2016-2017

Rouge Education Project: Survey Results

Friends of the Rouge

Dearborn, Michigan

www.therouge.org

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Contents

Introduction

Pre- and post-Rouge Education Project (REP) student evaluations, designed to reflect the program's impact, are distributed to each participating teacher and are written for different grade level groups: 4-6, and 7-12. Schools in the program that have numerous grade levels participating are given the appropriate mix so that each student has the ability to take the proper survey. Pre-REP surveys that do not have a matching post-REP survey (and vice-versa) are not included in overall calculations. This ensures that the assessments are balanced and accurate, though it also can mean some schools' data reflect more/less students who actually participated in the program than in the surveys because they missed either the sampling day or the survey distribution. Below is the compiled assessment of the survey for both fall and spring monitoring.

As of fall 2013, REP pre- and post-sampling surveys have been modified and are adapted (with permission) from similar surveys created and distributed by Friends of the Chicago River.

How Data are Used

Survey results are used in program development and grant writing to estimate a measurable impact from those students that participate. Quantitatively, the program will be considered a success for 2016-2017 the following are observed from student pre- and post- surveys:

- An increase in the percentage of students correctly answering multiple choice questions based on general watershed science and/or the Rouge River specifically
- An increase in the percentage of students who can identify specific water quality issues in the Rouge River
- An increase in the percentage of students who can correctly identify potential solutions to local and/or regional water quality issues

Fall 2016 and Spring 2017 Results

All Grades

Sample Size	
4th	7
5th	275
6th	179
subtotal	**461**
7th	172
8th	86
9th	29
10th	132
11th	48
12th	116
College Student	8
subtotal	**591**
TOTAL	**1,052**

Have you ever been on a Rouge River field trip?

	4th-6th		7th-12th	
No. of times to the Rouge River	Pre	Post	Pre	Post
Never	278	29	321	216
Once before	63	213	150	160
Twice before	77	84	84	116
Three times before	15	70	20	66
Four times before	14	40	6	13
Five times before	0	7	0	7
More than five times before	10	13	10	12
Blanks	4	5	0	1

57% of participants had never been on a Rouge River field trip before.

Interest in science

There was a 0.11% increase in the number of students *not* interested in science.

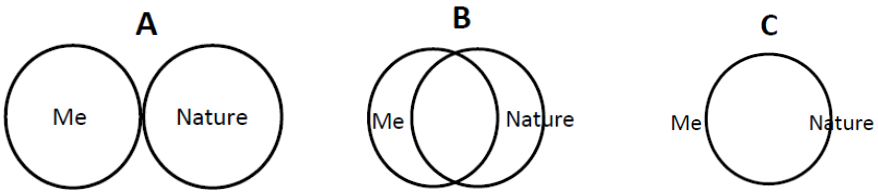
Interest in nature

There was a 2.16% increase in the number of students interested in nature.

Interest in school

There was a 2.65% increase in the number of students *not* very interested in school.

Relationship with nature



There was a 2.48% decrease in the number of students that chose "A", a 2.10% increase in the number of students that chose "B" and a 0.38% increase in the number of students that chose "C" to represent their connection to nature.

Q: All macoinvertebrates are equally tolerant of pollution

There was a 3.32% increase in the number of students indicating the correct answer (*false*).

Number of students correctly identifying ALL macroinvetebrates from list (i.e., insects, mammals, **crustaceans, molluscs (snails, clams, etc.),** birds, fish**)**

There was a 13.12% increase in the number of students able to correctly identify these macroinvetebrates (from 226 students to 364 students).

Pollution in the Rouge

Number of students (4th-6th) able to list a source of pollution in the Rouge

There was a 9.20% increase.

Number of students (7th-12th) able to list a problem affecting the Rouge

There was a 7.80% increase.

Number of students able to list a corrective action to limit pollution

There was a 4.75% increase (886 students to 983 students).

Number of students (4th-6th) that know where to look to find out more about the pollution problem they listed

There was an 8.99% increase in the number of students able to find out more about the pollution problem they listed.

Number of students (7th-12th) that know where to look to find resources to fix the problem

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Pre	70	166	233	87	32
Post	95	169	205	84	34

There was a 4.28% increase in the number of students that "strongly agreed" with this statement, and a 0.56% increase in the number of students that "agreed."

Students (7th-12th) able to research the problem listed

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Pre	141	227	149	50	21
Post	140	207	165	52	24

There was a 0.85% increase in students that "disagreed" and "strongly disagreed" with this statement.

Students (7th-12th) able to explain the problem listed

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Pre	82	109	105	42	18
Post	108	112	92	32	15

There was a 4.97% increase in students that "strongly agreed" with this statement.

Technical scientific questions (grades 7th-12th)

Q: Imagine you are at the river testing for the presence of dissolved oxygen in the water. If you want to get the most accurate result, you should repeat the test more than once.

96.27% of students answered this question correctly in the pre-survey (*true)*, and 95.40% of students got answered correctly in the post-survey.

Students able to list a source of high nitrates in the Rouge

There was a 29.06% increase in the number of students able to list a source of high nitrates in the Rouge (103 students to 271 students).

Students able to list a corrective action to limit nitrates

There was a 35.45% increase in the number of students able to list a corrective action to limit nitrates (70 students to 270 students).

Feelings regarding the Rouge Education Project

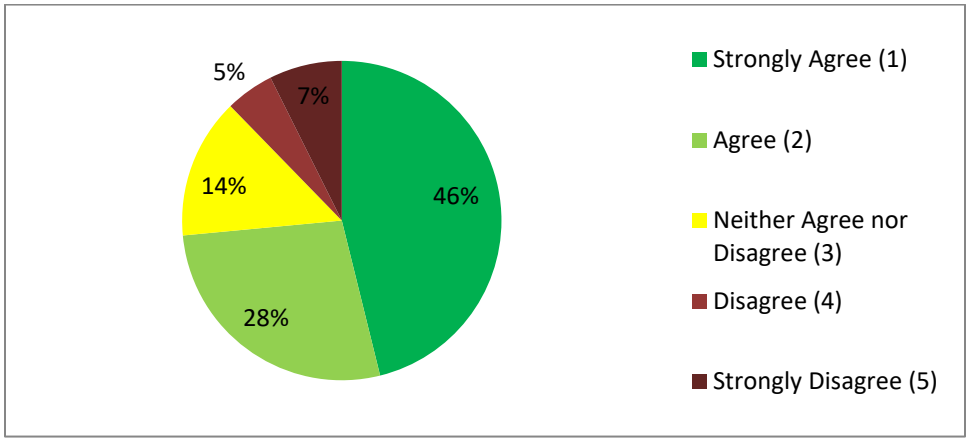
94.31% of all students were able to list a way participating in the Rouge Education Project helps the Rouge River.

4th-6th grade responses

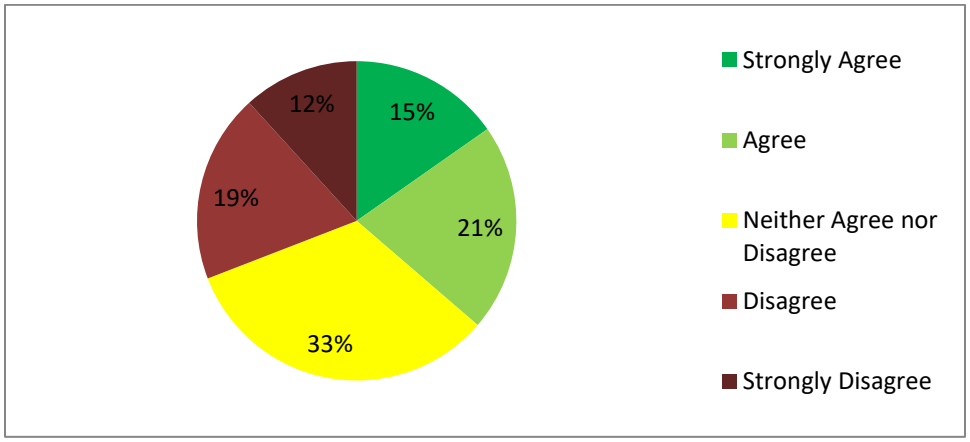
Question	Percent of students
Learned how to make the Rouge healthier	93%
Learned something new about the Rouge	91%
Participating in the REP made me feel like I could make a difference in protecting the environment	91%
Participating in the REP helped me to think like a scientist	83%
Plan to talk to family/friends about the REP	77%
Participating in the REP helped me understand classroom material better	72%

7th-12th grade responses

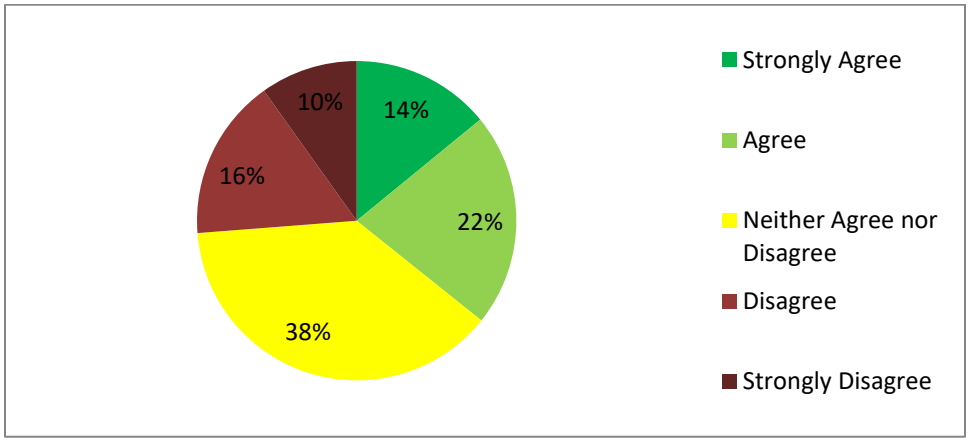
I learned something new about the Rouge River.



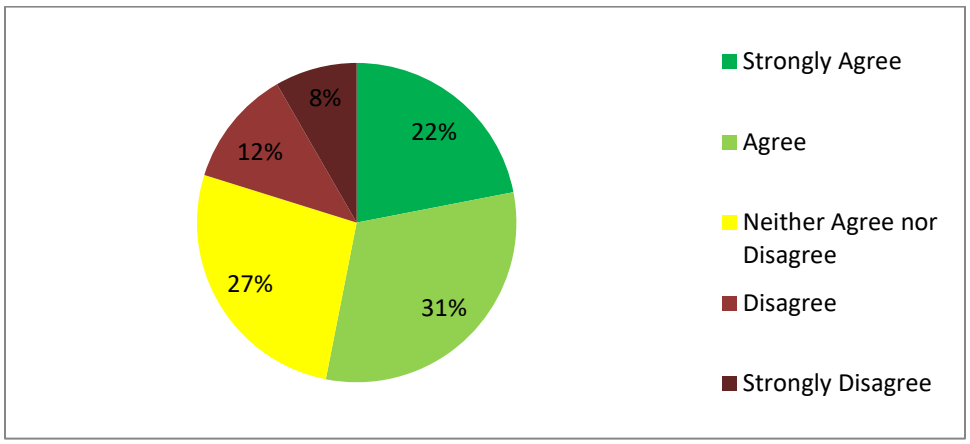
I plan to talk to family and/or friends about the information I learned.



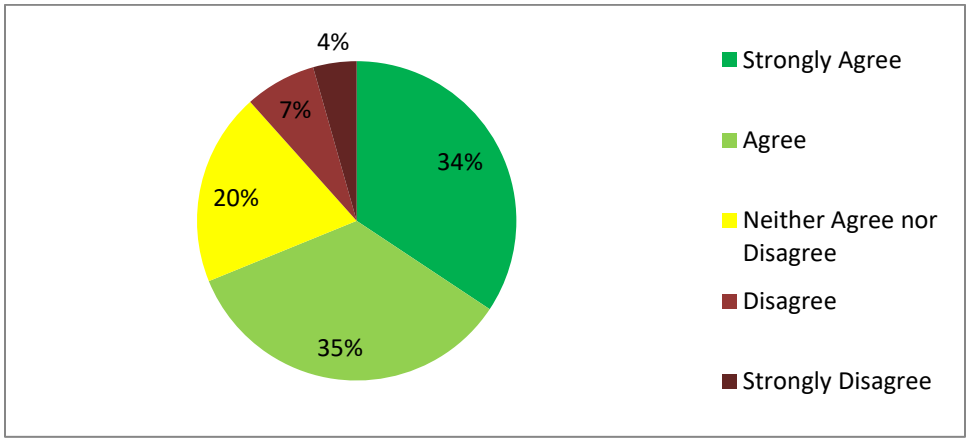
I experienced a feeling of connectedness to the Rouge River.



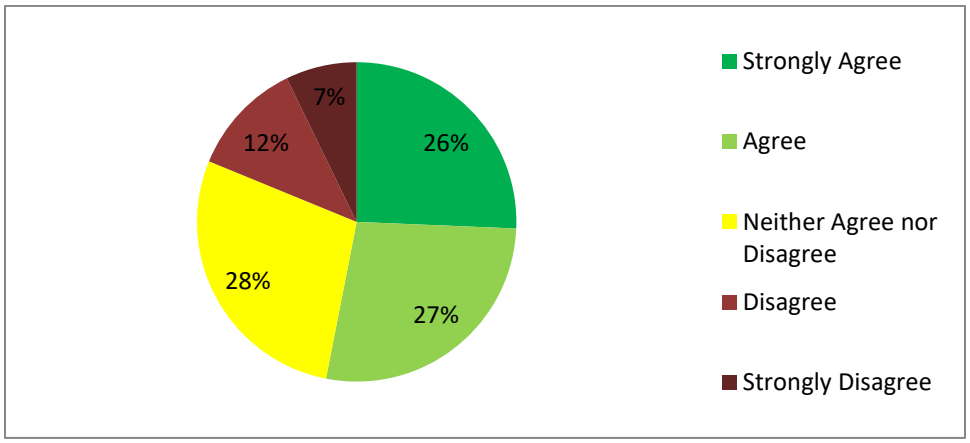
I found myself reflecting on new ideas about how my actions affect the river.



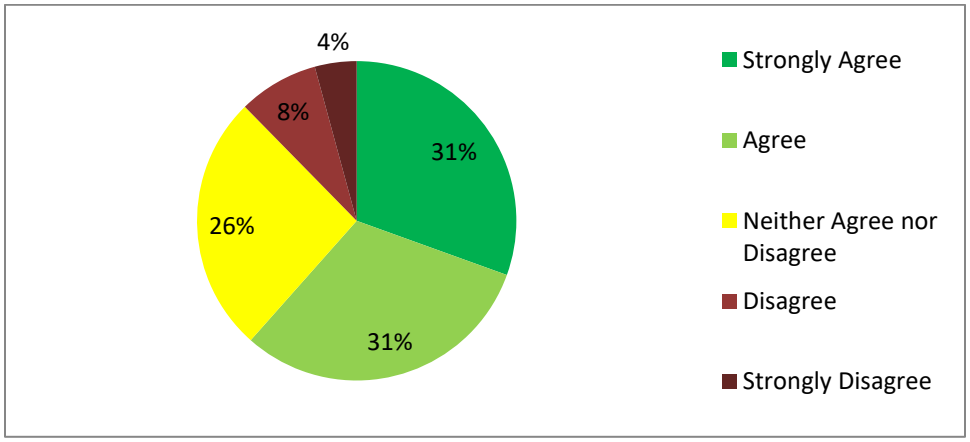
I learned about actions I could take to make the Rouge River healthier.



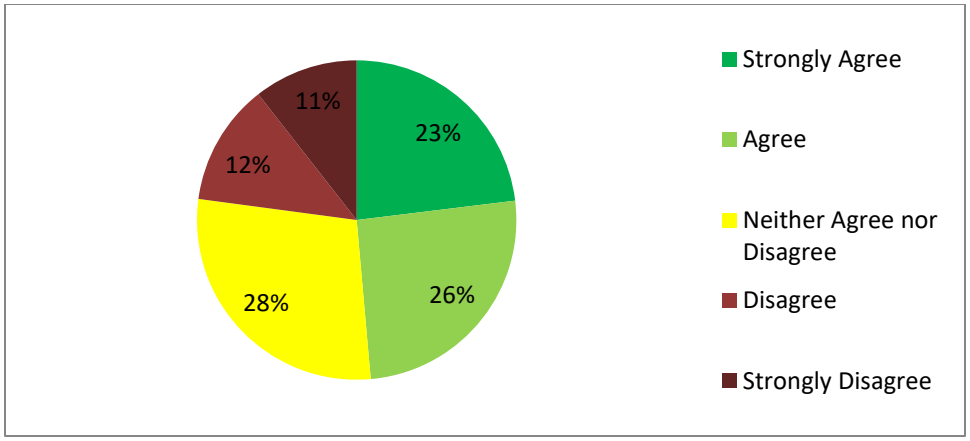
If given the opportunity, I would choose to participate in more projects that would help the Rouge River.



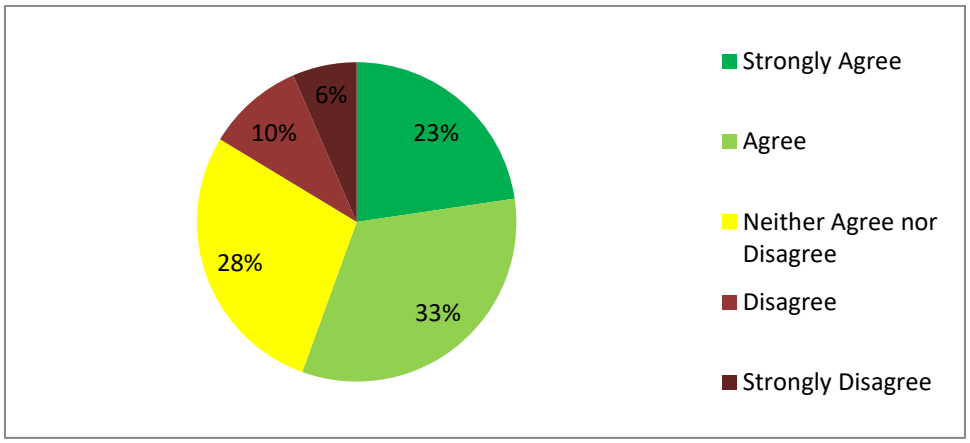
Our class' REP river monitoring made (or could make) a difference in the health of the Rouge River.



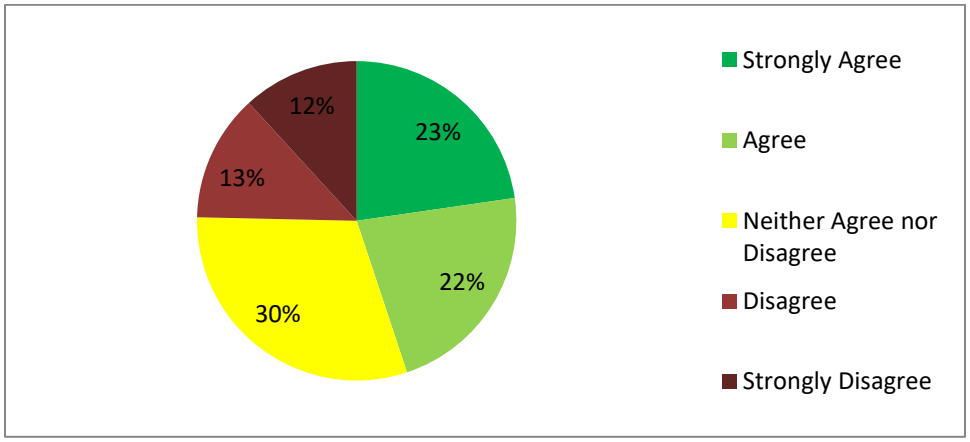
Our class' REP river monitoring involved people and/or organizations from the community (other than school staff/faculty.)



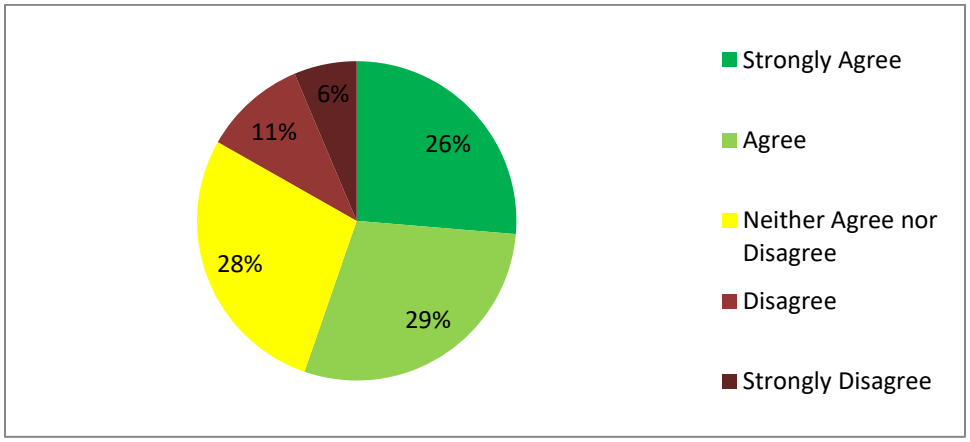
The REP helped me feel that I could make a difference in society.



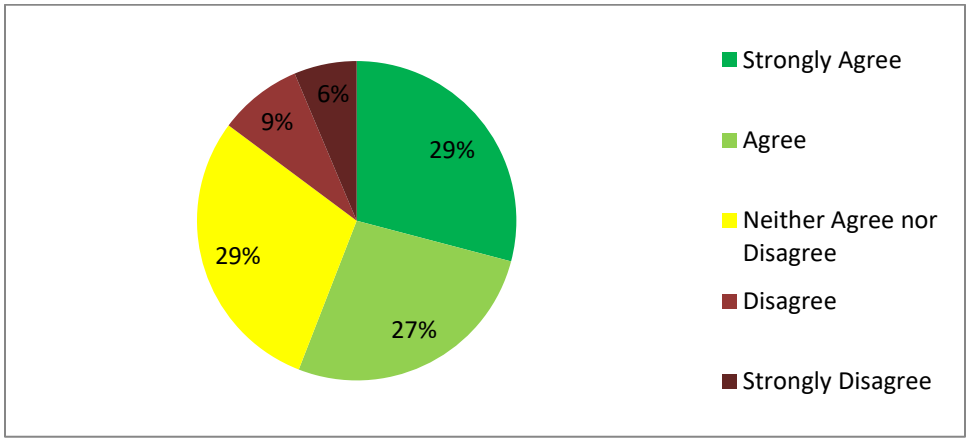
I met people/encountered things I normally wouldn't have during the REP.



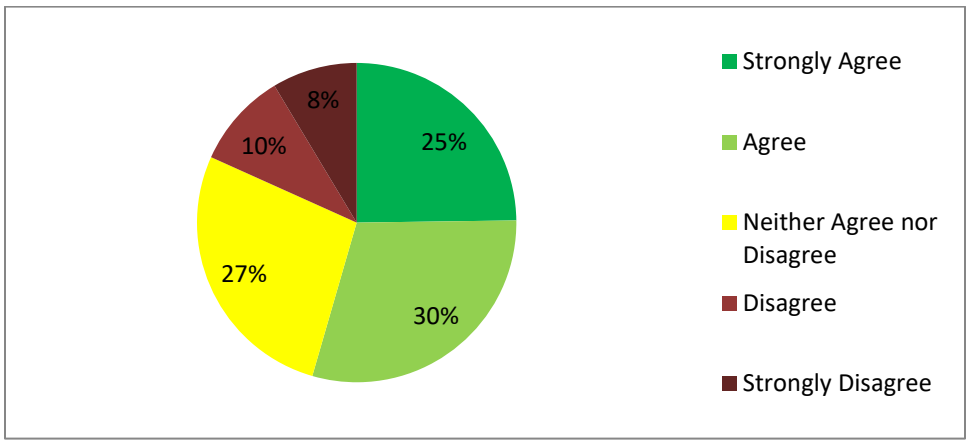
The REP challenged me to think like a scientist.



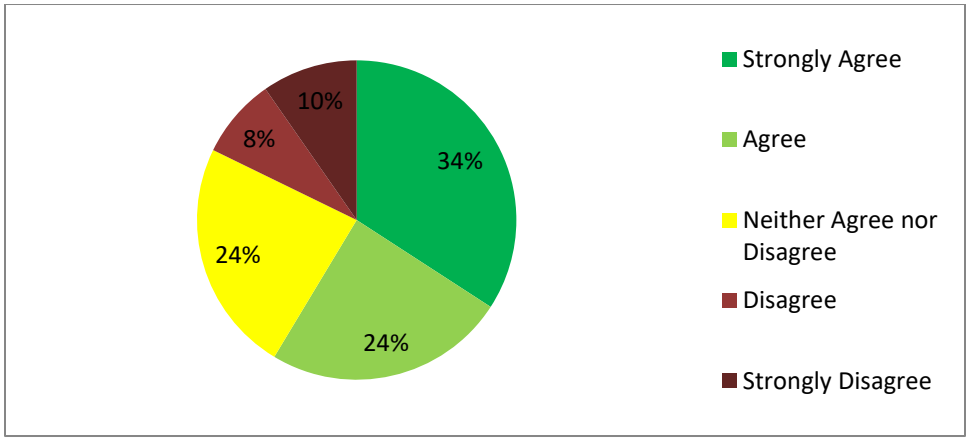
The REP was directly related to my classroom work.



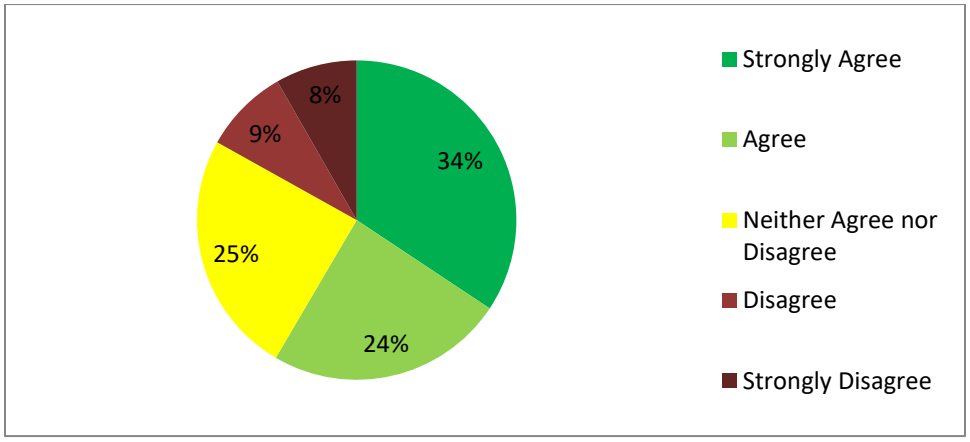
The REP helped me understand the classroom material better.



I had the opportunity to participate in river-related discussions and/or activities before our river field trip.



I had the opportunity to participate in river-related discussions and/or activities after our river field trip.



Open-ended Responses

When you think about the Rouge River, what is the first word that comes to mind?

4th - 6th Pre-		4th - 6th Post-		7th - College Pre-		7th - College Post-	
Word(s)	**#**	**Word(s)**	**#**	**Word(s)**	**#**	**Word(s)**	**#**
Water	136	Water	132	Water	200	Water	179
River	63	River	59	River	58	river	42
nature	27	Nature	22	Dirty	27	Dirty	30
Fish	16	pollution	13	Red	20	pollution	29
Fun	14	bugs	10	watershed	18	watershed	26
red	12	Fish	10	Pollution	16	Nature	17
Dirty	6	crayfish	9	Detroit	15	polluted	17
animals	5	Fun	7	Nature	11	red	12
Polluted	5	red	7	I don't know	10	Detroit	8
Awesome	4	clean	5	Polluted	10	Michigan	8
bugs	4	watershed	5	Rogue	8	Rouge	7
interesting	4	Animals	4	Fish	6	Fish	6
Pollution	4	boring	4	Michigan	5	School	4
red river	4	Cool	4	Dirty water	4	Turbidity	4
amazing	3	Dirty	4	Nasty	4	waste	4
Boring	3	field trip	4	Animals	3	Creek	3
clean	3	Amazing	3	big	3	Mud	3
Crayfish	3	Beautiful	3	Creek	3	Pretty	3
Litter	3	exciting	3	frog	3	Water Pollution	3
None	3	macroinvertebrates	3	important	3	wildlife	3
Outdoor	3	rocks	3	red river	3	Big	2
Beautiful	2	duck	2	Science	3	bridge	2
big	2	Ford	2	water pollution	3	brown	2
field trip	2	polluted	2	wet	3	Bugs	2
Fishing	2	polluted river	2	Backyard	2	dirty water	2
Ford	2	red river	2	big river	2	Ecosystem	2
habitat	2	Rouge	2	Body of water	2	Field trip	2
Mud	2	school	2	downriver	2	green	2
Rouge	2	Star Wars	2	French	2	Habitat	2
Salmon	2	Urban	2	Help	2	In need of help	2
science	2	water/nature	2	Local	2	Local	2
star wars	2	?	1	PH	2	Long	2
adventure	1	1980's cars	1	Polluted water	2	Macroinvertebrates	2
awenc	1	am going to a river	1	School	2	Nasty	2
Beavers	1	Aquatic Bugs	1	Southeast Michigan	2	Nitrates	2
Benthic Boogie	1	Awesome	1	testing	2	Peaceful	2
Big river	1	beauty	1	Waste	2	Residential	2
bike trails	1	benthic Macroinvertebrates& life	1	Water flow	2	Turbid	2
biking	1	Big	1	Baby fish and trash (our creek is	1	Wet	2

4th - 6th Pre-		4th - 6th Post-		7th - College Pre-		7th - College Post-	
				very polluted due to the large amount of students)			
Birds	1	big river	1	bad and abonadon... that's a least what I think when I hear rouge	1	(more than one word) The day we went to the river and investigated it.	1
Boat	1	bunny	1	bad water	1	Aesthetic	1
brown	1	catching animals	1	Beach	1	algal booms	1
Bugs and water	1	Catfish	1	Beautiful	1	Animal Habitat	1
calm river	1	Chemical Testing	1	beautiful river	1	Animals	1
camp	1	Chicago or Seabass	1	Beauty	1	Aquatic life	1
camp site	1	crappy water and bad smells	1	bep bep sheep	1	arrows	1
chemicals	1	creatures	1	Better.	1	b	1
city	1	Creek	1	big body of water	1	Backyard	1
Clean-ish	1	Current	1	Boring	1	beautiful site.	1
cool	1	dragonfly nymph	1	Brown	1	Beauty	1
Cool and water	1	fecal coliform	1	calm	1	Big River	1
Cool river i like the name	1	filthy	1	cats	1	BOD test	1
Creek	1	Flowing Water	1	Clean-up	1	Body of water	1
curious	1	Ford trucks	1	Contaminated	1	Branch	1
Detroit	1	Forest	1	creativity	1	cars	1
Dirty river	1	French	1	dark green river that goes through Michigan.	1	Clean	1
dirty water	1	full of nature	1	Detroit river	1	Clean Water	1
Duck	1	fun adventuring	1	dirty and mucky	1	Close	1
eager	1	Green	1	ecosystem	1	Cloudy.	1
Ecosystem	1	green frogs	1	environment	1	Connected	1
Exciting	1	gross	1	Environmental Issue	1	Contaminated	1
Fish and other creatures	1	happy	1	Extensive	1	Cool	1
Fish and water bugs	1	Has a river	1	field hockey ball	1	Creatures	1
Ford Factory	1	heat	1	Field trip	1	DCDS	1
Ford Trucks	1	help	1	Fish nature	1	Dearborn Heights	1
Fresh Water	1	i am a savage	1	Flammable	1	dirty mucky	1
Fresh/dirty water	1	i think is not fun	1	Flood	1	Diversity	1
frustrating	1	I want to go outside	1	Flowing	1	Downriver	1
giant river	1	imcute	1	Ford	1	Drinking water	1

4th - 6th Pre-		4th - 6th Post-		7th - College Pre-		7th - College Post-	
Going to a river	1	important	1	ford rouge plant	1	Ear	1
grass and hills	1	important lake	1	Forest	1	Ecology	1
Gross	1	interesting	1	France	1	Effort	1
gross bugs	1	invasive	1	Fresh	1	environment	1
Henry ford	1	Is the water polluted?	1	Gallant	1	Factory	1
hike	1	It has phosphate and pollution in the water, it's red, has soil, and is a river	1	great	1	Fair	1
History	1	it was vary good!!!!!!!!!!!!!!!	1	Gross	1	fascinating	1
How long is it.	1	Its fun!	1	Headwaters	1	Flooding	1
how will it be like.	1	lake	1	high school	1	Floods	1
I love nature	1	leeches	1	House	1	Flow	1
i want to go	1	Learning about water and water life.	1	I think about that it is pollution .	1	French	1
I wan't to go outside and explore	1	leech	1	I think of a river that is very large and is inhabited by many species.	1	french people saying red	1
I want to go there	1	life	1	I wonder about how many animals besides fish are living organisms in the river.	1	Gemstones	1
Lake	1	long	1	improving	1	Good	1
learning about the river	1	long body of water thats rough	1	In French rouge means red so 'red river'	1	Great	1
long	1	Making sure the river is healthy	1	insects	1	grass	1
Michigan	1	Michigan	1	Interesting	1	H2O	1
Microcerdabr as	1	mud	1	small river	1	Headwaters	1
My moms old house (it was a 15 minute walk)	1	muddy	1	Large	1	Healthy	1
nasty	1	muggy	1	large body of water with fishes	1	Home	1
Natural	1	My school	1	large stream of water	1	I don't know	1
Natural water	1	Narrow	1	Lil Boat	1	rusty boat	1
needs to be clean	1	Nature and Urban Development	1	Location	1	Improvement	1

4th - 6th Pre-		4th - 6th Post-		7th - College Pre-		7th - College Post-	
Nice	1	nature/rocks	1	Long	1	Indictator species	1
nice river that has a tint of red	1	Nature/water	1	long river	1	Inform	1
nice river with fish	1	need help to keep clean	1	long stream of water, a river.	1	interesting and dirty	1
once polluted, but now cleaned	1	Nice	1	my grandmother	1	intesting	1
physical	1	no words	1	Nothing	1	Kayaking	1
Plant	1	not-clean	1	open river	1	Lake	1
Powerful	1	once polluted river	1	peaceful	1	Life	1
preserve	1	Our watershed	1	Platitudinous	1	long beautiful river	1
really fast	1	packet	1	pneumonoultramicroscopicsilicovolcanoconiosis	1	Loud	1
red coloured.	1	park	1	Polluted river	1	low oxygen	1
red on crayon	1	peaceful	1	polluted river with many chemicals in it and you can not fish.	1	Main, Upper, Lower and Middle Branches	1
red water	1	place to count bugs and take tests on the water	1	Pretty water and nature	1	mexico	1
River flowing to detroit to port huron	1	place to use KVKWKA	1	Quarton Lake	1	muddy	1
river/water	1	Polluting	1	Rafting	1	Nastyness	1
Rivers	1	Pretty	1	Red Because of rouge is red and french	1	natural	1
Rivers and water	1	protect	1	Red River or that one river that burst into flames because of pollution	1	Nature, fish, and bugs	1
rivers/animals	1	red or fire	1	Red water	1	Neighborhood river	1
rivery	1	Red River full of iron	1	Residential	1	Not drinkable	1
rocky	1	river rouge	1	river flowing	1	Not sure	1
Rouge 1,A Star Wars story.	1	river that is polluted	1	river in the troy nature center	1	number of river or river that connect to a body of water	1
squirrel above a river in a tree	1	river that was exposed to pollution	1	River life	1	old people	1
Sticky	1	river with a hint of red	1	River or water shed	1	Organisms	1
swampy lake	1	rivers	1	River System	1	Parks	1

4th - 6th Pre-		4th - 6th Post-		7th - College Pre-		7th - College Post-	
the creek in my subdivision, the Rouge River flows through it	1	rivers/pollution	1	river that is in rouge	1	pH	1
forest and water	1	Rouge one	1	river that is rougey	1	Pollutants	1
there is a river there	1	Rouge one,a Star Wars story	1	River walk	1	Polluted home that not many creatures live in	1
Trash	1	runoff	1	River, fish	1	polluted river that extends a long way	1
tributary	1	Science	1	River, water	1	Polluted water that needs to be fixed	1
Unicorns	1	shallow, narrow	1	Riverside Middle School blacktop	1	Pollution calor	1
Vast	1	stream	1	rocky river	1	poop	1
Very pretty.	1	swimming	1	run off	1	Potential	1
Water and animals	1	Testing	1	runs through near my house.	1	Preservation	1
water and fun	1	The bick teals around it	1	School Science	1	Pretty good	1
Water and life	1	the river we get our water from	1	Sea creatures	1	Protection	1
water/body of water	1	Trash	1	shallow	1	quality	1
Water/River	1	trees	1	shiawassee park	1	Rebel River.	1
waterfall	1	tributary	1	Small	1	red river	1
Watermelon	1	Urban Development	1	smelly	1	Red river that is yeah	1
watershed	1	Vast	1	Sort of clean	1	relationship	1
Waves	1	Vegetation	1	Stank	1	Relaxation	1
Weighters	1	Venomous fish	1	Star Wars	1	Restore	1
Well-Kept	1	volunteering	1	city of river rogue	1	river in redford	1
Wet	1	Water testing	1	clean river flowing.	1	river that is located northern and southern area.	1
what	1	Water then fish	1	closest river to us	1	river that is slightly polluted and that goes throughout some parts of Michigan.	1
what is it like	1	Water, grass on the sides	1	Ford Car Plant	1	river which is foamy and brown.	1
Work	1	water/fish	1	the river thats behind my school	1	Rivers	1
		water/river	1	trail	1	Rivers or creeks that connect to one huge river	1
		waterfall	1	trees	1	Rocky Road Ice	1

4th - 6th Pre-		4th - 6th Post-		7th - College Pre-		7th - College Post-	
						Cream	
		Waders	1	Trouble	1	Rogue from X-Men	1
		Wet	1	Turtle	1	Safe water	1
		wonderful	1	Very long!	1	Save	1
				Violin	1	Scenic	1
				Water and dirt	1	Science	1
				water because its a river and river has water	1	Sediment pollution.	1
				Water by my house	1	Sewage	1
				water nature	1	Shiawassee Park	1
				Water source	1	Shiny	1
				water stream	1	Small	1
				Water, Habitat	1	smell	1
				watet	1	stream or body of water	1
				Wetlands	1	struggling	1
				Where the river is located.	1	test	1
				wild life/animals	1	Testing	1
						bridge that was broken in river rouge	1
						Ford Plant in detroit (Long story)	1
						Trash	1
						trashy	1
						Unhealthy	1
						Water (A River)	1
						Water Pollution and BOD	1
						Water quality	1
						Water, stream	1
						watershed that's travels all throughout michigan	1
						waterway	1
						Wetland	1
						When trash is thrown,dirt,also the animals that live there	1
						WQI	1
						Yucky	1

Notable Results & Discussion

Fall 2016 and Spring 2017 Monitoring

Matching pre- and post- surveys were found for 1,052 students.

Schools that submitted usable pre- and post- survey data: Achieve Charter Academy, Birmingham Covington School, Chandler Park Academy High School, Clippert Multicultural Honors Academy, Crescent Academy International, Crestwood High School, Detroit Country Day Middle School, Emerson Middle School, Garden City High School, Huron Valley Lutheran High School, Inter-City Baptist School, Lincoln Senior High School, Mary Helen Guest Elementary School, Pierce Middle School, Plymouth High School, Power Middle School, Smith Middle School, Steppingstone School, Tawheed Center School (Detroit), Tonda Elementary School, Troy High School, Tyrone Elementary School, University of Michigan-Dearborn. Only one pre- and post- survey was included for each student, therefore some students may have completed both fall and spring sampling and were given the pre-survey before fall monitoring and the post- survey after spring monitoring. No matching pre- or post- surveys were received from Crescent Academy High School, Ronald Brown Academy, Roosevelt High School, Salem Elementary School, Thompson K-8 International Academy, or Troy College & Career High School.

There was a large subsection of 7th – 12th grade students that indicated they had never been on a Rouge River field trip, even in the post-survey. This could be due to the large number of students that were from Chandler Park Academy High School's environmental science class or Crestwood High School's AP Environmental Science class that did not attend the field trip (only a smaller group of students from those schools are able to visit the river), but went over the background information, procedure and results.

While over half of the students had never been on a Rouge River field trip before, the large number of students that had attended a field trip previously were likely from Birmingham Covington School, Detroit Country Day Middle School, and Steppingstone School, where students participate through multiple grades.

Analyzing a student's interest in science, nature, and school, is to gauge the receptiveness of that student to a project like the REP. An increase in student interest in any of these fields throughout the Rouge Education Project is not a goal, but could be an added benefit to project-based learning. Students that left this section blank were not included in overall calculations. Notably, there was a slight increase in the number of students that were interested in nature, as well as a slight increase in students not very interested in school. This may be due to the timing of monitoring so close to the end of the school year when students are feeling emotionally "checked out" from school and ready for their summer break. Students also felt closer to nature.

The survey question referring to conducting multiple trials of the same test to get the most accurate result may be too simple for students in grades 7th-12th. This must be a concept covered heavily in science classes before students reach 7th grade. There was an insignificant decrease in the percentage

of students answering that question correctly from the pre- to post survey, further emphasizing that this question may not provide meaningful analysis.

Students were more comfortable with finding the resources to fix a particular pollution problem, but there was very little change with the number of students that felt confident in their ability to research the problem. Perhaps their feelings regarding their own research skills were not impacted by this project.

In general, most students (7^{th}-12^{th}) agreed with the statement that they learned something new about the Rouge River (74%). They learned actions to make the river healthier (69%), and felt like their monitoring could make a difference in the overall health of the river (62%). They participated in river discussions before and after their trip (58% for both). The project was related to their classroom work (56%), and a little over half of students (55%) felt like it helped them understand their classroom material better.

Students felt like the project helped them to think like a scientist (55%). They reflected on new ideas about how their actions affect the river (53%), and (53%) would participate in projects that would help the Rouge River. Less than half (49%) of students recognized that their monitoring involved people and/or organizations from the community, but felt like their monitoring would make a difference in society (56%).

Only 45% of students felt like they met people and encountered things they normally wouldn't. Most students did not plan to talk to family and friends about what they learned (36% did), and didn't experience a feeling of connectedness to the Rouge (36% did).

The 4^{th} – 6^{th} graders need improvement making the connection between what they are learning in the classroom and what they are doing on the field trip.

Open-ended questions such as "When you think about the Rouge River, what is the first word that comes to mind?" rendered these top responses: water, river, nature, fish, fun, dirty, red, and watershed in the pre-survey, and water, river, pollution, nature, bugs, dirty, and watershed in the post- survey. The word "dirty" was more popular with the 7^{th} – 12^{th} grade bracket, while younger students seemed to have a more positive vision of the river overall.

Teacher Evaluation Results

Rouge Education Project teachers are also given a program evaluation at the end of the school year to give them the opportunity to share their feelings about project execution. Twenty-four teachers responded.

Most teachers felt comfortable teaching the chemical, physical, and biological assessments of the river.

Level of comfort	Chemical	Physical	Biological
Completely comfortable	12	9	11
Very comfortable	7	8	7
Moderately comfortable	4	4	5
Uncomfortable	1	2	1
Very uncomfortable	0	0	0
N/A	0	0	0
Blank	0	0	0

Some teachers that responded were able to attend training events, whereas others didn't feel they needed to because they had gone through training and were confident. Barriers to attending training events included time constraints, the distance of the workshops from home, and conflicts with other events.

Twenty teachers felt that they were completely satisfied with the level of support received from REP staff, three were very satisfied, and one was moderately satisfied.

The REP is a good outlet for schools that may not be able to implement a water quality monitoring project on their own.

Likelihood of implementing water quality monitoring program if the REP did not exist	# respondents
Very unlikely	5
Unlikely	3
Doubtful	4
Likely	8
Very likely	3

Thirteen teachers were completely satisfied with their participation in the REP this year, nine teachers were very satisfied, and one teacher was moderately satisfied.

Some suggestions for additional training events included bug workshops, short video clips taken of the Rouge, more comprehensive lesson plans as well as demonstration videos for benthics, how to find stream flow, etc. A teacher said that the chemical tests were not presented well in the available clips, and it would be nice to have worksheets or activity sheets to go along with the videos. Teachers want an update on how to perform the HACH phosphate test, in-class demonstrations for students, videos on how to complete chemical tests, and references to the Michigan Environmental Education Curriculum Support unit for Water Quality Monitoring. The teacher that suggested the benthic macroinvertebrate training must have been unaware that three in-depth benthic training events are offered throughout the year at two locations in the watershed and have been for the past three years. Chemical instruction videos were produced this year; the teacher that did not think they were presented well could either be referencing the new videos, or the videos that were previously provided that were found on the web. The teacher that suggested production of chemical training videos must have not been aware of the new videos either.

Select teachers are able to take their program a step further, and **incorporate an environmental action component** following their participation in the REP. Additional projects included:

-Project on the three R's (reduce, reuse, recycle)
-Invasive species lesson and what we (Michiganders) can do
-Classroom visit by a parent that owns a boat service business. He talked about human impacts on the river condition, and how he has to scrape the invasive zebra mussels off boats.
-Discussion of stormwater runoff, and plan to have students make seed balls (bombs) to plant a rain garden
-The use of the REP as part of a larger ecology unit in which they discuss whether or not a town should allow a factory to come in and access their water supply
-Students complete an Adopt-a-Road in the Hines Dr area (near their sampling site)
-Students maintain a city rain garden three times a year
-Students conduct longitudinal research on water quality issues and use the data in their projects
-Discussion on what students can do to improve water quality and student groups put together posters
-Integration into a conservation unit
-Creating posters about Rouge data, one group compared a pond and river and the other looked at historical data
-Climate change project and Earth Day grocery bag project
-Discussion of hypothetical scenarios (what could you do at home / what could be done at this site, etc)
-Adopt-a-Beach
-Community clean-up day with a focus on protecting the watershed

Some students are encouraged to take their project further and take **environmental action in their community**:

-Students are littering less. They also tested water quality from different sources (tap water, mineral water).
-Take greater care to keep things clean and make sure they throw their garbage away
-Cleaned the area where they tested
-School grounds clean-up and mulching
-Make better choices and educate their parents on ways to enhance rather than impair our local watershed
-Two 5th graders started a creek clean-up at lunch twice a week
-Interest in creating a Globe Science Club next year
-Conducted a community inventory as part of the "Earth Force Process", all classes wanted water quality to be a focus for them this year

Barriers to action: students would have to earn hours, there is competition with athletics (they need to work out 4 days a week after school), and a lack of a symposium/competition for students to share what they have done.

The only suggestion to **improve communication** was to make data entry in the online classroom a little less cumbersome with more instructions on how to update entries instead of creating new ones.

REP Strengths:

-"Communication, organization, friendliness is a strength of the Rouge Project. No weakness that I can think of."
-"Kids love the hands-on experience."
-"Excellent continuing education and professional development offerings."
-"Excellent preparation and responsiveness."
-"Strengths: communication, community action."
-"Sponsorship of materials and outreach by Erin [the Program Manager] and Chester [a long-time GM volunteer]."
-"High level of support and training provided to local educators and the encouragement to get their students outside and monitoring."
-"Direct application science, direct impact on world."
-"Hands-on, authentic project that deals with real life."
-"It was very helpful having someone [(a volunteer)] very good at identifying the benthic macroinvertebrates."
-"Great communication!"
-"This project brings to life the lessons that are presented in the classroom… It allows students to directly understand the data we collect and where it comes from and what it means. I love this project and hope you guys are always here."
-"Hands-on learning."
-"I think it all runs quite well. I can't think of any weaknesses, but it seems well-organized and easy to do."
-"The opportunity to get students outside, to experience nature, science, and environmental issues."

-“Provides a high quality, authentic, hands-on, multi-disciplinary, standards-based educational experience.”
-“Organized, informative, and easy to participate.”
-“Gives students an opportunity to learn about watersheds, and how their actions can impact the environment. It provides them an opportunity to help their community.”

REP Weaknesses:

-“Very strong program although it gets a bit overwhelming to do all three kinds of testing in one day.”
-“Teachers in private schools may have more time to work on materials, but I would really like more ready-to-use materials, activities, games, etc.”
-“Would love to have local scientists to pair with – for example, having the chance to watch or participate in the sampling of fish in the Rouge.”
-“Fitting it into my curriculum, some years are easier than others.”

Additional Comments:

“It would be great if REP could facilitate a Rouge cleanup/remediation day for students during the week. Ideally, students would do their testing first, discuss what actions need to be taken at their site or another site, and then develop their own action plan for the site and return to implement it (replant native species along the river, remove logjams and trash, petition nearby establishments to reduce fertilizer use, etc.). To me, the most important goal of any education project should be to ultimately change students' actions for the better and spur them into action. Having students interpret their data and then use it to actually do something would increase the relevance even further and encourage them to be involved in environmental efforts in the future. Of course, these actions would benefit the health of the Rouge as well. It would be encouraging to take classes back to the same site year after year and see how the previous year's remediation efforts impacted the area. Then, students could track their data and hopefully see improvements.”

“I liked when we used to have Student Congress, but it would only work if we also had bus transportation, sub coverage to enable us to go. It was a great idea though, and also was a good place to follow through on Stewardship, see bird banding and do other neat activities.”

Overall Summary & Conclusion

Previous survey evaluations were analyzed by grade level. In an attempt to conduct meaningful analysis of the project's impact overall (rather than by grade level), some questions included all student responses to provide a larger sample size. This method of analysis began in spring of 2015. Additionally, fall and spring survey results were combined as of spring 2017 to include those students that complete two monitoring events throughout the school year and to not duplicate pre- and post- monitoring efforts within a single school year.

All submitted surveys this year were electronic. Only one school, Achieve Charter Academy, submitted hard-copies of surveys in the spring which were then translated by REP staff into the electronic format.

Pre- and post- survey analysis rendered the program a success based on the following criteria: an increase in the percentage of students correctly answering multiple choice questions based on general watershed science and/or the Rouge River specifically, an increase in the percentage of students who could identify specific water quality issues in the Rouge River, and an increase in the percentage of students who could identify potential solutions to local and/or regional water quality issues.

The REP did not receive a pre- and post- student survey from every student participating in the program. There were major issues with survey distribution this year, with students not completing the correct post- survey (completing the pre-survey again instead, leaving many of the post-survey questions blank), schools forgetting to have their students complete the post- survey before the end of the year, and leaving the students to conduct the surveys on their own (leading to a small sample size from the class). More schools than usual did not submit usable pre- and post- survey data, which means more reminders and follow-up will be conducted henceforth. Even so, the sample size was still even greater than previous years and provided sufficient results.

In addition, students that have already participated in the REP may receive the survey multiple times. Ensuring the surveys are only given to those students that participate in the full program (including the field trip) and are not given repeat surveys would help give a more accurate picture of the student's first exposure to the Rouge Education Project and field science, if measuring that is a goal.

Many students were able to list a problem affecting the Rouge River watershed, but were generalized statements such as "pollution." The post- survey reflected that the 7th-12th grade students were learning more about specific causes of pollution, which will help them to identify corrective actions to limit the pollution.

There needs to be an increase in engagement with older students to reach more than half of students on certain topics: to recognize that monitoring involved people and organizations from the community, to provide more opportunities for students to meet people and encounter things they normally wouldn't have, and to increase excitement and engagement so that students are interested in talking with their family and/or friends about the project. Many 5th and 6th graders are not making the connection between the material they are learning in the classroom and the field trip – this could be

because some teachers do not do an in-depth study of the river or present material beforehand. Those teachers use the REP as an exploratory trip out at the river for one day.

The survey reached students across many different demographics and backgrounds; some may already have environmental knowledge, and some may not have much of an interest due to lack of exposure. The open-ended responses may reflect the site along the Rouge that each school visits – some may be considered "dirtier," while other are more natural and scenic. Their impression of the local river can vary greatly due to the stretch of river in which they are exposed.

Service learning opportunities would increase with community involvement. Many schools did not request corporate or other trained volunteers to help with their project and worked completely independently. Establishing a greater connection to their collection of data and submission to Friends of the Rouge/the Rouge Education Project should be explored. The REP should also work with local communities to identify potential project areas (such as parks or city land) the students could restore, and a few teachers mentioned in their program evaluation that they would be interested in participating in restoration projects.

Teacher evaluations were mostly very positive with some helpful constructive criticism. The teachers that responded felt comfortable, and many were able to help with additional action projects in their community. Updates to the online classroom as well as the paperwork and documentation required for the program are ongoing. A couple teachers mentioned they missed the component of a competition or student symposium where they could share their research and learn more about becoming a steward of the river. Due to staff and budget constraints, the Student Congress was eliminated at least six years ago and has not been able to be reinstated in the meantime for the same reasons. Staff still intend to explore this opportunity, and will get feedback from teachers and the program advisory committee of creative ways to make something like this possible.

The REP continues to explore more opportunities for teachers as well as the integration of new technology (such as water quality monitoring probes and tools to collect atmospheric data) that make sense for the evolution of the program. Establishing more ready-to-use materials such as lesson plans and activities are also in development.

Evaluations clearly illustrated a positive impact on the students (and teachers) participating. Even schools new to the program this year were satisfied with their participation, and recognize that execution of the program will become more comfortable over time. This long withstanding program will continue to operate with the same program framework that has proved successful since 1987, although survey results help to shape modifications to the program moving forward. This will ensure that the Rouge Education Project remains relevant and meaningful to its participants.

The Rouge Education Project would like to extend a heartfelt thank you to all of the teachers and students that participated in 2016-2017. Thank you for your commitment to this program and your river.