinvertebrate activity and youths’ responses were noted (See Appendix I). Visitors’ questions were most frequently related to identifying macros, where macros live, and how to use the microscope.

Table 19: Comfort Level Presenting Macroinvertebrates Activity (n=9)

	Uncomfortable	Somewhat Uncomfortable	Somewhat Comfortable	Comfortable
Presenting the information	0	0	4	5
Answering visitors’ questions	0	1	6	2

Youths’ Reflections of Macroinvertebrates Activity

During the evaluation workshop, youth reflected back on their experience leading the Macroinvertebrates activity and did their own analysis of some of the summative evaluation data. Listed below is what youth wanted to keep and change about the activity. Items with a star (*) were written after looking at summative evaluation data.

Youth felt interacting with visitors and aspects of leading the Macroinvertebrate activity worked well. They also mentioned aspects of setting up the activity. They wanted to change some of the aspects of leading the activity and the training they received. They also wanted to improve the selection of macros they have available for visitors to interact with.

What worked well about the Macroinvertebrates activity? What would you keep?

Visitors

- Sitting by Hole 1 gave us the chance to recruit people who were waiting.
- Getting people of all ages worked well.
- Enjoy how the kids were excited and liked the bugs.

Leading the Activity

- The procedure of how we taught the activity went well. (Look for bugs, then look under microscope, etc.).
- Having the people (youth) explain the activity gets visitors more interested because they spend longer time.*

Set Up

- Setup was easy. (Bring out buckets, available outlets.).
- The bridge gave us a good place to sit; shade.

Other

- Gained significant (sufficient) training in order to teach the macro activity.

What didn't seem to work so well about the Macroinvertebrates activity? What would you change?

Leading the Activity

- Let visitor find macros is better than us helping them.*
- Certain steps could be carried out by the visitors themselves to make it easier to learn (i.e. IDing macros).*
- Make sure we get facts through to visitors.*
- Make sure we show visitors the key more than 50%.*
- Make the key easier to read.
- Words hard to pronounce (on key). We could get rid of the long names. Or learn them?

Training

- Need more information to give/teach about macroinvertebrates.*
- More information about why macros are indicators of water quality.*
- Types of pollution that affect macros' living areas.*
- Learn more about how to clean water specifically for macros.*

Macros

- Bugs died easily, got lost, crayfish ate bugs, bugs ate bugs.
- Keeping bugs alive did not work well.
- Find more places that macros be found.
- More boat trips to catch bigger and better bugs.

Other

- Sitting by Hole 1 because people didn't want to do Macros.
- We should give people surveys after every activity.
- Working with someone that nags.

Fossils Activity

Visitor Objectives for Fossils Activity

To gauge youths' understanding of Fossil's objectives, they were asked what they personally wanted visitors to learn from the activity. As shown in Table 20, most youth wanted visitors to learn what fossils are and how they are created. A third or less of the youth wanted visitors to learn about the different kinds of fossils, what fossils tell us about the history of an area, and how to make a fossil. One youth said he/she wanted the visitor to learn, "Lots about making fossils." But when the evaluator asked, "So they learn about fossil making from that activity?" The youth responded, "There's really nothing to learn from that one." See Appendix J for responses for each theme.

Table 20: What Youth Want Visitors to Learn from Fossils Activity (n=9)

Theme	Pre	Post
What fossils are/How they are created	6	6
There are different kinds of fossils	3	2
What fossils tell us about the history of an area	2	2
How to make a fossil	2	1
Nothing to learn	0	1
Other	1	2

Comfort Level Presenting Fossils Activity

Most youth felt comfortable presenting the Fossils activity and answering visitors' questions (see Table 21). The youth that was "uncomfortable" presenting the activity said the team had only been taught the activity once and felt the KAYSC should provide more training. The youth who felt "somewhat uncomfortable" answering visitors' questions said, "I didn't really do the fossil activity as much as everyone else did so I guess it's because I'm still kind of learning, but I think we just need more information on, maybe what to say to the visitors because sometimes I don't really have much to say... And then we just kinda get on with the fossil making."

Table 21: Comfort Level Presenting Fossils Activity (n=9)

	Uncomfortable	Somewhat Uncomfortable	Somewhat Comfortable	Comfortable
Presenting the information	1	0	2	6
Answering visitors questions	0	1	3	5

Youths' Reflections of Fossils Activity

During the evaluation workshop, youth reflected back on their experience leading the Fossils activity. Listed below is what youth wanted to keep and change about the Fossils activity. Youth liked interacting with visitors and leading the fossil making part of the activity. However, there were aspects of fossil making they felt could be improved. They also did not like being out in the hot sun.

What worked well about the Fossils activity? What would you keep?

Visitors

- Recruiting people was easy on those days.
- Getting people interested.
- Talking to the children.
- People coming back to the Fossil activity.
- Meeting new people.

Making Fossils

- Fossil making went well.
- Keep fossil making. (Change fossil picking?)
- The plaster did not break.

Set Up

- The table; instead of not having nowhere else to do it.
- Setting up was easy.

Other

- Taking fossils out; working the edges and rushing it out.
- Keep everything.

What didn't seem to work so well about the Fossils activity? What would you change?

Making Fossils

- Some shells didn't leave marks.
- Put tarp on table - worked well, kept table clean.
- Cleaning out the trays and tables. (Difficult to clean.)

Weather

- Didn't enjoy the hot sun. Need shade.
- Heat. Sun.

Other

- Not enough people came to it.
- Fossil-rocks didn't work very well. (Time consuming, hazardous tools.)
- How do the fossils apply to the Big Back Yard?

Elwha Dam Activity

Visitor Objectives for Elwha Dam Activity

To gauge youths' understanding of Elwha Dam's objectives, they were asked what they personally wanted visitors to learn from the activity. As shown in Table 22, youth most frequently mentioned wanting visitors to learn about the environmental impact of dams. Youth more frequently mentioned other topics at the beginning of the summer than the end; although the number of times each of these other themes was mentioned during the pre was still low (less than half of the youth for each theme). There was one youth at the beginning of the summer that

didn't know what he/she wanted visitors to learn from the Elwha Dam activity and was still uncertain at the end of the summer. See Appendix K for responses for each theme.

Table 22: What Youth Want Visitors to Learn from the Elwha Dam Activity (n=9)

Theme	Pre	Post
Environmental impacts of dams	6	6
How dams work	4	2
Dam creation and removal	3	1
Benefits of dams	3	1
Don't know	1	1
Other	0	1

Comfort Level Presenting Elwha Dam Activity

As illustrated in Table 23, a number of youth experienced discomfort presenting and answering questions related to the Elwha Dam activity. The youth that felt “somewhat uncomfortable” presenting the information had different reasons for their discomfort. One youth felt there was a lot of information to memorize, “*I didn't get to memorize a whole lot of information but I knew some. It was too hard to memorize a lot of the information for me.*” The other youth said that he/she wasn't sure what to say to visitors while filling up the dam. “*It's kind of confusing. You're filling the water up and you have nothing to say because you've said everything so you run out of stuff to say.*” When asked what the KAYSC could do to help them feel more comfortable presenting the information, neither youth had suggestions. One of the youth said that he/she just had a lot to work on as part of the Park Crew and the other youth mentioned, “*I just don't like Elwha.*”

Table 23: Comfort Level Presenting Elwha Dam Activity (n=9)

	Uncomfortable	Somewhat Uncomfortable	Somewhat Comfortable	Comfortable
Presenting the information	0	2	1	6
Answering visitors questions	1	3	2	3

Of the four Park Crew activities, youth most frequently cited feeling uncomfortable answering questions about the Elwha Dam activity. In all cases, the youth felt discomfort because visitors would ask them questions about the Elwha Dam that they didn't know how to answer. For example, one youth said a visitor asked about sediment, how rivers work, and what is currently happening with the Elwha Dam. A few youth felt KAYSC staff could provide them with more information about the Elwha. “*We could have looked up some more information about the Elwha: what is going on with it now.... We did have a little bit of info about what they are doing and when they are going to take it down, but I guess that was the only info we had.*” One youth mentioned there were question cards they could fill out if a visitor had a question, however he/she never used the cards. The question cards were not mentioned during any other interviews or used during any of the observed Watershed Walk or Macroinvertebrate activities.

Youths' Reflections of Elwha Dam Activity

During the evaluation workshop, youth reflected back on their experience leading the Elwha Dam activity. Listed below is what youth wanted to keep and change about the Watershed Walk activity. Youth liked the location of the activity and that it was appealing to visitors. There were aspects of the activity they wanted to change and they had suggestions to further improve the set up of the activity.

What worked well about the Elwha Dam activity? What would you keep?

Set Up

- Location was most excellent – entrance to BBY.
- The spot it was at under the bridge by the door.

Visitors

- Keep Elwha because it brings a lot of visitors.
- I enjoy the excitement of the children.

Other

- We did a lot of fun learning and easy training.
- I would keep the activity because it was actually going to happen in the near future.
- Looks pretty cool.

What didn't seem to work so well about the Elwha Dam activity? What would you change?

Leading the Activity

- Not knowing fully how to do it – hard to remember the full story.
- Shorten the story.
- Did not enjoy the long pauses while water fills up the basin.
- Hard to answer people's questions.
- Hard to talk to the visitor when you're cleaning.

Set Up

- Put it upstairs – use it to advertise the BBY and what we do there.
- Keep it up on the 5th floor – Mississippi River Gallery.
- I think we should keep going outside – they learn more because it's right in front of them.
- Hot days put Elwha under the bridge.
- Do dam inside because it gets hot outside.
- Standing up.

Key Findings & Recommendations

Park Crew Goal 1: Knowledge of Earth Surface Processes

Key Findings

The Park Crew's first goal states, "Youth will learn about Earth surface processes, specifically water related processes and the role humans play in affecting the processes." The evaluation was designed to focus on changes in youths' knowledge from the beginning to the end of summer, under the assumption that teaching the BBY activities, finding answers to visitors' questions, and going on field trips would increase youths' knowledge of Earth surface processes.

Overall, there was a limited pre to post increase in the breadth and depth of content delivered for most activities, in fact for some topics there was a decrease. Topics may not have been covered due to youths' lack of content knowledge or teaching skills (see Goal 2 below). Additionally, the limited change could be attributed to the fact that youth had just undergone training before the pre-interviews and observations and they did not receive any refresher trainings throughout the summer to help increase their knowledge and comfort level presenting the activities' content.

Recommendations

Youth need and want more training in order to increase their knowledge of the educational content of the Park Crew's activities, thus helping to increase their personal knowledge of Earth surface processes. Some training ideas include:

- Have youth start the summer by presenting some of the activities with less content and when they reach a confidence level with a certain amount of content add in additional information (this was suggested by one of the youth).
- Provide refresher trainings throughout the summer to increase youths' content knowledge and comfort level presenting the activities.
- Consider allowing more time for youth to reflect and discuss their field trips, since the trips are often related to the Park Crew activities. This will allow youth to delve deeper into various topics, thus helping to increase youths' content knowledge for their BBY activities.

Park Crew Goal 2: Teaching Skills

Key Findings

The Park Crew's second goal states, "Youth will learn teaching skills so they can educate the public (museum guests and school outreach groups) about the processes described in goal one." Teaching skills include more than just presenting the activity. As museum educators, youth interact with visitors in a variety of ways including:

- Greeting/acknowledging visitors when they walk by the activity.
- Inviting visitors to do the activity or come back later.
- Presenting the activity.
- Answering visitors' questions about the activity.
- Interacting with visitors groups who stop at the activity when others are already participating.
- Wrapping up an activity.

A large part of leading the activities is being comfortable interacting with visitors at various stages in the staff-visitor encounter. As evident through observations, youth are uncomfortable

with the most basic levels of interactions: greeting visitors and inviting them to participate in the activity. However, these skills are currently not taught to Park Crew youth, instead training focuses on presenting the activities.

Even though youth are reluctant to interact with passing and stopping visitors, they enjoy teaching others. Youths' favorite parts of the Park Crew are teaching elementary students and meeting BBY visitors. The Park Crew also affected youths' views of teaching, with over half stating that the Park Crew had "a great deal" of influence in increasing their interest in teaching (highest rating on a 4-point scale). Visitors are also highly engaged in the youth-led activities, spending a median time of over eight minutes at both the Watershed Walk and Macroinvertebrates activity.

Youth are able to clearly articulate what they would like visitors to learn from each activity, often aligning with the activities' objectives. However, at times there is a disconnect between what youth hope visitors learn and what youth are actually teaching. For example, youth wanted visitors to learn why macroinvertebrates are important, but rarely discussed this with visitors. Youth are interested in teaching, so there is an opportunity to provide them with more support to become better educators by helping them understand what objectives are and how they can teach visitors to ensure those objectives are addressed.

Youth are more comfortable presenting the information for the four BBY activities than they are answering visitors' questions. There is currently no means for youth to discuss the questions as a team and the question cards don't seem to be used by the youth. Youth desire more training so they can feel more comfortable both presenting the activities and responding to visitors' questions.

Recommendations

Training is needed to ensure youth are comfortable during all types of interactions with visitors, which will help make youth better educators. Some ideas for additional training opportunities include:

- Familiarize youth with the museum's Three Standards for Service (see Appendix L). These are standards of service that all museum staff and volunteers are expected to follow. The fact that a majority of the time youth did not acknowledge visitors passing the watershed model suggests that this training may be helpful. It may also help youth feel more confident in recruiting visitors to the activity.
- Have youth shadow or observe floor staff (paid and volunteers) or Park Crew staff. Provide youth with an observation sheet to look at how various interactions are handled, such as what staff do when visitors walk by, when they approach, when they ask questions, when the presentation is over, etc.
- Ask SMM theater staff to do a presentation with pointers on presenting to visitors.
- Role-play visitor interactions and how to address various situations. Model ideal staff-visitor interactions.
- Have youth pair up to do presentations together for the first few weeks; if possible, pair veterans with new youth.
- Have youth assess each other. Youth could come up with a list of ideal interactions and what they would look like. They could then observe each other and work together to decide how they can improve.
- Provide opportunities throughout the summer for youth to discuss their experiences interacting with visitors. These discussions could be as a team or one-on-one with a staff or volunteer who works on the floor.

Discuss with youth what objectives are and how what they teach helps to ensure the objectives are addressed.

- For the Watershed Walk, provide additional training on why various pollutants are considered bad for the environment and actions people can take to prevent that kind of pollution. Youth rarely discussed these issues for most types of pollution but stated these were important topics they wanted visitors to learn. Additionally, encourage youth to discuss reasons and actions for all pollutants, not just a few of them.
- For the Macroinvertebrates activity, youth are helping visitors look at macros and understand what they are, but training should include suggestions about how to incorporate information about the importance of macros into the visitors' experience of looking at the organisms.
- For the Fossils activity, a small percentage of youth shared that they want visitors to learn about identifying fossils and how fossils tell us about the history of an area. If these are important concepts, make sure training stresses these objectives.

Establish means for youth to find answers to visitors' questions.

- One youth mentioned question cards, but they don't appear to be used by the youth. The question cards would be an opportunity for youth to find the answers to common visitor questions with the help of KAYSC staff. The cards could also serve as a learning opportunity for the entire Park Crew if youth periodically share visitors' questions during a team meeting or by posting questions and answers somewhere in the KAYSC.
- Review the questions visitors had at Watershed Walk and the Macroinvertebrates activity (see Appendices G and I). Youth can determine if the questions were answered correctly, how they might answer them differently, and find answers to questions that youth did not respond to. These frequently asked questions could become part of a handout of common questions and responses for each activity so youth have a resource at their fingertips to easily find answers, especially if youth aren't yet comfortable with an activity's content.
- Training for the Watershed Walk should include reviewing the information under the flip-up features on the watershed model, as they provide answers to some of the visitors' questions. If youth are familiar with the information that is on the model, they can use that as a resource to feel more comfortable addressing questions.
- A number of youth were uncomfortable answering visitors' questions about the Elwha Dam activity. Part of this is related to the real-world connection of the activity and the curiosity people have about the Elwha Dam. Make sure youth have current information about the dam. Possibly have youth create an information sheet they can show visitors that addresses the most common questions about the current situation with the dam.

Reconsider the format of Watershed Walk and what youth are expected to teach.

- Reconsider if the outdoor portion should remain part of the Walk, since youth rarely invited visitors outside. If the outdoor portion is omitted, youth could focus more on learning the content of the model activity, especially why various things are considered pollutants and what people can do to address them. They can talk about some of the outdoor content by pointing out pervious and impervious surfaces on the model and showing the rain garden card. They can also encourage visitors to find the rain garden and pervious and impervious surfaces in the BBY. If the outdoor portion remains, talk to youth about how to encourage visitors who were already in the BBY to go back out for the demonstration, as this may have been the reason some youth did not invite visitors outside.

- Some of the picture cards were infrequently used. Decide if these cards are an important part of the Walk and if so, work with youth so they are comfortable incorporating all of the cards into their presentation.

Define the intended audiences for the activities. One youth did not present the Watershed Walk because she/he said the visitor was too young (2 years old) although there were adults with the child. Ensure that all youth know who the audience is for the activities. If an activity isn't meant for younger audiences, discuss with youth how they can still engage younger visitors in an activity.

Park Crew Goal 3: STEM Careers

Key Findings

The Park Crew's third goal states, "Youth will learn about STEM careers and get a chance to explore these career opportunities." Youth were provided with various opportunities to learn about STEM careers, especially during field trips to sites like a wastewater treatment plant and the National Center for Earth-Surface Dynamics Lab.

The Park Crew affected all youths' awareness of Earth Science careers, with over half stating that their awareness increased "a great deal." The Park Crew had less of an effect on increasing youths' interest in these careers, with responses spread across the four ratings. However, five out of the nine youth stating that the Park Crew increased their interest in Earth Science careers "quite a bit" or a "great deal" (highest ratings on a 4-point scale) is notable.

Additional Findings and Recommendations

The evaluation also brought to light issues that were not directly connected to the three Park Crew goals. Listed below are these findings and related recommendations.

Consider presenting the Watershed Walk as visitors approach the model, instead of at scheduled times. If Walks continue to remain on a schedule, consider the following:

- Ensure youth have access to a watch or some other type of clock while sitting at the Watershed model. There were instances where youth walked over to look at the clock by the elevator, which means they had no way of knowing when to present the activity.
- Develop clear expectations of what youth should do between presentations. This may be something youth decide on as a group, since it was clear that some youth tried to engage visitors, while others were only waiting until the half hour.
- Some youth are not at the model and/or ready to present at the advertised times. The Walks are advertised on the daily events fliers throughout the museum. The fliers say the walks are from 11:30 – 2:30 and are available every 30 minutes. If a walk is not available at one of these times, you may want to consider having a sign up that tells visitors to come back at a certain time for the next walk. Reminding youth that they need to be available to provide the advertised programming may be necessary, stressing how the visitor experience may be negatively impacted if advertised activities are not available (see the first Standard of Service in Appendix L).

At the beginning of the summer, Park Crew staff expressed a desire for youth to teach all four BBY activities, not just those that are "easiest" or are a youth's "favorite." While most youth spent their time spread across the four activities, there were three youth that did one of the activities only once or twice and a different activity more than ten times. If having youth lead all activities similar amounts of time or at least a minimum number of times is an important part of

the Park Crew, staff may want to create some way for youth to track how often they do each activity over the summer.

Reconsider how BBY activities are advertised to visitors, especially if they are at scheduled times. Youth were rarely observed providing additional advertising for the Watershed Walk. Additionally, in the BBY, some of the activities are set up on the picnic tables and visitors are not always aware what the activity it is off the path in the BBY. Consider creating signs that are posted by each activity space to let visitors know what the activity is when they walk past, as this may help recruit visitors to activities.

Although not described elsewhere in this report, there were instances where visitors asked for directions to a museum attraction and youth sometimes looked to the evaluator for assistance. It would be helpful to include a laminated map of the museum in the materials for each activity so youth could easily lead visitors in the right direction. Also, ensure youth know basic directions like how to get to the parking ramp, Omnitheater, cafes, and the special exhibition(s). This is especially important for youth doing the Watershed Walk since visitors sometimes accidentally end up on Level 1 while looking for something else or are headed to another attraction after the BBY and need assistance.

Youths' Recommendations

Youth also generated their own recommendations based on their reflections of the four activities and looking at some of the summative evaluation data. Even though the youth never saw the evaluator's interpretation of the data and resulting recommendations, the youths' interpretations and recommendations were often similar and provided additional insight into their Park Crew experiences. Table 24 includes the youths' recommended changes to help them reach their goals for working in the BBY. The recommendations are in the youths' words and organized into themes they identified.

Table 24: Park Crew Youths' Recommendations

Hands-on Field Trips	Seeking Information	Things to Change	Visitor Interaction	Activity Preparation	Space & Comfort	Advertising
<ul style="list-style-type: none"> • Canoe trip to collect macros, learn why important & fun facts • Overnight outreach trip to MCC • Mississippi River Challenge • Hands-on learning for macros at nature center • Practice watershed by doing outreach • Visit U of M researchers • Visit DNR/PCA water workers • Take more field trips that relate to BBY activities • Fossil hunting at Lilydale • More hands on learning & training 	<ul style="list-style-type: none"> • Study how fossils connect to BBY • More specific info on watershed • Types of pollution that affect macros • See how other people keep macros alive • Figure out our bug plan after they die • Talk about different kinds of macros and their importance • Need more info about ALL the activities we do • Gain significant information to teach activities (become familiar with names & terms) 	<ul style="list-style-type: none"> • Make adjustments to project with weak points • Teach new youth the activities • Don't do Watershed Walk on a schedule • Omit projects or parts that don't seem to fit • Take out fossil picking and add new activity • Do Watershed when ready and when you have visitors • Work with another person for Watershed Walk • Learn about groundwater • New activity – Pinhole camera 	<ul style="list-style-type: none"> • Give people surveys to get feedback • Suggestion box or survey • Conversate [sic] more with visitors in BBY • Explain what activity you're doing instead of handing out a paper • Have other workers on the floors inviting people to BBY • Make visitor question cards • Review SMM's Three Standards of Service • Count visitors at each activity • Practice engaging visitors 	<ul style="list-style-type: none"> • Practice teaching project before we start BBY • Practice by role playing • Make a list of things that we should know at end of training • Make sure crew knows activities and facts • Write objectives for each activity 	<ul style="list-style-type: none"> • Big umbrella for hot sun and fan • Plan out the best places for set up of project • Figure out comfortable places to do activities 	<ul style="list-style-type: none"> • Sign in front of SMM • Advertise BBY Park Crew

Appendix A

Favorite Part of the Park Crew (n=11)

*Some youth had more than one favorite part of the Park Crew.

Teaching Others (6)

- I like going on the outreaches, a lot. I like teaching the kids cause you go to a different school and it's really fun meeting them and you're experiencing teaching.
- Getting to go to different schools and do outreaches and teach the younger kids about it [because anything like that before.] It was just fun to do. They were really into the stuff, and they made it fun.
- Going to outreach. Fun going to other schools and teaching things. Getting to know kids and sad when you have to leave them.
- It was working with the kids 'cause it was fun to teach the kids and they teach us 'cause some kids they taught us things that we, basically, didn't know. So, that's why. (Interviewer: What's an example of one thing they taught you?) Like, one day, we was talking about... we was doing the... erosion, I think. And before we even said anything about it was like yeah, that's it; said something so intelligent the way she said it was just like, I ain't even know that...it's a lot of smart little kids out here... it was fun working with 'em and everything.
- Watershed Walk because I'm good at it and it's like, it teaches a lot to young kids in the Big Back Yard, 'cause it's hands-on. So they get to learn and do some fun stuff. So, I like it.
- Watershed Walk because it tells people what pollutes water and stuff.

Field Trips (3)

- We go on field trips and I really like that.
- Field trips. It was just the canoeing (favorite field trip)... I've never been canoeing.
- I'll have to say going out on the field trips. 'Cause I'm more of a visual type of learner, I like to see the thing right in front of me. That's what I can remember the best. So, when we go on the field trips, that's the real thing. Seeing it there, so... (Interviewer: Is there one field trip that was your favorite out of all of them?) Yeah, I'd go with the most recent... most recent was over in Minneapolis, when we went to some park in Minneapolis, I can't remember what it's called, but it looked like there was a lot of ruins there, right by the Mississippi River. A lot of ruins there, and they showed us the limestone and the other type of stone... something like that... and then we went to the Mississippi River, in the park right there, and they showed us the little waterfall, and what that does. So that was really cool, because it was a lot of water, and they had a little waterfall over there. That was pretty cool.

Working With People Their Own Age (3)

- Getting to know people my own age. I think at first, when we all met, when we all first started, some of us weren't as interested in Earth Science as much as we thought we would be, so it was kinda nice learning together.
- My favorite part of the Park Crew was coming here meeting new people. And every time you need help they always helped you.
- Being able to learn and teach others (Park Crew Members) what I've learned since they are new. Making our programs better for the visitors.

Learning About Science (2)

- Learning a lot more about science 'cause I wasn't really a big science fan. But now, I'm starting to like science, but it taught me a lot that I didn't pay attention in school about and now I know more about it. It changed the way I feel about a lot of things, now.
- I just like learning about stuff. About the Earth and stuff.

Other (2)

- Also I like that right now it's not the same thing everyday. Every time we meet we do different things.
- But, the project that I enjoy doing is the fossil. And I like looking at the watershed. (Like fossils activity because) it's more hands-on. You can present it to people while they're doing it. You can see how the people do different stuff and different... say different opinions. (Like watershed walk because) everything... I don't know, because I never seen nothing like that (the watershed model)... I heard it was hands-on made, people made that and that is very cool to come in and see what a group of people your age have in mind.

Least Favorite Part of the Park Crew (n=11)

Not Feeling Completely Prepared/Comfortable Leading Activities (5)

- Having to learn about things that you're not really... having to pick up a lot of stuff (learn and memorize it) right away. It takes time to learn about this stuff and having to teach it to somebody else... it gets kinda hard. We're trying to learn everything, and trying to make sure that all your information is correct, and trying to teach it all to somebody else.
- I would have to say, going out to the outreaches, not knowing exactly what you were doing. 'Cause in the beginning I was not really knowing, so that made it more difficult to teach somebody else. Now that I know a lot more (of the content and what comes with it), it's coming a lot more easy.
- There's not really any least, but, sometimes learning the information (info for both BBY activities and outreach) cause it's kind of hard to get it into your head yet. But, yeah. It gets frustrating at first, but then after you know it it's kind of good.
- Elwha River. Because it's hard to remember all that. All those things. Like, people come there and they know more than you, so you're sitting there like, uhhhh... you don't know what to say because they're giving you all the facts... yeah, so I don't like the Elwha.
- Elwha. 'Cause I don't know it that well. I get how they tell it and stuff... I just never, like, taught it or anything.

The Process of Learning the Activities (3)

- Reading and rewriting scripts (for the BBY activities). That was my least favorite. 'Cause, it's just like school, basically. And, we just read all them pages and then rewrite 'em over in our own words, that's the only thing. Otherwise, I like working with everybody I work with... even though sometimes it's just so crazy and everything, but I like it.
- When we had to sit down and read the scripts because I was real tired that day. It was four pages.
- Not having enough time to work on developing the programs for the BBY, more time to make it better.

Other (1)

- My least favorite was the field trips, I really didn't like it. Because we... it was too much in the bushes and woods... I don't like bugs, but... what we had to do was very interesting. Like, when we went in the water and picked bugs and... We test the water out, that's neat, I like... it was okay. But, I didn't like as when we went outside and stuff like that. I really don't like going outside.

Nothing (2)

- I'm gonna have to think about that for a second. I don't know. I actually really like this job, I guess you could say that sometimes my coworker just get into disputes, but, I mean, there's not that much to not like, so, I like my job.
- I don't really have one. No.

Appendix B

What Youth Would Change About the Park Crew (n=9)

Suggested Changes (4)

- Fun having more people; maybe a bigger group, but not too big.
- Well, no, besides the attitudes of people (other teens), basically. But, otherwise, no, it's just the attitudes. Like, if that changed it would be much better. It's like, at the time we don't have disagreements about things... certain things we get things done better than in arguing as much as we do.
- Make our work experience (the room) inside of the KAYSC bigger. 'Cause it fits a lot more people. Like, more than one group in there basically.
- I think... just to spend a little more time getting to know the activities (in outreach and BBY) even better. Yeah, that's about it.

No Changes (5)

- I think we're good. I was a little confused about how we deal so much with water and there's a new water crew, so, I just didn't know what they're doing. But, I think what we do is still, I mean I like that... I don't know. I just... it's not much to say, I guess... about changing it. 'Cause I like where we are right now.
- I don't think there's anything that would... 'cause everything so far has been going good, so far, since I've been working here in November. But, that's about it. Everybody's nice and there's no problem here. I enjoy working here.
- I like everything the way it is.
- I think what we're doing is great. It's, like, really beneficial to a lot of people.
- No... No, I like it.

Appendix C

Favorite Thing About Working in the BBY (n=9)

Interacting with Visitors (5)

- Working with other people and being with the visitors. In here (the KAYSC room) we don't get to be around the visitors. Meet people from around the world - England, Brazil, Texas, Virginia. Meeting visitors who come here.
- Meeting different people (the visitors). 'Cause people come from different states and countries and stuff.
- The kids with the funny questions and so excited about the activity and the ones that really took time and really getting to know the activity. They asked funny questions like, especially doing watershed walk, they always be like, "mm, this is some chocolate ain't it?" Could we drink it? (laughing) Like, no, they'd be like, "this hot cocoa?" I'd be like, yeah.
- Mine was basically having visitors that were interested in your activity because it made the activity more interesting and funner to teach.
- Getting to know new people (visitors) and work with them and see different reactions. Not the same reactions everyday from the same people.

Being Outside (2)

- Being able to be outside and the weather. It was nice to be outside and work with the visitors in a different environment than inside.
- I'd really have to say working outside (laughs) just because, first off, I'm an outdoors type of person, and it's just really nice to do things, just like science outside. Where you're getting to, you're able to present something based around science and stuff that's outdoors, being outdoors.

Other (2)

- The people I work with this year. Clicked better with teens this year than last year.
- Doing water bugs because, I knew how to do it better than all the rest of them.

Least Favorite Thing About Working in the BBY (n=8)

Weather (3)

- Coming in when the weather is really, really hot.
- When it was really hot.
- Probably the heat (laughing).

Cleaning Up Activities (2)

- When we have real crazy visitors. They wanna jump all over your stuff. They make a mess (during Fossils). They put the plaster everywhere. It would be everywhere on the table.
- Probably cleaning up after every presentation that you do (laughs). Well, because some days you're really busy. Some days you're not, but on the days you are, you'll just clean up and it takes about ten minutes, so, you'll just clean up and then (snap), wow, here comes another person wanting to know what you're doing, but that's ok, I guess.

Other (3)

- When it's nobody out there cause it's really nothing to do when it's just you just sitting out there, waiting on people to come.
- Having to get up and ask someone for a badge to get in the shed. I wish I had access to it, just, I mean it's not so hard getting up and asking but, I'd like it better if I could just get up and just, swipe my badge to just get what I gotta get.
- The activities this year. The majority of them because I've done them for the past year. I'm wanting to do new activities. We need some new materials/activities.

Nothing (1)

- Nothing.

Appendix D

Advice for Youth Working in the Big Back Yard BBY (n=9)

*One youth had more than one word of advice.

Know the Materials/Activity (5)

- First off, I'd like to tell them, for the activities we have right now, learn as much as you can about them and try and get to know them like the back of your hand because you're gonna be doing them the whole time you're working there. I think that's really important for them. So, that's pretty much it.
- (Giggles) Learn the activity, I guess.
- I really don't know. Know your material, I guess 'cause a lot of people ask a lot of questions. So, basically, know your material. Know what you're doing.
- Pay attention to the description of the work and the details that the veterans give you about the activities - how to lead the activities. So they know how to do the activities and have an easier time and feel more comfortable teaching the visitors.
- Learn as much as you can about what you are doing so visitors get the info they want and need.

Have a Positive Attitude (3)

- They should enjoy what they are doing, if you don't it won't be very fun. Just enjoy it I guess.
- Just I don't know, give them a positive attitude. Just have a positive attitude.
- Come open-minded cause you didn't never expect what you gonna do here. (For example) we had to get in the pond and get bugs. You'll have to clean up maggots and stuff.

Other (1)

- I would tell them to make sure they bring something to do (giggles) at least when they gotta sit there, in case there's nobody out there or something like that.

Didn't Have Advice (2)

- None really.
- I don't.

Appendix E

How KAYSC Staff Can Improve Youths' BBY Experience (n=9)

*One youth had more than one suggestion.

Additional Training (3)

- Probably we should spend a little more time learning, going over the activities. (Interviewer: Are there any activities in particular?) I would say, for me, Watershed probably.
- More help, I guess. Like, help on learning the activities a little bit better. I'm not that good at Watershed.
- We doing good right now, so they did a good job, but they could probably explain a little bit more. Yeah, more about the activities, we understand about them but it's something's like the people be asking and we can't answer. Give us more information about it. (Interviewer: So are there any questions or any specific information that you're thinking of that you would want them to give you more of, or a certain activity?) No. Not really, it's just with each activity, like basically, a question that somebody asks you that, I don't know, but it's basically the Watershed Walk with me.

More Activities (3)

- I think we need more activities, more different activities (for the BBY). I suggested, since there was a dinosaur exhibit inside, maybe we can do something on dinosaur bones or some type of activity related to them that could be moved outside. That we can do as Park Crew or something. So, there's one suggestion. This could be a suggestion to the whole science museum, maybe make the Big Backyard bigger (laughs).
- Give us more activities (than the four they already have). I would want to do some of the stuff that we do on the outreaches, like the dam. And then the erosion stream table, so there's a lot of things that we do.
- Yeah, more activities. A lot more activities.

Other (3)

- Keep giving teens their input and support. Tell us when we are doing a good job and keep giving us helpful tips.
- Hire more teens? The more the better, I guess.
- More stuff they can give, do more stuff to help us towards to apply for after KAYSC, more college stuff in here (to help prepare for college).

Nothing (1)

- Nothing.

Appendix F

What Youth Want Visitors To Learn From Watershed Walk (n=9)

How our waters get polluted

Pre	Post
<ul style="list-style-type: none"> • I want them to learn about how it gets into our lakes and stuff, about everything they do, gets into our lakes. Our number one polluters and stuff... • I would hope they would know how the water and the river is getting so dirty. • I hope they learn that polluting, throwing things down in the ground, it literally, that everything that goes in our water and what if one day they put... they pull something down it's like... poisoning or something and It goes in our waters. It can't be filtered or nothin' so, I just want them to know that that's not the only thing they hurtin' is the Earth. Just, they hurtin' our water and everything else. • How our waters get polluted. And by what kind of things we have that pollutes the water. • Pollution is destroying our lakes and rivers; pollution is the big thing.... • Pollution. It just talks about pollution and where it comes from, how it's dirty... 	<ul style="list-style-type: none"> • How everything gets into our lake and they shouldn't litter 'cause it's all going straight to our lakes. There's no filtering. Stuff like that. • What happens when people litter or people use things that are harmful to the environment, you know to water and stuff. What I really want them to get out of that is to know when you're polluting the earth. • That everyday things they do or use could be pollution to the water. • Get them acknowledge that it is going to our waters, the waters that gotta get filtered out for us to drink, it mean, it's effecting us to not only to the world. • Pollution and how pollution affects our lakes and rivers. Concept that pollution isn't good for out watershed. • And pollution in different ground surfaces. And where it come from. Where pollution comes from. • About non-point source pollution.

Actions to prevent pollution

Pre	Post
<ul style="list-style-type: none"> • I would hope they would think about more of what they do when they get back home, and try and make an effort ... to help do their part, to try to stop polluting.... • About all the pollution that they can prevent easily, like picking up the dog waste, and stuff like that, not washing your car in the driveway and stuff like that... • How we can stop it and how the Science Museum is preventing that from happening. We have rain gardens. Outside in the Big Back Yard we have, surfaces that the rain can soak through, like in the towers, I don't know what you call them. I think they're pave stones? 	<ul style="list-style-type: none"> • Give them different ways how to stop it or reduce it. • What to do and what not to do. Like, just throwing your stuff on the ground. • To learn about not to pollute and stuff. • I would like them to learn to help and stop polluting our world cause it's very trashy. • How to prevent that (pollution) and ways that the Science Museum is already preventing that. • What we can do to help pollution - slow it down.

Actions to prevent pollution (continued)

Pre	Post
<ul style="list-style-type: none">• Make an effort to make a difference; where not to wash your car because of where water goes....• Recycle and pick up after themselves.	.

Other

Pre	Post
<ul style="list-style-type: none">• Different definitions of stuff... Like pervious and impervious.	<ul style="list-style-type: none">• What the watershed is.• What water does around lakes.

Appendix G

Visitors' Questions About Watershed Walk & Youths' Responses

Questions Related to Dirt (n=6)

Q: Where does the dirt come from? (F30)

A: Washes off from construction sites.

Q: Visitor said that dirt doesn't do that (causes lakes to be murky so fish can't see and plants can't grow). Instead he said fertilizer does that by creating algae blooms. This wasn't a question but he was pretty vocal that he was right and the teen was wrong. (M40)

A: Teen didn't respond but asked question about next cup.

Q: Do you think that's (dirt MN's biggest polluter) because of all the chemicals in the soil? (F30)

A: I think it's from all the dirt and farms.

Q: Why does it pollute? (dirt) (M8-15)

A: Explained dirt pollution.

Q: Why is dirt so bad for the water? (M8-15)

A: Clouds the water fish.

Q: Do they (fish) need to come up to breathe? (Youth had previously said that dirt pollutes the water and makes it hard to see so they can't get to the top to breathe.) (F40)

A: Yeah. (This is actually an incorrect response as there is dissolved oxygen in the water that fish use to breathe – frozen lakes in winter is an example of this)

Questions Related to the Sewage System (n=4)

Q: How far underground does sewage go? Where does it end up? In the lakes? (F40)

A: I don't know.

Q: But, it goes to the river. Isn't there a filter system? (F30)

A: In farms there are (showed storm tile, picture and tile.)

Q: How do you tell the difference between a regular sewer and a storm sewer? (F30)

A: Good question. I don't know.

Q: What is this water (watering pitchers) over here for? (M8-15)

A: "It just shows the difference between pervious and impervious surfaces." Did not invite outside.

Questions Related to Preventing Pollution (n=2)

Q: So, how do they prevent this (pollution)? (F40)

A: Recycle. Don't throw garbage on the ground. Bag the grass.

Q: How do we prevent some of these things, like bird poop? (F30)

A: Bird poop is hard to prevent. Dog poop -clean it up. Recycle - don't litter.

Other Questions (n=1)

Q: Why do they cut down the trees? (M8-15)

A: To build houses and things.

Appendix H

What Youth Want Visitors To Learn From Macros (n=9)

Why macros are important to us

Pre	Post
<ul style="list-style-type: none"> I would just like to tell them how you can find, like if you find a certain kind, cause some bugs are more sensitive to pollution and stuff, you can tell which creeks and stuff... creeks and streams and stuff are cleaner than others. Identify at least some of the species of insects that can stand polluted water, realize that the water is kind of polluted. I hope they learn the value of 'em. And, like, what they... what they here for and everything like that. Because, like, how important they is, some of 'em, important they is to our water, and everything else. And to our air, and everything. Instead of just first looking at 'em like uh-uh and then just try to automatically kill them or something. About polluted water too macro invertebrates can tell, show the visitors how we can tell by looking at them how our waters are polluted or not. From different types of bugs living in water you can tell what is good/not good about the water. 	<ul style="list-style-type: none"> They can learn how they can tell if their water is polluted or not by the types of macros that live in the water. Can tell if your water is clean or dirty - if it is a healthy creek you can tell by the kind of bugs that live in it. The little kids kinda somewhat know that the different bugs in the water mean the pollution. What do they do for our waters. They help tell if the water is polluted or not. The animals that, like, how we can, I would like them to learn because, about the macros, well basically it's about polluted water and nonpolluted water. And, I would like them to learn about which waters is up in our Minnesota that's polluted and which ones you can find more animals in and stuff like that. To learn that bugs can help determine whether the water is polluted or not. Learning which bugs are good and which aren't. And how you know if the water's clean and stuff. I guess the good bugs are in clean water, or something like that. You can tell by different species of bugs in the water how polluted or fresh the water is.

What macros are

Pre	Post
<ul style="list-style-type: none"> Basically all we're doing is just putting a lot there and teaching kids about them, you know just letting them get to see different bugs and stuff. You know, 'cause some people don't get around water a lot. So, basically just showing them about bugs...Invertebrate bugs and stuff...So just showing the difference between them. And how like each bug leads up to one thing... like most, all bugs are connected. 	<ul style="list-style-type: none"> And they can tell different types of macro invertebrates they are. I would want them to get there's more, smaller life out there than what you think, 'cause, macro invertebrates, you really, pretty much gotta dig to find, to find the little critters. So, yeah, just to know, just to find different, different little animals out there. The different bugs.

What macros are (continued)

Pre	Post
<ul style="list-style-type: none">• To see a live bug...learning about different bugs that are in our oceans, and not all of them are like, bad...• The different kinds and everything.• Learn about different bugs...How do they change color,• I missed some of that, so I would guess that I would hope they would know what type of bugs there are [laughs] in the water.	<ul style="list-style-type: none">• Somewhat identify, at least know what different bugs look like.• To learn about the different kind of animals.

Where macros live

Pre	Post
<ul style="list-style-type: none">• Bugs that are in our oceans.• What kind of animals live in there.• How do they live.	<ul style="list-style-type: none">• The kind of bugs you find in your pond or creek.

Other

Pre	Post
<ul style="list-style-type: none">• About the bugs.	

Appendix I

Visitors' Questions About Macroinvertebrates & Youths' Responses

Questions about Identifying Macros (n=14)

Q: What is that? (M8-15)

A: That's a leech.

Q: It's not a leech? (F8-15)

A: No, it's a larva.

Q: What is that one? (M30)

A: Nematode.

Q: Is that a crayfish or something? (F40)

A: Yeah, that is a crayfish.

Q: So all of these might be found in there (pointing to key)? (F40)

A: Yeah, we did find a crayfish. We had a lot of these (she pointed out on the key ones they have found).

Q: Do we look at kind of microscopic stuff or big ones? (M30)

A: You can look at both kinds.

Q: Are they big bugs or really small bugs? (F8-15)

A: Small bugs.

Q: What are you going to see? (F30)

A: Bugs.

Q: Is that a bug? (F30)

A: (No response.)

Q: Are they (bugs) the dark things? (F30)

A: (No response.)

Q: What is under there? (water) (F<8)

A: Bugs.

Q: Are there other animals in there? (F<8)

A: If you let your eyes adjust you can see more...

Q: What kind is it? (Pointing to bug in the big bucket.) (M8-15)

A: (No response.)

Q: Are those the eyes or the nose? (M40)

A: No, that's the 2 eyes.

Questions About Activity (n=6)

Q: What should I suck up? (F<8)

A: Pointed to an area of the bowl.

Q: What are we looking for in here (bucket), a big leech? (F30)

A: (No response)

Q: How do you find them? (F30)

A: You just have to go looking.

Q: Can you get it out? (M8-15)

A: No, it likes to hop.

Q: What is this? (asking about turkey baster) (F<8)

A: It is a bigger tube.

Q: Why do I even need to see this stuff? (F30)

A: (No response)

Questions About Where Macros Were From (n=4)

Q: Are these from the lake? Where are they from? (F40)

A: They are usually from Battle Creek.

Q: Where do you get the water from? (M40)

A: Usually from Valley Creek, so this is probably from there too.

Q: Where do you get the water? (M40)

A: Battle Creek.

Q: Do you collect these every day? (F40)

A: When a lot have died, not every day.

Questions About Microscope (n=3)

Q: How do you turn the light on? (F<8)

A: (Turned it on for her)

Q: How do you focus it? (M8-15)

A: Use this (the knobs).

Q: Do you usually use one eye when you use these things? (microscope) (F30)

A: I think it's easier to use one eye.

Appendix J

What Youth Want Visitors To Learn From Fossils (n=9)

What fossils tell us about the history of an area

Pre	Post
<ul style="list-style-type: none"> • Just teach them about Minnesota, how it used to be underwater. • Get to see what was living millions of years ago in the oceans and we've captured those moments in rocks; show them another time.... 	<ul style="list-style-type: none"> • Fossils are very important (laughs) in discovering them, I guess, and that...it (fossils) tells a lot about history, I would think, and it, you know, can tell you how, how old things are, what kind of things lived back then. • Millions of years ago Minnesota used to be an ocean. Fossils preserved so we know what was living back then and what was in our ocean water.

What fossils are and how they are created

Pre	Post
<ul style="list-style-type: none"> • To learn something new about fossils, like where they came from and stuff. • How fossils are made, where they come from and stuff... how they got here. • How they're made. And where you can find them. Like, in the water. • How they're made... • Just teach them about fossils. • We also have an activity where you can make your own fossil. I'd hope they learn a lot from that, too. I guess just knowing how fossils are made. 	<ul style="list-style-type: none"> • Learn about what fossils are and things like that. • Where they come from. • I hope they got to learn how does a fossil made over time. • About how fossils is made and how it's so interesting how something that's was not living and everything to become a skull of something that's just, that was rocks and mud and everything else. • How they're (fossils) made. • Where fossils are made and how they're made.

There are different kinds of fossils

Pre	Post
<ul style="list-style-type: none"> • All the different types... • If they don't know what fossils are they can go away with learning what kind of organism you can find in fossils. • What different types of fossils there are out there. 	<ul style="list-style-type: none"> • The different kinds of fossils you can find. What type of fossils they are. • What kinds are usually fossilized.

How to make a fossil

Pre	Post
<ul style="list-style-type: none">• To take their own fossil home, have their own experience of making one.• The fossil making is for them to be able to do their own thing and take it home with them so they can have a souvenir of the Big Back Yard without having to pay for it.	<ul style="list-style-type: none">• I guess they get to make their own at home.

Other

Pre	Post
<ul style="list-style-type: none">• I would like them to get out of that how cool it really is, like, to be able to find something and... you see nothing, there's just the print of something that really was there before and it's just not there... it just gone. That's... how amazing that is to me.	<ul style="list-style-type: none">• How people get them (fossils).• Different types of rock - limestone sandstone and how they change and develop. (Interviewer: How what developed?) The ocean dried up and the mud turned into limestone - how limestone is formed and different types of rocks there are. I probably would want to learn more about fossils.

Nothing to Learn

Pre	Post
	<ul style="list-style-type: none">• Lots from making their fossils. (Interviewer: So they learned about fossil-making from that activity?) There's really nothing to learn from that one.

Appendix K

What Youth Want Visitors To Learn From Elwha Dam (n=9)

Environmental Impacts of Dams

Pre	Post
<ul style="list-style-type: none"> To let them know about the salmon and all about that, the loss of the salmon because of it and stuff... How salmon are dying. How, basically, when they pollute, back to polluting, when they pollute it could somewhat mess up the hydro-electricity. How they, like, effect our rivers and... or not. And what they do to our fishes. I guess. (Interviewer Okay, and what would you say they do to the fishes?) Well, for the Elwha River dam it, like, stopped the salmons from coming up streams cause they didn't build fish ladders. And, so, it killed a lot of the fishes and other organisms in the water. Can hurt our environment; lowered salmon population because of the dam... I would just hope they would know how the river changes over time. Like I said, with the meandering river, a lot of erosion happens, a lot of sediment transport happens. Just how different the river takes form over time. And also what happens to the fish in there, too. The fish are affected with whatever we put into the water, like the dam. Yeah, that's pretty much it. 	<ul style="list-style-type: none"> Basically what happened to that river from then until now. It (the dam) was a big disturbance for the salmon. It killed a lot of them - left only five miles for the salmon to span compared to the number of miles before. A lot are dying from the dam. Dam slowed down natural flow of the sediment so it all got trapped upstream. How does like the dam affect the land over time, a little bit. The effects they have on our rivers and our ecosystems. How it affects our environment when we put dams up. By putting something up that helps something can also be damaging in the environment (Interviewer: Why is it damaging?) Damaging by salmon population went down, sediment backed up in the river so now water is polluted. Erosion. Sediment transport. How rivers are made and lakes are made

Dam creation and removal

Pre	Post
<ul style="list-style-type: none"> What happens if you take them out. We're trying to get peoples' input on that, on dams, and what they think they should do to dams.... Dam removal (Elwha). How we put them in, how we take them out. 	<ul style="list-style-type: none"> What's the process of taking them down and putting them up.

How Dams Work

Pre	Post
<ul style="list-style-type: none">• What dams are.• How the flow of the water will go when it get to the dam.• What dams do.• About dams.	<ul style="list-style-type: none">• How dams work.• Learn about dams.

Benefits of Dams

Pre	Post
<ul style="list-style-type: none">• What they're used for.• How, basically, the flow of the water and how important dams is about the hydro-electricity.• Dams are good, using them to make electricity.	<ul style="list-style-type: none">• To acknowledge that they put up dams to prevent what they prevent and what they for, and how's it important to our water.

Other

Pre	Post
	<ul style="list-style-type: none">• Elwha can give you a lot of info on its history. That Elwha was one of the largest salmon producing rivers in the United States. It can give you a lot of info on how it came to be, what they used before, and why the dam.

Appendix L

SMM's Three Standards for Service

All museum staff and volunteers are expected to:

- 1) *Represent the museum.* To be aware and understand the impact each of us has on the visitor.

How: Be responsive, listen to visitors, be courteous and patient, maintain a clean and neat appearance, and be punctual.

- 2) *Be informed.* Have a basic knowledge of museum operations and programs.

How: Listen, read, and ask.

- 3) *Make every visitor feel welcome.* Make each visitor feel welcome and important. Every visitor needs to know that their presence and the quality of their experience is important to the museum.

How: Acknowledge every visitor. Make eye contact and/or smile, say hello. Be prompt with assistance and follow through.