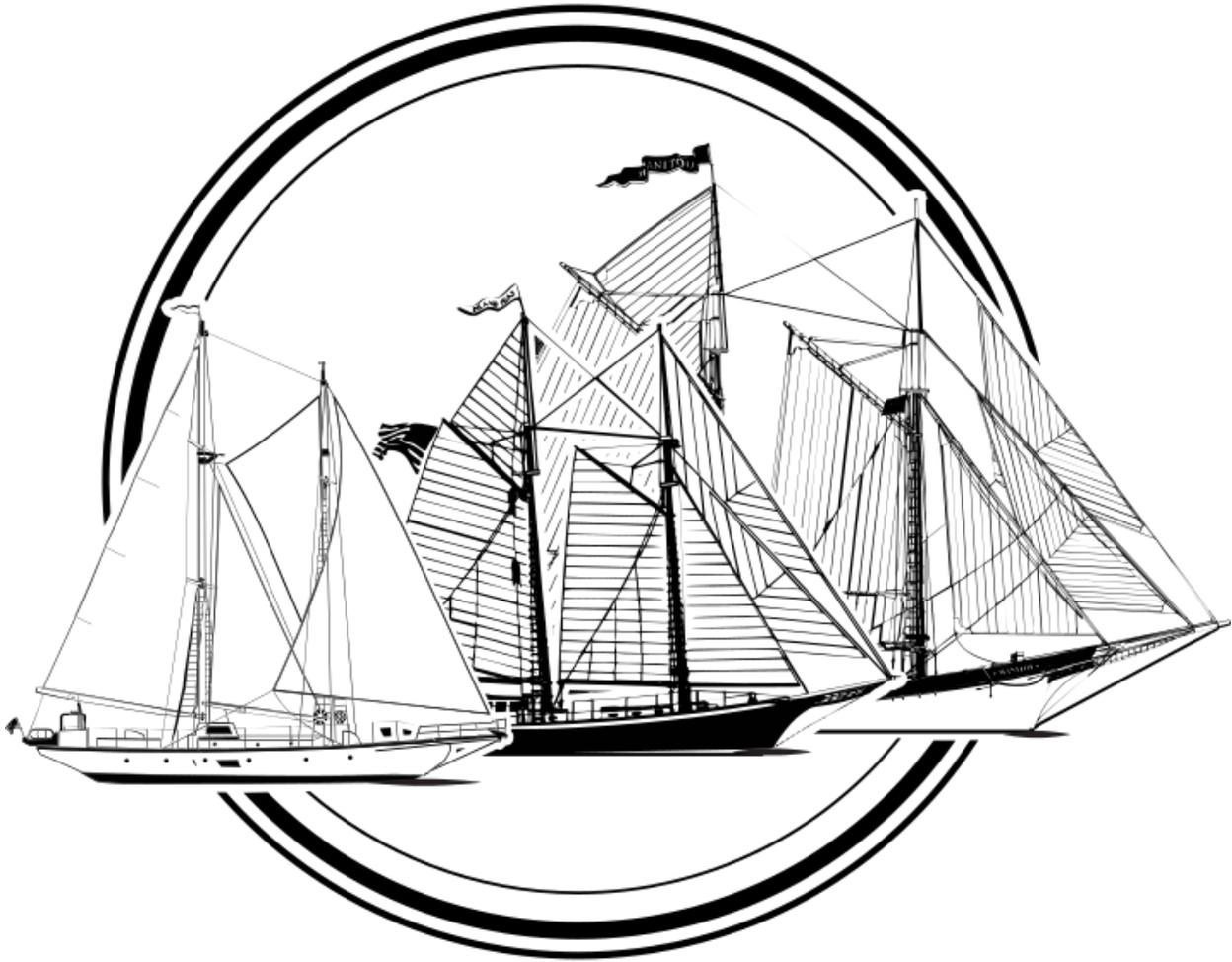


2017 Program Evaluation Report

Inland Seas Education Association



The Inland Seas Education Association (ISEA) was founded in 1989 as a non-profit charitable organization whose mission is to inspire Great Lakes curiosity, stewardship, and passion.

To date over 117,000 students have participated in ISEA programs.

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Introduction

Inland Seas Education Association (ISEA) was founded in 1989 as a private, non-profit organization. ISEA helps people of all ages experience the science and spirit of the Great Lakes through shipboard and shoreside education programs. **The mission of ISEA is to inspire Great Lakes curiosity, stewardship, and passion.**

ISEA's education programs are designed to promote the mission of ISEA and reinforce some of the science and social studies objectives in the Michigan Academic Standards. The surveys used in ISEA's evaluation process are designed to measure how well we meet our mission and our learning objectives.

Staff use the results of ISEA's evaluation process to improve our teaching methods, education materials, and volunteer training programs. Modifications to the evaluation process are often made to increase the effectiveness of the process and the usefulness of the results.

The 2017 report includes statistical information about participation in ISEA's education programs, summaries of teacher and student evaluations of Schoolship programs, and summaries of participant surveys from a variety of ISEA's other education programs. It also includes a summary of evaluations completed by ISEA's volunteer instructors about their volunteer experience.

Throughout this report, Key learnings are marked with this symbol: ▶ You will see a summary of these key learnings in the 2018 Action Plan.

Staff

ISEA Professional Staff

Fred Sitkins - Executive Director
Courtney Bierschbach - Program Coordinator
Ben Hale - SV *Inland Seas* Captain
Jeanie Williams - Lead Scientist and Education Coordinator
Tom Maynard - Volunteer Coordinator
Michelle Handke - GTSI Coordinator
Eileen Wehr - Office Assistant

Americorps VISTA

Billy Schwab: August 2016-2017
Alicia Symanski: August 2017-2018

Seasonal Employees

Meara Cafferata - First Mate
Rycki Hill - First Mate
Francis Bedell - Cook
Kayla Kassel - Marketing Intern
Preston Whittle - Office Intern
Jillian Votava - Shipboard Education Intern
Clayton Harbin - ROV Intern

2017 Action Plan Accomplishments

Goals for 2017	Progress
School programming	
Continue to emphasize experience over content in Schoolship programming	✓ This was a constant emphasis in our training and Lead instructors regularly reminded schoolship instructors of it.
Continue to center the Schoolship experience on the objectives	✓ Instructors are continually reminded to connect the experience to lake health and stewardship of the Great Lakes.
Create a version of the Next-Gen program that features Seamanship rather than Microplastics.	✓ Revisions will occur over this winter
Revise teacher survey process to improve our rate of return.	✓ Teacher survey was revised and rates increased.
Revise student survey process to improve our rate of return.	☐ Revisions were made to survey delivery, but we still had trouble with students taking the wrong survey and rates were not higher than 2016
Create a 2.5 hour program in the use of Remote Operated Vehicles.	✓ 15 groups attended the program in which they piloted a professional grade ROV and assembled their own ROVs in a cooperative build setting.
Volunteer Training	
Better align instructor training and materials with our educational priorities	✓ Volunteer training was structured to be more exploratory, just like our objectives.
Make the expectations clear during the training process.	☸ Volunteers got clear job descriptions and clearly communicated program goals, but more needs to be done. This is especially true for instructors, who need a clear path from trainee to full-fledged instructor.
Teacher Professional Development	
Provide a 4-day training in the Grand Traverse Region for 30 teachers from around the Great Lakes Thanks to a NOAA BWET grant.	✓ 28 teachers were trained in watershed ecology and how to implement stewardship action projects.
Support these teachers in implementing stewardship action projects during the 2017/18 school year.	☸ In progress. We are halfway through the school year and actions are in all stages of completion from finished to not yet started.

Summer programming

Young People in STEM programs: more focus on engineering, math, and technology and more opportunities for reflection and discussion.

✓ An engineering design challenge and more emphasis on chart reading and navigation were included in 2018.

Overnight programs and full-day charters will be a bigger part of our summer season than in years past.

✓ We were very busy on the water! We ran six overnight charters in 2017 compared to one in 2016, and 15 day and half-day charters in 2017 compared to 22 in 2016.

Experiment with other 2-hour summer programs in addition to the microplastics program we already offer.

✓ We ran 19 2-hour programs (60% of our public sails) and they were a big success!

Participation in ISEA's Education Programs in 2017

During the 2017 sailing season, the total number of participants was **5231** (Table 1).

Table 1: Summary totals of sails and participants in 2017, organized by sail type.

Program Type	Number of Programs	Number of Participants
Great Lakes Schoolship Programs		
Schoolship Program on SV Inland Seas - Spring	47	1173
Schoolship Program on SV Manitou - Spring	33	920
Schoolship Program on SV Inland Seas - Fall	32	792
Total Schoolship Programs	112	2885
Beyond Schoolship Programs		
ROV Program on SV Utopia - Spring	9	249
ROV Program on SV Utopia - Fall	6	135
21st Century Programs	6	168
Boat Building Programs	2	14
Total Beyond Schoolship Programs	23	566
Summer Public Programs		

Multi-day public programs		
Young Women in STEM	3	26
Young Men in STEM	2	15
Day programs		
Great Lakes Discovery Sail	12	298
What's in the Great Lakes Food Web?	2	31
Steady the Ship	6	109
Great Lakes Under the Microscope	6	100
Fishes of Lake Michigan	5	114
Astronomy/Meteor Shower Sails	3	101
Below the Bay	9	457
Total Public Programs	48	1251
Chartered Programs		
Research-based Multi-day Charters	2	28
Multi-day Charters	4	39
Research-based Single and Half-day Charters	2	30
Single & Half-day Charters	13	252
Total Chartered Programs	21	349
Great Lakes Specialty Programs		
Member Sails	2	46
Speciality Sails (music, art, etc.)	5	134
Total Specialty Programs	7	180
Total Programs	211	5231

School programming

Great Lakes Schoolship Programs (Spring and Fall)

Schoolship programs are half-day educational experiences offered to school groups during spring and fall. Spring Schoolship programs are offered aboard ISEA's schooner *Inland Seas* in Suttons Bay and the chartered schooner *Manitou* in Traverse City. Fall Schoolship programs are offered aboard *Inland Seas* only. A total of 112 Schoolship programs were offered in 2017 (spring and fall), and included 111 schools from Michigan, Ohio, and Indiana. 82 schools (73%) returned from 2016.

Schools participating in Great Lakes Schoolship Programs in 2017 had three programs to choose from. All include opportunities to raise the sails, steer the ship, and help the crew in various ways. They differ by the program objectives and program delivery methods:

- Traditional Schoolship - Students help the lead instructor collect samples. The learning stations are: Plankton, Benthos, Fish, Water Quality, and Seamanship.
- Next-Gen Schoolship - Students collect samples in small groups, guided by an instructor. Each group collects one sample, then students teach about the equipment and sampling process to students from other groups. The learning stations are: Plankton, Benthos, Fish, Water quality, and choice of Microplastics or Seamanship.
- Diving Deeper Schoolship - Student groups focus on one topic for the duration of the program (Plankton, Fish, Benthos, Water Quality, or Microplastics), contribute to the design of a research project on this topic, and collect multiple samples which are analyzed for patterns. This program was design with regional teachers and Great Lakes scientists.

Beyond Schoolship

Beginning in 2017, Inland Seas offered new programming to complement our sailing options. The first of these is the ROV program, where students design, build and test Remote Operated Vehicles in small teams, pilot a professional grade ROV to scan an underwater scene, and learn about the applications of ROVs for underwater exploration and protection. This dockside program takes place on Schooner Utopia.

Student evaluations have not been developed for the ROV program. ► *Evaluations will be designed and distributed for the 2018 program season.*

Teacher Survey

Overview

In 2017 the teacher survey was given as a paper form to teachers when they arrived for their program, and was also sent electronically in two MailChimp emails delivered one and two weeks after their program date. The survey questions were the same for both versions of the survey. Paper surveys were entered into the electronic survey by a volunteer.

Rate of return:

We received responses from 40 teachers, the same number as 2016. 18 teachers submitted the paper survey (many of them mailed to us), 4 teachers faxed the survey, 18 teachers completed the survey electronically. *►We should continue to offer both paper and electronic versions as they were equally effective at collecting surveys.*

Overall, **for every 10 programs we offered in 2017, 3 teacher surveys were returned.** This might seem to be a reduction in return rate from 2016 where 4.5 surveys were returned for every 10 programs (Table 2), but in 2016 the survey was delivered in 2 parts and even though 45% of programs got some evaluation, only 8% of teachers in 2016 completed both parts of the survey. Therefore the return rate was much greater for 2017 than for 2016.

►In 2018 we hope to get 5 surveys returned for every 10 programs offered. We may need to change the way we request surveys to make this happen. We will also attempt to learn the number of groups a teacher is speaking for when he or she completes the survey.

Table 2: The number of teacher responses to all programs in 2017.

Schoolship program	Number of programs	Number of surveys	Percent of programs	
			2017	2016
Spring Manitou	33	13	39%	45%
Spring Inland Seas	47	12	26%	
Fall Inland Seas	32	13	41%	45%
ROV	15	2	13%	n/a
TOTAL	127	40	31%	45%

Results

Summary

We couldn't be more pleased with the teacher reaction to our 2017 programming. **Nearly 100% of teachers agree that the student experience was excellent**, and in many cases the response was slightly more positive than in 2016 (Table 3). These surveys suggest that we continue to meet our high standard of programming that cares for the physical and emotional safety of our passengers, provides an engaging and student-centered experience, and delivers quality information about Great Lakes ecology.

94% of teachers report that their students demonstrate an increased concern for the Great Lakes and an increased interest in science, following the schoolship program (Table 3). And, 97% of teachers are personally inspired to learn more about the Great Lakes or do more for them.

100% of teachers would recommend this experience to a colleague. They frequently cite the great student experience as their primary reason for sailing with us. A large number of teachers integrate the schoolship experience into their classroom content, and find the experience to be helpful in teaching students to be stewards of the natural world.

All of the teachers who came would like to return in a future year. The most frequently stated barrier to return is funding. Scholarships provided by Inland Seas support a large number of our teachers. **76% of the teachers who responded receive funding from Inland Seas**, and another 5% were unsure if they received funds or not. This lines up with the approximately 78% of teachers who did get some type of funding from Inland Seas in 2017. Those who received scholarships this year expressed concern that they would not be able to come next year without the scholarship.

Only 28% of teachers reported help from their school general fund to cover the cost of the trip, for only half of those teachers did the school cover all of the fees above what was provided in ISEA scholarships (Figure 1). Families contributed funds for 47% of the teachers. Most surprising, three teachers reported covered some of the costs themselves.

Detailed results

Multiple choice questions:

Teachers were asked to respond with strongly agree, agree, neutral, disagree, or strongly disagree to a series of statements. Below is a summary of responses.

Table 3: The percentage of teachers who agree or strongly agree with each statement. Results from all programs are combined, ROV program not included. *= 37 responses, **=36 responses.

Part One: The Experience Onboard	2017 <i>38 responses</i>	2016 <i>39 responses</i>
The pre-trip information adequately prepared me for the schoolship program.	100% *	95%
Our welcome was organized and professional.	97%	93%
The atmosphere on the boat was supportive.	100%	100%
The safety of my students was attended to at all times.	100%	100%
Interactions with ISEA staff and volunteers were appropriate and professional.	100%	98%
The instructors were knowledgeable about their station content.	100%	100%
The teaching was excellent.	97%	100%
Students were engaged the whole time.	97%	100%
Students expressed awe, wonder, or curiosity while onboard.	100%	91%
The content level of the program was just right for my students.	97%	100%
The schoolship experience helps me complete content standards.	87%	73%
I would recommend this experience to other educators.	100%	100%
Part Two: Student and Personal response	2017 <i>38 responses</i>	2016 <i>7 responses</i>
My students demonstrated an increased interest in science following the schoolship experience.	94%**	91%
My students demonstrated an increased interest concern for the Great Lakes ecosystem following the schoolship experience.	94%**	100%
I incorporate stewardship education or stewardship projects into the rest of my year.	84%	64%
I feel inspired to learn more about the Great Lakes or do more for them.	97%	91%

Open-ended questions:

A series of questions allowed teachers to respond however they chose. Next are each of the questions and a summary of teacher comments. The teacher responses were coded and summarized to create the figures.

Q: How did you fund your trip (beyond grants and scholarships provided by ISEA)? (36 responses)

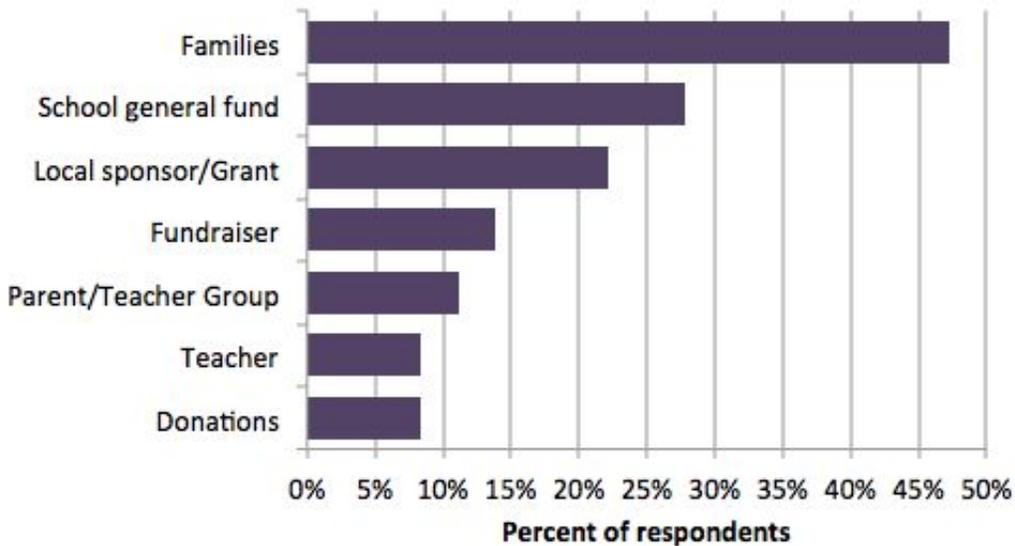


Figure 1: Trip funding by schools beyond grants and scholarships provided by ISEA. Shows percentage of teachers mentioning each reason. Many teachers gave multiple answers.

The most common source of additional funding for Scholarship trips is a field trip fee requested of families; \$10 per student is a common amount. Three teachers indicated that they paid for costs out of their pockets. About a quarter of the teachers combined sources to cover the cost of the trip. In addition to program fees, costs may include bussing, food, and overnight lodging.

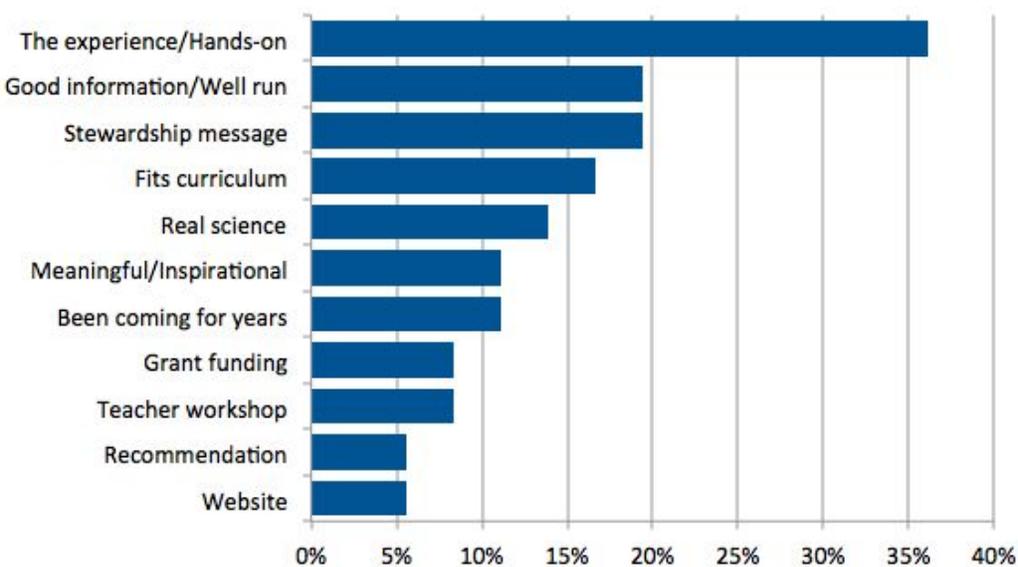
Q: Please give your primary reason for choosing to sail with us (36 responses)


Figure 2: The primary reasons teachers chose to sail with Inland Seas. Shows percentage of teachers to mention each reason. Many teachers gave multiple reasons.

The reasons teachers cite for sailing with us are various, but most of them align with the goals we have for our programming; hands-on experience, real science focus, and meaningful connections to the Great Lakes. By far **the most commonly stated reason for sailing with us was the hands-on and real-world experience students get on the ship.**

Teachers also **appreciate the strong science and stewardship focus.** They find the information valuable, it fits their curriculum, and it provides an opportunity for students to engage with a real science experience. Many teachers also endeavor to inspire their students to act on behalf of the Great Lakes and be aware of environmental concerns and our programs help them do that.

Tradition plays an important role for many teachers; **11% cite their history with Inland Seas as their primary reason for coming.** This year we offered 28 teachers a free program in association with training in a teacher workshop (during which they also participated in a Scholarship program) and that incentive is reflected in the teacher survey. Hopefully a trip to Inland Seas also becomes tradition for their classes.

Here is a selection of teachers' primary reasons to sail with us:

- *I love the opportunity for the students to do REAL science- collect, analyze important /relevant data, get the kids connected to their environment, increase their concern for the great lakes*

- *A science teacher friend who sailed with you about 15 years ago recommended the program to us.*
- *I was introduced to ISEA many years ago through the summer teacher program that ISEA sponsored. I decided that this experience with ISEA had to be shared with my students and incorporated into our year-end trip to Sleeping Bear.*
- *Believed it would be an amazing hands-on up front experience that would be a major part of the curriculum.*
- *for me it is important to expose students to our environmental concerns, to give them a hands-on experience and something they haven't done before.*
- *The cost was perfect, the cost was only for the bus and food and a 5 hour drive. I felt it would be a meaningful opportunity for my students.*
- *it beautifully complements what we will be learning this year.*

Q: How do you prepare your class for the trip? (38 responses)

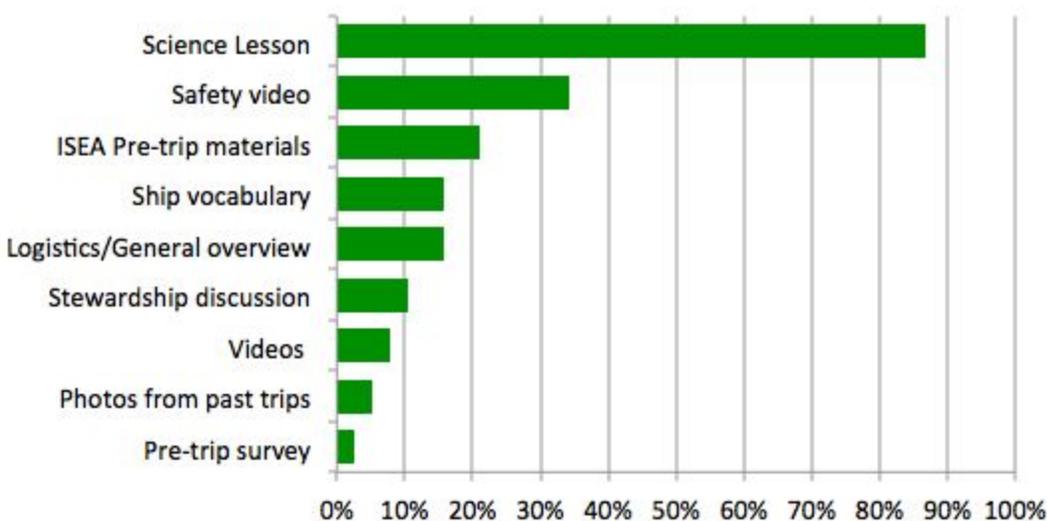


Figure 3: The ways teachers prepare their students for the Schoolship program. Shows percentage of teachers to mention each reason. Many teachers gave multiple answers.

All of the teachers did something to prepare their students for the Schoolship program. **87% of the teachers prepare their students with some sort of science content.** The topics include invasive species, Great Lakes ecosystems, water testing, macroinvertebrates, and microscopes. With this background knowledge students are likely able to ask more questions and get more out of the shipboard experience.

Our pre-trip materials were also cited by 63% of respondents: the safety video, ship vocabulary, pre-trip activities, and the pre-trip survey. ▶ *Next year we will ask specifically about these pre trip materials to see how frequently they are being used.*

Q: How do you process the schoolship experience after you get back to school? (38 responses)

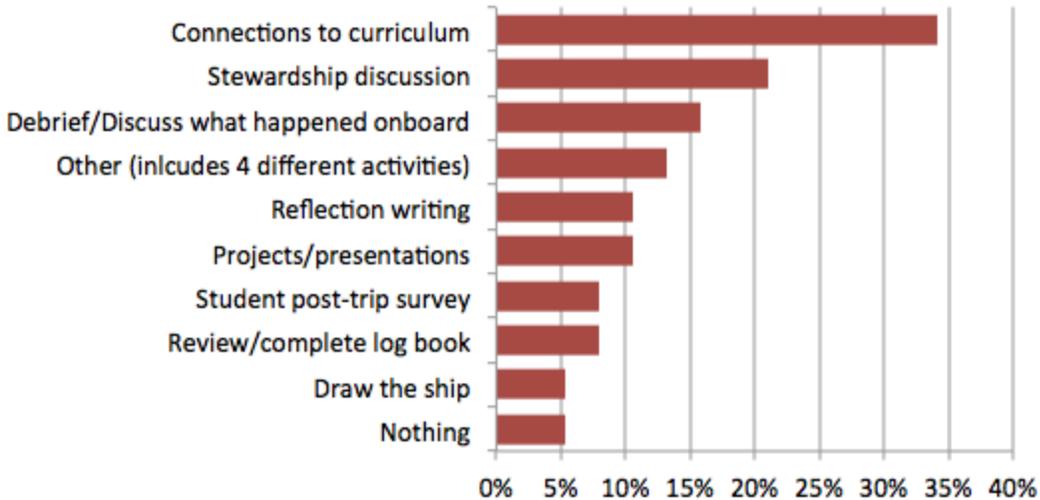


Figure 4: The ways teachers process the Schoolship experience with their students. Shows percentage of teachers to mention each activity. Many teachers gave multiple answers.

Several teachers indicated they didn't have time to process the trip, presumably because it happens at the very end of the school year and is seen as a culminating activity for the year.

Over a third of teachers use the schoolship trip as a portion of their curriculum units on the Great Lakes, invasive species, habitat loss, pollution, lake and stream ecology, and watersheds, and **many discuss with students how to help the Great Lakes and act on their behalf**. One teacher includes parents in this stewardship discussion.

Some of the creative ideas for processing the experience included having students draw the ship from memory and label the parts to practice seamanship vocabulary; creating a podcast; writing thank you notes; reading the book *Water Walkers*; engaging in debate; and using schoolship data in Math class (these last four are all in the "other" category) (Figure 4).

We believe that what happens after the Schoolship experience is as important as what happens during it, so are pleased that nearly all teachers, even those who have very little time, process the experience in some way. ► *To help teachers who are new to Inland Seas and give experienced teachers new ideas, we can put together a list of suggested activities for processing the Schoolship experience based on the data we have collected over the past few years.*

Q: Do you plan to bring your class to Inland Seas again next year? Please explain. (38 responses)

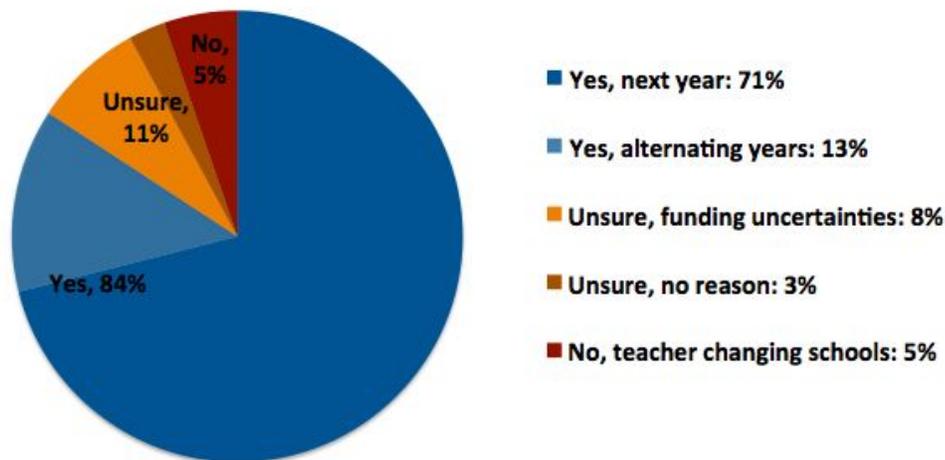


Figure 5: The proportion of teachers who will return to Inland Seas in 2018.

All of the teachers who responded want return for an Inland Seas field trip. Most of those who responded “Unsure” cited funding uncertainties, and one “Unsure” left no reason. The “Nos” are moving to a different school next year. ▶ *We will invite the teachers who take over their classrooms to continue the Schoolship tradition. Of the 84% of teachers who will return in 2018 or 2019, the primary reason for returning was the great experience.*

Here is a sampling of teacher comments:

- *It is important every 4th grader class from Elk Rapids experience such a unique and influential trip - the ripple effect in their lives and to the community and all the Great Lakes is vast.*
- *This was my 28th year. I am so proud to be a small part of educating students about the Great Lakes.*
- *Many responded that it was the best field trip ever!!*
- *Our school does this every year, it is an amazing and outstanding experience for all involved. special for 5th grade.*

Q: Comments/Praise/Suggestions (34 responses)

The teachers were generous with their praise and helpful with their comments.

Some things to improve for 2018:

- A few of our instructors were called out for their instructional styles that were not preferred by our teachers. The teachers gave specific reasons for their comments, which was very helpful (comments for all teachers combined: sarcasm, grumpy, no eye contact, a jumble of information, no hands-on activities, information over their head). Inland Seas is dedicated to creating a teaching environment that is positive and student centered.
▶ *We will address these concerns with the instructors mentioned to ensure an excellent experience for all students in 2018, and create teaching standards to help all instructors understand what we expect from our education team.*
- One teacher complained that her students did not get a chance to steer the boat.
▶ *Steering should be an option on every program, so we will work to make that a uniform experience in 2018.*
- Another teacher encouraged us to cut the sampling portions short as needed to give students the maximum amount of time in the stations and hauling up the sails and the anchor. ▶ *We will strive to give 15 minutes or more to teaching stations in 2018, and find a way to log the length of stations so we can track our progress.*
- And, of course, the perennial reminder to ask the students to dress warmly: “Let students know that even if it's warm on land, it's going to be CHILLY on the water and to dress/bring clothes accordingly.” ▶ *We will continue to emphasize the importance of weather-ready clothing in our pre-trip materials.*

Teacher praise was also abundant. Here is a selection of their thoughts:

- *Getting better every year...I really love the Diving Deeper, Next Gen, and ROV programs*
- *This was a fantastic experience for my kids. The interactions with materials and teachers on board the ship created dynamic learning for my kids, ones they will never forget.*
- *The crew was amazing. They were beyond knowledgeable. The professionalism and courtesy given was first rate.*
- *Thank you for the organization and frequent contact to help ensure we are prepared.*
- *An amazing experience for all, the students just couldn't say enough about it, on the 5 hour trip home(the bus goes very slow). Back at school students got in their groups and*

were told to bring those that didn't go up to speed about their experience, students were going out of their way to tell them how much fun it was!!

- *you guys are awesome! volunteering is HUGE in our school so I use you all as an example*
- *when I was a 5th grader at IC I went on this trip. It was pouring so we never left the dock. it was wonderful to come back as a teacher and re-experience this, especially with great weather!*
- *this program is incredible, the staff is always wonderful, and the kids are completely engaged and learn tons. thank you!*

And there were some comments about the ROV program (2):

- *wonderful program! We loved seeing the students working together in teams. Clayton and Dan were professional and engaging. Don't forget to have the instructors explain how to be safe and comfortable. Where can students go/where should they go (fore deck, down below, etc.)? where is the bathroom? Where can we fill up water bottles? These comments are so helpful to us as we build a new program in a new location.*
- *tom and jeanie were so helpful and energetic. the activities were age appropriate. It would be fun to sail and use the ROV's out in the deeper water.*

Student Survey

Overview

Introduction and Methods

The student survey process for 2017 followed the same process we used in 2016. Pre and post surveys were offered to students to determine if there was a change in knowledge or attitudes as a result of the schoolship experience. We ran statistical tests on pre and post results to determine if any differences were meaningful.

Students who attended the Traditional and Next-Gen programs took the same survey because these programs have the same objectives. However surveys were differentiated by age group to account for different reading levels and stages of development. There was a pre and post survey for each of these groups: Elementary School, Middle School, High School, and College/Adult. There was also pre and post survey for the Diving Deeper program. This year the Diving Deeper program was attended by both middle and high school students, and all of these students took the same survey.

We continued to get a fair number of students who took the survey that did not match their program. Two classes of elementary students took the Diving Deeper survey, and several high

school groups took the Next-Gen/Traditional survey rather than the Diving Deeper survey. We moved the answers that were the same for both surveys to the appropriate location. ► *More measures are needed to direct students to the appropriate survey in 2018.*

The College and High school groups that participated in the Next-Gen or Traditional program only took the pre-survey so their results are not analyzed here.

A small number of surveys were deleted because they were clearly answered in a flippancy way.

This report summarizes the most important results from the student surveys. Original student surveys and complete results are available upon request.

Return Rates

Next-Gen and Traditional programs: We received a smaller number of NextGen/Traditional Schoolship surveys this year as compared to last year, about 20% fewer (Table 4). We continue to get higher returns on the pre-trip survey than the post-trip survey. **About half of the groups took both surveys.** No groups took only the post-trip survey. ► *In 2018 we'd like to see more students take the post trip survey and will work on our processes to encourage this.*

Two-thirds of the post-trip survey respondents participated in the Next-Gen Schoolship program; one-third participated in the Traditional Schoolship program.

Diving Deeper Program: **We had almost twice the number of responses to the Diving Deeper survey in 2017 as compared to 2016** (Table 4). Seven groups took both surveys, two took the pre-survey only. We tend to have more interactions and a longer relationship with our Diving Deeper teachers, and that could account for the survey higher returns for this program.

Table 4: Number of students from each program responding to the student surveys. 2285 individuals participated in our fall and spring programs, some portion of them were adult chaperones and teachers.

Program	Grade level	Pre-trip survey		Post-trip survey	
		2017	2016	2017	2016
Next-Gen/ Traditional	Elementary	531	517	231	302
	Middle School	452	631	305	464
Diving Deeper	High/Middle	219	103	170	83
	TOTAL	1204	1305	706	849

Results

Summary

Results are organized by the questions we were trying to answer about student attitudes and knowledge about the Great Lakes, student interest in STEM (science, engineering, mathematics, and technology) subjects, and their experiences before and during the Schoolship program. Detailed results and discussion follows the key findings for each of these areas.

Key findings:

Attitudes and Knowledge about the Great Lakes:

- Students in all programs held favorable attitudes toward the Great Lakes both before and after the Schoolship programs; all average scores were greater than 3, and nearly all were greater than 3.5.
- All age groups reported knowing more about environmental issues after the schoolship program as compared to before it.
- Elementary students showed significant increases in their attitudes for nearly all questions.
- Diving Deeper students showed significant increases in their connections to both the Great Lakes and local waters.
- Although the schoolship program seems to improve only some of the attitudes we measured, student appreciation for the Great Lakes and willingness to protect them are strong for all ages, and our program likely works to reinforce and encourage the attitudes students already hold.

Understanding of Biodiversity and Food web concepts, and the Activities of a Scientist:

- Elementary and Middle school students show better understanding of biodiversity and food web concepts after the schoolship program.
- They also have a stronger sense of what scientist do after the program, although this result is stronger for elementary students than for middle school students.

Student interest in Science and STEM careers:

- The majority of students in all age groups report that attending a Schoolship program increased their interest in science. However when asked generally about their interest in science and STEM careers, this was no change after a Schoolship program.

Student experience before and during the Schoolship program:

- About half of all students found it beneficial to do Great Lakes lessons or activities before their program.
- Participation with program components is high for all programs. The lowest rate of participation was with steering the ship, although rates here were higher in 2017 than they were in 2016.
- Over 80% of our students had visited the Great lakes before sailing with Inland Seas.

Results are organized by the questions we were trying to answer about student attitudes and knowledge about the Great Lakes.

Detailed Results

Question 1: What attitudes do our students hold about the Great Lakes? Do those attitudes change after participating in our program?

Five sub-questions are associated with this question and are described below. Students responded to these questions on a 1-5 scale: 1 = No, not at all, 3 = Neutral/Unsure, 5 = Yes, very much.

Question 1a: Do students feel a connection to the Great Lakes and their local waters?

In a word, yes. All students report great care for the Great Lakes both before and after the schoolship program (Average > 4 for all surveys, Table 5a). Elementary students showed a significant improvement in their care for the Great Lakes. **Diving Deeper students showed a significant increase in their connection to both the Great Lakes and water in their local area.** This increase in connection to local water is a powerful comment on the impact of our programming on students even when they return home.

Table 5a: **Do students feel a connection to the Great Lakes and local waters?** Average response to pre and post question tests. Blue highlighted cells indicate the post score was significantly higher than the pre test score, t-test, $p \leq 0.05$

	Traditional and Next Gen				Diving Deeper	
	Elementary		Middle		Middle/High	
Question:	Pre	Post	Pre	Post	Pre	Post
Do you care about the Great Lakes?	4.53	4.69	4.57	4.35	4.24	4.34
Do you feel a personal connection to the Great Lakes?	-	-	3.64	3.35	3.32	3.82
Do you feel a personal connection to the water in your local area?	-	-	3.79	3.53	3.32	3.82
Number of responses:	531	231	452	303	219	153

Question 1b: Do students think the Great Lakes are important?

Middle and high school students gave very high scores here (4.7), showing that they think the Great Lakes are very important for the people of Michigan (Table 5b). Elementary students thought the Great Lakes were more important after the program than before the program (before = 4.38, after = 4.67, $p=0.00001$).

Table 5b: **Do students think the Great Lakes are important?** Average response to pre and post question tests. Highlighted cells indicate the post score was significantly higher than the pre test score. t-test, $p \leq 0.05$

	Traditional and Next Gen				Diving Deeper	
	Elementary		Middle		Middle/High	
Question:	Pre	Post	Pre	Post	Pre	Post
Do you think the Great Lakes are important in your life?	4.38	4.67	-	-	-	-
Do you think the Great Lakes are important for the people of Michigan?	-	-	4.79	4.74	4.69	4.71
Number of responses:	531	231	452	303	219	153

Question 1c: Are students aware of any threats to Great Lakes health?

Students from all programs felt they knew more about problems and environmental issues that affect the Great Lakes after our programming (Table 5c). These changes were all statistically significant. This was the only significant increase for middle school students. For all other questions, the change was small or showed an apparent decrease on the middle school post-surveys. The decreases were surprising, but they make the increase on this one question all the more meaningful.

Diving Deeper students also increased their appreciation for the fact that changing one part of a lake's ecosystem could affect the lake as a whole (before = 4.41, after = 4.47 $p=0.021$).

Table 5c: **Are students aware of any threats to Great Lakes health?** Average response to pre and post question tests. Highlighted cells indicate the post score was significantly higher than the pre test score, t-test, $p \leq 0.05$.

	Traditional and Next Gen				Diving Deeper	
	Elementary		Middle		Middle/High	
Question:	Pre	Post	Pre	Post	Pre	Post
Do you know about any problems in the Great Lakes ecosystem?	3.46	4.06	-	-	-	-
Do you think you are well informed about environmental issues that affect the Great Lakes?	-	-	3.45	3.69	3.16	3.74
Do you think changing one part of a lake's ecosystem could affect the lake as a whole?	-	-	-	-	4.41	4.57
Number of responses:	531	231	452	303	219	153

Question 1d: Do students think that humans can affect the health of the Great Lakes?

Middle and high schools students do think humans can improve the health of the Great Lakes (Average = 4.5), and there was no change in their thinking after the program (Table 5d). However elementary students did more strongly agree after the program that humans can impact the health of the Great Lakes (before = 4.43, after = 4.82 p=0.00000).

Table 5d: **Do students think that humans can affect the health of the Great Lakes?** Average response to pre and post question tests. Highlighted cells indicate the post score was significantly higher than the pre test score, t-test, p <= 0.05.

Question:	Traditional and Next Gen				Diving Deeper	
	Elementary		Middle		Middle/High	
	Pre	Post	Pre	Post	Pre	Post
Do you think humans can impact the health of the Great Lakes?	4.43	4.82	-	-	-	-
Do you think humans can improve the health of the Great Lakes?	-	-	4.45	4.52	4.49	4.49
Number of responses:	531	231	452	303	219	153

Question 1e: Do students think humans are obligated to improve the health of the Great Lakes?

Generally **middle and high school students do think humans have a responsibility to improve the health of the Great Lakes**. The average answer was the same for pre and post surveys for all programs, approximately 4.2 (Table 5e).

Table 5e: **Do students think humans are obligated to improve the health of the Great Lakes?** Average response to pre and post question tests. Highlighted cells indicate the post score was significantly higher than the pre test score, t-test, p <= 0.05

Question:	Traditional and Next Gen				Diving Deeper	
	Elementary		Middle		Middle/High	
	Pre	Post	Pre	Post	Pre	Post
Do you think humans are responsible for improving the health of the Great Lakes?	-	-	4.21	4.16	-	-
Do you think humans have an ethical obligation to improve the health of the Great Lakes	-	-	-	-	4.17	4.21
Number of responses:	531	231	452	303	219	153

Question 1f: Are students interested in being Great Lakes stewards?

About 60% of middle and high school students are interested in being involved in Great Lakes protection, a third feels neutral about involvement, and about 10% is not interested. Results were very similar before and after the field trip (Table 5f).

Elementary and middle school students are positive about their ability to take action. **About 80% of middle school students and 90% of elementary students think there are things they can do to help protect the Great Lakes.** The elementary response to this question increased after the program from 87% agreeing to 95% agreeing ($p = 0.002$, Table 5f).

Over half of the students in the Diving Deeper program would like stewardship activities to be part of their school studies, about a third are neutral on the idea and about 15% would rather not do stewardship in school (Average = 3.6). However slightly more, about 60%, are willing to take actions to protect the Great Lakes in their free time, and only 8% are unwilling.

Table 5f: **Change in attitudes and knowledge following schoolship programs, 2017.** Average response to pre and post question tests. Highlighted cells indicate the post score was significantly higher than the pre test score. t-test, $p \leq 0.05$

Question:	Traditional and Next Gen				Diving Deeper	
	Elementary		Middle		Middle/High	
	Pre	Post	Pre	Post	Pre	Post
Do you want to help protect the Great Lakes?	4.55	4.62	-	-	-	-
Do you want to be involved in protecting the Great Lakes?	-	-	3.95	3.71	-	-
Are you willing to take actions that protect the Great Lakes in your free time or in your personal life?	-	-	-	-	3.65	3.69
Do you think there are things you can do to help protect the Great Lakes?	4.45	4.66	4.31	4.26	-	-
Would you like stewardship activities to be part of your school curriculum?	-	-	-	-	3.56	3.72
Number of responses:	531	231	452	303	219	153

Question 2: Does our program have an impact on students' interest in science or future career choices?

When we asked students about their interest in science or STEM careers, there was no change after they attended a schoolship program (Table 6a). However, **when we asked if the program increased their interest in science 81% of elementary school students, 61% of middle school students, and 56% of Diving Deeper students said it did** (Table 6a). This suggests that even if our programs don't make an objective difference in student interest, they might make a difference in student attitudes toward science, and that could be just as important.

Table 6a: **Change in student interest in learning about science, 2017.** Average response to pre and post question tests. No significant change was detected.

	Traditional and Next Gen				Diving Deeper	
	Elementary		Middle		High	
Question:	Pre	Post	Pre	Post	Pre	Post
Do you like learning about science?	4.16	4.17	3.79	3.83	3.87	3.96
Are you considering studying a STEM subject after high school or pursuing a STEM career? (STEM = science, technology, engineering, mathematics)	-	-	2.94	2.95	3.30	3.36
Number of responses:	531	231	452	303	219	153

38% of middle school Traditional and Next-Gen students said the program they attended will help them make future career choices, whereas 56% of Diving Deeper students the program would help. About a third of both groups answered neutral/unsure (Table 6b). ► *We think exposure to sailing and hands-on, authentic science ignites interest for some of our participants, so it is important for us to ask students to reflect on how their experience on board resonates or does not resonate with what they love to do. Sometimes simply asking the question, “Have you ever thought about being a scientist?” is enough to open a door students never considered before.*

For middle school students, an interest in studying STEM subjects is present, but not strong. Equal numbers of students agree, disagree, and are neutral on their interest in STEM studies (Average = 2.9). Interest in STEM studies is greater for the Diving Deeper students, but many of the students in this program are in school classes that specialize in STEM subjects, so their greater interest is to be expected.

Table 6b: Student response to the **impact of the Schoolship program on their interest in science and future career choices.** Answers were given on a 1-5 score (1 = No, not at all, 3 = Neutral/Unsure, 5 = Yes, very much). Average score, and proportion of students who agree with the statement (4 or 5) are reported here. Number of respondents is given in parentheses.

	Traditional and Next Gen				Diving Deeper	
	Elementary (231)		Middle (303)		(170)	
Question:	Mean	% agree	Mean	% agree	Mean	% agree
Do you think the Schoolship field trip increased your interest in learning about science?	4.21	81	3.66	61	3.74	56
Do you think your experience on the Schoolship will help you make future education or career choices?	-	-	3.68	38	3.13	35

Question 3: How many of our students have visited one of the Great Lakes? Do students realize they were on the Great Lakes during our program?

Younger students have less exposure the Great Lakes (83%) than older students (89%), but still a relatively high number of all students have visited the Great Lakes. The portion of students reporting they have visited the Great Lakes after our program increased for all groups, indicating they realized the program took place on Lake Michigan.

Table 7: Percent of **students who report having visited the Great Lakes** before and after the Schoolship program. The Schoolship program takes place on Lake Michigan.

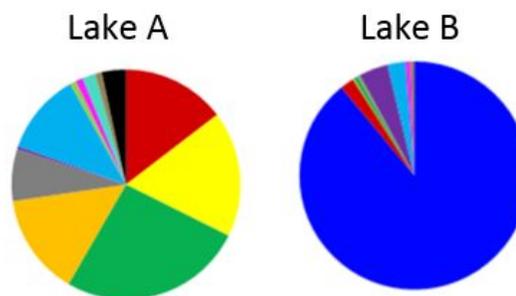
	Traditional and Next Gen				Diving Deeper	
	Elementary		Middle		High	
Question:	Pre	Post	Pre	Post	Pre	Post
Have you ever visited one of the Great Lakes (Lake Michigan, Lake Superior, Lake Huron, Lake Erie, Lake Ontario)?	83	93	88	94	89	94
Number of responses:	530	231	452	303	219	170

Question 4: Do students understand the two aspects of biodiversity (number of species, and proportional abundance of each species)? Do they understand that more diverse communities are typically healthier? Does their understanding improve after the Schoolship program?

Elementary and middle school students were given two pie charts and asked to answer questions about biodiversity using the information provided in the charts. The pie charts in the survey resemble the ones we use during our programming.

These pie charts show all the fish in two different lakes, Lake A and Lake B. Each color is a different type of fish found in the lake. Based on this information [answer the following questions]:

See Table 8 for questions.



Students in Traditional and Next Gen showed meaningful gains in their understanding of biodiversity and interpreting pie charts (Table 8). **The most exciting gain was their understanding that diversity is an indicator of health.** Not only were the increases large for

both elementary (+21 percentage points) and middle school (+7 percentage points), this is one of the main concepts we are trying to teach in the program.

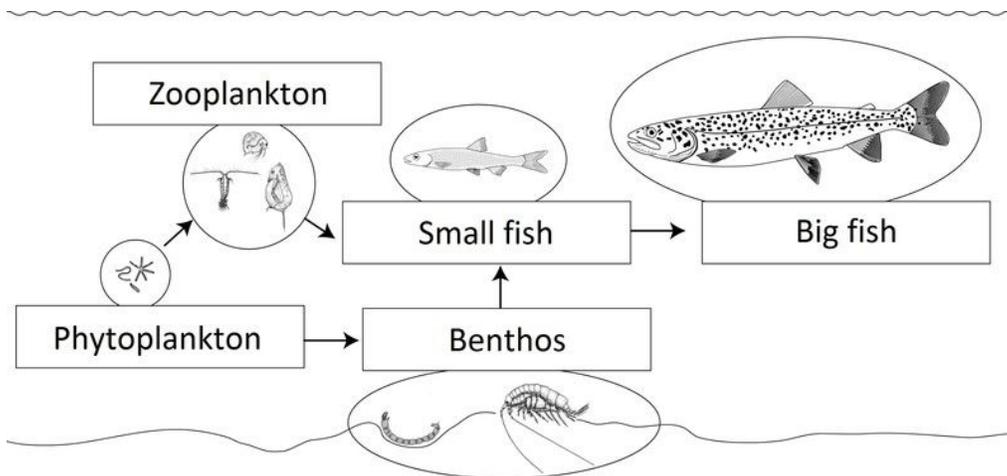
Table 8: **Student understanding of biodiversity, 2017.** Percent of students who gave each answer to the biodiversity questions before the Schoolship program (Pre) and after (Post). Grey highlighted rows indicate correct answers; blue highlighted numbers indicate a statistically significant increase (z-test, $p \leq 0.05$) in the portion of correct answers.

<i>Based on the pie charts:</i>		Elementary		Middle	
Question:	Answers	Pre	Post	Pre	Pre
Which lake has more types of fish?	Lake A	85	93	93	94
	Lake B	7	4	4	3
	Can't tell	7	2	3	3
Which lake is dominated by one type of fish?	Lake A	-	-	9	7
	Lake B	-	-	87	90
	Can't tell	-	-	4	3
Which lake has several types of fish that are seen frequently?	Lake A	-	-	75	84
	Lake B	-	-	14	10
	Can't tell	-	-	10	6
Which lake seems to have a healthier fish community?	Lake A	60	81	76	83
	Lake B	20	11	11	9
	Can't tell	21	8	12	8
Number of responses:		530	231	452	303

Question 5: Do students understand food web relationships and how to read a food web diagram for information? Were there gains in understanding after the Schoolship program?

Elementary and Middle school students were given a food web and asked questions that could be answered by reading the diagram.

This is a Great Lakes food web.



Both elementary and middle school students showed statistically significant gains in their understanding of food web relationships after the Schoolship program (Table 9). Improvements could be caused by an improvement in their ability to read food web diagrams, or by knowledge gained from the program.

Table 9: **Student understanding of food webs.** Percent of Elementary and Middle school students who gave each answer to the food web questions before the Schoolship program (Pre) and after (Post). Grey highlighted rows indicate correct answers; blue highlighted numbers indicate a statistically significant increase (z-test, $p \leq 0.05$) in the portion of correct answers.

<i>Use the food web to answer these questions:</i>		Elementary		Middle	
Question:	Answers	Pre	Post	Pre	Post
Small fish are eaten by big fish.	True	92	95	94	96
	False	4	3	3	3
	Can't tell	4	1	2	1
Small fish are eaten by zooplankton.	True	13	11	11	13
	False	78	86	83	85
	Can't tell	8	3	4	2
Benthos are eaten by small fish.	True	-	-	78	85
	False	-	-	13	10
	Can't tell	-	-	9	5
Number of responses:		530	321	452	303

Question 6: Do students understand what scientists do and what makes science different from other activities? Does the Schoolship experience broaden student understanding of the types of things scientists might do?

What kinds of things might scientists do?

Students have a fairly broad understanding of what scientists can do, and increased their understanding after participation in their Schoolship program (Table 10a). For all ages, **the proportion of students who answered “don’t know” declined for all questions**, which suggests experiences related to the program gave students needed information to answer the questions.

The proportion of middle school participants who thought scientists might do a presentation about their research declined somewhat from the pre survey. 80% of students on the Traditional program said “Yes” to that question and 74% of students in the Next Gen program said “Yes,” ► *which suggests when students present to each other on the Next Gen program, we should be more explicit with them that presentation is an activity scientists do.*

Table 10a: **What does a scientist do?** Percent of students who gave each answer to the questions about what scientists might do before the Schoolship program (Pre) and after (Post). Grey highlighted rows indicate correct answers; blue highlighted numbers indicate a statistically significant increase (z-test, $p \leq 0.05$) in the portion of correct answers.

Which of these things might a Great Lakes scientist do?		Elementary		Middle	
Question	Answers	Pre	Post	Pre	Post
Take measurements of different parts of the lake.	Yes	75	81	80	86
	No	6	6	6	6
	Don't Know	18	11	15	8
Decide that the lake is healthy without doing any tests.	Yes	10	8	10	8
	No	78	86	80	86
	Don't Know	12	6	10	6
Track changes in lake health over time.	Yes	82	92	86	90
	No	3	4	4	3
	Don't Know	15	4	10	7
Go sailing or snorkeling to collect data.	Yes	83	89	86	87
	No	4	4	4	3
	Don't Know	12	6	10	7
Give a presentation about their research.	Yes	-	-	79	77
	No	-	-	5	11
	Don't Know	-	-	16	13
Number of responses:		530	231	452	303

What type of information is best for making decisions about lake health?

When orienting students to their time on the schoolship, we explicitly tell them that we can't learn much about the health of a lake by looking at the surface of the water, so it's encouraging to see the number of students who think Scientist A knows the most decline after our programs (Table 10b). Many of the students who chose scientists A or C cited experience as the main reason. They

correctly reason that a scientist who knows the lake well could use color to determine some things about lake health, and a person who tracks data over time would be alerted to changes. These are concepts we emphasize on board, so they are encouraging answers.

The vast majority (87% of elementary and 78% of middle school students) selected the scientist who takes the greatest diversity of tests. ► *We can work on the way we talk about the importance of multiple test to emphasize the types of tests, in addition to taking tests over time.*

Table 10b: Percent of students who gave each answer to the questions about the kinds of observations that are most helpful for making a decision about lake health, before the Schoolship program (Pre) and after (Post). Grey highlighted rows indicate correct answers; blue highlighted numbers indicate a statistically significant increase (z-test, $p \leq 0.05$) in the portion of correct answers.

Question	Answers	Elementary		Middle	
		Pre	Post	Pre	Post
Three scientists are trying to understand the health of the lake. Each uses a different method. Which scientist understands the most about the overall health of the lake?	Scientist A looks at the lake, notices it's beautiful and writes down the color of the water.	6	3	8	5
	Scientist B takes the temperature, measures the dissolved oxygen and identifies the fish.	74	87	78	78
	Scientist C takes the temperature of the surface water of the lake every week for a month.	17	10	15	13
	Can't tell	-	-	0	4
Number of responses:		530	231	452	303

Question 7: Is it beneficial for students to do activities related to the Great Lakes before attending the Schoolship program?

Just under half of middle and high school students and 60% of elementary students said it was beneficial to do a lesson or activity related to the Great Lakes before attending the Schoolship program; only 5% of Diving Deeper and 10% of middle school students said pre-trip activities were not beneficial (Table 11).

Table 11: Percentage of students responding to **the usefulness of activities related to the Great Lakes before the Schoolship program.**

Question	Answers	Elementary	Middle	Diving Deeper
If you did a lesson or activity on the Great Lakes before your trip on the Schoolship, do you think it helped you on the boat?	Yes	60	49	48
	Neutral/Unsure	6	32	22
	No	22	10	5
	We didn't do a Great Lakes pre-trip activity.	12	10	15
Number of responses:		231	303	170

Question 8: Did students get to do all of the things designed into the program?

One of the more informative parts of the survey asks students to recall what they were able to do while on board. All of the experiences we asked about are things we hope all students get to do.

Key findings (Figures 6a-6b):

- For elementary students, more Next-Gen than Traditional students said they got to help collect samples from the lake (88% vs 77%), but other than that, there were minimal differences between the participation experiences of elementary students in the Traditional Program as compared to the Next-Gen program.
- For middle school students, far more Traditional than Next-Gen students said they got to interact with the fish caught (89% vs 61%). There is not an easy explanation for this pattern. On the Next-Gen program launch and recovery of the microplastics trawl is located at the Fish station and it is possible that this results in less time to interact with the fish, but it is surprising that this would result in such a large reduction in interaction time. ► *We will work on minimizing disruption of the fish station in 2018.*
- There were a handful of classes (more middle school than elementary) who did not get the opportunity to raise the anchor since the anchor was not set in their program in order to save time.
- Fewer elementary students remember steering the boat than we would like (65%), but the numbers are way up from last year (2016 = 48%). About 65% of middle school students in both programs remember steering the boat, which is on par with the elementary results for this year, yet quite different from last year's results (2016, Traditional = 80%, Next Gen = 41%). ► *We will continue to work on making opportunities for all students to steer.*
- All other numbers for elementary students are similar or slightly higher than last year, however numbers for middle school participation are generally lower. It's hard to understand why there is a difference in age groups when we don't vary the opportunities

for participation for different groups. ► *We will continue to encourage instructors to involve students as much as possible in the hands-on experiences in the program, and give students opportunities to reflect on what they did to seal it in their memories. Our goal for 2018 is for the percentage of students who say they wanted to, but did not get to do an activity will be less than 10%.*

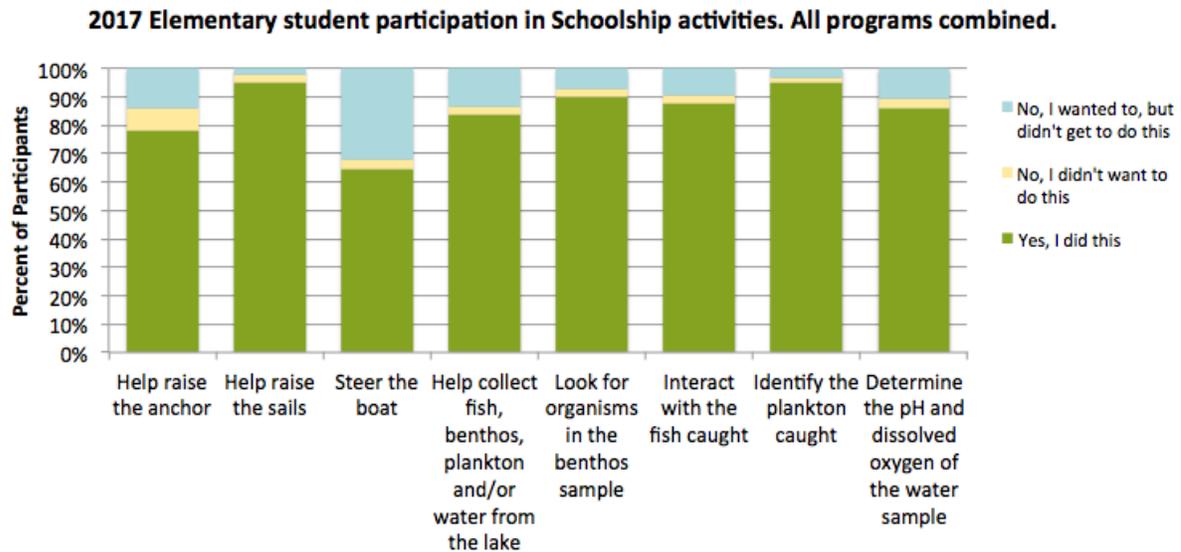


Figure 6a: Elementary student participation in Traditional and Next-Gen schoolship activities, 2017.

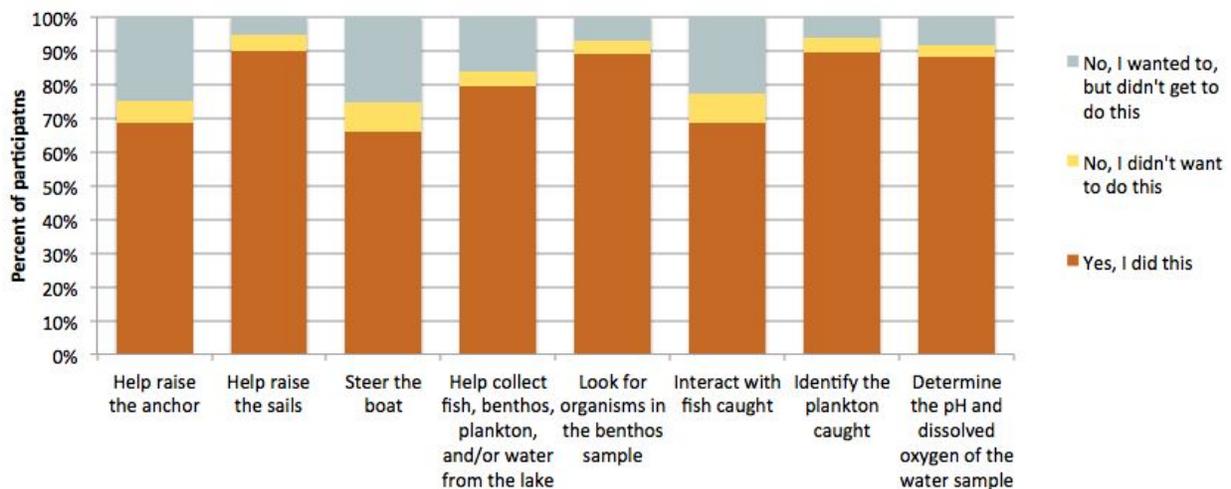


Figure 6b: Middle school student participation in Traditional and Next-Gen Schoolship activities, 2017.

Diving Deeper students

The participation goals in the Diving Deeper program differ from those in the Next Gen and Traditional programs. Our outcomes for Diving Deeper were very high. **99% of students got to use the sampling equipment independently or didn't want to do so** (Figure 7). This is an excellent outcome. The students who answered, "No, but I wanted to" was less than 10% for all measures. ► *We will continue to encourage instructors to achieve all of these outcomes in 2018 so the Diving Deeper program is rigorous, hands-on, and enjoyable.*

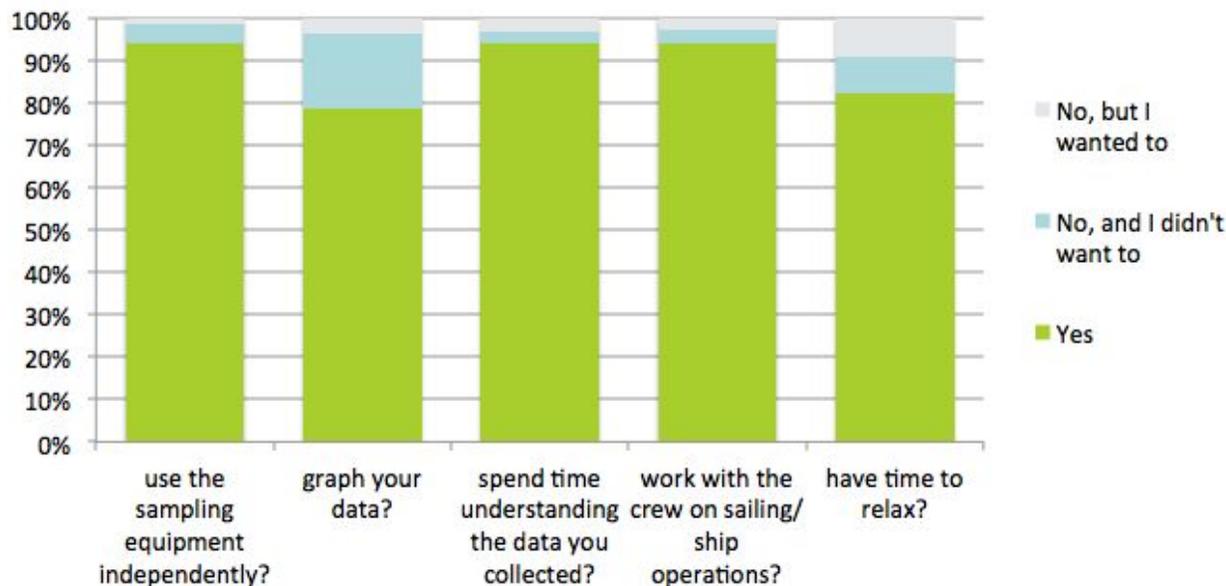


Figure 7: Student participation in Diving Deeper Schoolship program, 2017. Responses to questions that began with. "Did you:"

80% of the Diving Deeper students said they got to do everything they wanted to do (11% didn't get to do some of the things they wanted to do, and 8% either thought there was too little or too much to do). ► *The experiences of different individuals in the Diving Deeper program might be very different based on the topic the students studied because students are divided into research groups with very different sets of tasks. Next year we will consider looking for any differences based on the research the students participated in.*

78% of the students thought the research they participated in was meaningful, which is an increase from 2016 when 69% thought the research was meaningful. We will have three years of data when we start the 2018 season so it will be interesting to see if this number changes at all when students are able to compare their work to a longer history of data collection.

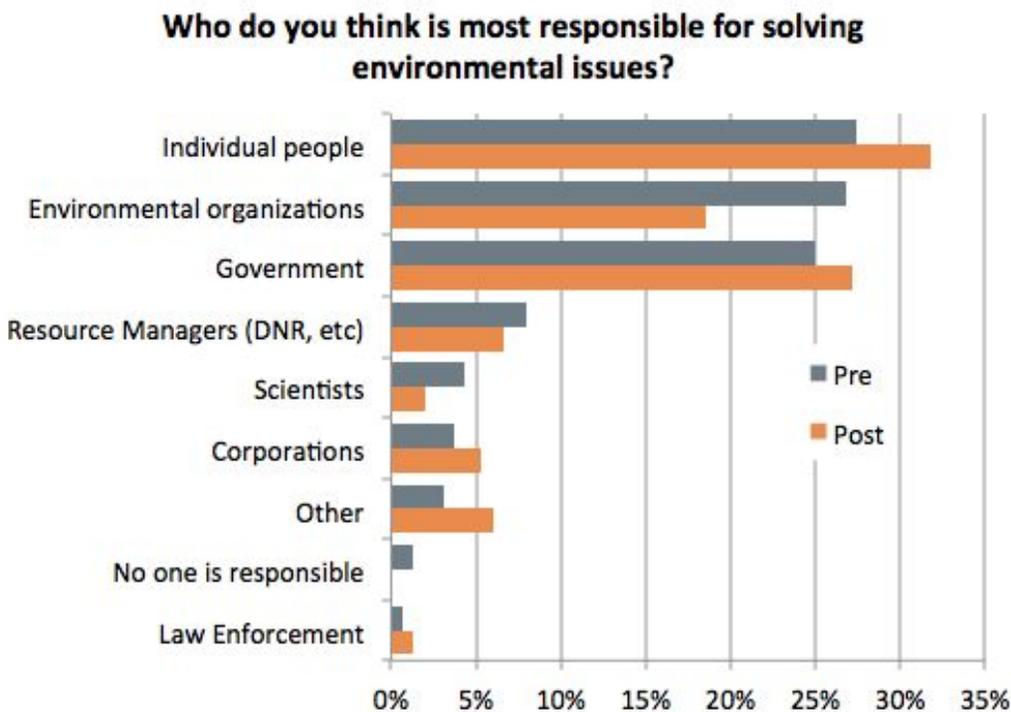


Figure 8: **Who is most responsible for solving environmental issues?** Diving Deeper student responses. Students could only choose one answer.

When asked who is most responsible for solving environmental issues, three quarters of responses before the trip were roughly split between individual people, environmental organizations and government (Figure 8). After the program, more people said individuals were responsible for solving environmental problems (pre = 27%, post = 32%). Is this because they felt more personally responsible for environmental care? Or did they learn something on board that put the onus more on individuals than institutions? ► *These are conversations we will encourage during the program in 2018 to discover what students are thinking about environmental responsibility and to educate students about the important roles organized groups play in conservation.*

Summer Programs

The summer sailing season in 2017 saw **1438** participants over **70** community sails, charters, and Young People in STEM programs. Not included in those numbers are the 3 sails that were cancelled for lack of ticket sales or weather concerns. After attending a sail, participants in the 2 and 3 hour programs received online after-sail surveys. Participants in the Young People in STEM program completed pre surveys as part of the sign-in process when they arrived at the program, and completed post surveys before they left the ship on the final day. Results to both

sets of surveys are below, with a selection of comments for each. Complete data and comments are available upon request.

Public Programs

Table 12 gives an overwhelmingly positive picture of the passenger experience with our programs. Narrative comments help to flesh out the reasons for their ratings.

Table 12: Participant ratings of their experience on Great Lakes Discovery, What's in the Great Lakes Food Web, Steady the Ship, Fishes of Lake Michigan, Great Lakes Under the Microscope, Specialty, and Astronomy sails. Ratings are out of 5, 0 being the worst and 5 being the best.

Summary of combined scores for all public summer sails. - 50 responses	
How was your purchase experience?	4.9 / 5
How knowledgeable were Inland Seas staff and volunteers?	4.9 / 5
How passionate were Inland Seas staff and volunteers about Great Lakes issues?	4.9 / 5
How helpful were Inland Seas Staff and Volunteers?	5.0 / 5
Your overall experience.	4.8 / 5

Great Lakes Discovery Sails

The Great Lakes Discovery Sail is the most popular public sail offered by ISEA. It is a slightly shorter version of the Traditional Schoolship sail that schools participate in. Participants sample fish, plankton, benthos, and water, test water clarity, and spend time learning about seamanship. It is offered to people of all ages. Inland Seas hosted 14 Great Lakes Discovery Sails in 2017, hosting 337 total participants.

Table 13: Participant ratings of their experience aboard a Great Lakes Discovery Sail. Ratings are out of 5, 1 being the worst and 5 being the best.

Average Scores for Great Lakes Discovery Sails - 11 responses	
How beneficial was the program information to you?	4.6 / 5
How was the balance of 'learning to fun' that you experienced?	4.5 / 5

100% of respondents would recommend the Great Lakes Discovery Sail to others.

Comments:

"I took my sons - both six years old - they LOVED it, as did I. Thank you so much for offering this in the Hessel area!! An absolutely outstanding crew and an excellent experience!!"

“This was our second time sailing with Inland Seas. Once again, we had a great experience both sailing and learning about the Great Lakes. We LOVE all the hands on work you do with the kids. My kids love science and this is such an amazing opportunity for them to use equipment and access resources that they never would otherwise. The staff and volunteers are so kind and patient with them, never talking over their heads. We have only good things to say.”

“An excellent voyage for both myself and my 8 year old grandson! He's still talking about the experience days later and using some of the new vocabulary he learned. Thanks to all!”

Astronomy Under Sail

Astronomy Under Sail is an evening sail that allows participants to witness the night sky away from the lights of the shore. Dick Cookman, from the local science supply retail store, Enerdyne, guides participants through astronomy, physics, history, and lore surrounding the night sky. Inland Seas hosted 4 Astronomy Under Sail programs in 2017 totalling 106 participants, one of which was timed for a meteor shower.

Table 14: Participant rating of their experience aboard Astronomy Under Sail. Ratings are out of 5, 1 being the worst and 5 being the best.

Average Scores for Astronomy Under Sail - 9 responses	
How beneficial was the program information to you?	4.8 / 5
How was the balance of ‘learning to fun’ that you experienced?	4.7 / 5

89% of respondents would recommend Astronomy Under Sail to others.

Comments:

“Like all Inland Seas programs, the astronomy under sail was excellent, enjoyed thoroughly by six of my family. The experience was unique, seasoned well with “wow” moments, and great fun. In two words: happily memorable. Our thanks to staff and crew and also to the weather gods who parted the clouds, chased them away in time for a bit of starlit magic.”

“This was my second Astronomy cruise. I was excited to bring my granddaughter with me this time. We both enjoyed the beautiful, calm night sail. Although sky conditions were somewhat limited, Dick Cookman made the most of the breaks in the clouds with an excellent presentation of the constellations. During the cloudy “intermissions” he filled our minds with amazing facts which compelled us to discuss and wonder about on our ride home that night. It was a wonderful experience, and I know I’ll go again...”

What’s in the Great Lakes Food Web? (Microplastics)

Inland Seas’ “What’s in the Great Lakes Food Web” sail includes taking plankton and microplastics samples and provides information on what plastics are, how they get into the Great Lakes, and their effects on the food web. Samples collected on the program are sent to Dr. Sheri

Mason's lab for final processing. Inland Seas hosted 2 What's in the Great Lakes Food Web Sails in 2017, with a total of 31 participants.

Table 15: Participant ratings of their experience during a What's in the Great Lakes Food Web sail. Ratings are out of 5, 1 being the worst and 5 being the best.

Average Scores for What's in the Great Lakes Food Web Sails - 3 response	
How beneficial was the program information to you?	4.3 / 5
How was the balance of 'learning to fun' that you experienced?	4.7 / 5

100% of respondents would recommend the What's in the Great Lakes Food Web Sail to others.

Comments:

"All the staff and volunteers were upbeat and knowledgeable. They encouraged and engaged my grandson in all the activities and it was a positive learning experience for both of us. Thanks for a wonderful evening."

"As members of inland seas we try to sail on one or two trips a summer. We live down state but summer in Torch Lake Township. We have never been on a trip that was anything but top shelf professional! Your staff is the greatest and the work you do is outstanding!"

Fishes of Lake Michigan

New in 2017, the Fishes of Lake Michigan Sail focuses entirely on Fish and their interactions in the lake. The sail features fish collection with an Otter Trawl, Fish Station, and a short talk given by a local fish expert. All participants are given a chance to steer the ship and a chance to relax and enjoy the sail. Inland Seas hosted 5 Fishes of Lake Michigan in 2017, with 114 total participants. Nathan Barton, Jory Jonas, David Jude, Steve Hensler, and Tom Clement acted as our fish experts in 2017.

Table 16: Participant rating of their experience aboard a Fishes of Lake Michigan sail. Ratings are out of 5, 1 being the worst and 5 being the best.

Average Scores for Fishes of Lake Michigan Sails - 4 responses	
How beneficial was the program information to you?	4.5 / 5
How was the balance of 'learning to fun' that you experienced?	4.8 / 5

100% of respondents would recommend the Fishes of Lake Michigan to others.

Comments:

"Staff members were all exceedingly cheerful. Our class/group was a total mix--from adult through infant--and so the "lecture" content had to match the audience, but I would be extremely

interested in taking an excursion that focused much more in depth on the science end and was geared for adults. Having the live animals to observe was excellent. The outing was a great value. I hope to sign up for the astronomy outing in the near future! Thanks!"

"Nathan Barton received excellent comments for his knowledge and experience. My family, again, was very pleased with the comfort of this sail and the joy of being on the Lakes with dedicated people. That's you, the Inlands Seas Staff and volunteers."

Great Lakes Under the Microscope

New in 2017, the Great Lakes Under the Microscope sail features sampling of Benthos and Plankton, along with those stations. All participants are given a chance to steer the ship and a chance to relax and enjoy the sail. Inland Seas hosted 6 Great Lakes Under the Microscope Sails in 2017 with 100 total participants.

Table 17: Participant rating of their experience aboard a Great Lakes Under the Microscope sail. Ratings are out of 5, 1 being the worst and 5 being the best.

Average Scores for Great Lakes Under the Microscope Sails - 10 responses	
How beneficial was the program information to you?	4.7 / 5
How was the balance of 'learning to fun' that you experienced?	4.5 / 5

100% of respondents would recommend the Great Lakes Under the Microscope sail to others.

Comments:

"Our grandchildren,, ages 7 & 9, were engaged the entire morning. Length of 2 hours was perfect. We all learned a lot! Will look forward to repeating the excursion next year. Thank you to all volunteers & staff for their focus & joy in learning about the lake. The wind and water was perfect for sailing."

"So impressed with your organization!"

"2 of our granddaughters went on the sail with us and were so well treated by all the crew that they loved the experience."

Steady the Ship

New in 2017, the Steady the Ship sail features an extended version of the Seamanship station and describes the physics of sailing, a history of schooners in the Great Lakes, and a discussion about ballast and invasive species. All participants are given a chance to steer the ship and a chance to relax and enjoy the sail. Inland Seas hosted 6 Steady the Ship Sails in 2017, totalling 109 participants.

Table 18: Participant rating of their experience aboard a Steady the Ship Sail. Ratings are out of 5, 1 being the worst and 5 being the best.

Average Scores for Steady the Ship Sails - 3 responses	
How beneficial was the program information to you?	4.7 / 5
How was the balance of 'learning to fun' that you experienced?	5.0 / 5

100% of respondents would recommend the Steady the Ship Sail to others.

Comments:

"A very enjoyable two-hour sail. Crew were friendly and knowledgeable and it was fun helping to raise the sails and steer the ship. We hope you continue this 'new' trip. I think as word spreads it will become very popular. Perfect weather certainly added to the experience!"

"This was definitely one of our best experiences on our first vacation to Michigan and the Suttons Bay area! Our boys (12, 10, 8) were ALL very engaged and interested in learning about the local bay and the boat. They were put to work and were excited to be a part of the experience. I HIGHLY recommend this company and all they have to offer. The volunteers and staff are INCREDIBLE communicators/educators and know how to ask a variety of age appropriate questions to pique the kids curiosity and encourage a love of learning --despite it being "Summer!". Boys had a ton of info to share to grams and gramps at home. GREAT price for the experience....actually it was a steal! Donation coming your way---THANK YOU for a GREAT time and all your preparation (images, handouts, models, hands-on activities)--your efforts did not go unnoticed!"

Specialty Sails (Art, Breakfast, & Music Sails)

Specialty Sails are events aboard the ship which feature a unique experience for participants. These are extended to donors and high level volunteers before opening up to the public as a way to reward our inner circle of support.

Table 19: Participant rating of their experience aboard a Specialty Sail. Ratings are out of 5, 1 being the worst and 5 being the best.

Average Scores for Specialty Sails - 5 responses	
How beneficial was the program information to you?	4.4 / 5
How was the balance of 'learning to fun' that you experienced?	4.4 / 5

100% of respondents would recommend a Specialty Sail to others.

Comments:

"Wonderful time we had for my daughter's Bachelorette Party, the only downfall was we were so busy painting we never got to take in the beautiful views of Sutton's Bay. Thanks again I will definitely recommend friends and family check the site to see if there are any sail's that the public can participate in. The artist was an absolute gem and saw a lot of smiles and good times had by all!!!"

“The breakfast event was very nice. Staff and volunteers were very friendly and made the morning very nice. Breakfast was delicious and we had plenty to eat.”

“Everyone on board was professional as well as fun. The captain was particularly patient with a young boy that needed a great deal of attention. Questions were answered and detailed answers were given. All 4 of us enjoyed every minute of the trip! Thank you By the way. I just happened to stop at the welcome center. Great staff and information there too!”

Below the Bay (ROV Program)

New in 2017, the Below the Bay program takes place dockside aboard the Schooner Utopia and is an opportunity to pilot a professional ROV. Participants can buy time online, and work with an ROV technician to learn how to pilot an ROV in Grand Traverse Bay.

Table 20: Participant rating of their experience aboard an Below the Bay program. Ratings are out of 5, 1 being the worst and 5 being the best.

Average Scores for Below the Bay - 5 responses	
How beneficial was the program information to you?	5.0 / 5
How was the balance of ‘learning to fun’ that you experienced?	5.0 / 5

100% of respondents would recommend the Below the Bay program to others.

Comments:

“Just wanted to mention that the staff was really friendly and helpful. Clayton was very knowledgeable about the ROV, give a lot of details on how they are used and cost, etc etc. I couldn't have been pleased any more than I was. I really enjoyed driving the ROV around. Thanks for offering this program.”

“Really cool to get to drive the ROVs around the aquatic weeds (that got tangled up a few times) and scare the gobies! Unfortunately, my video game skills are lousy, so I kept diving into the bottom, Pete did way better at this. We were also pleased to get to go below on the Utopia, what an absolute beauty. AND there was a Channel 9&10 guy there filming so we got to be on the six o'clock news, whoa . . . Thanks for the opportunity to drive one of these things!”

Suggestions for Improvement on public programs

- *Include more than two minutes to quietly observe the world around the boat [on Great Lakes Discovery Sails]*
- *While the learning was interesting, too much was presented [on the great lakes discovery sail] to reflect and internalize the importance of the message*
- *Give a summary at the end on how the learning activities fit into the large picture*

- ▶ *Time for reflection and integration is very important because this is what leads to stewardship action. We will strive to make these an integral part of our summer programming.*
- *Dedicate some time to passenger introductions*
 - ▶ *We have experimented with giving time to passenger introductions and it has proven to be a positive experience for all. This is something we will implement on 2018 summer programs when it is practically possible.*
- *Include suggested ages/grades for children in the descriptions [on the website]*
- *More information is needed on the website explaining what Astronomy Under Sail entails.*
- *Unclear where to go once they arrived at the pier, signage needed [at Discovery Pier]*
 - ▶ *Both our website and program registration pages can easily be updated to give accurate program descriptions so passengers know what to expect and how to find us when they arrive.*
- *Also offer a trip that focuses on birds.*
- *Include a fish/plant key to help identify the biology seen through the ROV [on Below the Bay programs]*

Young People in STEM

Overview

In 2017 ISEA offered 5 Young People in STEM (YPIS) programs for those finished with 8th -12th grades. Three programs were for young women and two for young men. 41 of the 50 slots were filled. 26 women and 15 men took the survey.

Results

The participants assessed themselves with a 5-point scale on how much they understood before the program began, and assessed themselves again when the program was complete. A score of 1 indicated no knowledge or experience and a score of 5 indicated a great deal of knowledge or experience. Students increased knowledge to some degree in every category. Those categories which had less increase in knowledge (such as motivation to act on behalf of the Great Lakes) also received the highest ratings for knowledge before the sail, thus leaving less to be learned.

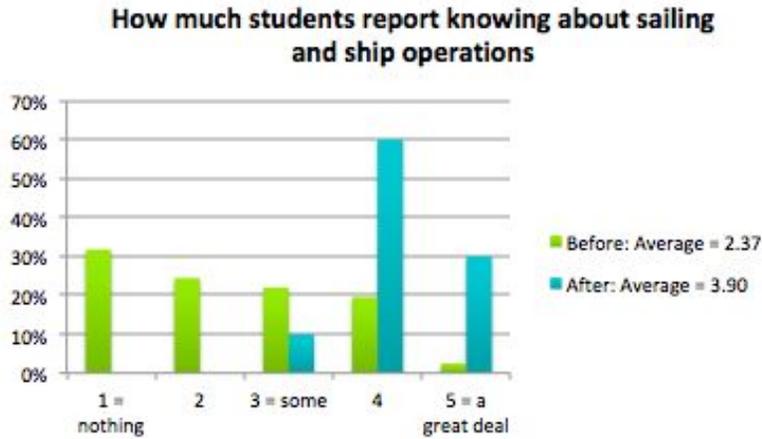


Figure 9: Participants report a 65% increase in knowledge about sailing, boat handling, and ship operations.

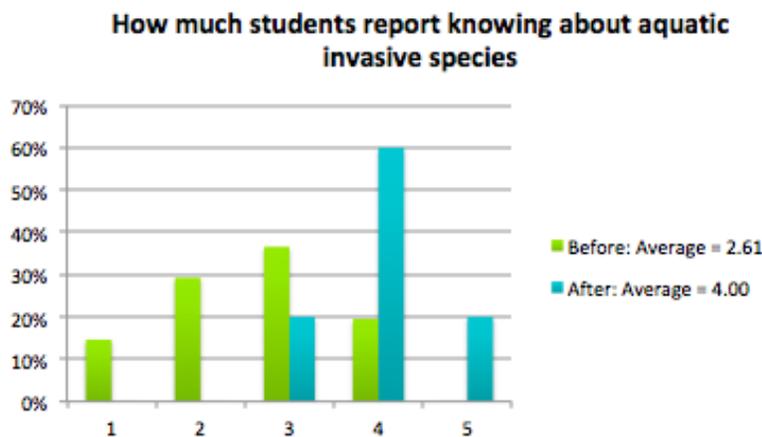


Figure 10: Participants report a 53% increase in knowledge about aquatic invasive species in the Great Lakes.

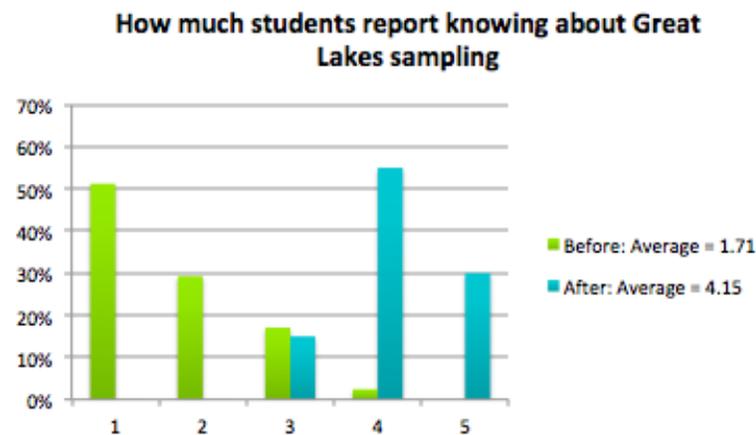


Figure 11: Participants report a 143% increase in knowledge about techniques for biological and

physical sampling in the Great Lakes.

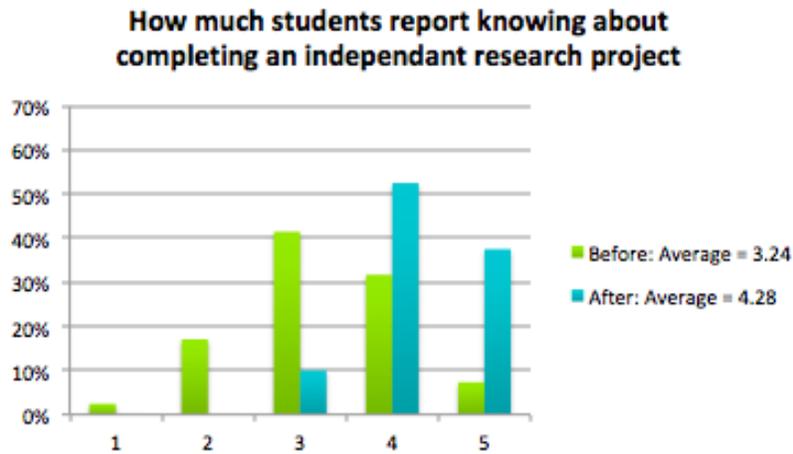


Figure 12: Participants report a 32% increase in knowledge about completing an independent research project.

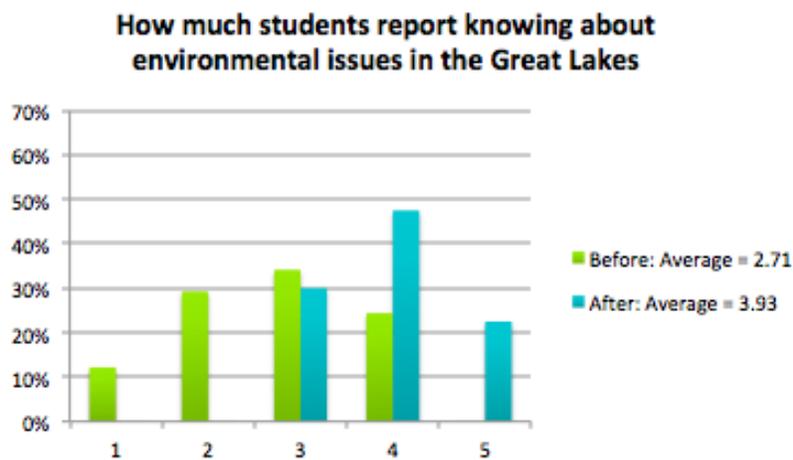


Figure 13: Participants report a 45% increase in knowledge about environmental issues in the Great Lakes.

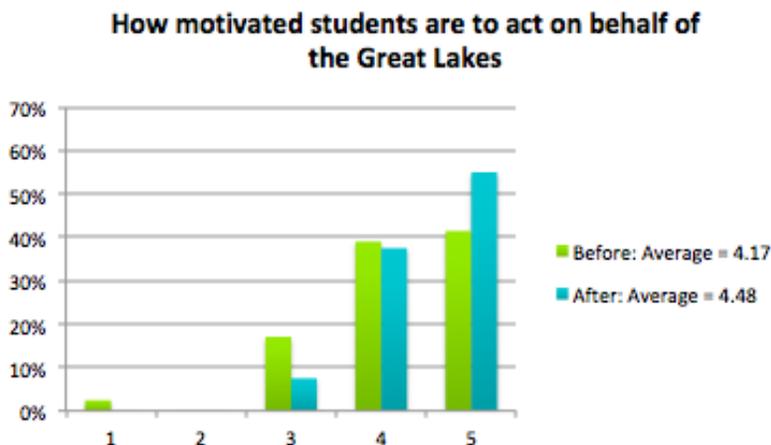


Figure 14: Participants report a 7.3% increase in motivation to act on behalf of the Great Lakes.

In Figures 9 through 14 students indicated that they had a range of knowledge and experience when beginning the program; the distribution of ‘before’ answers varied by question. However the ‘after’ responses nearly all showed a bell curve centered on a 4. This shows that ISEA staff are adept at taking a group from various levels of comfort, experience, and expertise and bringing them up to a level of feeling confident in their level of understanding and abilities. Student motivations to act on behalf of the Great Lakes see the least improvement (Figure 14), but they also start from the highest levels and end on the highest score. This shows that students are being motivated and having their motivations reinforced during the Young People in STEM program (Figure 14).

Participants then evaluated the trip itself, rating the effectiveness of the program on a scale of 1 to 5. A score of 1 meaning “not at all” and 5 meaning “very” (Table 21).

Table 21: Percentage of participants who answered a 4 or 5 (indicating “yes” or “very” to the following statements.

Question	% of women who agree	% of men who agree	Total %
Was the instruction on lake ecology effective?	88%	87%	87%
Was the instruction on sailing and ship operations effective?	85%	92%	87%
Did you feel comfortable asking questions?	88%	91%	89%
Do you think the research you conducted during the program was meaningful?	83%	85%	84%
Was the logbook useful to you?	75%	77%	76%

Did the program feel organized?	88%	91%	89%
Was the program compelling? In other words, did it hold your interest?	86%	88%	87%
Did you have fun on the trip?	86%	96%	90%
Are you considering studying a STEM subject after high school or pursuing a STEM career?	82%	85%	83%
Do you think this experience will help you make future educational or occupational choices?	82%	79%	80%
Would you recommend this experience to others?	90%	93%	91%

The answers given in Table 21 indicate that participants enjoyed their time aboard the ship, and found the curriculum interesting, informative, and useful. Scores and comments were generally positive, therefore no specific recommendations or action items for improving the program are given. ► *We will bring on new staff to deliver these programs in 2018, so we will work to deliver the Young People in STEM program at consistently high levels even if the educator on board changes.*

Finally, participants evaluated the timing of the trips. They scored the time given to key activities during the program on a 3 point scale, 1 indicating not enough time, 2 indicating just the right amount of time, and 3 indicating too much time. The results show that the pacing of the Young People in STEM trips was nearly perfect; responses averaged 1.89, with very little variation.

Participants also wrote comments, a selection of those comments are included below:

“Logbook helped me organize data. I agree with you getting what you give this trip.”

“[The trip] was very fun! Got even more interested in water studies!”

“I think it definitely helps for getting a clear knowledge of the ecology and healthiness of the water and how safe it is for animals”

Multi-Day Charters

In addition to our own overnight programs, other groups contacted us requesting multi-day experiences on the ship. The amount of programming that we provided varied by group, but every group had a positive experience and have reached out to continue that experience into 2018. A short summary of our multi-day charters follows.

Center for Conservation Leadership

The Center for Conservation Leadership booked a 3 day, 2 night trip on Inland Seas in 2015 that focused on Great Lakes Ecology and Research. The signed up again in 2017 for the same experience and sailed from Suttons Bay to Charlevoix, sampling and learning all the way. Nine students and one counselor went on the trip and had a great experience.

Crystalaire

Another group from 2015 that returned in 2017 was Crystalaire Adventures, a camp for middle and high school students that gives participants a menu of adventures to choose from. Eight students and two counselors came aboard for 7 days for a week focused on sailing and island exploration. Students learned about the history of sailing, modern weather prediction techniques, lake and island ecology, and team dynamics.

Chicago Yacht Club

Every year the Chicago Yacht Club selects girls from the Chicago area who have a lot of potential, if not a lot of opportunity, to go on a 5-day sailing adventure. This was our second year with this group. We explored South Fox Island and Beaver Island with 10 amazing young women. They hiked across the dune on South Fox, collected lake samples near Beaver Island, took a night hike on Beaver Island, and braved huge waves on our return journey to Petoskey.

University of Michigan Microbiology

Dr. Melissa Duhaime's U of M Microbiology class came aboard Inland Seas for two days to study Little Traverse Bay microbiome. Since the class exceeded the boat's sleeping capacity, students used the bunkhouse at Tom Darton's house in Oyster Bay off Lake Charlevoix. Students took shallow and deep samples in search of microbes that might have an effect on and be affected by an oil spill in the Straits of Mackinac.

University of Michigan Limnology

This three-day program was concocted after a one-day outing with professor Paul Moore in 2016. He clearly saw the need for a multi-day trip so students could get more experience with Great Lakes sampling. The students planned their experiments at the University of Michigan Biological Station in the days before the trip. We met them in Petoskey and waited for high winds from the west to settle enough for comfortable passage out of Little Traverse Bay. Eventually, winds subsided just enough to get off the dock. We beat hard into high waves for several hours before ducking into Grand Traverse Bay and sheltering in Lake Charlevoix for the night. The students took full advantage of their remaining time to study microplastics concentrations at different levels in the water column and the distribution and prevalence of ectoparasites on round gobies.

Jug and Mug

This group of adults from the Lansing area sailed with us for 4 days in late August. We hiked South Fox Island and Garden Island and sailed up to Squaw Island - a long-time dream for our captain. Each day we learned about a different part of the lake (fish, benthos, and plankton) and sailed as much as possible. This was a group of hearty folks!

Grand Traverse Stewardship Initiative

Overview

During the 2016-17 school year 9 schools across Northwest Michigan engaged with GTSI. At least 26 teachers participated in GTSI-hosted professional development, with GTSI offering at least 63 unique hours of professional development and mentoring to local teachers. During the 2016-17 school year 43 community partners actively participated with GTSI, 36 of which were new to GTSI. By the end of the 2016-17 school year GTSI awarded over \$10,000 in mini grants and supply stipends to classrooms in Northwest Lower Michigan.

Table 22: Participation and accomplishments of GTSI from September 2016 - August 2017

Metric	Number
Engagement	
Schools engaged	9
Teachers participating in GTSI-hosted professional development	26
Active community partners	43
Professional development	
Hours of professional development and mentoring offered to teachers	63
Hours of professional development participated in by community partners	129
Grants	
Mini grant dollars distributed	\$9,131

The number of active schools has remained consistent since 2013 (Figure 15). We consider it a success to have maintained this number of active schools even after a year with minimal support from GTSI.

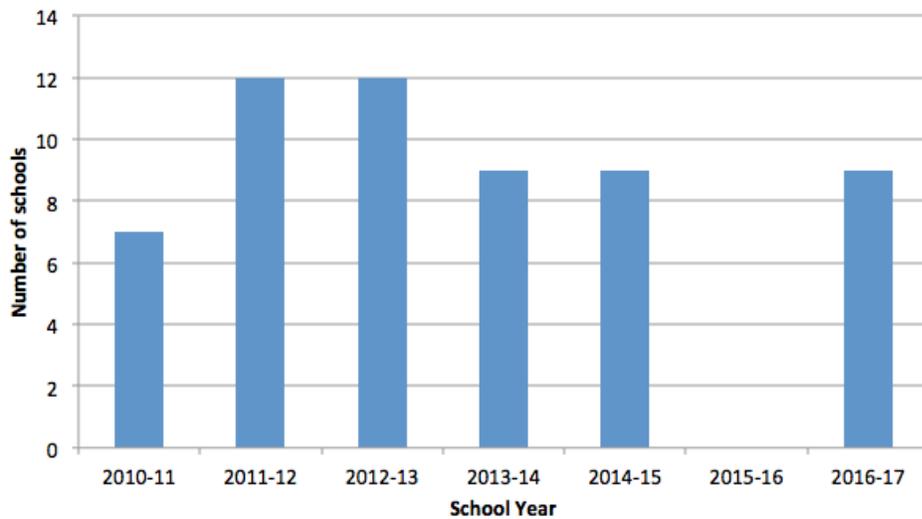


Figure 15: Number of schools active in GTSI since 2010. GTSI was not active during the 2015-2016 school year.

Two new schools were added to the GTSI community in the 2016-17 school year (Figure 16). Recruitment was an important part of our work this year, and will be an even bigger part of our work over the next two years. GTSI started in 2010, which explains the larger recruitment numbers in the first two years of activity.

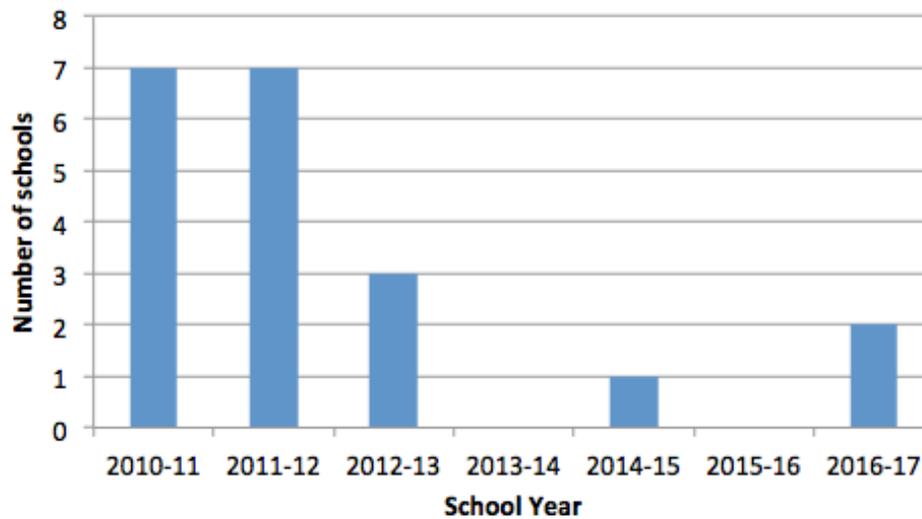


Figure 16: Number of new schools recruited to GTSI since 2010. GTSI was not active during the 2015-2016 school year.

Twenty-six teachers took part in the professional development offered by GTSI in the past year (Figure 17). This is somewhat lower than in the past, but still respectable. We expect to see these numbers increase as we work to grow the GTSI program to more schools and more teachers.

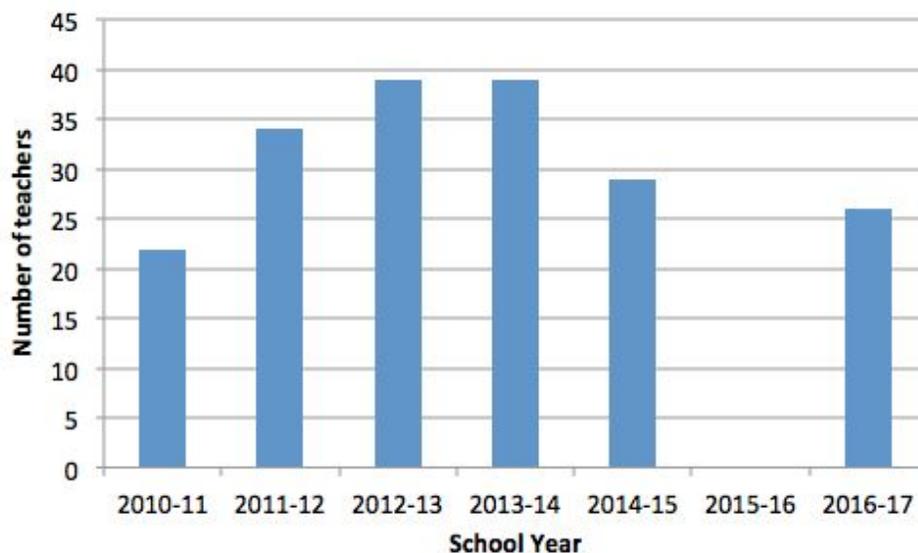


Figure 17: Number of teachers who participated in professional development with GTSI since 2010. GTSI was not active during the 2015-2016 school year.

Professional Development

In the fall of 2016 GTSI hosted kick-off events for both teachers and partners to celebrate GTSI's new presence at Inland Seas, including a sail aboard Inland Seas with community partners to discuss the exciting future course for GTSI. Throughout the year a variety of professional development and networking events were hosted by GTSI, including an Educator Round Table, Growing Algae Biofuels in the Classroom Teacher Workshop, and three Community Connections dinners, in addition to ongoing one-on-one mentoring sessions between educators and the GTSI Coordinator.

In August 2017 GTSI hosted its annual 4 day Summer Institute, which was attended in full or part by 10 educators. **At the close of the Institute teachers completed a post survey in which the average rating for activities was 4.81 out of 5.** The most common negative comment was a request for more time with specific activities.

The GTSI Coordinator worked alongside students at TC West Senior High School throughout the school year to plan the Bayside Bash, a student organized and implemented fundraiser event to benefit Inland Seas. The event raised over \$7,000 that ISEA will use to purchase bikes for classrooms to rent and ride along the Leelanau Trail. GTSI hosted its annual Spring Celebration at this event, giving GTSI teachers and students an opportunity to show off their achievements to community members.

Classroom Efforts

Classrooms across the Grand Traverse region participated in an exciting variety of place-based education efforts during the 2016-17 school year. Here are the highlights:

- Elementary students at Grand Traverse Academy focused on getting outside and exploring nature more and high school students operated their aquaponics lab and designed a workshop that they will implement for inner city students on building and maintaining tabletop aquaponics labs.
- Eighth graders at TC West Middle School worked alongside a variety of community partners to design and install four interpretive signs along the Buffalo Ridge Trail in Traverse City - their efforts were the subject of a video by NatureChange.org.
- Junior high students at Children's House Montessori investigated vernal pools and constructed ROV's while their upper elementary schoolmates nurtured Salmon in their classroom and explored ecosystems.
- Interlochen Arts Academy students continued their water quality and vernal pool monitoring efforts, diving into streams to collect data that they analyzed in their labs.
- Students at Mill Creek and Lakeland Elementary Schools participated in a wide variety of place-based, stewardship-focused activities and Native American cultural studies throughout the school year, culminating in a joint field day where students explored nature on the Mill Creek campus, created artwork to decorate their native plant garden, and met a wide variety of community partners.

21st Century Grant Programing

Overview

Inland Seas was awarded a grant through NOAA's National Marine Sanctuary Foundation to work with three regional 21st Century Community Learning Center (21st CCLC) programs and offer a series of in-depth experiences intended to provide students with an opportunity to gain awareness, understanding, and interest in a wide variety of STEM related skills and experiences.

These activities also provided an opportunity for 21st CCLC program staff to work alongside ISEA staff as they modeled best practices in hands-on, place-based education.

All told, we worked with 147 students and 14 educators, allowing each group of students to take part in seven separate experiences throughout June and July. Below is a brief summary of each activity and the number of students impacted.

Activities

Inland Seas Schoolship - 6- 21st CCLC sites attended an ISEA Great Lakes Schoolship program where all program participants assumed the role of a Great Lakes scientist to study the health and ecology of Lake Michigan. This activity impacted 55 students and 14 adults.

Makerspace - 6- 21st CCLC sites had the opportunity to engage in two different Makerspace activities designed to explore circuit prototyping and allowing students to build their own circuits. This activity was designed to help 21st CCLC educators gain familiarity and comfort with incorporating makerspace type activities into their regular 21st CCLC programming. These activities impacted 141 students and 12 adults.

ROV Program - 6-21st CCLC sites participated in the Inland Seas Underwater Remotely Operated Vehicle Challenge Course. During these activities students had the opportunity to design, build, and test their own underwater remotely operated vehicle. Participants also had the opportunity to operate one of ISEA's professional quality underwater remotely operated vehicles through a challenge course designed to replicate their use in industry. 110 students and 12 adults participated in this activity.

Marine Debris - Rachael Franks Taylor of NOAA's Office for Coastal Management trained ISEA staff in the use of a variety of NOAA tools and curriculum resources accessible to teachers and classrooms. ISEA staff visited each of the 6- 21st CCLC sites and led them through NOAA's marine debris curriculum resources applicable to the age group attending. These activities provided an educational experience for 126 students while at the same time providing direction and support to 14 of 21st CCLC staff as they learned how to incorporate NOAA educational resources into their 21st CCLC programs.

Paddle Building- Four of the 21st CCLC programs had the opportunity to build a Stand-Up Paddleboard (SUP) paddle with ISEA's boat building instructor. 86 students and 11 adults participated in the paddle building course.

Paddleboarding- Four 21st CCLC sites had the opportunity to learn how to paddle a SUP from certified SUP instructors. ISEA constructed special paddleboards that could hold up to 5 students at a time. In this way, students had the opportunity to practice technique while also learning to work together as a team. Eighty-three students and 14 of adults participated in the SUP experience.

Kicknets- Two 21st CCLC program sites (45 students and 8 adults) built kick-nets and viewboxes for a stream ecology experience.

Stream ecology- Two 21st CCLC sites (83 students and 14 adults) visited a stream to collect and view aquatic organisms and learn about the factors that influence stream health.

Summary

As a result of these activities, students got a series of experiences that built on and reinforced one another. The Science, Technology, Engineering, and Math challenges they faced gave a broad picture of ways scientists, engineers, technicians, boaters, paddlers, and citizens affect and think about the Great Lakes. Students interacted with the lakes directly, allowing them to create an emotional bond with the body of water they were learning about. These experiences likely motivated or reinforced stewardship behavior while equipping them with skills and knowledge to act on the desire to be a steward for the Great Lakes in one or more ways.

Great Lakes Watershed Field Course

Thanks to the award of a NOAA BWET grant, we were able to convene 28 teachers from around the Great Lakes region to learn about the interactions of humans and their watershed and explore a number of conservation projects in the Grand Traverse Region that support the goals of the Great Lakes Restoration Initiative: removing and preventing invasive species, reducing nutrient run-off that leads to harmful algal blooms, and restoring habitat for native species.

These were the highlights:

- Sailed on the *SV Inland Seas* and took part in the Next-Gen Schoolship program.
- Canoed the Boardman River and learned about dam removal and river restoration there.
- Toured Leo Creek, a permaculture and wild nature preserve in Suttons Bay.
- Sampled for Great Lakes fish with the Natural Resources division of the Grand Traverse Band of Ottawa and Chippewa Indian.
- Toured the stormwater mitigation strategies and low impact design elements at the Munson Medical campus with the Watershed Center.
- Visited Maple Bay preserve and learned about nutrient retention strategies on their agricultural lands from the Grand Traverse Regional Land Conservancy.

In addition to learning from regional conservation efforts and experiencing first-hand the types of stewardship actions that can improve watershed health, teachers also received training in how to conduct stewardship action projects with their students. All of these teachers will guide students through an environmental assessment, project identification process, and action planning process during the 2017/18 school year. Inland Seas will encourage and support them along the way with regular check-ins, webinar trainings, and planning support.

Summary of evaluation:

Following the 4-day summer Field Course, 100% of teachers either agreed or strongly agreed with the following statements:

- The 4-day field experience was useful
- The 4-day field experience was enjoyable
- I have a sound understanding of meaningful watershed educational experience

Here is a selection of comments from the teachers in response to this prompt, "Use this space to write about something that shifted for you over the past four days, was transformative, or felt like meaningful growth.:

- *I felt like I could "do this"; this type of learning process for my students has been a goal of mine for years, but I never felt I knew how to make the shift away from teacher-driven instruction to student-driven investigations. I am now much more confident that I can implement project-based learning in my classroom.*
- *I know how important the Great Lakes and are natural resources are to us. I am just overwhelmed with the information presented. I hope that I be able to incorporate meaningful lessons into my curriculum so that my students, who live in the city of Chicago, will become informed activists willing to make a change in their community.*
- *Getting to spend time with so many people that work in this field made me see just how much everyone loves what they do and genuinely want people to reach out and be involved. The combination of that and the additional knowledge I gained (as far as what kind of projects might be going on etc) has definitely given me more confidence in this respect.*
- *My knowledge about the Boardman River dam removal project- All the work that went into bringing the river back to its original path. I am I now have a "structure" for a PBL unit to use for future PBL units. I am a little more comfortable with the idea that I might not know exactly where my PBL unit will end up- I need to wait until I see how the kids react/join in with ideas to see how it will evolve.*
- *I really appreciated working with teachers from all different backgrounds, levels of instruction, and types of instruction. I think it helps us as a profession to examine teaching strategies, concepts, and the like from multiple perspectives and find ways to collaborate. For me, the best part was meeting teachers who love the Great Lakes, and live near different Great Lakes. I focus mostly on Lake Michigan because it is where I live and where I grew up. Learning that teachers near Lake Erie are just as passionate about "their lake" as I am about "my" lake gave me a sense of belonging to a larger group of educators working to connect students to a sense of place and the call of stewardship. It gives me hope and a larger community.*

Volunteer Experience

As of November 2017 Inland Seas has **208** Total Active Volunteers. **127** volunteers were active with Inland Seas during Fiscal Year 2016-17*, donating **8,421** recorded** hours.

*July 1, 2016 through June 30, 2017

**Actual hours are likely higher, as volunteers sometimes forget to record hours

Volunteer Survey

Overview

The following charts and comments are from the 2017 volunteer satisfaction survey. The survey was sent to 313 volunteers and received 55 responses. It is important to note that while the survey was open to all volunteers (instructors, crew, boat builders, office helpers, etc), most of the survey was relevant to only schoolship instructors (66% of respondents served as instructors). Here, those taking the survey will be referred to broadly as ‘volunteers’, and the schoolship instructors within that group will be referred to as ‘instructors’.

Results

The results of the 2017 survey show volunteers are happy with programs and volunteer opportunities overall. ▶ *Surveys indicate that more work needs to be done to make volunteer onboarding and instructor training more effective and smoother* (Figures 33, 34). Volunteers strongly indicated that their time is valued (Figure 21), that they are learning new things, they they enjoy their experience, and that ISEA staff are supportive, communicate well, and support a positive culture (Figures, 20, 22, 26). ▶ *Volunteers also indicated that there is room to improve communication with staff to make it more clear, consistent, and helpful.* **100% of volunteers indicate that they are having fun at ISEA.**

I received adequate practical training for my time as a volunteer

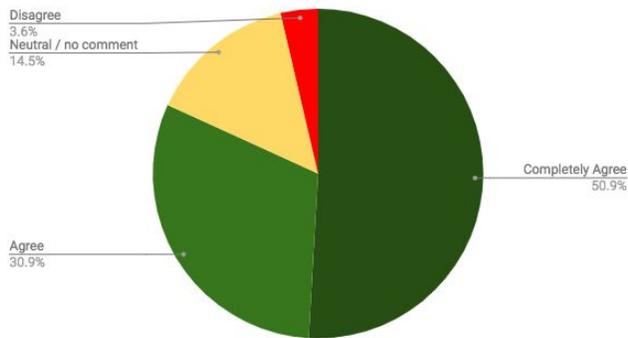


Figure 19: Percent of volunteers who feel they received adequate practical training for their time as a volunteer.

ISEA staff supported me by providing guidance, and answering questions along the way

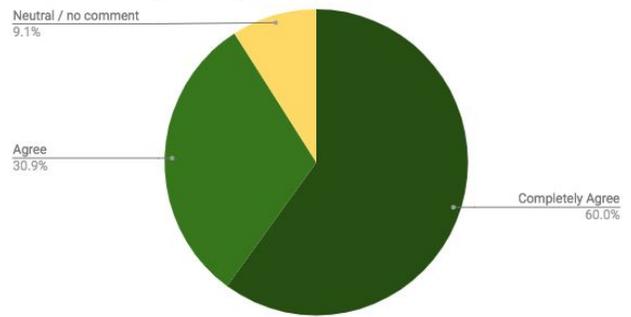


Figure 20: Percent of volunteers who feel ISEA staff supported them by providing guidance, and answering questions along the way

I feel like my time is valued

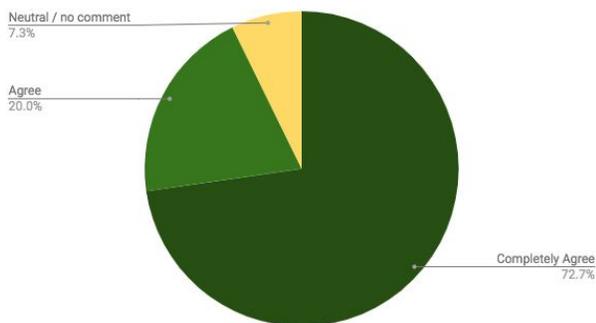


Figure 21: Percent of volunteers who feel like their time at ISEA is valued.

The communication between ISEA and I was clear, consistent, and helpful

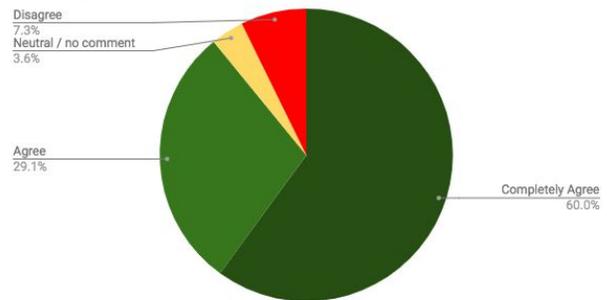


Figure 22: Percent of volunteers who feel their communication with ISEA was clear, consistent, and helpful.

I am enjoying my volunteer experience

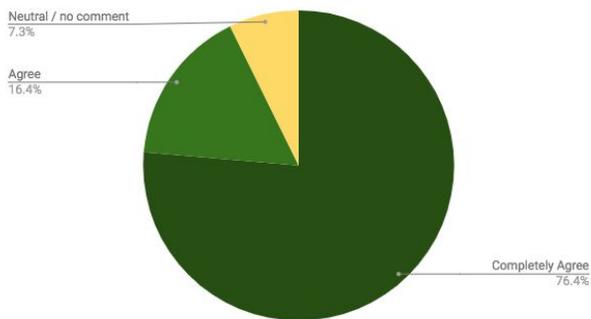


Figure 23: Percent of volunteers who enjoying their volunteer experience.

I feel like my contribution to ISEA is making a difference

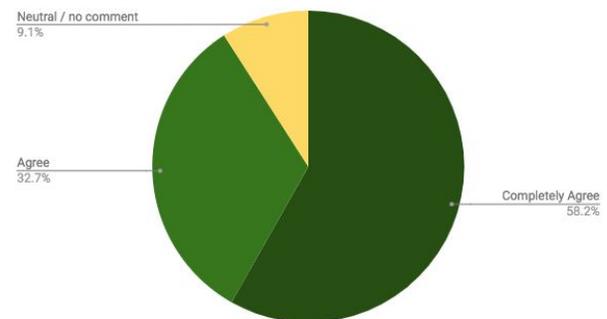


Figure 24: Percent of volunteers who feel their contribution to ISEA is making a difference.

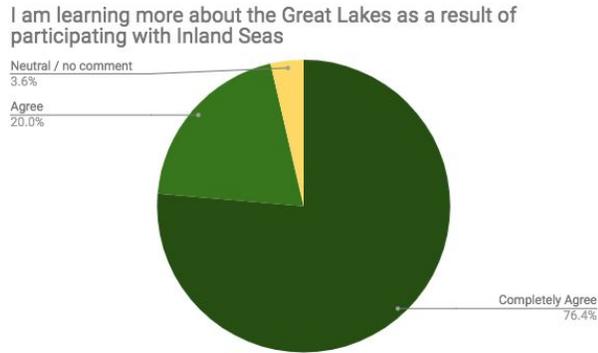


Figure 25: Percent of volunteers who feel they are learning more about the Great Lakes as a result of participating with Inland Seas.

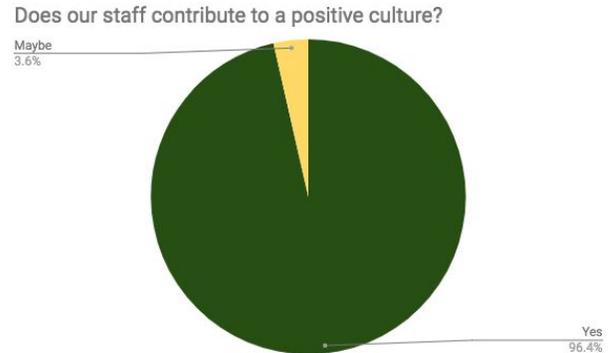


Figure 26: Percent of volunteers who feel that ISEA staff contributes to a positive culture.

Instructor Survey

Instructors on the ship filled out a separate survey in addition to the above questions. Instructors were asked about student behavior and learning, as well as their teaching style and abilities. Instructor feedback indicates that during station teaching, students are getting a hands-on experience which is creating understanding, curiosity, awe, and wonder. (Figures 27, 28, 29, 30) Most instructors (**94%**) indicate that they are able to manage student behavior most of the time, however a small number of instructors indicated that student behavior is an issue for them.

Figures 27-34 represent responses from 37 instructors responding to the survey.

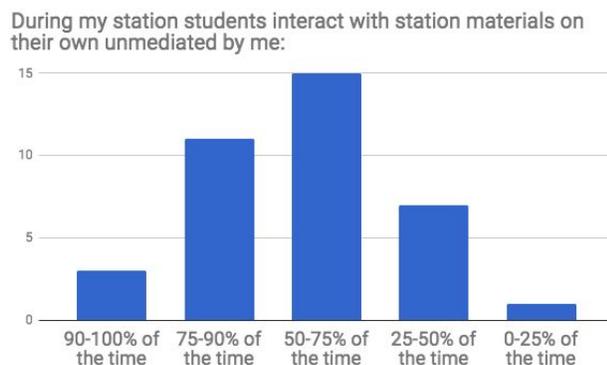


Figure 27: The proportion of station time during which instructors allowed students to interact with station materials unmediated by the instructor..

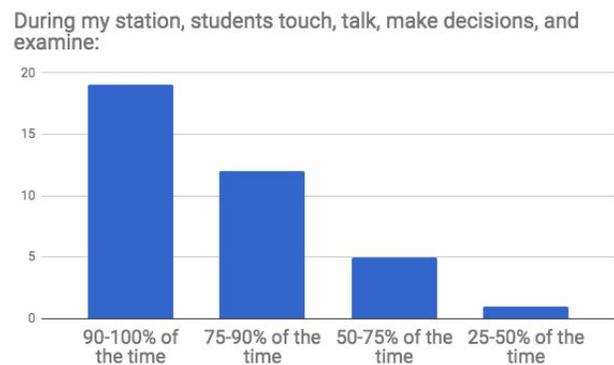


Figure 28: The proportion of station time during which instructors allowed students to touch, talk, make decisions, and examine.

Students seem to understand the message we are trying to get across

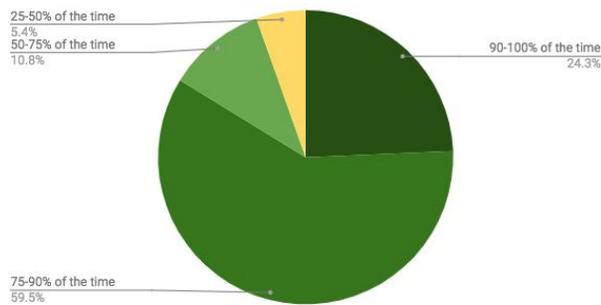


Figure 29: Percent of instructors who indicated that students seems to understand the message we are trying to get across.

Participants in the program demonstrate awe, wonder, and curiosity

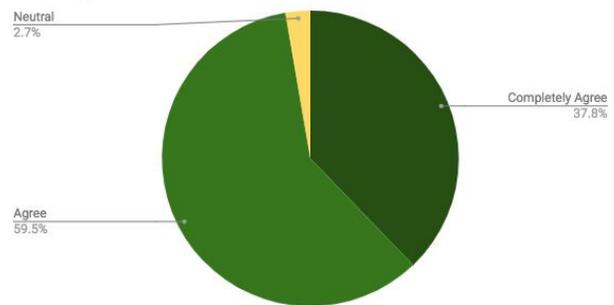


Figure 30: Percent of instructors who indicated that participants in the program demonstrate awe, wonder, and curiosity.

Stewardship

The Stewardship Discussion is the last program element of the schoolship experience. Students are asked open-ended questions about the Great Lakes and their experience. These questions are geared towards asking students to review their experience and think about their impact and responsibility related to the Great Lakes. About **73%** of instructors indicated that the stewardship questions on the last page of the student's logbook help guide the conversation. A low number, about 57% of instructors indicate that students are able to answer the stewardship questions meaningfully (Figure 31). Some instructor comments indicate that this is due to the length of the trip and students' fatigue, and also because it takes place while the ship is docking, which can be a distracting and exciting event. Where we must do the most work, though, is teaching instructors to listen rather than teach during this time. The Stewardship Discussion is meant to be a time to listen, not teach but only 56% of instructors indicated that they were allowing students to do most of the talking and thinking during this period. (Figure 32) *► This indicates that more work needs to be done to help instructors understand the purpose of the stewardship wrap-up and what successful engagement looks like at that time.*

Students able to answer the stewardship questions meaningfully

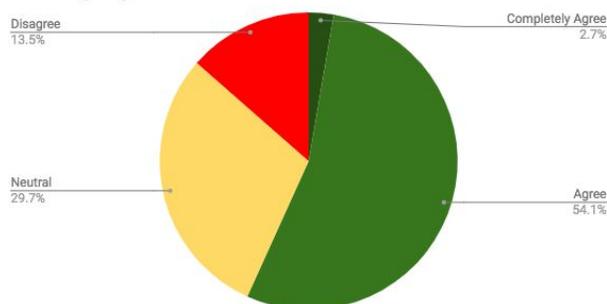


Figure 31: Percent of instructors who feel students are

I am able to let students do most of the talking and thinking during the stewardship wrap-up

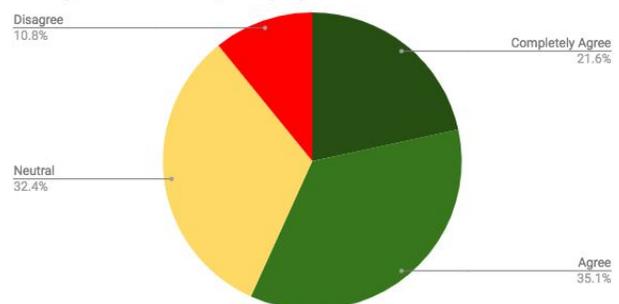


Figure 32: Percent of instructors who are able to let

able to answer stewardship questions meaningfully.

students do most of the talking and thinking during the stewardship wrap-up.

A selection of comments about the stewardship questions, experiences or suggestions for using these questions, or the answers instructors hear from students during the stewardship wrap-up.

“Student answers are sometimes all over the map but usually always relevant.”

“I just put the question to them and let students answer. All ideas.”

“It is hard to keep the kids interested, but i think the wrap-up is important. Sometimes they need little prompting. Other times it's like pulling teeth to get a reaction out of them.”

“I love the way their thinking evolved from the time they arrive until departure.”

Training & Signups

The training and signup process has been an ongoing area of focus and reform. Removing the barriers to the mechanics of signing up for instructor shifts is important to make the rest of the experience fun and productive. Most instructors found the transition from training to teaching easy, but some indicated that it was a rocky process (Figure 33). This is likely related to instructor sign up. Responses from instructors indicate that fewer instructors found signing up for shifts easy and straightforward than 2016, when the process was identical (Figure 34). **Clearly more work needs to be done to make this a simple, straightforward, and easy process in 2018.**



Figure 33: Percent of instructors who feel the transition from training to teaching was easy.

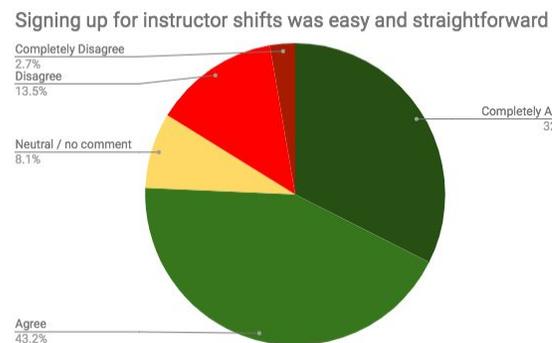


Figure 34: Percent of instructors who feel signing up for instructor shifts was easy and straightforward.

Selection of comments and suggestions about the training instructors receive for teaching programs.

“I thought training was well done last year. On ship shadowing for new instructors was helpful.”

“Not having been a ‘real’ teacher previously, I like the idea of getting more tips for engaging

disinterested students.”

“More training for identification of species and proper pronunciation of their names.”

“The reason for my low score on the signing up is purely my fault. I would like a training on how to use the website to sign up for the different shifts since I had a problem with that. [Staff were] GREAT about signing me up when I became frustrated with the process.”

“It could be helpful to have the lead instructor give feedback and ideas based on any observations during the sail. As a newer instructor I would welcome feedback to see if I’m on the right track.”

“The materials are excellent, getting up to speed on all of it, was , for me, a lot of work, albeit very enjoyable.”

Volunteer Survey Comments

Selected comments about volunteer experience. More information available upon request.

“I feel grateful for how well-organized and efficient our instructor materials are.”

“I was last a regular when Tom [Kelly] was still on the boat a lot , I am very impressed.”

“The materials and programming have come so far in just 3 years...It all seems to flow beautifully!”

“Great experience with the ship and it’s crew. The crew is just as engaged with instructors, students, and the program as the Inland Seas staff.”

“The volunteers, staff and crew are all wonderful. Teaching on the Schooner was a wonderful experience for me.”

“I feel much pride and satisfaction for being a member of your team. For me, it’s all about the mission and the enthusiastic, professional approach to accomplishing it. And by golly, I just have a lot of fun when I’m there.”

2018 Action Plan

So many things went well in 2017! This gives us the opportunity to fine-tune our offerings in 2018.

Spring and Fall Scholarship Experience

These goals will support inquiry and the hands on nature of our programs.

- ▶ Steering will be an option on every sailing program. We aim to increase, compared to 2017, the number of students who say they got to steer during the schoolship program.
- ▶ We will strive to give 15 minutes or more to teaching stations in 2018, and find a way to log the length of stations so we can track our progress.
- ▶ We will continue to encourage instructors to involve students as much as possible in the hands-on experiences in the program, and give students opportunities to reflect on what they did to seal it in their memories. In 2018 we aim for the percentage of students who say they wanted to, but did not get to do an activity to be less than 10%.
- ▶ We will work on minimizing disruption of the fish station during manta trawl launching in 2018.

These are things we can mention to students during the program that might help them make stronger connections. We will share these with instructors during training and throughout the sailing season:

- ▶ When students present to each other on the Next-Gen program, we can inform them that presentation is a tool used by scientists to share what they know. Perhaps this will help students understand the importance of presentation in scientific work.
 - ▶ We can emphasize the importance of multiple kinds of tests to understand lake health, in addition to the importance of taking the same test over time.
 - ▶ To better ensure our programming ignites interest freshwater careers, we can ask students while on board if they have ever considered a career in science, or one that could protect freshwater resources.
 - ▶ In our Diving Deeper program, we can ask more questions that engage students in discussion about environmental responsibility the important roles organized groups play in conservation.
-
- ▶ To support successful stewardship conversations at the end of the program, Lead instructors will include reminders about the stewardship conversation in the pre-trip instructor meeting, such as how much time instructors can anticipate for the stewardship discussion, and the focus on listening to student ideas.
 - ▶ We will create a set of teaching guidelines for schoolship instructors that will help instructors learn about how to be an excellent teacher. This tool will also be useful when we observe teaching that could use improvement.
 - ▶ To help teachers who are new to Inland Seas and give experienced teachers new ideas, we can put together a list of suggested activities for processing the Schoolship experience based on the data we have collected over the past few years.

Surveys

ROV Survey

- ▶ A student survey for the ROV program will be designed and distributed for the 2018 program season.

Teacher Survey

- ▶ We will continue to offer both paper and electronic versions of the teacher survey as they were equally effective for collecting surveys.
- ▶ Teachers will be asked to record the number they are speaking for when completing the survey. We aim to get 5 surveys returned for every 10 programs.
- ▶ The 2018 survey also will find out how frequently our pre trip materials are being used.

Student Survey

- ▶ More measures are needed to direct students to the appropriate survey in 2018. We will create a plan that better directs users to the correct survey.
- ▶ In 2018 we'd like to see more students take the post trip survey and will work on our processes to encourage this.
- ▶ The 2018 Diving Deeper student survey will ask for for the topic students studied, so we can find out if student outcomes or levels of participation vary by research group.

Summer Programming

- ▶ Our new two-hour programs were well received in 2017. For 2018 we will create a brief manual for each of these programs that gives direction for a meaningful introduction and wrap-up with space up for participant discussion of how the learning activities fit into a bigger picture.
- ▶ Summer 2018 programs will make time for passenger introductions, when practically possible, to build a sense of community and get conversation started.
- ▶ Both our website and program registration pages will be updated to give accurate program descriptions so passengers know what to expect and how to find us when they arrive.
- ▶ We are in a position to bring on additional staff to deliver our summer overnight programs, which comes with a need to train new educators and take steps to create consistency in program delivery. To that end, in 2018, we will compile best practices for delivery of Young People in STEM programs so our program outcomes remains high.

Volunteer Experience

- ▶ The onboarding process for all volunteers will be reviewed and revised. An onboarding checklist will be created to make sure that all volunteers get the materials and experiences needed for them to be successful.

- ▶ Instructors will have additional tools in 2018 to help the transition from training to teaching feel smoother. An Instructor Success Packet will outline expectations, guidelines, and guide instructors (new and returning) through a self evaluation and reflection process.

- ▶ Volunteers also indicated that there is room to improve communication with staff to make it more clear, consistent, and helpful. We are working with a consulting group to examine communication with volunteers to make their experience as positive as possible.

- ▶ More work needs to be done to make the volunteer sign-up process a simple, straightforward, and easy process in 2018. The sign-up system will undergo revision and instructors will receive training in how to sign up.