EXECUTIVE SUMMARY
EVALUATION OF THE GRAND RAPIDS PUBLIC MUSEUM'S *WATERSHED EDUCATION PROGRAMMING*

About the project: In 2015, the Grand Rapids Public Museum (GRPM) sought funding from the Great Lakes Fishery Trust to infuse Great Lakes and water themes throughout its educational programming. The grant supported museum staff in prototyping, creating, and delivering Great Lakes Watershed education programs including summer camps, after-school programs at the GRPM's Museum School, and a watershed workshop inserted into the GRPM's existing IMMERSE program, in which teachers and their students spend a week at the museum learning about their city.

About the evaluation: Distinct evaluation approaches and instruments were designed for each strand of watershed-themed programming piloted by the GRPM. In camps and the IMMERSE workshop, youth completed a four-question, pre/post multiple-choice test to assess learning gains. Campers additionally completed survey questions focused on their perceptions of science and scientists, and used photo journals from camp to tell about a "great day at camp" or about an experience that shows their curiosity; their parents were surveyed. Participants in after-school programming took pre/post, predominantly open-ended tests to assess their knowledge of "special" species in Michigan, including native, invasive, and threatened or endangered species.

EVALUATION FINDINGS

Parents and children rated the camps very highly. Parents rated the camp quality, overall, at 4.81 on a scale of 1 to 5, and rated staff at a 4.93. Parents valued the camps for being educational, fun and engaging, and hands-on, among other things. Youth aged 9-11 and 12-14 were asked what they liked best and least, and said they liked trips to the creek for water sampling, hands-on experiments, "having fun," and often, "everything," and they shared no real complaints when asked what they liked least.

Campers came to think more positively and accurately about science and scientists through camps. While most campers began camp thinking science was fun, their positive views of science got even stronger over the course of their camps. Campers aged 6-8 were more likely, at the end of their camp, to say "fun," and less likely to say

Figure 1: Pretest--3 Words You Think of When Thinking of a Scientist, ages 9-14

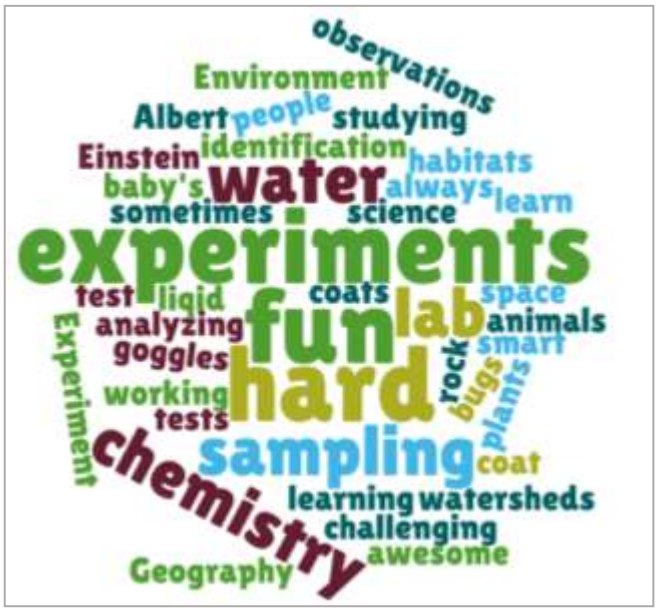

Figure 2: Posttest—3 Words You Think of When Thinking of a Scientist, ages 9-14

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"smart," when asked for words they thought of when they heard the work "scientist." When asked for words they thought of after hearing the word "scientist," campers aged 9-14 were more likely after the camp than before to specify numerous examples of science tools, processes, and topics, and they included camp-related themes like "water," "watersheds," "bugs," "sampling," "environment," "plants and animals," and "habitats," whereas pre-camp words were more limited to stereotypical scientist tropes such as "chemistry," "blowing things up," experiments," and "lab coats."

Campers of all ages met the key learning goals for the camps. Multiple-choice tests, self-assessments of knowledge before and after the camp, and free-write assessments demonstrated that campers were advancing in their understanding of watersheds, water quality monitoring processes, sources of water pollution, and special species in the watershed.

Parent-observed changes in campers' awareness, perspectives, behaviors, or skills and knowledge regarding watersheds, the Grand River, water quality, special species in our watershed, and being a good steward of water

- "Excited about everything he learned." (Parent of a camper aged 6-8)
- "He is able to talk about the questions of the day and is enthusiastic." (Parent of a camper aged 6-8)
- "He noticed water-bugs last time we went to Reads Lake." (Parent of a camper aged 6-8)
- "So many new vocab words he understands." (Parent of a camper aged 6-8)
- "She's been identifying bugs since the class and telling me about them!" (Parent of a camper aged 9-11)
- "She came home each day with something new to tell me. She notices things about her environment more now." (Parent of a camper aged 9-11)
- "Discussed what she learned every day." (Parent of a camper aged 9-11)
- "Seems more aware of other species in our watershed. He already had a love of nature but this camp gave him another outlet to explore the natural world." (Parent of a camper aged 9-11)
- "More aware of pollution from cars & factories. Animal identification and asked more questions at home. Both of my kids want a chemistry set to analyze waterways. Son wants to join the Grand River Care group when he is older." (Parent of a camper aged 9-11)
- "She excitedly talked about things that she learned." (Parent of a camper aged 12-14)
- "He was easily able to talk about what he learned. Normally, this is a challenge." (Parent, camper age not specified)

Short watershed workshops within IMMERSE showed targeted gains in understanding on a few content questions. Students in grades 3 through 5 learned something about each of the focal topics of the workshops, but began with the strongest baseline—and therefore learned the least—about threatened and extinct species. No other data was collected on the workshops or the broader IMMERSE programming.

Lyceum data show improved content knowledge related to native, invasive, threatened, and charismatic species, but also suggest resistance and low energy. Six Lyceum students demonstrated surprisingly limited awareness of threatened and endangered species in their local area, but learned about sturgeon and wild rice through the Lyceum. They had very little ability to define native and invasive species before the Lyceum, and demonstrated improvement, although not mastery. Students' self-rated care and concern about the health of the Grand River declined modestly over the course of the Lyceum. Although the decline may be artificial given the small number of students, the overall pattern of responses suggests a comparative lack of enthusiasm among Lyceum students as compared to campers.

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FINAL REPORT: EVALUATION OF THE GRAND RAPIDS PUBLIC MUSEUM'S *2016 WATERSHED EDUCATION GRANT*

SUBMITTED MAY 2017

1301 E. DAWSON
MILFORD, MI
48381

PHONE:
(248) 752-0471

E-MAIL:
LMARCKINI@
COMCAST.NET

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INTRODUCTION

The Grand Rapids Public Museum's Grant and Goals

In 2014, The Grand Rapids Public Museum (GRPM) received a grant from the Great Lakes Fishery Trust (the Trust) for a youth education effort entitled *Classroom with a Current.* In that grant, high school students from the greater Grand Rapids region engaged in place-based learning about the Great Lakes and their local water resources. A smaller group of approximately eight students continued to meet after the initial education effort, and conceptualized an engaging Great Lakes exhibit for which the GRPM could seek funding.

In 2015, the GRPM sought additional funding from the Trust to infuse Great Lakes and water themes throughout its educational programming. This grant—which is the focus of this evaluation—supported museum staff in prototyping, creating, and delivering Great Lakes Watershed education programs including summer camps, after-school programs at the GRPM's Museum School, and a watershed workshop inserted into the GRPM's existing IMMERSE program, in which teachers and their students spend a week at the museum learning about their city.

Evaluation Methods

Distinct evaluation approaches and instruments were designed for each strand of watershed-themed programming piloted by the GRPM. Summer camps included one four-day week of camp (one "camp") for youth aged six to eight; one camp for youth aged nine to eleven; and one camp for youth aged twelve to fourteen. Each camp ran for four days and involved water-quality sampling at Lamberton Creek, modeling a watershed and its water flows, and other age-appropriate activities involving museum exhibits focused on native Michigan species and other points of interest. The evaluation methods varied somewhat by age group:

- In the camp for youth aged 6-8, staff administered a four-question pre/post test using a voting box; collected student descriptions of a "Great Day at Camp," drawing on photos taken during the week; and created pre and post "word walls" in which students nominated words to describe a scientist at the beginning and at the end of their watershed camp.
- In the camps for youth aged 9-11 and 12-14, staff administered a pre/post written combined survey and test, which explored feelings about science and knowledge of watershed concepts. Students also completed a photo journal page on the theme "I am curious," in which they selected a photo from their camp, and answered a series of prompts about what it represented. The combined survey and test was modestly differentiated for the two age groups.
- Parents of campers of all ages completed a post-camp survey.

The IMMERSE workshops featured a one-hour pull-out workshop on watersheds, conducted at some point during a classroom's weeklong IMMERSE experience at the GRPM. Evaluation methods included:

- A five-question pre/post multiple-choice test
- A "significant change" form for completion by staff and by teachers relating to the broader IMMERSE experience.

After-school programming at the Museum School was referred to as the *Lyceum*, and every student was required to participate in one Lyceum per semester. These after-school sessions functioned as extensions of the regular school day, and were 12-hour programs in total: one hour, one day per week, for twelve weeks. The grant-supported Lyceum (one of several choices available to students) focused on special species in the Grand River watershed, including charismatic native species and invasive species. Intended evaluation methods for the Lyceum included:

- A pre/post test using primarily open-ended questions focused on familiarity with native, invasive, and threatened species
- An end-of-program survey focused on attitudes regarding the environment and enjoyment of the Lyceum.

FINDINGS

Summer Camps

1. YOUTH AGED 6-8

Pre/post test

Campers aged six through eight took a four-question multiple-choice test using a "treasure chest" with four slots for poker chips. Camp staff read each question carefully, and instructed each child to place his or her poker chip in the slot in the box—A, B, C, or D—that matched his or her choice for the best answer. Four different colors of poker chips were used so that staff could track the students' responses to each question.

As shown in Figure 1, the campers averaged a score of 25% (one right) at the beginning of the week, but averaged 95% on the same four questions by the end of the week. Figure 2 shows question-by-question results. The only question campers had some success with before camp was a question on the characteristics of a healthy stream, but by the end of camp, most campers could answer all four questions correctly.

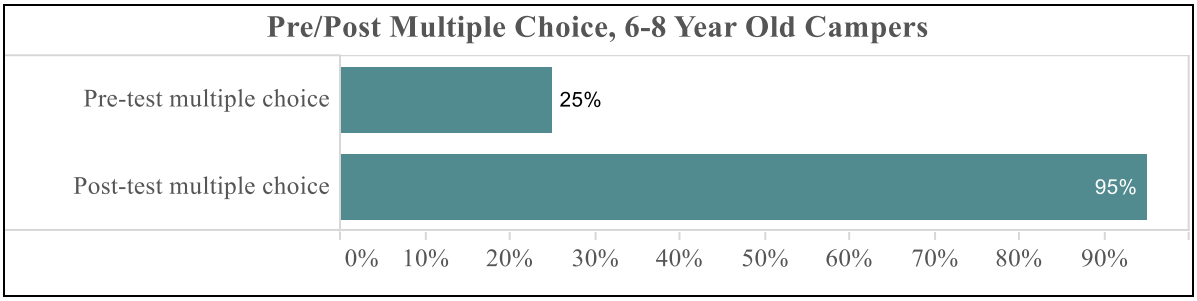

Figure 1: Pre/post scores on four multiple-choice questions. *Note:* Nine campers took the pretest and ten took the posttest; the additional camper at the posttest cannot be identified.

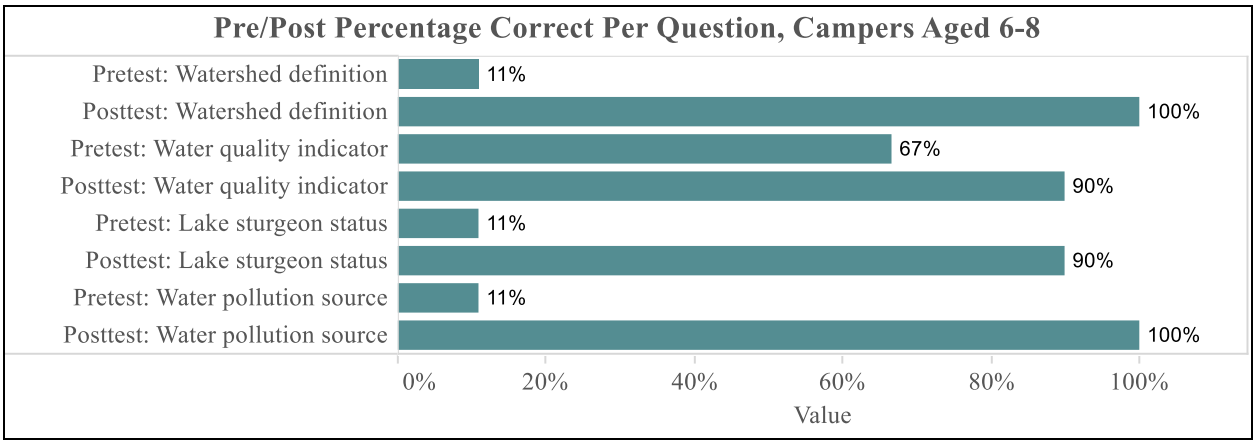

Figure 2: Question-by-question pre and post percentages "correct." *Note:* Nine campers took the pretest and ten took the posttest; the additional camper at the posttest cannot be identified.

Word wall

Students were asked to generate words that came to mind when they heard the word "scientist." Staff wrote the words on a poster-sized sheet of paper in front of the group as students called them out. The process was done twice, on the first day of camp and on the last day of camp. Table 4 shows the comparison of themes expressed before the camp and after.

Table 1: Words You Think of When You Hear the Word "Scientist"

	Pre	Post
"Smart"	17%	3%
"Fun"	10%	20%
"Learning"	3%	0%
Science tools, topics, and processes	20%	23%
"Cool," "crazy"	10%	10%
"Serious"	13%	7%
"Hard"	3%	0%
All others	23%	37%

The most notable shifts are that students were *less* likely to say "smart," *more* likely to say "fun," and *more* likely to generate other terms not captured in the listed themes. The "other" themes at the beginning of camp predominantly consisted of the word "interesting," which was given to campers as an example. At the end of camp, "other" terms included "coffee" with three mentions—a reference to the camp leader, Stephanie Ogren; and also "cold," "easy," "exciting," and "gooey" and "new," along with three mentions of "interesting."

Science tools, topics, and processes mentioned before camp included "math" (two mentions), "meteorite," "experimenting," "exploring," and "observations." At the end of camp, words in this category included "catching bugs," "discovering," "experimenting," "making," "math," "explosions," and "magnifying glass."

Photo journal

Campers aged 6-8 did a photo journal assignment titled, "A Great Day at Camp." They were asked to select a photo from their journal, or draw a picture, of a "great day at camp." Additional prompts on the page asked, "What is happening in this picture?" and "What was fun about it?"

One camper said, "I caught a fish. It was kinda scary but coooooollll."

Five campers selected pictures of this activity. They said, "My hand froze" and "didn't move for an hour," or "I stuck my hand in for 15 seconds" and "it was the most seconds." One enjoyed coloring in connection with this activity.

One camper selected a photo showing him "holding fur" that "made me laugh."

One of these campers chose this picture where students were writing a skit, which was fun because "we got to say it."

One camper wrote about sampling at the creek but didn't have a picture.

2. YOUTH AGED 9-11

Pre/post test and survey

Fifteen campers took the 10-question combined test/survey at the beginning of camp, and thirteen completed the 12-question instrument at the end of the camp. The campers were asked to identify the grade they would enter in the fall and their gender. They were spread across several grades and included a mix of girls and boys. Both girls and boys were spread across the grade range.

Table 2: Camper Characteristics

Grade in September	Number of Campers	Gender	Number of Campers
3rd	2	Male	6
4th	5	Female	9
5th	3		
6th	4		
7th	1		

Campers self-rated their knowledge about the topics featured in the camp at the beginning of the week. At the end of the week, they again rated their pre-camp knowledge, then rated their post-camp knowledge. In some contexts, a baseline self-rating of knowledge can shift if respondents learn that they don't know as much as they thought they did. However, campers aged 9-11 did not show much shift in their self-assessed baseline knowledge. They did, however, report a sharp increase in their knowledge about watersheds, water sampling, and the Grand River over the week at camp.

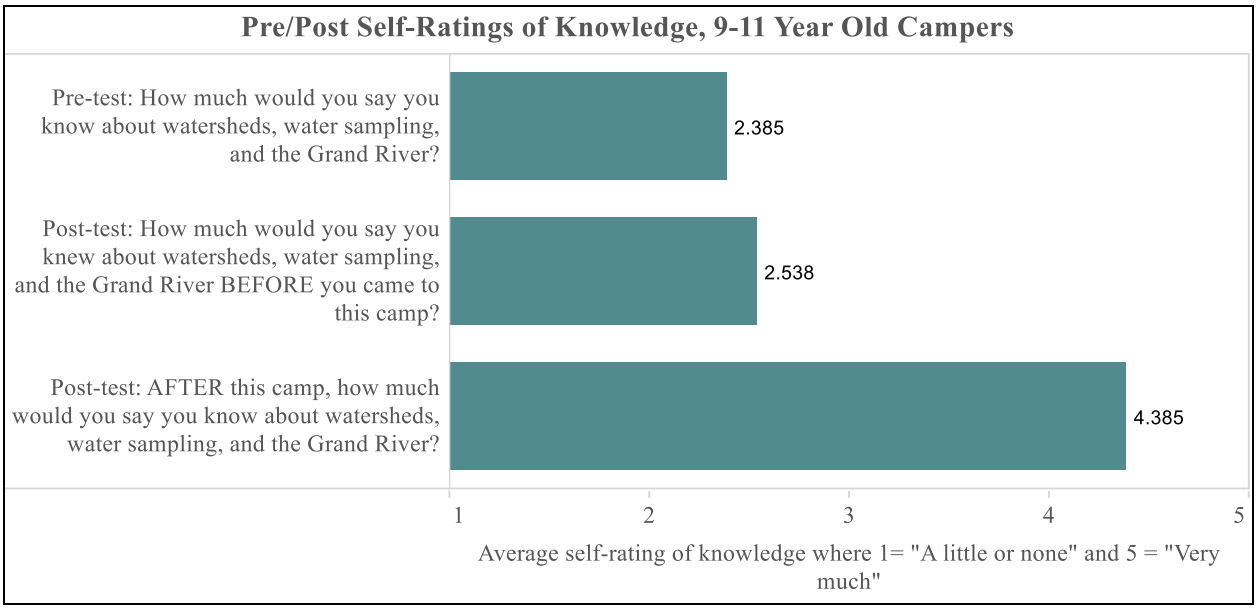

Figure 3: Pre/post self-assessed knowledge of camp theme. *Note:* Two students with a pretest but no posttest are excluded from the calculations.

The evaluation took a direct measure of pre-camp and post-camp knowledge through campers' responses to four multiple-choice questions. Campers aged 9-11 scored an average of 31% on this test at the beginning of the week and 67% at the end of the week.

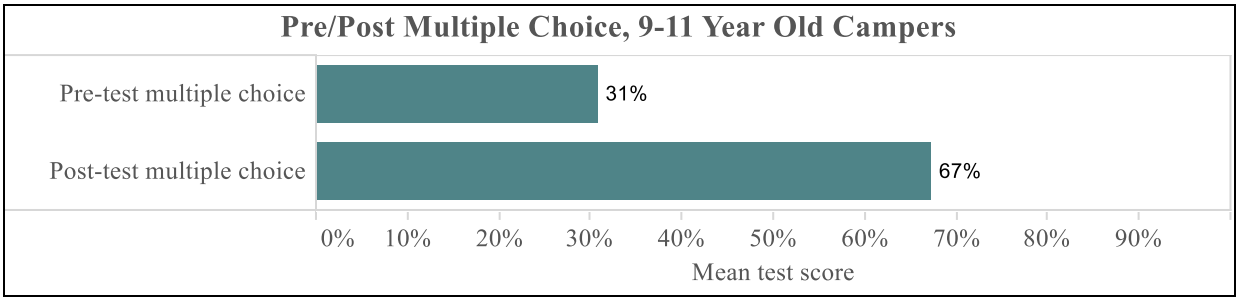

Figure 4: Pre/post scores on four multiple-choice questions. *Note:* Two students with a pretest but no posttest are excluded from the calculations.

Campers' performance improved on every question. The greatest increase was seen in their understanding of the most important cause of water pollution. At the beginning of the week, only one student answered the question correctly. More than half chose "waste dumped by factories." By the end of the week, 11 of 13 campers chose the correct answer— "surface water running off yards, city streets, paved lots, and farm fields."

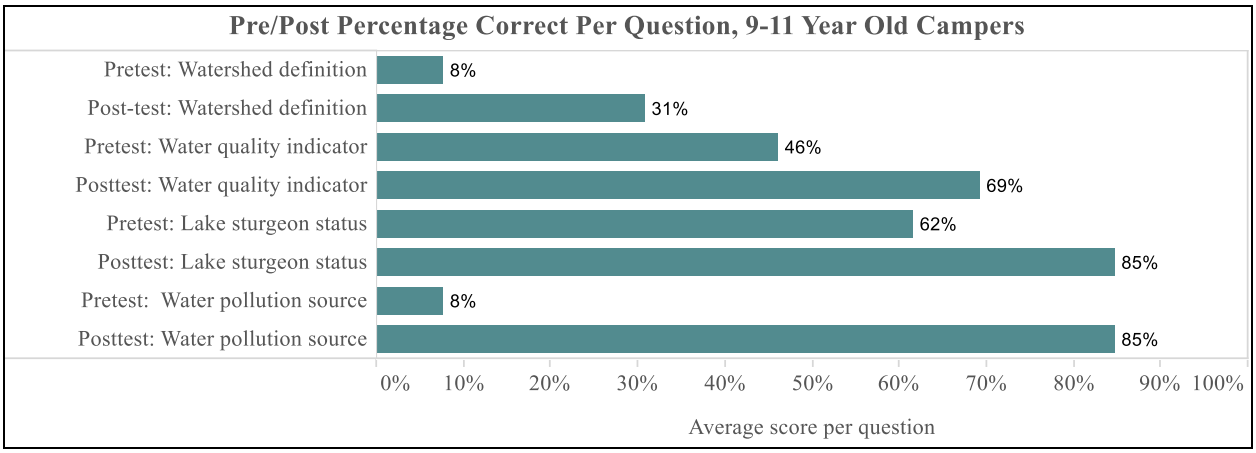

Figure 5: Question-by-question pre and post percentages "correct." *Note:* Two students with a pretest but no posttest are excluded from the calculations.

On the posttest only, students were presented with three fill-in-the-blank boxes that specified "I used to think," "now I know," and "this is how I learned it." They were prompted to reflect on one way in which their thinking about watersheds, water quality, or water sampling had changed, and to write about it using the prompts.

Students' responses are summarized below.

- Learning about watersheds and hydrology
  - I used to think that "*the rain carry the water";* now I know "*if there's high grounds the water go to the low point"*
  - I used to think "*a watershed was a type of body of water"*; now I know "*it's how water travels"*
  - I used to think "*a watershed was a lake";* now I know "*it's where everything goes"*
  - In the past *"I didn't know what a watershed was";* now I know "*what it is"*

- Learning about the process of water sampling
  - I used to think that "*you would just look at water";* now I know "*you go through the water"*
  - I used to think that "*you couldn't see how many chemicals are in the water";* now I know "*you can"*

- Learning about macroinvertebrates
  - I used to think "*there was nothing in water";* now I know "*lots of bugs are in the water"*
  - I used to think "*there's one type of bugs";* now I know "*that there are many types"*
  - I used to think *"the bugs are scary";* now I know "*they aren't"*

- Other themes
  - I used to think "*trash washed into the ocean is the biggest source of water pollution";* know I know "*it's actually surface water"*
  - I used to think "*that sampling is sientific";* now I know "*that it is sientific [sic] and fun"*
  - I used to think "*the Grand River was just a river. A boring river."* Now I know "*the Grand River is home to many things."*

Campers were asked to circle one word from a list of four— "fun," "boring," "hard," and "challenging"— that best characterized their feelings about science. This question was asked both at the beginning and at

the end of camp. Most campers chose "fun" in both cases; students in the camp generally thought well of science from the beginning.

Table 3: Pre/Post Feelings About Science, 9-11 Year Old Campers

Word	Pre		Post	
"Fun"	10	77%	11	85%
"Boring"	1	8%	0	0%
"Hard"	1	8%	1	8%
"Challenging"	3	23%	1	8%

Campers were also asked to list three words they thought of when they heard the word "scientist" at the beginning and at the end of the week. Table 4 shows the most common themes at both times.

Table 4: Three Things You Think of When You Hear the Word "Scientist"

	Pre	Post
"Smart"	13%	6%
"Fun"	15%	14%
"Learn," "school"	8%	9%
Tools/topics/processes of science	31%	49%
Negative comments	5%	0%
"Science"/I don't know	10%	6%
"Hard," "challenging"	3%	11%
All others	15%	6%

Campers in the 9-11 age range were most likely to mention scientific tools, topics, or processes on both surveys, but the frequency of mention changed over the course of the week, increasing from 31% of all responses to 49%. The types of tools, processes, and topics mentioned changed as well.

- At the beginning of the week, students' selected words included "chemistry," "lab," "experimental studies," "lab coat," "bubble and fizzy stuff experiment," "analyzing," "liquid," "computer," "data," "rock," "testing," and "comparison."
- At the end of the week, the terms included "chemistry" (2), "lab coat," "goggles," "experiments" (2), "analyzing," "tests," "observations," "liquid," and "rock," but also "sample," "sampling," "watersheds," "identification," "water," and "bugs."

Campers were asked to describe what they liked best and least about camp. Among the best-liked elements was the trip to the creek, which was mentioned by four students. Three said the best was "everything," one said "having fun," and one said, "I met a new friend." One response was illegible and three campers did not provide a response to this question. Ten students also responded to the question about what they liked least, and five said, "nothing" or "none of it." Two students referenced "sitting" or "staying" inside, one said "going to the robot zoo," one said "waiting to go different places," and the last said "waiters," which may refer to "waders."

Finally, campers were asked if the time they spent outside was "not enough for me," "about the right amount for me," or "too much for me." Ten campers said the time outside was "about right for me," while three said, "not enough," and none said, "too much."

Photo journal

Campers aged 9-11 completed a photo journal assignment in which they selected a picture from their photo journal that showed a time they were curious. Students were asked to respond to four prompts, including:

1) This picture reminds me of a time I was CURIOUS about: (fill in the blank)
2) What questions did you have?
3) What did you do, or WILL you do, to answer your questions?
4) What else do you want to say about what's in this picture?

Some of the pictures are shown on the following page with short summaries of some of the student commentary.

The student who selected this picture was curious about "chemistry."

The student who selected this picture was curious about "all the animals that live in the marshland" and wanted to know where they live.

This student wondered "how the Asian carp got their aggressiveness." To answer, "I will make an inference [*sic*] the environment it came from it wasn't a top predator so it had to be aggressive." The student also wrote, "how did it adapt to fresh water."

This student wondered, "Which way does our water go into the ocean?"

This student wondered, "What's a watershed?"

This student was curious about "my backyard," and wondered, "are all these animals from Michigan?"

The student who selected this picture wondered, "Which direction does the water go?"

Project staff reported that photo journaling was a generally successful activity for the *camp*, but from an evaluation perspective, the assignments did not yield a tremendous amount of information. It may be that the evaluation activity felt superfluous to some campers, given that it occurred on top of an already robust photo journaling experience throughout the week. It may also be that the prompts were ill-suited to the campers' ages or experience. Three campers' responses strongly suggested they had literacy issues that made it difficult to respond on a form of this nature.

3. YOUTH AGED 12-14

Five campers took the 12-question combined test/survey at the beginning of camp, and five completed the 15-question instrument at the end of the camp. The campers were asked to identify the grade they would enter in the fall, their gender and race, and their pattern of grades earned in school. All five students were middle-school aged and reported that they earn above average to excellent grades.

Table 5: Camper Characteristics

Grade in September	Number of Campers	Gender	Number of Campers
6th	1	Male	1
7th	1	Female	3
8th	3	Gender not specified	1
Grades in School		**Race**	
Mostly As	1	White/Caucasian	4
As and Bs	3	Asian/Pacific Islander	1
Other ("A, B, C")	1		

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Four campers were Grand Rapids residents and one lives in Rockford.

Campers self-rated their knowledge about the topics featured in the camp at the beginning of the week. At the end of the week, they again rated their pre-camp knowledge, then rated their post-camp knowledge. Like campers aged 9-11, campers aged 12-14 reported a major increase in their level of knowledge about watersheds, water sampling, and the Grand River after their week at camp.

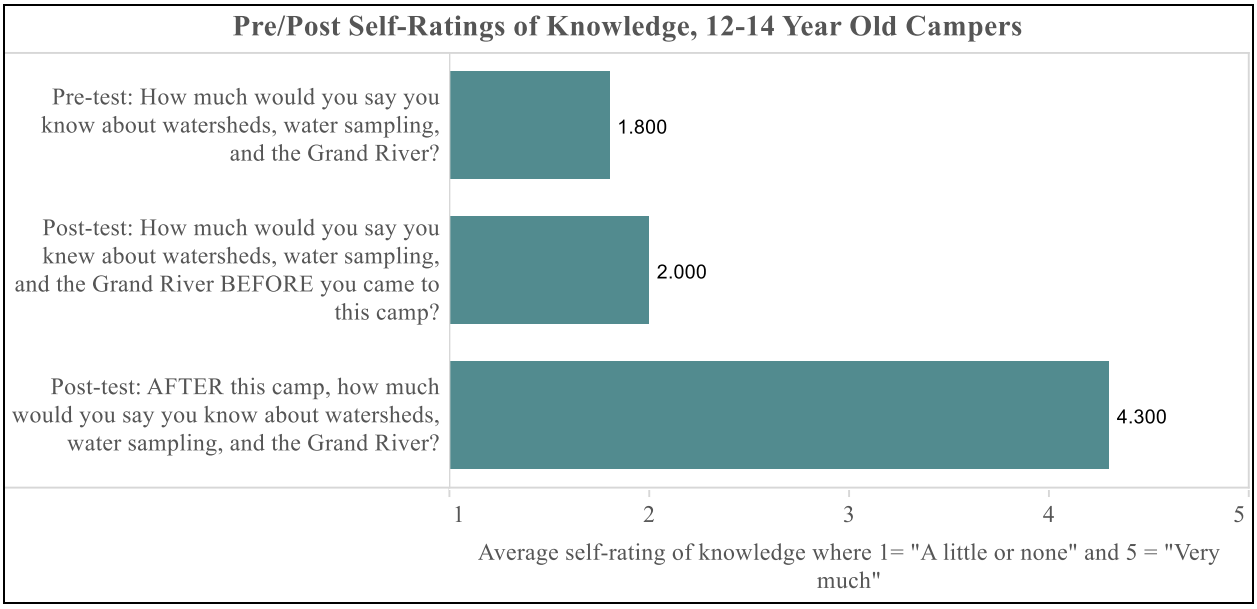

Figure 6: Pre/post self-assessed knowledge of the camp's topics.

The evaluation directly measured pre-camp and post-camp knowledge through four multiple-choice questions. The 12-14 year old campers scored an average of 30% at the beginning of the week and 85% at the end of the week.

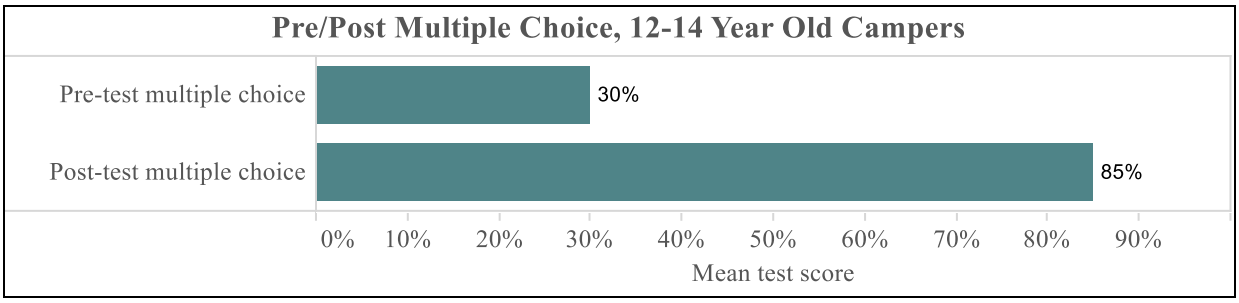

Figure 7: Pre/post scores on four multiple-choice questions.

Campers' performance improved on every question, as shown in Figure 8.

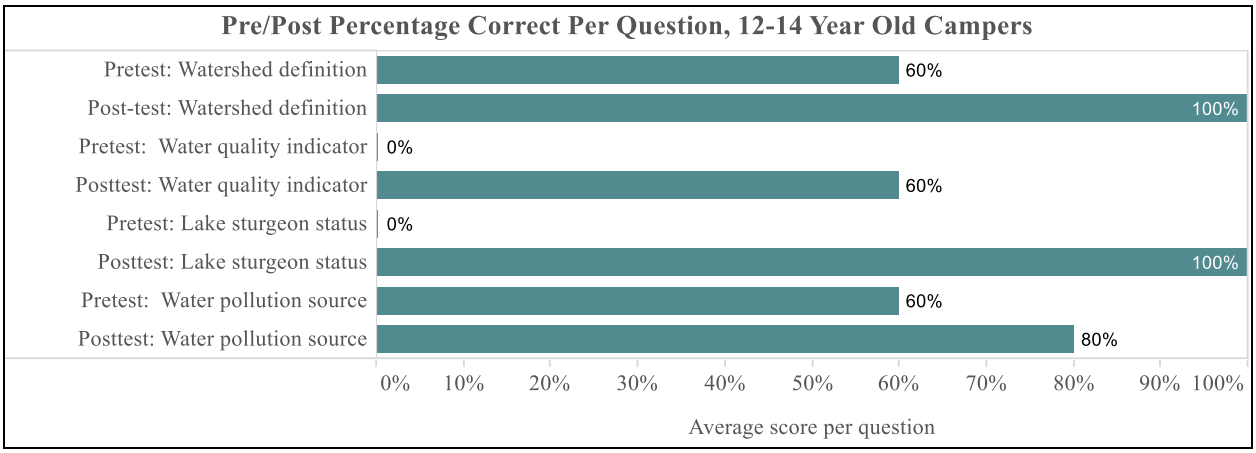

Figure 8: Question-by-question pre and post percentages correct.

Campers aged 12-14 also rated how much they learned on each of six science topics or processes, using a scale of 1 (low) to 5 (high). They indicated learning a great deal (4.4 out of 5 possible) on watersheds, water quality sampling, and collecting and analyzing data. They reported less but still substantial learning on the other topics, as shown in Figure 9.

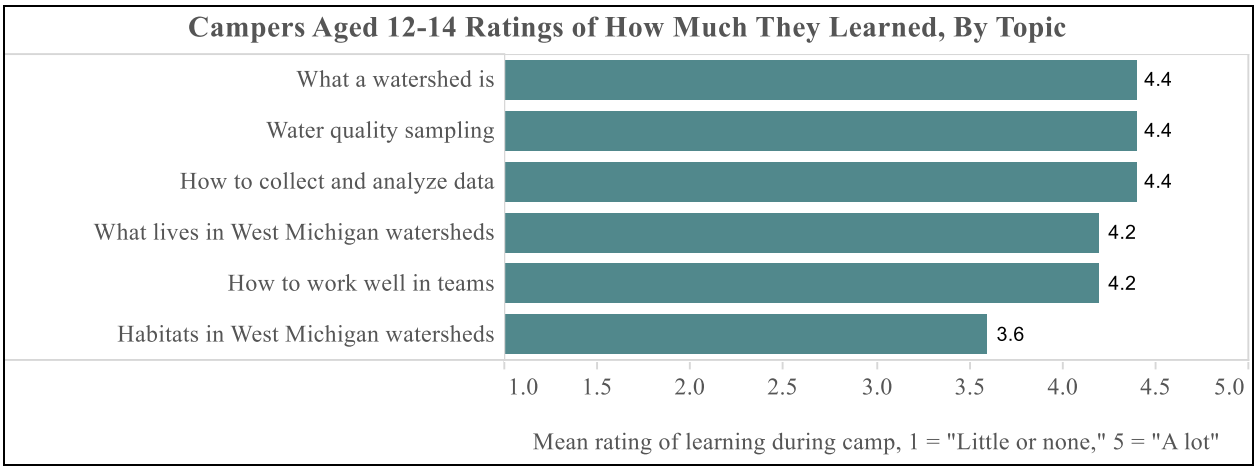

Figure 9: How much did you learn about these science processes and topics?

On the posttest only, students were presented with three fill-in-the-blank boxes that specified "I used to think," "now I know," and "this is how I learned it." They were prompted to reflect on one way in which their thinking about watersheds, water quality, or water sampling had changed, and to write about it using the prompts. Four campers' responses are summarized below; the fifth could not be interpreted due to legibility problems.

- I used to think that "*A watershed is a shed that was filled with water for a farm or something";* now I know "*A watershed is land that leads water to a bigger body of water, like a lake or ocean."* How I learned: "*I learned this by watching videos and looking at graphs and maps."*

- I used to think that "*You just got water and put it in test tubes and you were done";* now I know "*You collect insects and fish to see if the water is polluted."* How I learned: *"Because I collect insects put them in ice cube trays and charted my data."*

- I used to think "*Bugs were just bugs";* now I know "*Different bugs respond to different levels of pollution and can only live in certain pollution."* How I learned: "*Looking at bugs and comparing them to pollution levels.*"

- I used to think "*the Grand River didn't have big fish in it";* know I know "*the Grand River does in fact have big fishes."* How I learned: "*We all walked to the fish ladder & saw big fish. Plus we saw a habitat in the museum."*

Campers were asked to circle one word from a list of four— "fun," "boring," "hard," and "challenging"— that best characterized their feelings about science. This question was asked both at the beginning and at the end of camp. Two of the campers aged 12-14 made negative selections ("hard," "boring") at the beginning of the week; none did at the end of the week.

Table 6: Pre/Post Feelings About Science, 12-14 Year Old Campers

Word	Pre		Post	
"Fun"	3	60%	4	80%
"Boring"	1	20%	0	0%
"Hard"	1	20%	0	0%
"Challenging"	1	20%	2	40%

Campers aged 12-14 were also asked, at the beginning and end of the week, to list three words they thought of when they heard the word "scientist." Table 4 shows the most common themes at both times.

Table 7: Three Things You Think of When You Hear the Word "Scientist"

Word category	Pre	Post
"Smart"	13%	7%
"Fun"	0%	7%
Tools/topics/processes of science	53%	67%
"Science"/I don't know	20%	7%
"Hard," "challenging"	3%	11%
All others	13%	13%

Campers aged 12-14, like campers aged 9-11, were most likely to mention scientific tools, topics, or processes at both times, and the frequency of this category of response increased from 53% of all responses at the beginning of the week to 67% at the end of the week. The types of tools, processes, and topics mentioned changed as well:

- At the beginning of the week, students supplied the words "geology," "biology," "experiments" (2), "blowing stuff up," "testing," "particles," and "animals/living creatures."

- At the end of the week, the students supplied the words "geography," "lab coats," "experiments" (2), and "test," but also "sampling," "water," "plants and animals," "environment," and "habitats and space."

Campers were asked to describe what they liked best and least about camp. The trip to the creek was mentioned by two campers. One said "getting to do experiments," one said "learning and the teachers," and one said, "learning about the Grand River." Three campers said there was "nothing" they liked least. One liked "going to exhibits" least, and the last liked "the hot weather" least.

All five campers said the time outside was "about right for me" as opposed to too much or too little, and all five would recommend the camp to a friend. Their reasons for recommending the camp emphasized fun mixed with learning:

- "Because they like science and I had fun."
- "Yes because it's a great learning experience and it's fun to do."
- "You get to have fun and learn."
- "Because you learn a lot while having fun at the same time."
- "Because I never knew we would do this much cool stuff and I met new friends."

Photo journal

Campers aged 12-14 also completed a photo journal assignment in which they selected a picture from their photo journal that showed a time they were curious. Students were asked to respond to the same prompts as campers aged 9-11:

1) This picture reminds me of a time I was CURIOUS about: (fill in the blank)
2) What questions did you have?
3) What did you do, or WILL you do, to answer your questions?
4) What else do you want to say about what's in this picture?

Some of the pictures are shown below with short summaries of some of the student commentary.

This camper was curious about "what I caught in Lamberton Creek" and wondered, "why is the mud so dark?" The camper went on to say, "I had mud on my arm. I caught A LOT of creatures. I fell in the mud. I had fun. It stank."

This camper was curious about "the pollution runoff and its problems on the Earth." He wondered, "how does pollution travel?

This camper was curious about "how cold the metal plate was," and wondered, "How many gloves are you supposed to put on?" She also noted, "It was a lot of fun trying to figure the gloves out. It was really cold touching the plate with my bare hand."

Two additional campers did not include a photo, but responded to the prompts. One focused on "when we went to the stream" and was curious about "clean water." Specifically, "Why can't all water be clean?" The last focused on a visit to a fish ladder, where the camper saw a turtle and wondered if it would get out of the ladder, and what it would do. The camper also noted, "It was cool looking at so many fish."

4. PARENT FEEDBACK

Twenty-seven parents completed an online survey (19) or paper survey (8) about their child's camp experience. Sixteen of the respondents (62%) indicated the family has a GRPM membership. Eleven surveys (42%) were about a child in the camp for 6-8 year olds; twelve surveys (46%) were about a child in the camp for 9-11 year olds; and three surveys (12%) were about a child in the camp for 12-14 year olds.

Finding out about GRPM camps. Parents were asked to select as many as applied from a list of ways they might have learned about GRPM's camp offerings. As shown in Table 8, several methods offered by GRPM were not selected by any parents, including "postcard in the mail," "from my school," and "GRPM staff." About a quarter indicated they were return customers, but the largest category was "other."

Table 8: How Parents Learned of GRPM Summer Camps

Channel	Percentage
Previous customer	26%
Camp brochure	11%
GRPM Email blast	7%
"I'm a member"	11%
Postcard in the mail	0%
From my school	0%
GRPM staff	0%
All others	52%

Other ways of learning about camp included the GRPM Web site (3 respondents), from friends (2 respondents), various unspecified online or e-mail based sources (4 respondents), television news, "word of mouth," from grandparents who are members, and "GRKids camp list."

Parents were also asked about the factors that affected their decision to enroll their child(ren) in a summer camp at the GRPM. The open-ended answers were classified into categories and are shown in the table below. The most common types of responses focused on the competitive cost of the camps, attraction to the theme of the camps, and the fit of the camps into a family's other summer plans.

Table 9: What Factors Affected Parents' Decision to Enroll in a GRPM Camp

Category	Percentage of Respondents	Example Quotes
Cost	57%	◆ "Honestly the watershed camp was a great price! ◆ "Cost." ◆ "Excellent price." ◆ "…The cost was also a huge selling point - camps can be expensive when you are signing up multiple kids, and the cost is often prohibitive for us."
The theme	39%	◆ "Her areas of interest, related (in a fun way!) to science or math or reading."

CIVIC RESEARCH SERVICES, INC.
1301 E. DAWSON • MILFORD, MI 48381
(248) 752-0471 • LMARCKINI@COMCAST.NET

Table 9: What Factors Affected Parents' Decision to Enroll in a GRPM Camp		
Category	**Percentage of Respondents**	**Example Quotes**
		◆ "My son is really into water." ◆ "The science theme was the main factor."
Schedule/timing	22%	◆ "Pricing, schedule and camp themes/topics." ◆ "Was the right week." ◆ "The schedule matched when he was available…" ◆ "Length & time of day." ◆ "… Good times (matched up with Slimy Science for summer)."
Educational	13%	◆ "Quality education…."
Hands-on	13%	◆ "He has a curious nature, so the hands-on learning style really translates to a great experience."
Staff	8%	◆ "The instructors are knowledgeable & enthusiastic." ◆ "Trust in instructors' ability to teach, be prepared, safe and great with children."
All others	39%	◆ "Child interests and make up of class. My girls are interested in Legos but afraid to be with all boys." ◆ "The entire experience." ◆ "Something new and fun." ◆ "Reputation." ◆ "My son loves visiting the public museum." ◆ "… I also really liked that there were classes for multiple age groups offered at the same time (this is a big deal for me)." ◆ "Convenient." ◆ "Active." ◆ "…Sharing and an awareness of the world around us."

Registration. Eighty-nine percent of those responding to the survey registered online. The average rating of ease of registration, on a five-point scale ranging from 1 (low) to 5 (high), lies between 3.88 and 4.33. Unfortunately, the data exported from the GRPM online survey dropped six responses between a "2" and a "4" on the five-point scale.[1] On one paper survey, a respondent wrote in, "It would be nice to have more details about the camp."

Length of camp. Twenty respondents (77%) said the camp length was "just right," as opposed to "too long" (0%) or "too short" (23%). When parents were asked about the ideal length for a summer camp in days and in hours per day, their responses were diverse. The single most popular option was for a 4-day camp with half days in the morning, but only 29.2% selected this option. Table 10 shows how day count and hours-per-day choices combine.

[1] SurveyMonkey (or similar) data shared with Civic Research Services, Inc. (CRS) included labels for scaled ratings including "Difficult, inconvenient" for "1" and "Easy, convenient" for "5." For ratings of "2," "3," or "4," where no label was associated with the number, spreadsheet cells were empty. From a preliminary report after the initial camp had run, CRS was able to determine that some of the missing data were ratings of "4." Six later respondents offering neither a "1" or a "5" show only as blank cells in the data file. The low rating of 3.88 assumes all were the lowest possible, and the high average rating of 4.33 assumes the missing data is the highest possible rating of "4."

Table 10: Parents' Preferences for Camp Duration

Days	Percentage	Hours Per Day	Percentage
More than 5	8%	Half days (mornings)	4%
		Half days (afternoons)	4%
5 days	27%	Whole days	11.5%
		Half days (mornings)	11.5%
		"Whole or half day options"	3.9%
4 or 5 days	8%	Half days (mornings)	8%
4 days	50%	Whole days	12.5%
		Half days (mornings)	29.2%
		Half days (afternoons)	4.2%
		Half days (mornings or afternoons)	4.2%
3 days	8%	Whole days	4%
		Half days (mornings)	4%
*Totals**	*101%*		*101%*

*Totals vary from 100% due to rounding

Overall, independent of days per week, 27% of parents preferred whole days, 54% preferred half days in the morning, 8% preferred half days in the afternoon, and 12% preferred "something else," including one parent open to whole or half-day options, one parent open to morning or afternoon half days, and one parent (not shown in Table 10) who did not select a number of days per week, but preferred "six hours with a lunch break" as the hours per day.

Overall satisfaction and most/least liked. On a scale from 1 (low) to 5 (high), parents rated the overall quality of the camps at a 4.81, and the staff at a 4.93. These are extremely strong ratings indicative of nearly universal parent satisfaction at the highest level.

Table 11 shows what parents said their sons and daughters liked most about camp. The most common themes were going to the creek and the active and hands-on nature of the activities. In a couple of instances captured in the "other" column, it appears campers attended other camps, too, and their overall "favorites" were associated with another camp.

Table 11: What Parents Say Their Kids Liked Most

Category	Percentage of Respondents	Example Quotes
Water sampling/going to the creek	27%	◆ "Putting on waders & going in the river." ◆ "They really enjoyed the time at the creek."
Active, hands-on activities	19%	◆ "Active participation, field trip, real-life learning." ◆ "Being outdoors, hands on with nature."
"Everything"	15%	◆ "Basically everything, she said that all the things they did were fun." ◆ "She loved everything."

Table 11: What Parents Say Their Kids Liked Most		
Category	**Percentage of Respondents**	**Example Quotes**
Museum exhibits/exploring	15%	◆ "Going to the robot zoo." ◆ "Exploring the museum."
All others	35%	◆ "The themes/topics." ◆ "Learning about watersheds." ◆ "Scrapbooks." ◆ "Talking with his brothers about what they did (he was in the younger group)." ◆ "Making shield and smashing watermelons." ◆ "Everything! Planetarium, Veen's."

Parents liked that the camps were educational (42%), fun and engaging (29%), hands-on (21%), and they favored them for certain specific features (17%) and for practical and logistical reasons (17%).

Table 12: What Parents Liked Most		
Category	**Percentage of Respondents**	**Example Quotes**
Educational camps	42%	◆ "Quality education in the summer (and she didn't feel like it was school)!" ◆ "Educational content."
Fun and engaging	29%	◆ "It seemed hands on and engaging, and all of my kids had a great time." ◆ "How much fun she had!"
Hands-on/experiential format	21%	◆ "How it was experiential learning - the fact that they built the watershed and understood how it worked before going out into one." ◆ "Hands-on."
Specific features	17%	◆ "The science theme. Also loved seeing the journal at the end of the week." ◆ "I liked the information that was given to take home every day." ◆ "Loved field journal with animal identification pictures. Great detail. Compared river and creek chemistry. Related pollution back to own watershed. Loved pictures,"
Pragmatic considerations	17%	◆ "Drop off!" ◆ "Wrap-around activities." ◆ "Cost, hours."
Staff	8%	◆ "I love that the staff always seems knowledgeable & enthusiastic, which translates to a wonderful & fun learning environment.
All others	21%	◆ "Kids connected with others well." ◆ "Great exposure to so many new things." ◆ "Miss b, food and crafts." ◆ "Seeing my son so excited about space camp - and the Oreo moon phases.

Parents' reports of what their kids liked *least* included predominantly "nothing," or that the camp was "too short," which was stated by 15 of the twenty-one respondents writing anything in this section (71%). Three (14%) reported that their child didn't like "getting up early to attend." The other three comments were, "Planetarium show boring, too short," "hot weather," and "having to write."

Parents' reports of what *they* liked least also included predominantly "nothing," "N/A," or "no complaints." The six substantive comments other than "nothing" follow:

- "Remembering to pick up a parking pass"
- "Bad weather viewing plans for River exploration"
- "Paper survey - give online please to too long for paper - 24 hours wait"
- "That you had him write. :) Actually, another positive here. I have no complaints what so ever."
- "Time went too fast. Not much time between drop and pick up>"
- "The logistics of pick up/drop off are a bit tricky because of younger siblings, I think it could be easier to have longer days with fewer drop offs. However, if you could make a valet drop off and/or pick up, my life would be easier; and honestly, the shorter days probably are better for learning."

Outcomes for campers. Parents were asked, "What have you noticed, if anything, about changes in your child's awareness, perspectives, behaviors, or skills and knowledge regarding the topics covered in this camp: Watersheds, the Grand River, water quality, special species in our watershed, and being a good steward of water?" Most parents responded to this question by either pointing out a new awareness in their children, or by describing how the child spoke about camp after coming home.

Specific responses to this question are presented below, broken out by student age group. Parents of 6-8 year olds reported the following:

- "Excited about everything he learned."
- "N/A"
- "He is able to talk about the questions of the day and is enthusiastic."
- "He noticed water-bugs last time we went to Reads Lake."
- "So many new vocab words he understands."

Some parents of 9-11 year olds reported that their kids were talkative about the subjects covered in camp:

- "She's been identifying bugs since the class and telling me about them!"
- "She came home each day with something new to tell me. She notices things about her environment more now."
- "Discussed what she learned every day."
- "She talked about the water drop what was inside."

Parents of 9-11 year olds also described new awareness in their children:

- "Seems more aware of other species in our watershed. He already had a love of nature but this camp gave him another outlet to explore the natural world."
- "More aware of pollution from cars & factories. Animal identification and asked more questions at home. Both of my kids want a chemistry set to analyze waterways. Son wants to join the Grand River Care group when he is older."

- "She told me she understood why I'm always on her about drinking water from a lake while she swims!"

Another parent of a 9-11 year old camper said, "He connects on a much deeper level than before." One parent said she did not notice any changes in her child, and a third explained that his or her child attends Goodwillie, but the parent did not speak to the question at hand.

Only one parent of a 12-14 year old responded to this question, and said, "She excitedly talked about things that she learned." A final parent who did not identify his or her child's grade level indicated, "He was easily able to talk about what he learned. Normally, this is a challenge."

Interest in other camps. When asked if they would be interested in other camps, such as over spring or winter break, 10 respondents (37%) said "yes." Three did not qualify their response with conditions. Others suggested useful times and structures. Four specifically indicated yes for winter break, and of these, two were looking for a two-day camp or a one-to-three-day camp with half-day sessions. Another said, "probably if the days were longer & fewer it would be easier to fit in." Yet another suggested a Monday through Thursday structure featuring themes such as weather events or dinosaurs and archaeology. Three specifically mentioned spring break as a camp they would be interested in.

Another five respondents (18.5%) said "maybe" or "possibly." Of these, one further indicated that a schedule short of the full week— "a day, not a series" —would be attractive.

Final comments. Ten parents provided additional comments at the end of the survey. All expressed praise for some aspect of the camp or the entire experience. Parents took the time to commend the GRPM for the quality programs, excellent staff, and special features and services that they particularly appreciated.

- "My son has participated in many camp programs over the last couple of years and has enjoyed all of them. Thanks for the great staff and well-planned curriculum!"
- "Really nice teachers! Loved that my daughter got an experience like this. May help her understand some career fields that may interest her in the future. Loved that the kids were out in nature. Also, loved that she had real scientists and teachers working with her! Thanks for this camp!"
- "Very happy with her experience. The staff was very welcoming. Pretty sure that we will be doing another camp in the future."
- "The parking passes were very helpful since meter parking is not always available!"
- "Thank you! This was a great experience. One idea actually - it looks like you took some great pictures during the camp. Is there any way those could be sent to the e-mail list of parents from the camp? Not only is it really nice to have for memories, but it gives such a better idea of what happened in the camp this week. It's excellent advertising for you guys when we are able to see those pictures. :) It helps us be excited about the week as well!"
- "Really liked sheets of paper given to parents at pickup that gave us prompting questions for that day's event."
- "Just a wonderful program! We moved here from Pittsburgh last year and in spite of an amazing arts scene and wonderful museum in Pittsburgh, GRs kids programs are better here! Thank you!"
- "Best camps in town!"
- "Great time, thanks! He loved it!"

◆ "My daughter loved this experience. Thank you!"

IMMERSE On-Site Learning

1. STUDENT LEARNING

Students participating in IMMERSE experiences at the GRPM were engaged in a one-hour, pullout workshop on watersheds and native Michigan species and their habitats. At the beginning and end of the hour, students took a quick five-question quiz to measure baseline knowledge and growth through the workshop. One hundred forty-four pretests were collected, and 125 posttests. The attrition in posttest participation is assumed, for purposes of this analysis, to be random, as students' pre and post quizzes cannot be individually matched. To the extent that attrition was *not* in fact random, the results shown here may be biased in unknown ways.

Overall, student performance on the quiz increased from 58% at the workshop beginning to 79% at the end. Figure 10 shows the question-by-question results.

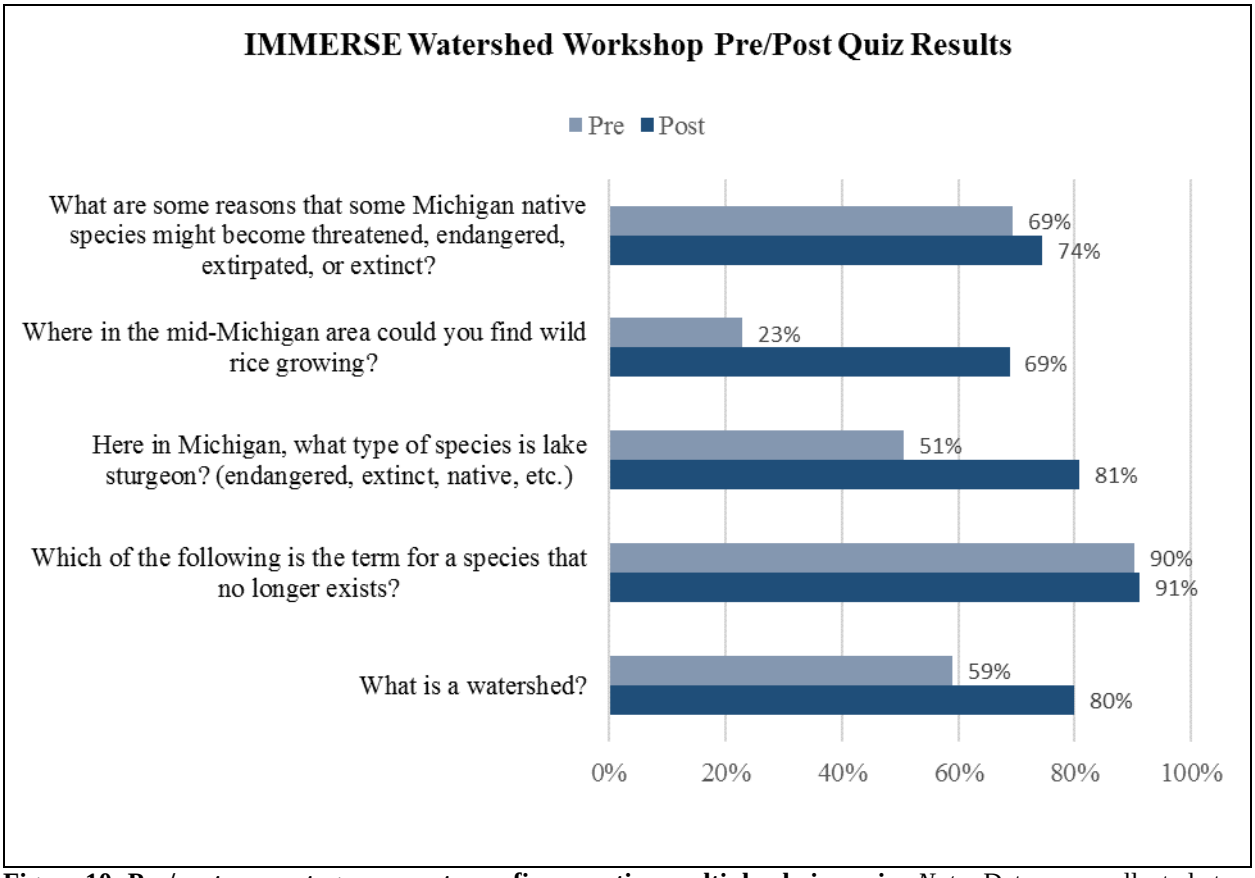

Figure 10: Pre/post percentages correct on a five-question multiple-choice quiz. *Note:* Data were collected at five workshops in fall 2016 serving 3rd, 4th, and 5th-grade students and teachers.

Students in this age group appeared to have relatively strong baseline knowledge of the terminology of threatened and endangered species, and did not gain a great deal from the workshop on these topics. However, understanding of the definition of a watershed improved (59% could recognize the definition in

the pretest, and 80% in the posttest), as did familiarity with the lake sturgeon and its condition in Michigan (51% answered the question correctly in the pretest, and 81% did so in the posttest). The greatest gains were seen on awareness of where wild rice grows in mid-Michigan. Only 23% of students answered this question correctly at the pretest, but 69% did so in the posttest.

2. Most Significant Changes

A "most significant changes" (MSC) process was designed for the evaluation to collection insights from staff and from teachers about important changes they observed and attributed to the IMMERSE program overall. The MSC protocol has strong potential for IMMERSE and for museum educational programming in general, but no forms were returned or submitted during the evaluation period. Using the protocol correctly and consistently will require some investment of time by GRPM staff to follow up with teachers and to encourage staff to use the process consistently.

After-School Programming

Two sessions of the watershed Lyceum were conducted during the grant period. Collecting data for this activity became burdensome on staff due to low energy among students and resistance to the after-school programming experience and the evaluation. The first Lyceum's data did not include the essay component of the posttest, and a pretest but no posttest was conducted for the second Lyceum. This report includes the available pre/post data from the initial program in spring 2016 from six students who completed both a pretest and posttest.

The Lyceum pretest and posttest began by asking the students to name three threatened or endangered species in their local watershed. This was very difficult at the pretest, but students showed substantial improvement by the posttest. The results of this inquiry are shown in Table 13.

Table 13: Name Three Threatened or Endangered Species in the Grand River Watershed

Pretest	**Posttest**
Average valid mentions: 0.58/3 possible	Average valid mentions: 2.00/3 possible
Responses:	**Responses:**
Sturgeon (2)	Sturgeon (6)
Lynx (1)	Wild rice (5)
"A species of salmon" (1)	Snuffbox mussels (1)
"A species of clam" (1)	Zebra mussels (1)
White catspaw (1)	Bugs (1)
Macroinvertebrates (1)	Macroinvertebrates (1)
	Birds
	Mussels in general (1)

Students were then asked to define, in their own words, the terms "native species," "invasive species," and "threatened species." CRS scored each response as "0" (not attempted, "IDK," completely wrong), "1" (partially correct, provided an accurate example), or "2" (a reasonable definition for middle school). As shown in Figure 11, Lyceum participants got better at defining each of these terms, and in the case of invasive and native species, were starting with very limited baseline understanding.

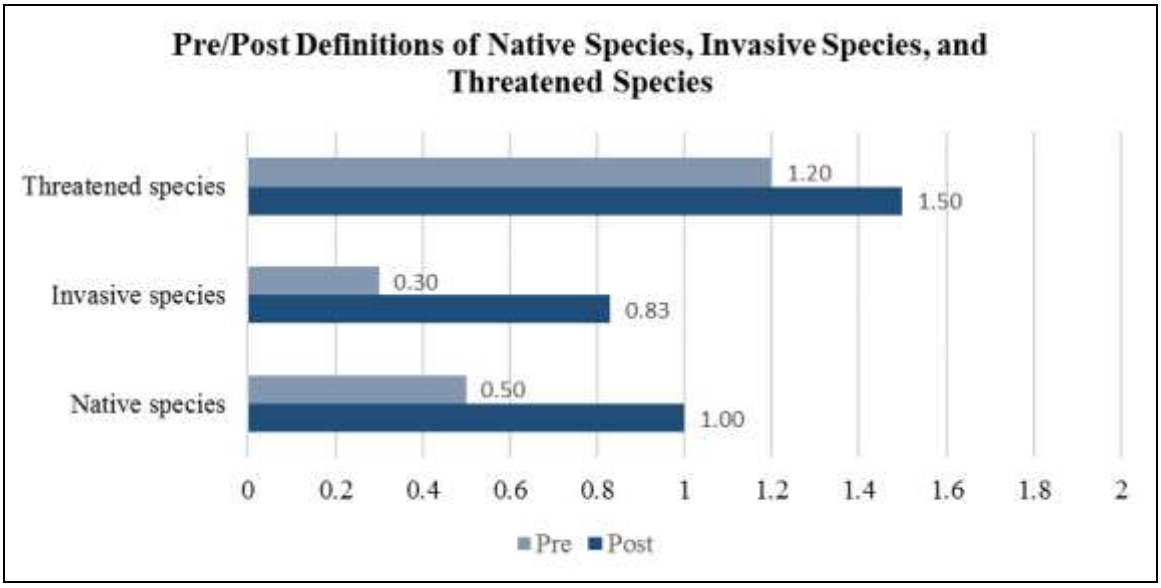

Figure 11: Scored definitions of key words, pre and post.

Students self-rated their level of care and concern for the Grand River. As shown in Figure 12, concern declined between the pretest and the posttest. This could signal learning that the river water quality is better than expected, or burnout with school or the program or the evaluation.

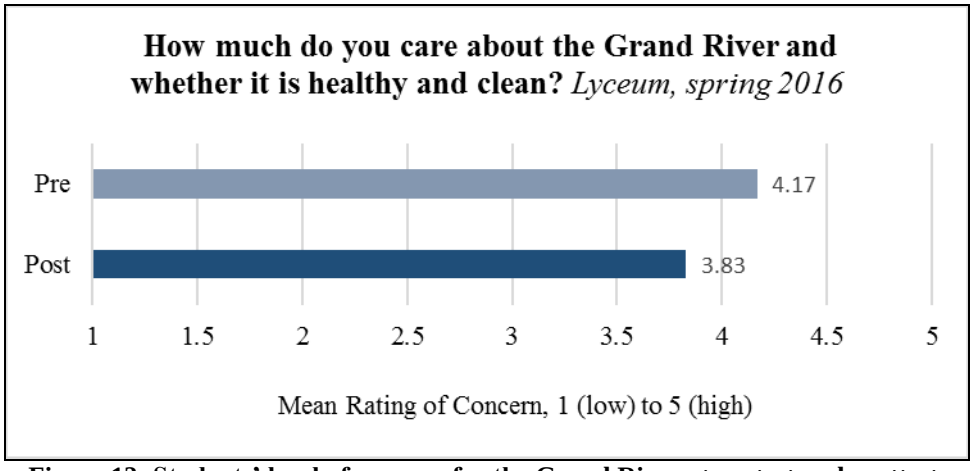

Figure 12: Students' level of concern for the Grand River at pretest and posttest.

The final question for which pre/post data is available was a multiple-choice item focused on which governments' laws and regulations affect the Grand River. The response options included a) the State of Michigan, b) the State of Michigan and the U. S. government; c) the cities and towns through which the river flows, and d) the State of Michigan, the U. S. government, tribal governments, and the cities and

towns through which the river flows. Two students correctly identified the answer at pretest and at posttest.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Watershed camps were well received by participants of all ages and their parents. A number of measures and prompts captured data on satisfaction and enjoyment. Parents gave the program and staff near-perfect ratings; relayed their children's' satisfaction with the camps' active, hands-on, exploratory format; and rarely indicated their children had any complaints about the camps. Campers themselves expressed satisfaction with water sampling and other hands-on activities and surfaced no meaningful complaints. Campers aged 12-14 were asked if they would recommend the camp to a friend, and all said they would, due to the camp's mixture of fun and learning. Finally, campers' photo journals showed real enjoyment of the activities by students.

Campers of all ages met the key learning goals for the camps. Multiple-choice tests, self-assessments of knowledge before and after the camp, and free-write assessments demonstrated that campers were advancing in their understanding of watersheds, water quality monitoring processes, sources of water pollution, and special species in the watershed.

Campers of all ages showed positive changes in their conceptions of science and scientists. While most campers began thinking science was fun, their positive views of science got even stronger over the course of their camps. Campers aged 6-8 were more likely, at the end of their camp, to say "fun," and less likely to say "smart," when asked for words they thought of when they heard the work "scientist." When asked for words they thought of after hearing the word "scientist," campers aged 9-14 were more likely after the camp than before to specify numerous examples of science tools, processes, and topics, and they included camp-related themes like "water," "watersheds," "bugs," "sampling," "environment," "plants and animals," and "habitats," whereas pre-camp words were more limited to stereotypical scientist tropes such as "chemistry," "blowing things up," experiments," and "lab coats."

Parents' most important decision factors were cost, content, and scheduling fit. Although parents praised the staff and the quality of the camps, when asked how they chose a camp cost came first, content came second, and the fit of the camp into other planned activities came third.

Parents' preferences for days per week and hours per day are highly diverse. Parents ran the gamut when asked how many days and hours per day they would prefer. However, 58% preferred "4 days" or "4 or 5 days," while 27% preferred "5 days," and only 8% each preferred "more than 5 days" or "3 days." The largest share of parents—54%--preferred half-days in the morning, while 27% preferred whole days, and 20% preferred other arrangements, including half-days in the afternoon or write-in suggestions.

Short watershed workshops within IMMERSE showed targeted gains in understanding on a few content questions. Students in grades 3 through 5 learned something about each of the focal topics of the workshops, but began with the strongest baseline—and therefore learned the least—about threatened and extinct species. No other data was collected on the workshops or the broader IMMERSE programming.

Lyceum data show improved content knowledge related to native, invasive, threatened, and charismatic species, but also suggest resistance and low energy. Six Lyceum students demonstrated surprisingly limited awareness of threatened and endangered species in their local area, but learned about sturgeon and wild rice through the Lyceum. They had very little ability to define native and invasive species before the Lyceum, and demonstrated improvement, although not mastery. Students' self-rated care and concern about the health of the Grand River declined modestly over the course of the Lyceum. Although the decline may be artificial given the small number of students, the overall pattern of responses suggests a comparative lack of enthusiasm among Lyceum students as compared to campers.

Recommendations

1. If attendance is meeting the GRPM's financial needs and expectations, **the GRPM should continue with watershed camps or other environmentally themed camps using a similar structure to the 2016 camps**. The camps were very well rated by parents and children, and were effective in fostering positive and more accurate impressions of science and scientists while imparting targeted content and building inquiry skills.

2. Although parents' ideal points are varied, **the camp format pleasing the greatest number of surveyed parents is a four-day camp with half days in the morning**. An optional afternoon component or after-care component might open the camp to working parents who need coverage throughout the day.

3. If GRPM staff concur with the impression of the evaluator that Lyceum students were less enthusiastic than other youth served through this grant, **it may be that after-school programming needs more of the hands-on, exploratory spirit appreciated in camps**. On the other hand, hour-long after-school programs are necessarily more limited in what can be initiated and concluded during the students' time with staff, and students may be tired after a long day at school. Other types of Museum-related programming may be a better fit for after-school learning.

4. GRPM staff should, when schedules so permit, **reexamine the Most Significant Change (MSC) process for ongoing use in evaluating IMMERSE** programs. MSC is easy and can provide better evidence of the real value of the weeklong program than student surveys, but it must be implemented with follow-up to establish a pattern of participation.