

2021 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.

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Executive Summary

In 2021, ISEA provided **168 programs to 3,427 participants** (Table 1). Over **75% of all surveyed respondents reported a 5-star** experience with ISEA programming. The *S/V Inland Seas* was utilized for **125 sailing days out of a possible 168 available**, and **89% of ISEA's 140 sailing days/year** goal by 2026 (Table 2). The Thomas M. Kelly Biological Station hosted **one facilitated (1) program serving twelve (12)** youth and staff, and lodged **fifteen (15) groups or individuals** for a total of **627 lodging nights impacting 130 individuals**.

Programmatically, the caliber of experiences offered in 2021 were on par with ISEA's tradition of high quality (Appendix 1), with **students showing gains in content knowledge**, both in understanding the value of the Great Lakes as a resource, and in their connection to the Great Lakes. **Teachers reported universally high (4- and 5-star)** experiences, and reported growth in their knowledge and stewardship. Public sail participants reported enjoyment of programming regardless of age or sail type, and appreciation for sail variety.

SHIPBOARD - Schoolship programs were down 70%, from 118 programs in 2019 to 43 programs in 2021, though extremely limited spring programming, as well as the decision not to charter *S/V Manitou*, comprised the biggest reduction in programs delivered. Beyond Schoolship program delivery was also reduced by a third.

ISEA was sustained in 2021 through a combination of ticketed public programs, charters, and solicitation of partner relationships with colleges and universities reaching eight (8) ports in the Great Lakes. **ISEA facilitated 125 non-Schoolship programs** in 2021, comparable to 2018's 127 non-Schoolship programs.

Twenty-nine (29) ticketed sail programs were well attended by **647 participants in 23 sailing days**. These programs served a similar number of individuals as were served in 2019 despite COVID capacity restrictions in the early part of 2021. Educational charters and university partner programs allowed ISEA to facilitate an additional **forty-five (45) programs serving nearly 1,000 people**. This is a nearly **50% increase** from 2018, occurring across eight (8) different ports - a notably high number of ports and programs for a non-Tall Ship Celebration year.

SHORESIDE - 2021 marked the beginning of intentional use of ISEA's remodeled Thomas M. Kelly Biological Station (TMKBioS), specifically the dormitory and exhibit hall components. TMKBioS hosted teacher professional developments, school groups, interns, volunteers, and researchers, and the exhibit hall was updated to better accommodate visiting groups in 2021. No official records were kept of exhibit hall use.

Teacher professional developments (PDs) changed in 2021, in part because of the pandemic, but also because the GLSI hub hosted by ISEA (GTSI) was closed due to staff restructuring. The Great Lakes Watershed Field Course (GLWFC) was filled with 29 teachers, and reached teachers from 7 of the 8 Great Lakes states. Two additional PDs were provided to SEEDS after school educators as a 21st CCLC grant deliverable. In sum, **54 educators were reached through three (3) professional developments**, ongoing support conversations, and school visits. Programming was also delivered on location at schools to both pilot year-round programming ideas and to fulfill grant deliverables. In sum, ISEA staff visited schools to provide **thirteen (13) programs to 407 participants**.

Using 2021 as a baseline from which to evaluate the utilization of the TMKBioS and the *S/V Inland Seas*, as well as program efficacy, for the next five years, it is incumbent upon ISEA to maintain the high quality of programs it has become known for as year-round, land-based programs are integrated, and metrics to evaluate campus utilization are explored. The diversity of audiences and program types sustained ISEA operation in 2021, and has built a reliable network of organizations with which to partner in the future. This partner network will continue to support the mission of ISEA as we expand our programs and reach across the Great Lakes basin.



Table 1. Three-year programming retrospective, 2018-2021 (omitted 2020 - COVID)

	2018		2019		2021	
Program Type	#/%Programs	#%Participants	#/%Programs	#/%Participants	#/% Programs	#/% Participants
Schoolship Programs	109/46%	3006/50%	118/41% (72 Spring, 46 Fall)	2,733/24%	43/32% (20 Spring, 23 Fall)	1403/36%
ROV & Engineer and Explore Programs	33/14%	716/12%	33/11%	991/9%	19/10% (11 Spring, 3 Summer, 5 Fall)	396/10%
Cycling Programs	5/2%	129/2%	1/<1%	10/<1%	0/0%	0
Public Programs (hosted by ISEA)	50/21%	1328/22%	23/8%	609/5%	29/20%	647/15%
Overnight Programs	5/2%	38/1%	6/2%	56/<1%	4/2%	36/1%
Single-Day Programs (away ports and charters)	25/11%	553/9%	37/13%	970/8%	45/24%	995/25%
<i>Inland Seas Away Ports w/ Partners</i>	2	See Single Day Programs	2	See Single Day Programs	8	94
<i>Inland Seas Tall Ship Festival Ports (every 3rd year)</i>	n/a	n/a	2	1018/9%	n/a	n/a
<i>Utopia Tall Ship Festival Ports</i>	n/a	n/a	2	4782/42%	n/a	n/a
Teacher Professional Development Programs	130 hours (GTSI)	26 (GTSI)	29 (GTSI)/10%	197 (GTSI)/2%	3/2%	54/2%
Programming @ Schools and Events	7 schools/3%	~175/3%	No records	No records	13/7%	405/11%
Total	236	5971	287	11,366	168	3427

Table 2. Number and Percent of Sail Days dedicated to audience type and compared to 2026 strategic goals.

	Primarily K-12 Audience		Teacher Audience	GTB Region Audience		Charter and Partner Audiences	
Strategic Audience:	Schoolship Programming (Schools)	Educational Charters (All-ages)	Teachers (PD, appreciation)	General Audience (Public Programs)	Volunteers (training, appreciation, maintenance)	College/ University Partners	Group Charters (non-instructional)
2021	42	17	1	23	20	19	2
2021 (of 124 days)	34%	14%	<1%	19%	16%	15%	2%
2026 Goal*	57%		2%	18%	11%	7%	5%

*Goal 1 of 2021-2026 Strategic Plan, as of December 2021. "2026 Goal" targets represent % of 140 sail days.



2021 Programming Summary and Evaluation

ISEA strategic planning during the 2020 pandemic, and subsequent new staffing plan, invites us to, once again, explore the best way to evaluate our impact. The 2021-2025 strategic plan is broadly broken into five goals: 1) ship-based programming, 2) year-round programming and campus utilization, 3) volunteers, 4) fundraising, and 5) public relations and marketing. This evaluation report will be framed upon creating a baseline for evaluating goals 1 and 2, as well as the education-related components of goals 3-5.

This framework will serve as the baseline data for evaluating success in 2026 in the following arenas:

- 1) direct any necessary adjustments to our evaluation rubrics;
- 2) recording and reporting on expanding STEM partnerships;
- 3) our trajectory in pursuing grants;
- 4) recruitment for educational goals.

2021 saw a variety of challenging modifications to our programming as well as staffing changes necessary to implement strategic goals as ISEA expands. Trisha Smrecak was hired as Education Coordinator in late June and Jillian Votava transitioned in her shifted role as STEM Coordinator, building and securing partner programs (e.g. University, educational, and private partnerships) in away ports during the 2021 sailing season.

In 2021, ISEA **provided 168 programs to 3,427 participants** (Table 1). This is down 30% from 2018, the last reasonably comparable year (2019 was a Tall Ship Festival year and 2020 was the start of a global pandemic). Considering vaccinations of adults didn't occur until late spring, teenagers in summer, and youth aged 5 to 11 in November, ISEA education staff are overall happy with the number and attendance of programs during the 2021 sailing season. Most notably, **only 43 Schoolship programs were held during 2021, down from over 100 in 2018 and 2019**. The shining light in 2021 was a very successful, diverse suite of partner and charter programming over the summer, visiting several new ports, including inaugural programs on Lake Superior and keeping non-Schoolship program numbers in 2021 aligned with those from past years (125 programs compared to 2018's 128 programs). This was made possible by year-round efforts of Program Coordinator, Stephanie Rustem and STEM Coordinator, Jillian Votava.

Two supplementary programs ISEA facilitated were changed significantly in 2021. Bicycling programs were not especially popular, so ISEA's fleet of bicycles and helmets were sold to Suttons Bay Bikes with the ability to rent them for programs in future years. Grand Traverse Stewardship Initiative lacked vital funding needed to continue, and when COVID forced staff restructuring in 2021, ISEA removed itself as a partner hub of the Great Lakes Stewardship Initiative, opting to build stewardship programs for teachers and schools through other partnerships.

K-12 Audience Programming

K-12 audiences are the primary demographic targeted by ISEA programming. For decades, the largest majority of our audience was reached through our Spring and Fall, ship-based 'Schoolship Program,' with land-based programs on our campus and at schools and away-port shipboard programming only a minor component. ISEA's 5-year strategic goals include reaching this audience year-round through the addition of land-based programming on our campus and in regional schools.

Schoolship Programming - Summary

In 2021, Schoolship programming (43 programs) was down about 60% from 2018 (109 programs) and 2019 (118 programs) participation. Changes to program facilitation were made between Spring and Fall



seasons as pandemic restrictions necessitated, and a description of those modifications can be found in Box 1. A new, simplified survey (pre- and post-trip) was given out to all Schoolship participants regardless of which program format they attended. Teachers were also asked to give feedback via a survey after their trip. A detailed report of these results is included in Appendix 1. While Schoolship attendance was down in 2021 and only accounted for 34% of sail days on the *S/V Inland Seas*, it was **significantly increased from 2020 and signals a return to 'normal' operations.**

Educational charters to primarily K-12 audiences, like Girl Scout troops and campers, bridged the gap in reaching the K-12 audience. An additional 17 educational charter programs accounting for 14% of *S/V Inland Seas* sail days were offered. However, the **goal of 57% sailing days dedicated to K-12 audience programs was not attained.** Only 48% of sailing days this season were committed to Schoolship and educational charter programs, and many of these were unfortunately underfilled. This reflects the realities of school programming during a pandemic - restrictive travel rules and school closures negatively impacted participation of many of our usual schools. It also supports the value of ISEA's strategic direction of diversifying programming and audiences for both broader impacts and organizational stability.

BOX 1. Description of program modifications made to Schoolship programs during 2021 sailing season.

Description of Schoolship Program Facilitation - Spring

Schoolship programming in Spring 2021 continued with the significantly modified 'Ship N Shore' model in order to sail the ship at 50% capacity (see 2020 Evaluation Report for more details). No other program options were offered (i.e. no Diving Deeper, or otherwise modified form of a high school-level program). Three stations were conducted aboard the ship (Fish, Plankton, Seamanship). Only one station, Plankton, was held below deck to limit participants and staff in enclosed spaces. Three stations were held shoreside (Benthos, Great Lakes Map, Wetland Walk). The Great Lakes mapping activity was improved upon from Fall 2020 (labels attached to blocks, map brought up onto tables), and two new stations were created. The shoreside Benthos station used D-nets (instead of the PONAR) to collect samples from the wetland, and emphasis was placed on discovering what lives at the bottom. The Wetland Walk station was created as a way for students to take a bit of a cognitive break and guided walk around the property with a wetland-themed scavenger hunt. Each school group was split into an "A" and a "B" group: "A" started aboard the ship and, after ~100 minutes, switched to shoreside programming, "B" started on shore and then boarded the ship. **Thirty (30) 'Ship N Shore' Schoolship programs were delivered in Spring 2021.** Spring was particularly under-attended compared to "normal" years as a result of the pandemic. *S/V Manitou* was not chartered which provided a cost-saving measure.

Description of Schoolship Program Facilitation - Fall

Schoolship programming in Fall 2021 returned to full capacity, shipboard programming with NextGen and Diving Deeper formats. Modifications to Next Gen included keeping only one station down below plus required masking (Plankton), removing the Water Quality station (though all groups still measured secchi depth and surface temperature), and including both Seamanship and Microplastics (i.e. there was no option for a teacher to choose either Microplastics or Seamanship). **Nineteen (19) modified Next Gen programs were delivered in Fall 2021.** Few modifications were needed to facilitate Diving Deeper programs. Plankton group was given priority to use the down below area for most of the program duration and masking was still required for anyone down below. Water Quality and Microplastics groups stayed above deck to analyze and summarize their samples. One group at a time could utilize the pilot house if needed. **Eight (8) modified Diving Deeper programs were delivered in Fall 2021.**

Spring Schoolship was particularly under attended in 2021, down 72% from 2019. Spring and Fall Schoolship had a very similar number of programs, which is unusual and a direct result of the pandemic. In most of the previous seasons, the *S/V Manitou* had been chartered to allow us to hold up to four programs per day during our spring season (Table 1). Thus, spring Schoolship programs in 2019 reflect twice the number of programs possible in 2021 and numbered 72, only 8 programs short of maximum capacity, compared to 20 filled programs of 40 offered this year. 46 Fall Schoolship programs were attended in 2019 and only 23 in 2021 (down



50%). These numbers would be concerning outside of a pandemic, but the rebound in Schoolship from only three modified programs total in 2020 to 57 programs in 2021, and indeed in all programming (a 75% increase from 43 programs in 2020 to 168 in 2021), during a pandemic is heartening.

Fall Schoolship programming was relatively consistent with Next Gen and Diving Deeper programs from years past, and the omission of water quality and inclusion of both seamanship and microplastics was not addressed by teachers in post-trip surveys. This was effective and clearly did not negatively impact program delivery in the eyes of our teachers and students. The microplastics research sample collection effort held to support the work of Dr. Sam Mason ended this year. This provides ISEA the opportunity to rethink or modify the microplastics station to refresh the experience for participants, especially in Next Gen program delivery. Diving Deeper is an increasingly popular program, and there are exciting opportunities to expand the program to a full-day ship and shore experience, but there is a smaller pool of volunteers from which to pull for teaching these. This is an issue that needs to be addressed in 2022. We anticipate that many teachers will be interested in expanding their Schoolship experience to a full day with the addition of a shoreside program like ROV or another pilot program once they are widely offered.

Schoolship Programming - Evaluation Summary

Schoolship programming is evaluated in multiple ways: student survey responses pre- and post- trip, teacher survey responses post- trip, and through volunteer feedback (addressed in volunteer evaluation report).

A thorough summary of all responses can be found in Appendix 1. Student responses to content-based questions showed a slight increase in personal connection to the Great Lakes. Perhaps most importantly, in the post-trip survey, when students were asked ‘Do you think the Great Lakes are healthy?’ (Fig. 1), the majority of students offered a nuanced response that indicated the complexity of the Great Lakes system and said that some indicators were positive while others were negative

Post-Trip Response to "Are the Great Lakes healthy?"

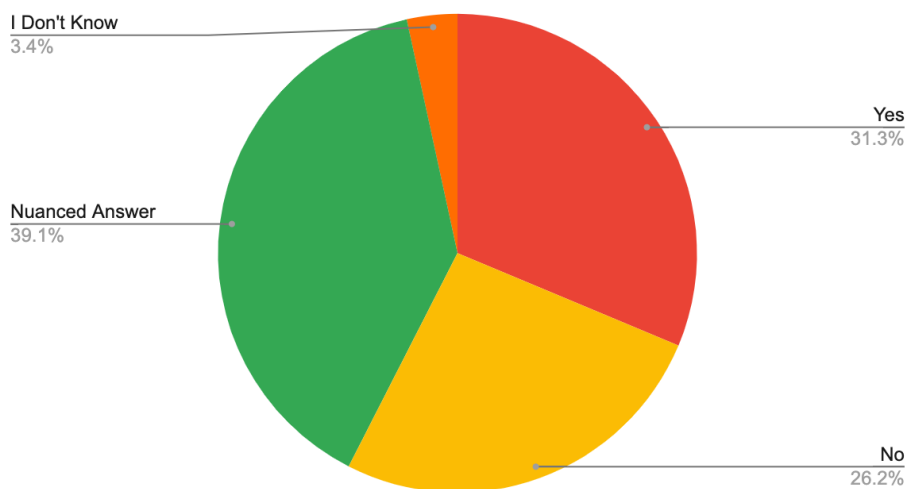


Figure 1. Post-trip student response to “Are the Great Lakes healthy?”. Notice the largest fraction provided a nuanced response denoting that the question was complex and that there were both healthy and unhealthy indicators observed on the trip.

The questions ‘Have you visited one of the Great Lakes?’ (Appendix 1), ‘Do you care about the Great Lakes?’ (Figure 3 - Appendix 1), and ‘What words do you think of when you think about the Great Lakes?’ (Figure 4 - Appendix 1) were asked before and after each trip. Nearly 10% more students (89%) acknowledged that they have visited the Great Lakes after the trip, and fewer responded ‘I don’t know’ (Appendix 1). All attendees did



visit a Great Lake during their trip, so additional clarification of place and how we are using it should be considered for emphasis in lead discussion, especially in ROV programs when the body of water is a platform for the experience, but not the focus. When asked if students care about the Great Lakes, more students answered ‘yes, quite a bit’ after their trip than before (Appendix 1).

Students also showed a greater capacity for describing the Great Lakes after participating in an ISEA experience. Individual student responses shifted from generic descriptions (e.g. pretty, blue) and recreational uses (e.g. swimming, fishing) before participation toward a more nuanced descriptions of the life, human impact on, study of, and personal connection to the Great Lakes after an ISEA experience (Appendix 1).

Schoolship Programs - Points of Tension

Weather and participant comfort during our four hour, shoulder season programs is always a significant point of tension, for participants and for volunteer crew and instructors. Our success with modified, shorter sailing programs during Ship N Shore was observed by teachers. “The program was excellent, even with the changes. I just wish we could control the weather.” Coded responses to the pre-post student survey question “What words do you think of when you think about the Great Lakes?” showed an increase in the number of responses that it was ‘cold’ and also included negative responses that referenced the weather in their experience (e.g. hypothermia) that weren’t in the pre-trip survey.

Anecdotally, if a teacher’s group had excellent weather, there are comments requesting more time to enjoy sailing (“After our return our kids say they really enjoyed the experience. Some wanted more time on the boat and more time to just take in the experience of being on the boat and on the bay.”) Both of these teacher opinions suggest benefits to building flexibility in programming. Attracting volunteers may also be impacted by the sail length and weather concerns associated with them. To volunteer for ROV requires only a 3.25-hour commitment, including setup and tear down, and ez-up tents mitigate some weather discomfort. Volunteering for one Schoolship program requires a five-hour commitment, fully outdoors regardless of weather and sea conditions. With attrition rates of volunteers through a combination of COVID concerns and age of volunteer base, filling volunteer crew and instructor slots for programming is growing more difficult. Increasing program flexibility may positively impact volunteer instructor recruitment and change the required number of volunteers needed for a program overall.

Schoolship program length is also troublesome for staff; education staff in 2021 were involved in teaching most of the Schoolship and ROV programs, making them inaccessible to teachers, partners, and colleagues to pursue other opportunities and grow ISEA for nearly 25% of the year. Spring programming is particularly problematic as many summer partners have important needs that must be addressed, and staff cannot make time to do so if teaching aboard a ship >30 hours/week. Expanding programming year-round (see next section) will further increase the burden on staff and volunteers.

Beyond Schoolship and Other Land-Based Programs

ISEA is committed to expanding how participants are reached to foster curiosity, stewardship, and passion, which includes utilizing shoreside (and dockside) facilities across our campus. Some of these Beyond Schoolship programs, like the ROV programs, have several seasons from which to evaluate and draw experience from. These programs occur year-round and are not restricted in the same way our sailing programs are by seasonal changes in climate.



At the time of this writing, Beyond Schoolship is the term describing programming offered shoreside, namely our Remotely Operated Vehicle (ROV) program, as well as pilots of our Solar Boat program. The viewboxes program was not scheduled during 2021. ISEA staff also conducted a series of programs with SEEDs after school programs as part of the 21st Century Community Learning Centers grant-funded program. Future reports will include information about the year-round, land-based programming currently being planned for piloting in Winter, 2022. Early results from a teacher advisory survey (n=26, Dec, 2021) reports some teachers did not know Beyond Schoolship programs were an option and were interested in participating (see Appendix 2).

ROV Engineer and Explore and Solar Boat Programs

Nineteen (19) Beyond Schoolship programs were conducted on campus in 2021, reaching 396 participants, eighteen (18) of which were ROV and one (1) was a pilot Solar Boat program. Most ROV program attendees participated in one of two ways: through our 21st Century Grant partnership with SEEDs after school programs or to make their Schoolship experience a full day field experience. Our solitary solar boat program ran with a homeschool group who broadly support ISEA programming.

No notable modifications were made to any land-based programs due to COVID restrictions. Because all programming occurs above deck, in the spring out of an abundance of caution, masks were required, and masking requirements followed the established practices of the school in fall. During a significant portion of the season, ISEA's professional grade ROV was not operational. Despite this, the program was still uniformly successful, although occasionally the time allotted was not quite appropriate without the opportunity to drive the professional ROV. For younger groups, staff observed that the amount of time offered was appropriate, though the final challenge was rarely successful. Older groups were effective more quickly - the result was that, toward the end of the program, there was sometimes too much time remaining between modifying the ROV design and the final team game.

Minor modifications like starting with the easiest challenge and requiring teams to be successful before moving onto the next challenge, as well as pausing in the middle of the design phase to allow teams to present their ROV and discuss strengths and struggles faced were very well received and will continue to be incorporated into programs in 2022. Especially in a post-COVID classroom, social and emotional learning is stunted regardless of grade level. Some programs would run more effectively if team building activities were incorporated into the learning process, and team building facilitation training were provided to volunteers leading programming.

The Solar Boat program is in need of significant overhaul to be successful in the long term. On a sunny Fall day, solar panels were not strong enough to power the boat via electric motor through the trough. The hull design component was not scaffolded for individuals who are unfamiliar with how boats work, and modifying the hulls for the purpose of the program created significant plastic waste in the form of plastic shavings, which is at odds with our messaging and did not go unnoticed by participants. Finally, there were no benchmarks or challenges to overcome for those individuals not intrinsically motivated to build a solar boat, which, if they were in place, would have readily aligned the program with Michigan science standards. This program is being modified for pilot programming in 2022 (see Table 3).



ROV and Solar Boat Evaluation Summary

Feedback on our ROV and Solar Boat programs was low, though because ISEA does not have an evaluation system appropriate for multiple programs in a single trip, this may be expected. Anecdotally, teachers and chaperones were overheard discussing whether the ROV or the Schoolship program was the favorite, implying that both were well received. **Only one teacher feedback survey** on ISEA's ROV program was collected. The quantitative responses were universally positive, and open response feedback was "You did a great job this year putting together a program for students even with COVID restrictions. Thank you! It was easy!"

Only **seven post-trip responses from three schools were collected from ROV student participants**, and these were all generated from participants who did a full day Schoolship and ROV experience, thus post-trip evaluations reflect both the Schoolship and the ROV experience together. No responses were collected from the solar boat pilot program.

Somewhat disheartening, despite doing two programs using Lake Michigan as a classroom, **only 5 of the 7 respondents acknowledged having been on a Great Lake**, and after learning about many significant issues facing the Great Lakes (and some mentioning them in open response questions) **4 out of 7 respondents answered 'I don't know' to whether or not they could name any issues facing the Great Lakes**. Only one respondent mentioned aspects of the ROV program in their open response questions, though the response was nuanced and positive ("that building robots is super fun and we need to protect waters from microplastic and plankton and stuff that helps pollution in the Great Lakes.")

Overall, 4 of 7 respondents ranked the overall experience as 5 stars. Two gave a 3-star rating, and one gave a 1-star rating. This may be attributed to the mention of seasickness in the open responses.

Clearly, the current system of ROV evaluation is not beneficial and should be modified in 2022. There is also currently not an effective evaluation for experiences that involve two or more programs in a single visit, and this will need to be addressed as pilot programming moves forward.

Pilot Programming

Fall 2021 saw an increase in education staff at ISEA with the intention of preparing for piloting programming that will be offered year-round to further diversify our program options, impactfully reach a broader audience, and better utilizing our campus assets. The goal is to fill a 4-6 week block near the month of February each year with highly impactful overnight programming opportunities, reaching at least 50% underserved students (broadly defined as BIPOC and/or from Title 1 school districts).

In preparation for piloting programs, the following measures were taken: re-establishing the volunteer-populated education committee, soliciting teachers to join an advisory group to offer pilot program feedback, and administering a survey to that population to receive and process that feedback. A teacher packet for 2022 pilot programming was created and shared with advisory group teachers, inviting them to pilot programs with their students. The shifting from fully shipboard to our spring 2021 Ship N Shore delivery was also considered a pilot of the use of campus assets. Additionally, the shore-based components were expanded and taken into the classroom of an allied teacher for additional piloting of the experience.

Teacher advisory group feedback is detailed in Appendix 2, but one substantial portion of feedback was on the preferred format and content of our year-round programs. The 27 teachers who completed the survey were invited to bring their students to ISEA in February and March of 2022 to begin program piloting. At the time of this writing, **seven teachers are planning to bring their students to pilot six new or modified programs**



(Table 3). Two of these seven teachers have selected an overnight experience with three programs, allowing us to also experiment with evening activities and the logistics of overnight programming. While overnight programs were the most popular among our teachers (see Appendix 2), the logistics of an overnight experience during a global pandemic may have deterred some from choosing that option. Many teachers also reported that the February timing identified by ISEA was not preferred in their schedule, and the vast majority of pilot programs were requested in March or deferred until fall 2022.

Table 3. Pilot programs being designed for implementation in 2022

Program	Description	# Pilots Scheduled
Study the Stream (MS/HS)	Learn how streams carry runoff from the local watershed into the Great Lakes, then investigate the impact of physical properties of streams and their banks on water quality by measuring riparian zone characteristics and building a stream profile.	3
Dissect the Watershed	Collect and dissect native and invasive plants and animals (e.g. native cattail, native and invasive mussels, native and invasive crayfish, invasive round goby), and learn about the advantageous adaptations that allow invasives to outcompete native species.	2
Advanced ROV programming (MS/HS)	Build and operate an ROV outfitted with a camera and depth finder designed to a) (HS) find the depth of various locations in Suttons Bay to map underwater topography (bathymetry) or b) (MS) to find a message hidden on floating objects under the water/ice in Suttons Bay.	2
Boatyard Challenge	Learn how ships have been designed and engineered to meet challenges faced by scientists and sailors in Great Lakes history. Then, design a battery or solar-powered boat by upcycling single-use plastic objects in the style of 'Junkyard Wars' to navigate a series of challenges in a water trackway in our lab or outdoor classroom.	2
Navigate the Great Lakes	Learn how to use tools and charts necessary to navigate on the Great Lakes. Determine latitude with a sextant, use bathymetric maps and charts, chart a path through the Great Lakes, and navigate a course with a compass.	3
Groundwater: the 6th Great Lake	Explore the role groundwater plays in our Great Lakes watershed. Define and identify the water table, experiment with infiltration of water through various ground covers near the coastline, and explore the role of soil in groundwater systems.	2

A watershed investigation pilot was administered to MS-aged students at Northport Schools in May 2021. Two programs were delivered, modified from the shore-based components of the Ship N Shore program, and were well received per communication with the teacher. Input from this experience will be incorporated into planning the Spring 2022 pilot programs. Seven water conductivity investigations were conducted at SEEDS after school programs as a component of our 21st Century Learning Centers grant. These were not evaluated, but conversations with individual program leaders support their efficacy and most report an interest in continuing the relationship in future years. Considering these programs were all effectively delivered at the local school requesting programming, and the negative impact COVID-related staffing shortages have had on an already stressed bussing system, building programs that can be offered to schools at schools may be an



important way to maintain support from our local Schoolship teachers and to build new relationships with schools in the region.

Teacher Professional Developments

Teachers are a demographic that are reached through Schoolship and land-based year-round programs as a demographic served through marketing and implementation of programs for K-12 audiences. However, ISEA also identifies teachers as an audience served through professional development opportunities, support for classroom implementation of Great Lakes content and stewardship experiences, and as a resource for up-to-date science on Great Lakes issues. **Three (3) teacher professional developments supporting 54 educators** were held in 2021. Each was accompanied by individual and/or small group support conversations scheduled after the initial professional development was held. All educators received a scholarship to an ISEA experience for their classroom and access to a \$300 mini-grant to support stewardship actions by their students. This is an area ISEA will expand upon in 2022, continuing its successful Great Lakes Watershed Field Course (GLWFC) that invites teachers to the TMKBioS twice during a calendar year for professional development, and growing to accommodate the requests of GLWFC alumni and other teachers to offer additional watershed experiences.

Public Programming - Ticketed and Chartered Sailing Programs

Sailing Programs Overview

The majority of our sailing days are dedicated to providing subsidized programming for K-12 schools and groups when the season overlaps with the school year. As such, the summer sailing season is ISEA's primary opportunity to offer public, chartered, and partner programs in Suttons Bay and across the Great Lakes (Box 2). This season starts immediately after Spring Schoolship and continues through Labor Day weekend when we start Fall Schoolship, and encompasses nearly all of our public, university/college partner, and chartered sailing programs, with a few additional programs scattered on fall weekends. In 2021, the **summer season ran from June 14th to September 3rd (82 calendar days)**.

Box 2. Non-Schoolship Sailing Days on the *S/V Inland Seas*

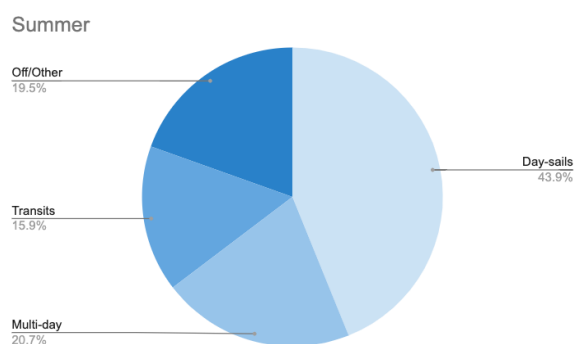
Day-sail - An up-to-one day sail trip for which we carried passengers, including both ticketed public and chartered sails.

Multi-Day - "Overnight" sail trip that included passengers staying overnight (either on the ship or shoreside), where the ship remained in service to that group for the entire duration of the multi-day trip.

Transit - Any days used to move the ship from one place to another that did not include paying passengers. Many transits were used by Crew-In-Training (CIT) volunteers to get more time aboard the ship without the pressure of programmatic operations.

Off - Days in which the ship had no operational duties. **Other** - maintenance, inspection, or training days.

Type	No. of Days Summer 2021
Day-Sails	36
Multi-Day	17
Transits	13
Off/ other	16
Total	82





The following is an overview of the types of public programs that were delivered in 2021, mostly in summer and fall. They include: Open Dock Tours, ISEA Public Ticketed Sails, and Educational Charters.

Open Dock Tours

In 2021, there were no single-day events of just dock tours. *S/V Inland Seas* hosted **four (4) separate “open dock tours”** during the summer lasting from one hour to two hours in Trenton, Detroit, and Houghton, reaching an estimated **262 people**.

ISEA Public ticketed sails

Reaching the general public audience is achieved primarily by hosting 2- and 3-hour themed sails out of Suttons Bay (and sometimes Traverse City) where people can browse dates and themes on our website then purchase tickets in advance, or day-of. Young People in STEM (YPIS) youth overnight trips were not offered in 2021 (nor in 2020) due to the ongoing logistical health and safety limitations posed by the COVID-19 pandemic. New in 2021, we offered an adult women’s (women-identifying) program that was resoundingly successful. In late summer/early fall ISEA hosted specialty-themed sails like Night Sails (stargazing and astronomy with local guest instructor, Dick Cookman) and relaxing Fall Color Sails.

In 2021, there were **29 day-sail public programs (14 days) reaching 647 participants, plus one (1) public adult overnight program (3 days, 9 participants)**. The number of public programs offered and **sail days reserved in 2021, at 17.8%, for public programs were in alignment with our strategic goals of 18%** of sail days. The average number of participants on these public sails was 22 people, which was below our internally-set, COVID-adapted capacity limits of 26 passengers in early summer, and 30 passengers by late summer. A total of five (5) public sails were cancelled in 2021: two for bad weather, three due to lack of ticket sales. In **30 evaluation responses from public sail participants, over 75% offered a 4 or 5 star rating** of their experience (see Appendix 1 for guest reviews and additional feedback).

Educational Charters

Organizations, groups, and individuals might charter with ISEA looking for a unique learning experience for their group, or for their community. Some groups book a program we already offer, while other groups want a completely customized experience. Most often these partners are booking with an organized group in mind (e.g. a camp, scout troop, or club), but a few partners book us so that members of their community can have an on-the-water experience (i.e. they charter us, but the public buys tickets). **In 2021, ISEA hosted 22 educational charter programs reaching 506 participants** (excludes educational charters booked by a college or university, see next section), **this includes one (1) youth overnight program (5 days)**.

Our goal for 2022 and beyond, is working towards having a menu of ready-made program options for charters to help potential clients visualize ways in which our ship can meet their needs. This will allow staff to focus their attention on customizing experiences only when the charter dictates, whether because of learning needs, custom content ideas, or unique location. This shifts the burden of recreating an experience with every charter, every sail, every year, a process which complicates staffing these sails.

University and College Outreach Partner Programs

A special audience to highlight are the colleges and universities that ISEA hopes to grow and strengthen relationships with in the years to come. While most of the engagement with these audiences is through charters



of our ship to reach their own outreach or educational goals, by articulating the variety of ways this engagement happens we will be able to assess how best to recruit new partners, ensure the mission of partner organizations align with ISEA, and build additional opportunities for higher level research and outreach opportunities facilitated by ISEA.

There are three broad ways in which ISEA currently engages with colleges and universities:

- 1) **Hosted Instructional Platform:** Partners utilize our facilities, usually the ship, as a field-based platform from which to deliver their own course content. Some of our on-going university partnerships have engaged in this way for several seasons now. In 2021 ISEA hosted **nine (9) instructional charters reaching 173 participants; this includes two (2) multi-day programs (6 days total), with an associated two (2) nights of dormitory use.** Partners in this category include: University of Michigan, Michigan State University Extension, Western UP MiSTEM network, and Michigan Technological University.
- 2) **Partnered Content Delivery:** Higher-education partners hold access to expert and local knowledge, and can supply “guest” instructors during an otherwise “normal” ISEA program. ISEA therefore is a platform by which that partner can share their knowledge and reach their outreach goals, which enhances our overall programming content. In 2021 **four (4) enhanced programs were delivered with guest instructors, reaching 77 participants.** Partners in this category include: University of Michigan’s Detroit River Story Lab and Central UP MiSTEM network.
- 3) **Outreach Program for University-Targeted Audience:** Partners have a specific audience in mind and request ISEA to deliver one of our programs. The audience is typically either college students or a younger, pre-college outreach demographic. These programs are often delivered in conjunction with other events and activities hosted by the partner organization as part of a larger on-going educational series. In 2021, **eight (8) outreach program charters were conducted reaching 102 participants, which includes one (1) multi-day youth program (4 days).** Partners in this category include: Wildland Studies, Central UP MiSTEM network, Michigan Technological University’s Summer Youth Program, Michigan State University Extension, and Lake Superior State University.

Charters for partner/private audiences

A small but important type of charter for ISEA are Non-instructional Charters for Partner Audiences. Partners charter the ship for celebration or fundraising-style events that include guest-list only passengers (therefore are not public). While these do not deliver any program content per-se, these types of sails act as a way to let our partners showcase their work, relax on the water, and provide a break in program delivery for ISEA staff. In 2021 ISEA hosted **ten (10) non-instructional charter sails reaching 197 participants**, and dedicated two sail days to the audience.



Evaluating Charters

Youth overnight programming does include gathering feedback from participants via a pre- and post-trip paper survey. This is conducted for all youth overnight experiences whether public or chartered (see Appendix 1, Figures 10, 11). Beyond this, ISEA does not currently have a formal system in place to solicit feedback from our charter clients, nor from the participants on those sails. Informally, charter clients may sometimes reach out to us afterwards to give feedback, or to set up a meeting to discuss the experience. Collecting basic participant feedback (“rate your experience from 1 to 5”) as well as creating a process for feedback from our charter clients, especially those partners identified in our strategic plan, will be a priority for 2022.

Volunteers, Members, and Donors

Volunteers are, in some ways, our most impactful audience. ISEA utilizes around 10,000 hours of volunteer time annually and cannot run without these important contributions. That said, we grow and engage our volunteers to be some of the most curious and passionate stewards of the Great Lakes through their work with us. The time spent aboard *S/V Inland Seas* training these members is therefore also meeting the needs of a crucial audience. Our members and donors are also critical to our success as an organization, many retiring from active volunteerism due to health or other constraints. ISEA recognizes their contribution with special appreciation sails for members, donors, and volunteers, which also serves to shift them toward more active stewardship. **There were three (3) appreciation sails that reached 74 participants in 2021. In 2021, eight (8) shipboard events were hosted for volunteer training** (including maintenance and Coast Guard inspection days), **as well as 12 days during summer transits** when ISEA maximizes programmatic and training time by supporting volunteer crew members on their skill development en route to the next port. In sum, **25 days of the 2021 sailing season** were utilized in this way.

Thomas M. Kelly Biological Station Use

A capital campaign in 2018 allowed remodeling of the TMKBioS, including dorm-style lodging and common space for up to 40 individuals, a renovated lab facility, and an updated exhibit hall. Future plans include modifying our outdoor classroom for 4-season use and storage of year-round program equipment. At time of writing, the lab is not yet renovated and no data has been collected on use of the exhibit space. However, one scheduled program with regional ally Norte was held in the exhibit space for 11 participants (Table 1).

Dormitory Usage

In 2021, the dormitory space was utilized by a variety of stakeholders: ISEA volunteers, researchers, K-16 groups, and ISEA and other regional interns. Groups participating in ISEA programming reaped the benefit of affordable housing, allowing them to participate in our programs when they otherwise might not be able to do so. For volunteers, researchers, and interns, the dorm acts as subsidized housing for their efforts. Both ISEA and other regional program interns stayed in ISEA dorms in 2021. Table 5 shows the number of groups or individuals who were issued a contract for dorm use, the number of rooms used per group per visit, and the total number of lodging nights (individuals lodged x number of nights lodged). Fifteen groups or individuals were housed for a total of 627 lodging nights and impacting 130 individuals. The variety of groups utilizing ISEA dormitory space and the varied metrics used to quantify their use (e.g. by room, by # nights/individual, by group, etc.) suggests that a standardized method of quantification will need to be considered in the 2022 Education Evaluation Report. Further, current dormitory contracts are issued by rooms and not individuals, impacting the ability to



quantify the total number of people impacted by access to housing. Numbers in Table 5 were tallied using ship manifests and may not indicate actual occupancy. For instance, women from Champion Local Schools stayed in our dorms, but not all names on the ship manifest were overtly gendered and chaperone distribution is unknown, therefore those numbers are estimates of occupancy.

Table 5. Dorm Use, 2021

Individually Scheduled Groups by Audience Type	# Days Stayed	# Rooms Used	# People Housed	#Evenings Lodged/person (Days*People)
Volunteer	11	1	1	11
Volunteer	8	1	1	8
Volunteer	1	1	1	1
Volunteer	1	1	1	1
Volunteer	1	1	1	1
Volunteer Use	22	5	5	22
ISEA Marketing Intern	68	1	1	68
Fishtown Intern	77	1	1	77
Education Intern	8	1	1	8
U of M Intern Cohort	61	4	4	244
Individual Researcher	9	1	1	9
Housing	163	8	8	406
U of M Biological Station	1	2	15 (est)	15
U of M Biological Station	1	2	11	11
Lakeshore HS	1	5	32	32
GLWFC	3	5	23	69
Champion Local HS	2	4	36 (est)	72
Program Groups	8	18	117	199
TOTALS	251 Days Stayed	31 Rooms	130 People Housed	627 Evenings of Lodging

Building Relationships and Marketing Programs

Recruiting a diverse audience for ISEA programming as it expands is an important component of the sustainability of the organization. Due to cancellations and shifts online, many traditional recruitment avenues were unavailable for use in 2021. Table 6 shows the current conferences attended, in part, as a recruitment opportunity for ISEA experiences for K-12 and teacher audiences.



Programmatic growth also relies on the networking in discipline-based education research groups. ISEA had representation at the short courses and webinar series listed in Table 7. Participation in these programs builds the rapport of ISEA and allows for both networking and staff professional development to occur. Quantifying the time spent building these relationships with the goal of growing ISEA partnerships will need to be considered in order to evaluate some aspects of ISEA 2026 strategic goals.

Table 6. Conference attendance in 2021

Conference	Attended in 2021?	Relevant Sessions or Committee Work	Virtual/InPerson/Cancelled
MAEOE	yes	Justice, Equity, Diversity, and Inclusion committee member	In Person
AEE	yes	n/a	virtual
STEAM Alliance monthly calls	yes	STEM	virtual
MakerFest	no	STEM	virtual
Tall Ship Conference	yes	Social Committee	virtual
M.A.N.S.	no	n/a	cancelled
MSTA	no	n/a	cancelled
Rouge River Water Festival	yes	n/a	virtual
Freshwater Summit	yes	n/a	virtual
Great Lakes Science Vessel mtg	yes	n/a	virtual
GLSI Place-Based Education Conference	no	Former hub	cancelled
Earth Educators Rendezvous	yes	Presented non-ISEA work	virtual

Table 7. Networking group participation in 2021

Group	Relevant Content	Host Organization
MiRCLE- Michigan Resources on Climate and Land Change Education	Climate change and land use in the Great Lakes	Grand Valley State University
Disciplinary Literacy and place-based education short course	Science literacy, place-based education	Center for Education Design, Evaluation, and Research, U of M
On Belonging in Outdoor Spaces webinar series	DEI	On Belonging Task Force - multiple host orgs
Earth Force webinar series	Stewardship action	Earth Force



Summary

Considering the limitations to programming brought by a continued global pandemic, 2021 was an excellent year. Many schools are still experiencing field trip limitations, a lack of substitute teachers, and bus driver shortages, which will continue to impact ISEA's ability to populate the Schoolship programs. However, the enhanced focus on building partnerships and administering summer programs at away ports nearly doubled the number of programs and people reached by ISEA and helped to ensure program longevity in a tumultuous time.

Revising the evaluation report to establish a baseline and monitor the implementation of ISEA's strategic plan has highlighted a number of places where actual evaluation metrics are lacking (e.g. dorm and campus use, participant feedback on public, partner, and charter programming, and revising feedback structures for K-12 Schoolship and land-based programs for participants and group leaders), and offers opportunity for growth.

Schools are still emerging from pandemic protocols and have not returned to normal field trip activity. This does not reflect negatively on our current recruitment plans, but should inform our future plans. For example, the 2022 sailing season now plans to return to Detroit the last week in October to better serve identified audiences and mitigate the ongoing bussing concerns shared by teachers. Many long-allied teachers may have or soon retire without a plan for passing on the ISEA trip to their successors, and some COVID-era impediments to establishing a field trip experience may become additional barriers to recruiting new schools for the foreseeable future. Adding land-based, year-round programming brings marketing considerations and outlines the need for new relationships with other non-formal learning communities like Boy Scouts, robotics teams, and other groups that have more flexibility to navigate COVID-related hurdles.

2021 was an amazing year of recovery for ISEA educational programs, bolstered by the hard work and flexibility of ISEA education staff and volunteers. COVID will continue to impact programming in 2022 and perhaps beyond, and ISEA appears well poised to continue to respond with modifications that allow effective authentic learning experiences to occur for participants.



Appendix 1. Program Survey Responses

ISEA Program Evaluation - Efficacy and Impact

Our current evaluation model affords us the opportunity to assess the efficacy of our program content and logistics. In Schoolship Programs both students and teachers are surveyed, and participants receiving scholarships are required to submit pre- and post-trip surveys. In Public Programs paying participants are incentivized to offer feedback with free merchandise and sailing opportunities. In partnership programming, debriefs between ISEA's STEM and Program Coordinators with program organizer(s) act as summative assessment and formative planning for the following season. These evaluation summaries will appear in the sections in which they are relevant to strategic planning goals.

Program Type	Impact	Reasoning
Multi-Day Programming	Very High	Spending significant hours in low participant/staff ratio allows each participant time to cultivate a deep and meaningful connection to our programming and the Great Lakes
Volunteer Development	Very High	Our outward facing program goals seek to reach participants outside of our volunteer pool, however offering training, development, and opportunities for growth for our volunteers builds their curiosity, stewardship, and passion, thus making a very high impact
Schoolship Programming (K-12 school programs aboard <i>Inland Seas</i>)	High	Our Schoolship programming asks participants to engage in authentic science inquiry while giving them an unforgettable experience aboard a traditional schooner, inspiring curiosity, stewardship, and passion, while providing our volunteers opportunities to act as Great Lakes stewards
Overnight Year-Round Experiences	Very High	Expanded programming on shore allows us the opportunity to share multiple learning experiences with a group of students, and gives them informal time to talk about their experiences in a unique, ship-inspired dorm setting where social and emotional learning also takes place
Teacher Professional Developments	Very High	Spending significant hours with a smaller number of teachers reaches all of their classrooms for multiple years while building a relationship between ISEA and that school that may result in additional Schoolship or Shoreside programming
Public Programming	High	Our traditional 2-3 hour sailing experience offers an opportunity for participants to cultivate curiosity about and passion for the Great Lakes, and inspiring them to act as stewards, while providing our volunteers opportunities to act as Great Lakes stewards
Day Sail Programming (Partner and Chartered)	Varied; Medium to High	Varying by the mission of chartering organization providing the bulk of the programmatic content, these programs offer <i>Inland Seas</i> as a vessel upon which a connection to and learning about the Great Lakes can occur; gives staff and volunteers development opportunities
½ to Full Day Year-Round Programs (K-12 programming on shore near ISEA vessels or campus)	Medium to High	We provide high quality learning experiences that occur in the Great Lakes watershed, sometimes on the beach or dock adjacent a Great Lake, but the experience is less impactful because its location is less unique than a traditional tall ship
Tall Ships Sails and Dock Tours	Low	While these opportunities expose a significant number of participants to <i>Inland Seas</i> and, through that, the Great Lakes, the lack of programmatic content means the impact we have on those individuals is minimal

Table 1. ISEA Perception of Program Impact



Impact of programming in informal environments is notoriously [difficult to assess](#), as short-term gains in terms of attitude and affect, as well as skills acquisition, are not tracked longitudinally by informal learning centers. Past education evaluation reports have correlated positive content gains with impact, but this does not report the impact of positive affect, feelings towards science, and other long-term gains. However, based on our anecdotal observations and comments from participants, we've established a qualitative hierarchy of impact for our sailing programs, and strategic planning goals have been established to ensure ISEA is providing a diversely impactful suite of programs. Please consider impact descriptions in Table 1 when reflecting on past and future evaluation reports.

Comparing Programs Delivered to Past Years

In past years, evaluation metrics have been scaled using the number of programs, not the current strategic planning benchmark of sailing days. As we move forward with expanding shoreside and partner programs, it may prove valuable to examine % of programs, % of participants, and % of sailing days to assess shipboard programming impact and make comparisons with year-round, shoreside programs. All are provided for 2021 (see *executive summary*) in order to establish a baseline for future comparison.

Quantitatively, establishing a 2021 baseline for *S/V Inland Seas* use by audience type during the sailing season is an important step. Sail days and program numbers from years prior to COVID are not a reasonable indicator of success as we emerge from an ongoing pandemic. In 2021, **nearly 4,000 people** were impacted by **184 ISEA programs**, down from the last comparable year (2018) of nearly 6,000 people in 236 programs. This is a notable drop in ISEA reach. Yet this, as well as **offering programs on 107 of the idealized 140 sail days** during a global pandemic, is laudable and shows the effectiveness of program partners to fill gaps when Schoolship programming wanes and speaks to ISEA's organizational stability. This is an excellent baseline from which to grow.

Participant Evaluations

Evaluation forms were solicited from all students, teachers, and public sail participants. Schoolship programming is evaluated in multiple ways: student survey responses pre- and post- trip, teacher survey responses post- trip, and through volunteer feedback (addressed in volunteer evaluation report). Schoolship scholarship attendees were required to complete evaluations as a component of fund release. Those who attended our programming as participants (students and public) and filled out an evaluation form were asked to rate their experience (Fig. 1, 2). Students and public overwhelmingly offered positive ratings. Over 75% of students and over 90% of public participants rated their experience as 4 or 5 stars. Student experiences occur primarily in shoulder seasons when the weather is less favorable, which might impact their opinion of the experience.



Overall Trip Rating by Students (n=248)

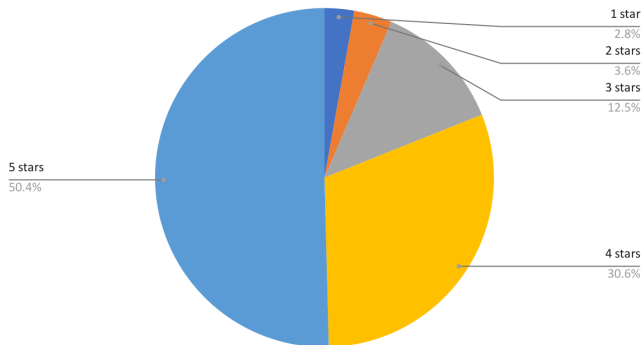


Figure 1. Overall trip rating by students

Overall Experience Rating by Public (n=30)

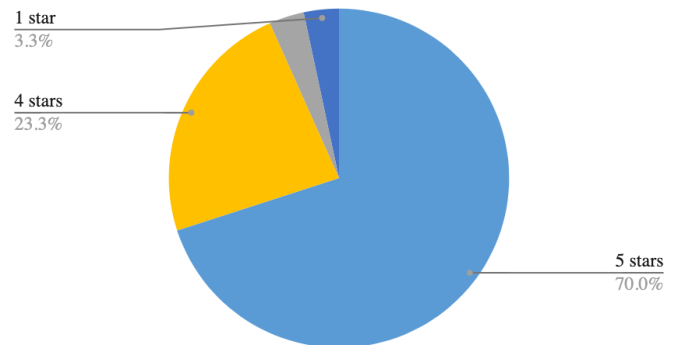
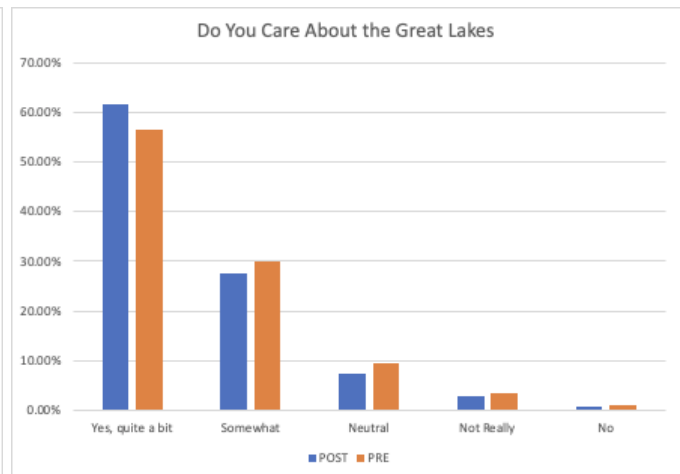
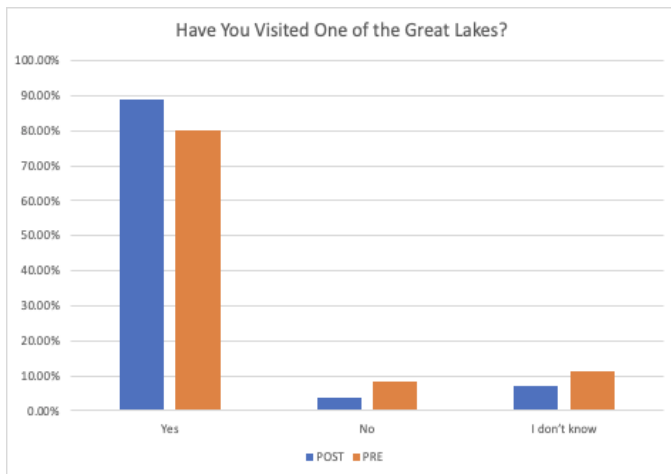


Figure 2. Overall trip rating by public audiences

Student Schoolship and Beyond Schoolship Evaluation Responses

Students were asked to respond to a series of questions with the goal of ascertaining the degree to which Great Lakes content knowledge and affect about science, the Great Lakes, and stewardship were improved upon as a result of participation in an ISEA program. Figures 3 and 4 show student perceptions and experiences on the Great Lakes. Post-trip responses (in blue) show an increase in student awareness that they had visited a Great Lake and made a connection on their trip. Unfortunately, despite using the Great Lakes as a classroom for their ISEA experience, some students indicated that they had not, or did not know if they had, visited a Great Lake.



Figures 3 and 4. Student responses to 'Have you visited one of the Great Lakes' and 'Do you care about the Great Lakes before and after an ISEA experience on the Great Lakes

The proportion of students who cared 'quite a bit' about the Great Lakes increased after an experience with ISEA to over 60% of respondents. It is unclear from this survey if other students shifted in their concern for the Great Lakes (e.g. from neutral to somewhat) because fewer individuals completed the post-trip evaluation and answers cannot be individually traced from pre- to post- trip responses.



Post-Trip Response to "Are the Great Lakes healthy?"

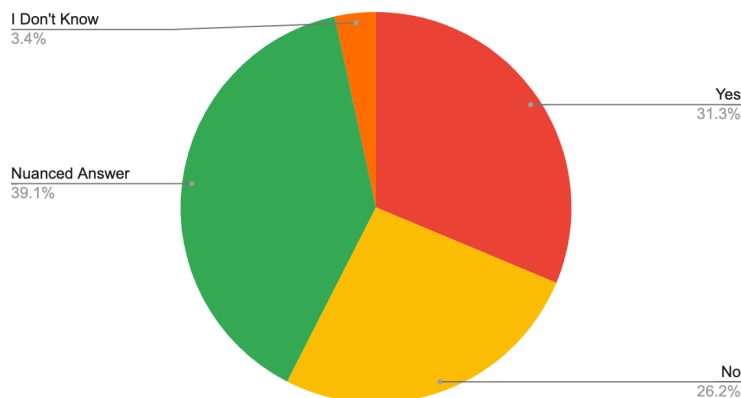


Figure 5. Post-Trip student responses to 'Are the Great Lakes healthy?'

Students were given space to write a short response to the question 'Are the Great Lakes healthy?' after their ISEA experience (Fig. 5). Responses were coded as 'Yes' if the response indicated that their observation showed the Great Lakes were broadly in good condition, 'No' if the response indicated that the Great Lakes were polluted or otherwise exhibiting signs of distress, and 'Nuanced Answer' if the response indicated that some observations made during their experience suggested a healthy ecosystem and other observations indicated an unhealthy ecosystem. Context and nuance are important factors in science literacy and comprehension, and that the majority of responses were nuanced (39%) supports the efficacy of Schoolship programming in facilitating the next generation of Great Lakes scientists and stewards.

Students were also invited to answer the question 'What words come to mind when you think about the Great Lakes?' before and after participating in an ISEA experience.' Student responses were coded with tags designed to highlight changes in student affect and content competency (Figure 6). Descriptive words were the most commonly used in both pre- and post-trip surveys (e.g pretty, blue, big). Some listed the organisms that live and use the Great Lakes to live (fish, plants). Recreation activities (fishing, swimming) or emotional connections students have to the Great Lakes (my grandma's cabin, calming, peaceful) were also prominent answers in both pre- and post-trip surveys.

Notable shifts in responses include a decrease in listing points of interest (sand dunes, Mackinac Bridge) and recreation activities on the Great Lakes for a broad, generally evenly distributed increase in content-related words like invasive species, plankton, and words related to science (e.g. secci, food web). Student gains in knowledge about microscopic life in the Great Lakes (Plankton-'ish') reflect anecdotal evidence that the plankton station is one of the most impactful parts of our Schoolship program and offer support for incorporating this station regardless of the sailing program we are facilitating.

It is especially heartening to see so many responses that reflect student understanding of the value of the Great Lakes as a natural resource both in the pre-and post-trip, and may be an area for us to consider implicitly testing in future surveys. This is an important concept in Michigan's science standards and is an integral perspective to cultivate stewards of the Great Lakes.



Pre% and Post% Responses to "What Words Come To Mind When You Think About the Great Lakes?"

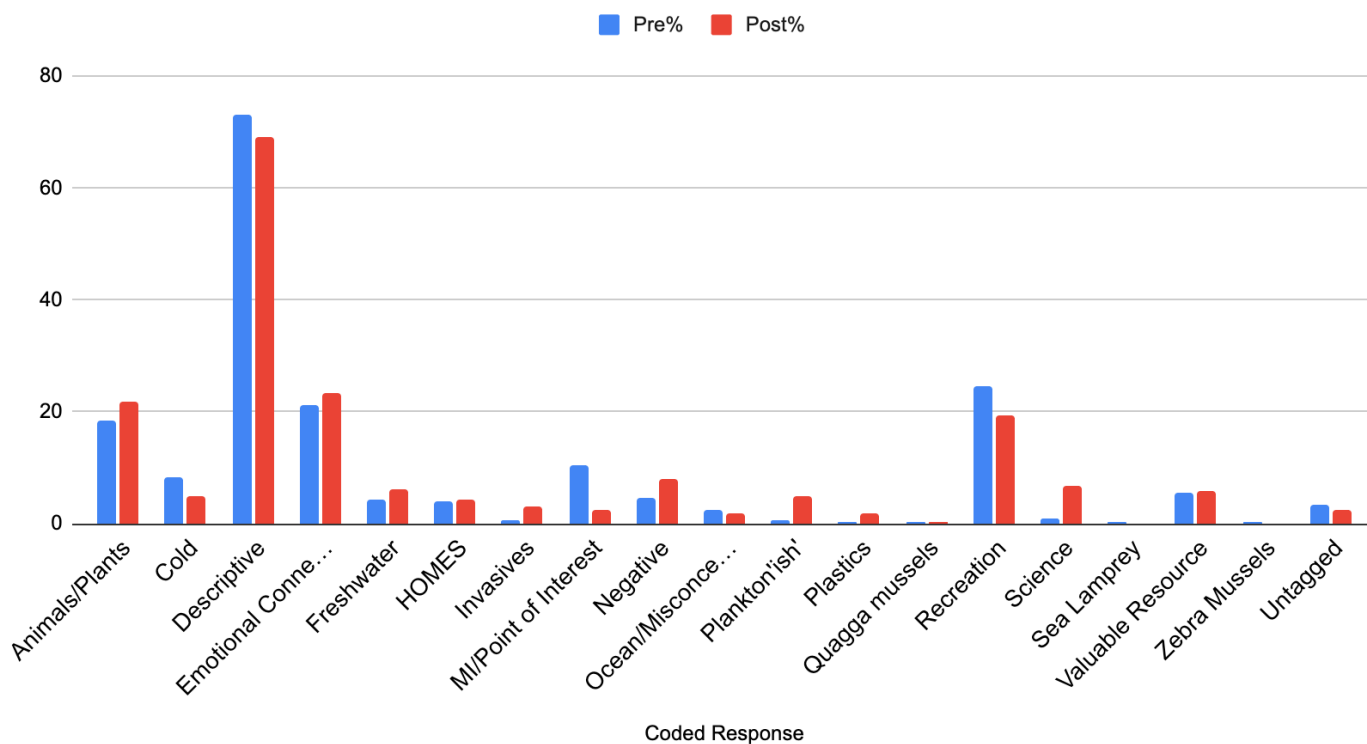


Figure 6. Pre- and post-trip responses to the question 'What words do you think of when you think about the Great Lakes?'. Notice decrease in generally descriptive words that correspond with specific terms used in post-survey, distributed among other tags and tags established for post survey (e.g. benthos, trout, gobies; not pictured). Also note the increase in negative terms (e.g. hypothermia, sick, dirty) in post-trip.

Teacher Schoolship and Beyond Schoolship Evaluation Responses

Sixteen teachers provided responses to the 2021 ISEA teacher evaluation survey. 48 Schoolship experiences and 19 ROV experiences were offered for a total of 67 experiences available for teacher evaluation in 2021. While some groups participated in both programs, or had the same teacher lead multiple classrooms, a **response rate of 21%** makes it difficult for significant assessment of program impact to occur. Paths like regular interaction with a teacher advisory group should be considered to supplement program evaluation in the future.

Teachers were asked about their perceived impacts of ISEA programming on their students (Fig. 7). Most strongly agreed that their students' interest in science and the Great Lakes ecosystem increased as a result of ISEA programming. Nearly 80% of teachers reported feeling inspired to learn and act as stewards of the Great Lakes as a result of bringing their students to ISEA.

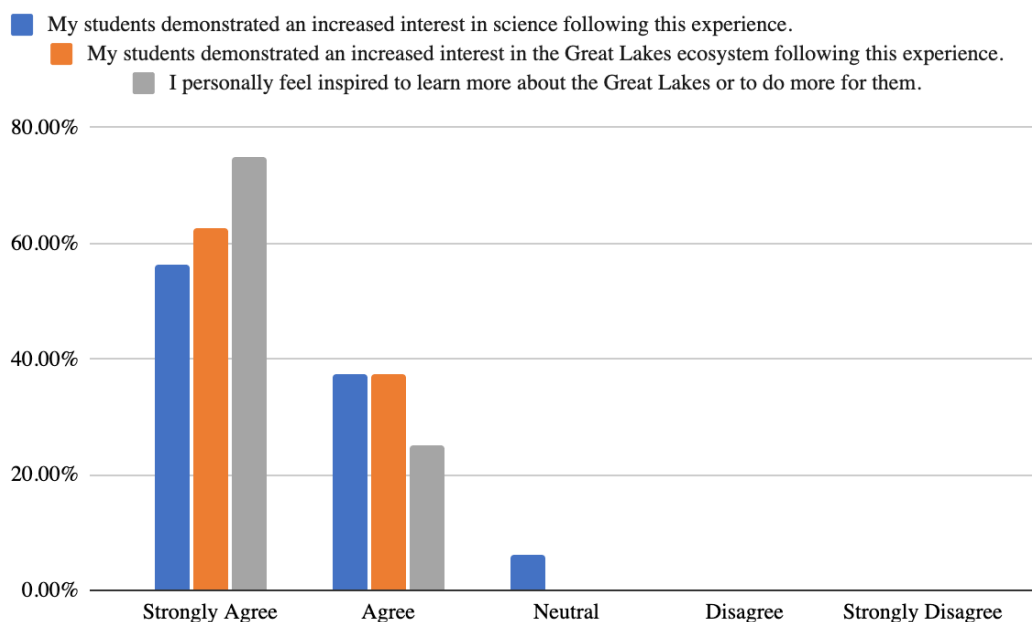


Figure 7. Post-trip teacher responses to questions about perceived student impact as a result of an ISEA experience

Teachers were also asked about the logistics surrounding their ISEA trip (Fig. 8). Universally, all respondents agreed or strongly agreed that the logistics, safety, and overall experience were in alignment with their expectations. Areas where teachers agreed, but did not strongly agree, indicate room for improvement.

Trip Experience, Teacher Survey 2021 (n=16)

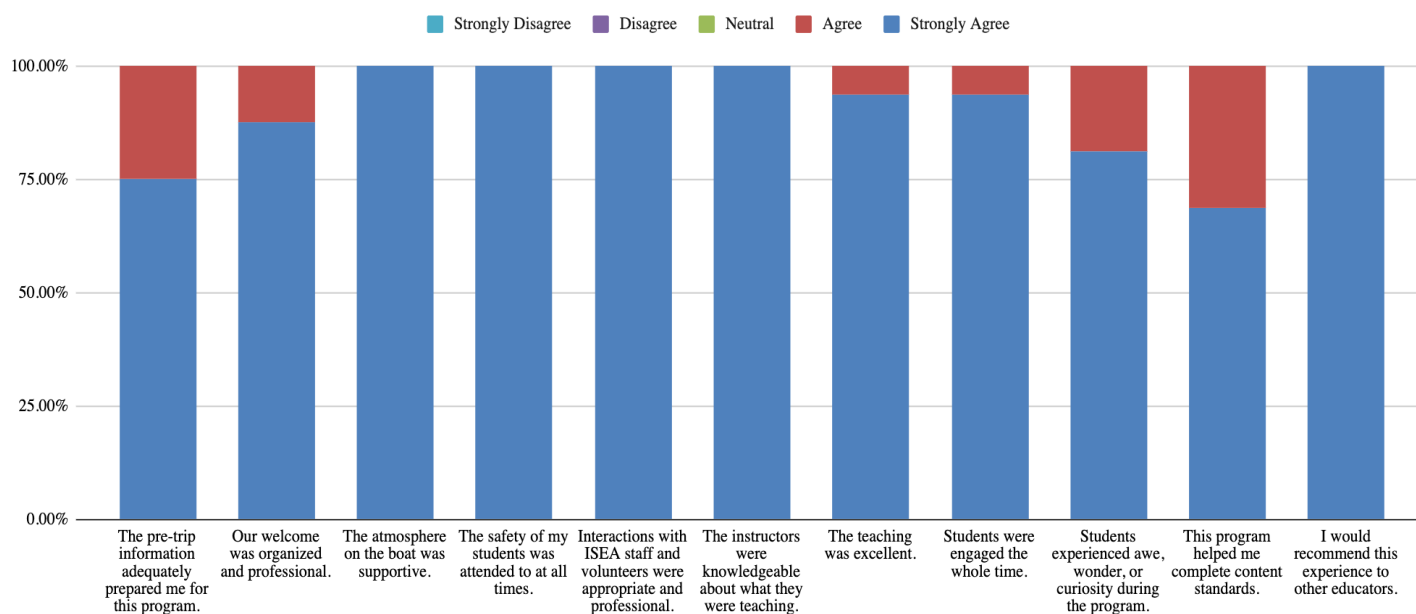


Figure 8. Teacher responses to logistics, safety, and facilitation quality of their ISEA experience

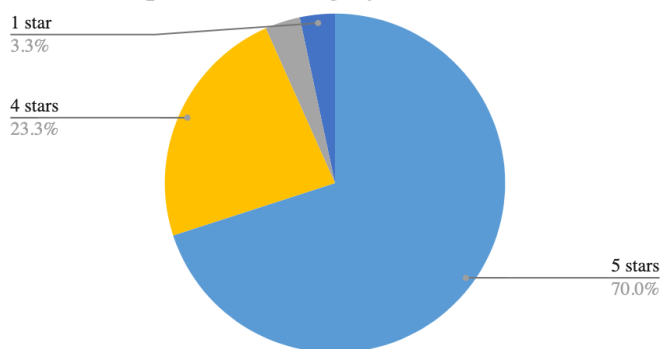


Areas ISEA could most improve upon include providing a more sound pre-trip experience and improving connections to content standards in their classrooms. Additional areas of growth include the welcome and facilitator interactions to promote engagement, wonder, and curiosity throughout the program. Of course, these areas were also highly ranked - our volunteer and staff teaching, as well as our overall experience, meet teacher standards.

Public Sails Survey Responses

In 2021, there were **29 day-sail public programs (14 days) reaching 647 participants, plus one (1) public adult overnight program (3 days, 9 participants)**. The average number of participants on these public sails was 22 people, which was below our internally-set COVID-adapted capacity limits of 26 passengers in early summer, and 30 passengers by late summer.

Overall Experience Rating by Public (n=30)



We had 30 participants respond to an after-sail survey (given via email to whomever booked the tickets), for which the average overall rating was **4.5 out of 5** (Fig. 9). Remarks and responses given were overwhelmingly positive: Most stated they would highly recommend the experience to others, that the knowledge and passion displayed by ISEA staff and volunteers, as well as the balance of “learning” to “fun” was high.

Figure 9: Responses to the question, “How would you rate your overall experience (5 high, 1 low)?”

General feedback from public sails:

“We had fun learning about plankton, fish and native species to the Great Lakes. It was hot but we appreciated the overhead shade for our ride. Recommendations for young kids: bring water! While there was some onboard but it was served out of a strange container. Pack a dry snack due to the length. The ride was long for my kids. [Don’t] go below deck if your sensitive to motion. We were shown a video. Overall fun experience on the Great Lakes!” - GLDS participant

“We enjoyed it all and were really impressed by the way the staff incorporated the children in the learning and tasks. Sometimes it was hard to hear the people talking to the entire group as it was windy that day.” - Fishes of Lake MI participant

“What a wonderful way to spend 2 hours! A great sail, expert instruction, and great people. We Love ISEA.” -Steady the Ship participant

“Great interaction between crew, staff and passengers. Good hands-on experiences. Very professional and knowledgeable staff. They are good at what they do and seem to love it.” - GLDS participant

Youth Overnight Trips - Summary of Survey Responses

In 2021, two (2) programs were conducted as overnight trips aboard *S/V Inland Seas*, reaching 15 participants. Both trips were chartered programs: one for a 3-day/2-night research-based experience from Houghton to Marquette, conducted as we would a YPIS program and included one adult counselor; the other for



a 5-day/4-night experiential immersion trip, i.e. not conducted as a YPIS, from Mackinaw City to Suttons Bay. All participants completed two surveys, one before and one after the trip (Fig.10). This process is integrated into the program itself, therefore the response rate is always 100%. Two multi-part question blocks in particular are asked both before and after as a way to measure any changes in perception, knowledge, and attitudes towards science, sailing, and the Great Lakes.

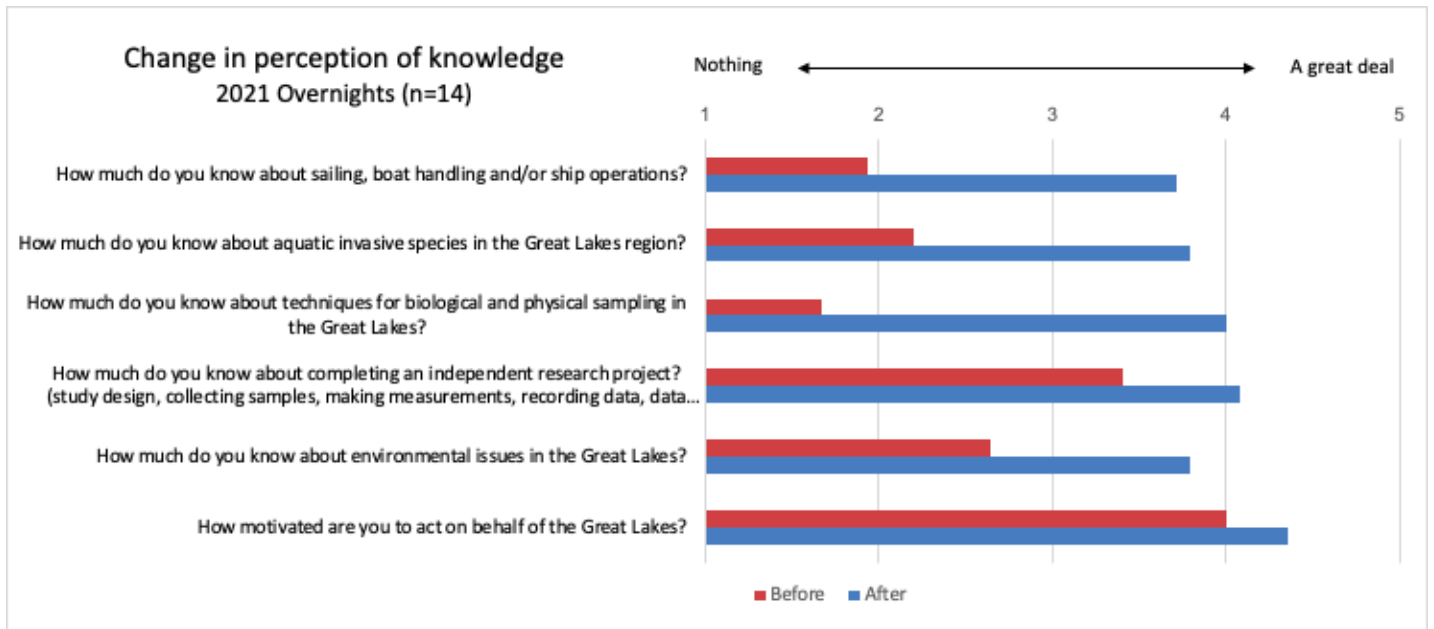


Figure 10: Before/after self assessment of knowledge for 2021 youth overnight participants from two separate trips, weighted averages, n=14.

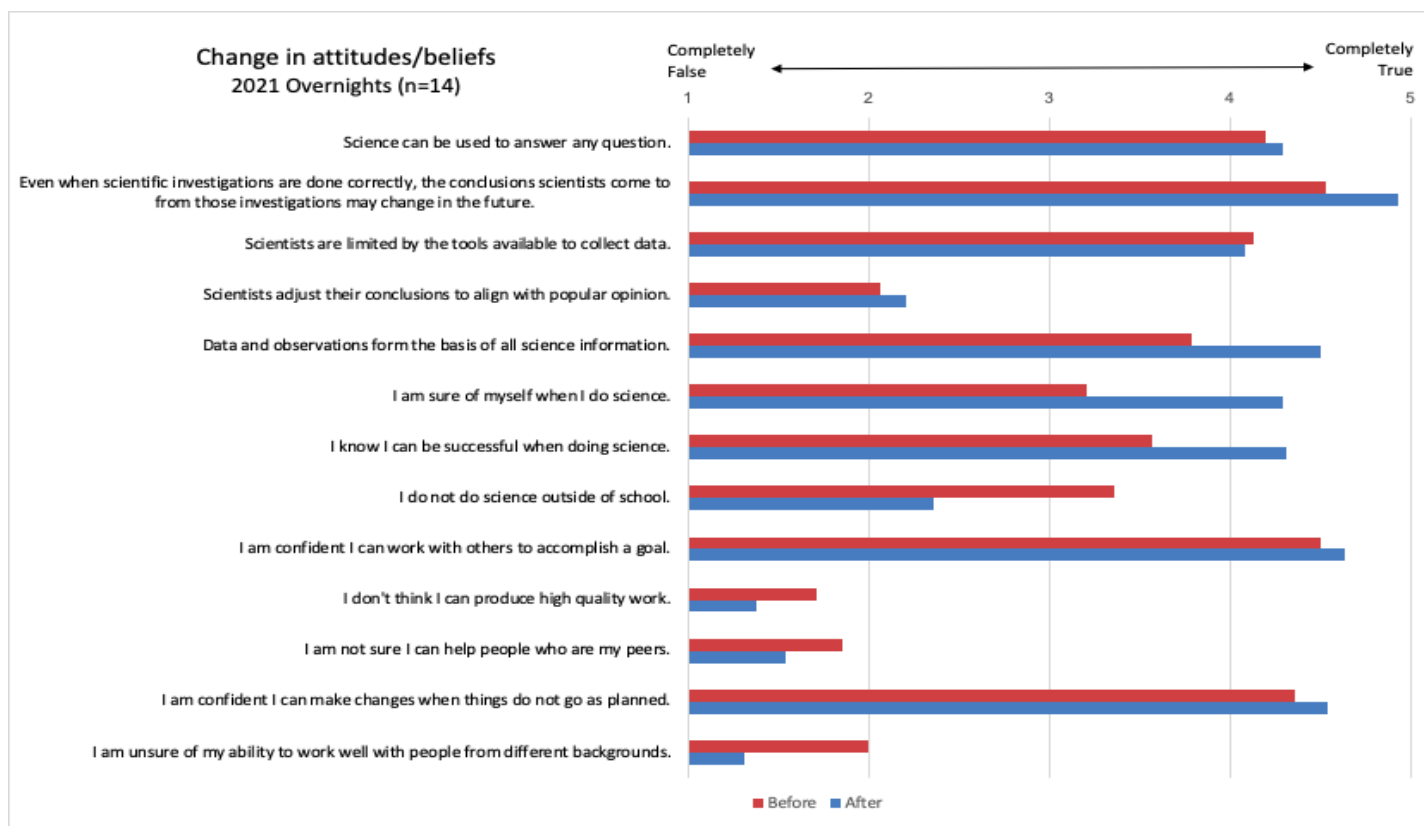


Figure 11: Before/after self assessment of attitudes/beliefs for 2021 youth overnight participants from two separate trips, weighted averages, n=14.

All overnight participants showed positive gains in skills, knowledge, and confidence after the program. The largest gains in knowledge (self-assessment of knowledge) came with using and operating tangible objects related to both the ship itself and the science equipment used to investigate the lakes. The smallest gain was in motivation to act on behalf of the Great Lakes, however this was overwhelmingly self-described as “high” beforehand anyways (Fig 10). The largest positive shifts in attitudes relate to confidence in doing science and working with other people, as well as beliefs about the scientific process. The smallest shifts relate to beliefs about what scientists can do with the tools they have and the conclusions they can make (Fig. 11). Gains in self-confidence, camaraderie or inclusion, leadership and responsibility, even more so than learning new skills and concepts, are the elements that continue to make our multi-day immersion programs highly impactful. When asked to rate parts of the trip, 1 - *not at all* to 5 - *very much*: all respondents gave a “5-very much” for “Did you have fun on the trip?”. When asked if they would recommend this experience to others, all respondents gave a 4 or 5 rating.



Appendix 2. Results from Fall, 2021 Teacher Advisory Group Survey

Establishing a teacher advisory group to support implementation of ISEA's year-round programming and other strategically relevant changes was an important first step in the process, especially considering the limited number of teacher survey responses received (16 in 2021). Building rapport with a subset of valued teachers from targeted demographics allows ISEA staff to request and receive honest feedback about program changes.

Select teachers with longstanding relationships to ISEA were identified and invited to participate, as were new teachers from school districts populated with under-represented students who have shown interest in beginning a relationship with ISEA. The survey administered was part of an invitation to pilot programs - once the survey was completed, the teachers were given a teacher planning packet to attend pilot programs free of charge in February or March of 2022. In sum, over forty teachers were contacted, of which 26 responded. Feedback was solicited in three categories: demographics of program participants, feedback on current programming, and input on design of future programs.

Classroom Demographics of Teachers Surveyed

A total of 26 survey responses were collected. Of them, three quarters of respondents were past participants with ISEA (Fig. 1), and most had done either a Next Gen or Diving Deeper sailing program in the past (Fig. 2). The bulk of respondents teach in high school classrooms, though middle school and elementary school teachers also responded (Fig. 3).

Because of ISEA's goal to reach 50% underserved student populations during the piloting of year-round programs, teachers were asked to self-report the percentage of free/reduced lunch students at their schools, both in the survey and again when they registered for a pilot program (Fig. X). Schools with at least 60% free/reduced lunch populations are 'Title 1' schools and therefore important audiences to reach with subsidized programming like the pilots being offered in 2022.

Past ISEA Participant?

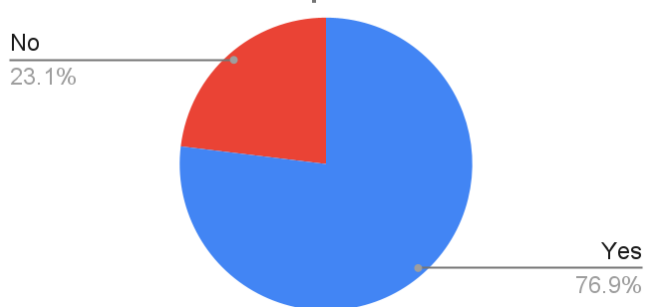


Figure 1. Familiarity of respondents to ISEA

Which Programs Survey Responden...

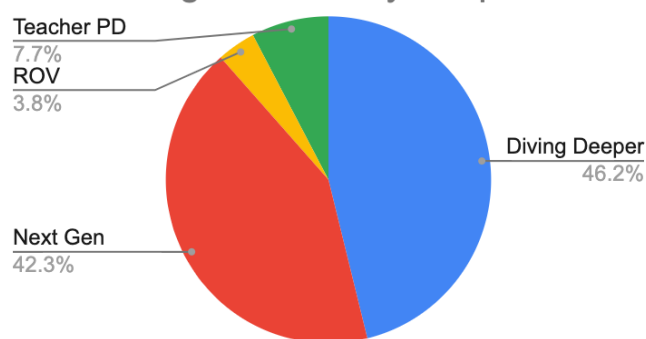


Figure 2. Type of ISEA program attended



Grades Taught by Survey Participants

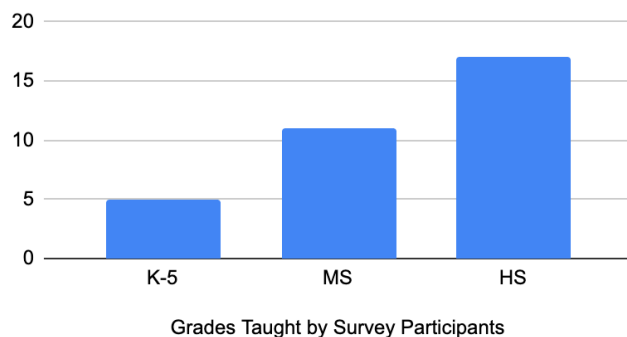


Figure 3. Grades taught by Survey Participants

Of the 26 teachers surveyed, at the time of this writing (Dec., 2021) only **7 teachers have registered to bring a group** for fully subsidized pilot programming. Of those, two registered groups are from Title 1 schools, one of which - Suttons Bay Middle School, will be bringing six different groups totalling 100 students to pilot programs (Fig. 4). Mostly middle school aged students will be piloting programs in the spring, though some high school classes will also be attending. No elementary-aged groups were registered for pilot programs.

Survey Participants and Pilot Program

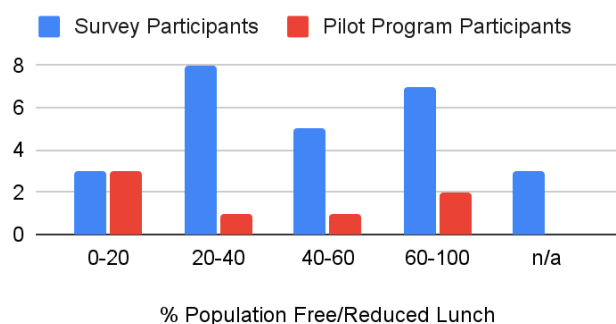


Figure 4. Demographics of Survey Participant Classrooms

Of teachers who have attended ISEA programming in the past (n=20), reasons for not participating in a Beyond Schoolship program were solicited (Fig. 5). The most common reason was lack of funding for a second experience, although it is important to note that five did not know there were other experiences and four did not think an engineering-style program would fit with their curriculum. If these results are representative of our

current population of teachers, year-round programming on a diversity of topics may encourage Schoolship teachers to register for another experience with us.

Reasons Teachers Haven't Tried Shoreside Programs

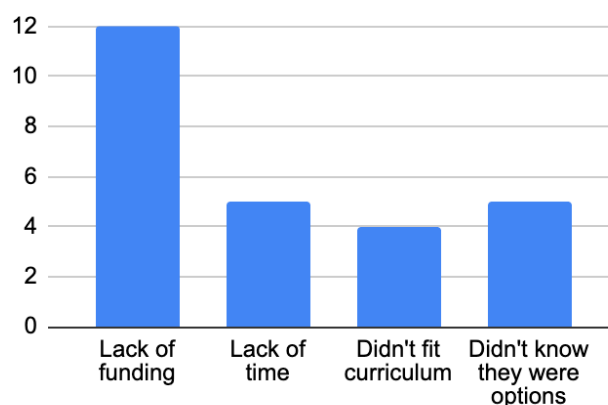


Figure 5. Reasons past ISEA attendees had not participated in Beyond Schoolship

It is also important to note that lack of funding will remain a problematic issue for attracting schools to year-round programming. Additional sources of scholarship, bussing, and even chaperone support may be needed to realize the potential of our year-round curriculum.

Feedback on Current Programming

Feedback was solicited about Next Gen, Diving Deeper, and ROV programs. All participants were asked, regardless of if they had experienced that particular program. Fig. 6 and 7 show the respondents' ranking (n=26) of each component of Next Gen and Diving Deeper programs. Diving Deeper allows students to more intimately interact with data, so there are additional components, though most components are seen across both programs. In Next Gen programs, the 5 components most often ranked as 'integral' to the experience are: Using Scientific Equipment, Interacting with Samples, Authentic Science Inquiry, and Raising the Sails (Fig. 6). The 'doing' of science is our strongest experiential component.



Integral, Appropriate, Secondary and Unnecessary Components of Next Gen

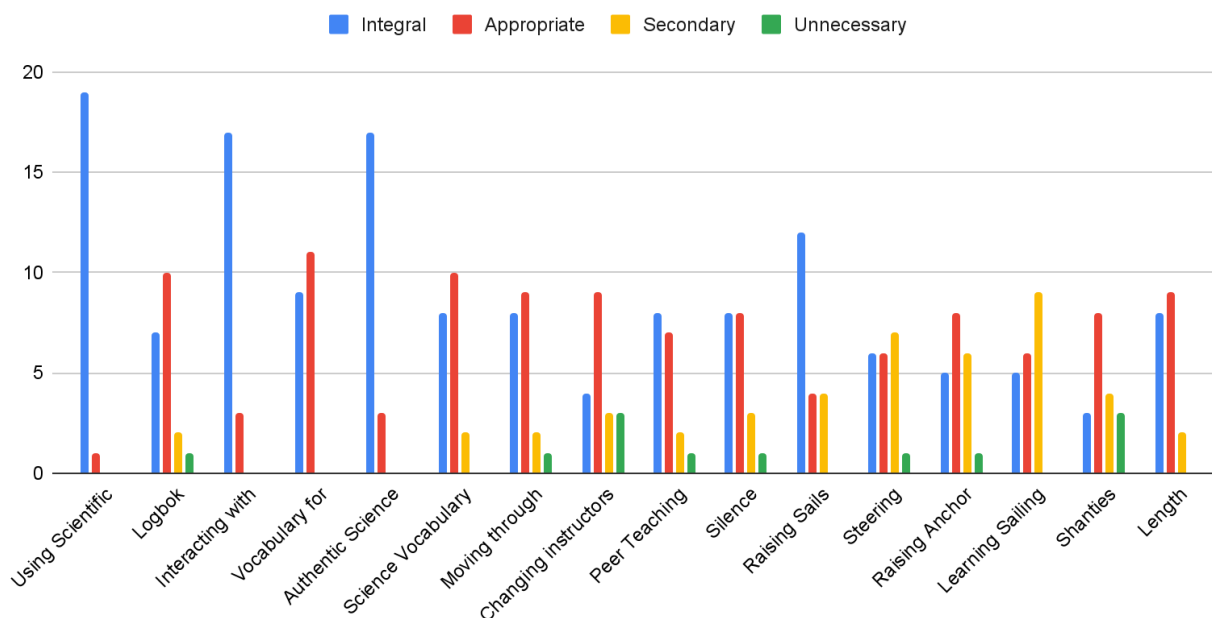


Figure 6. Evaluating the components of Next Gen Schoolship Programming

A similar trend is seen in Diving Deeper respondents' ranking (Fig. 7). Three of the same top 5 components appear. Graphing, a component related to the 'doing' of science and not present in Next Gen, and Peer Teaching, also found in Next Gen, were also most commonly ranked as integral to the experience.

Integral, Appropriate, Secondary and Unnecessary Components of Diving Deeper

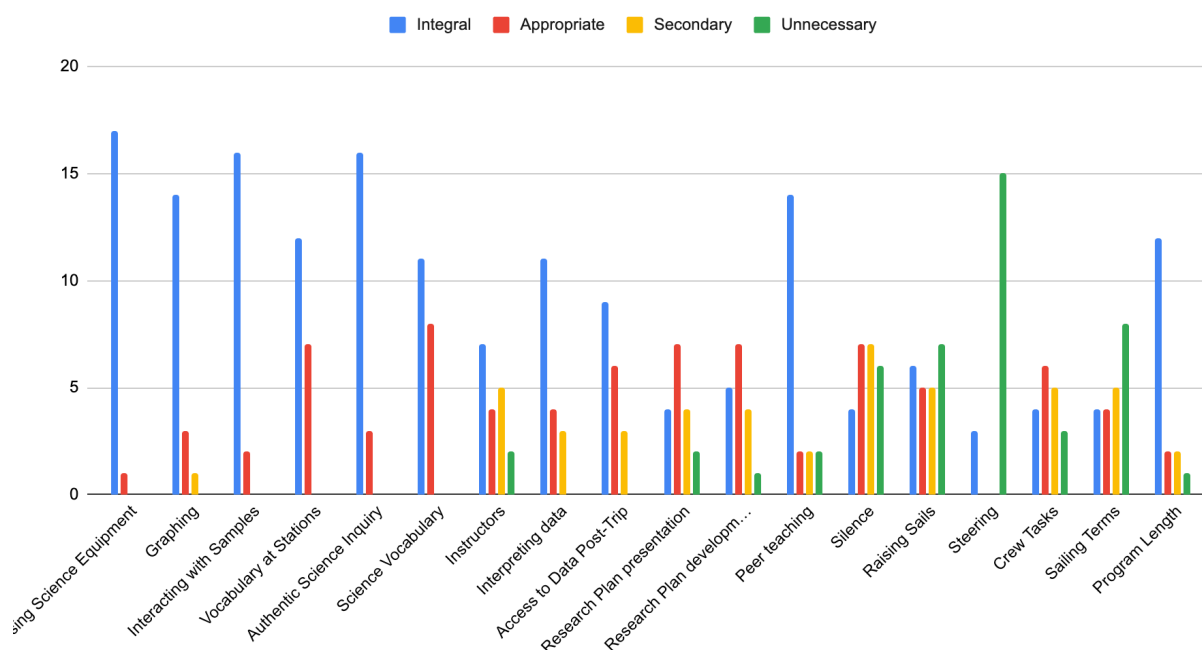


Figure 7. Evaluating the components of Diving Deeper Schoolship programming



Components of our current programming that were ranked as unnecessary or secondary to the Schoolship experience by teachers include, from both programs: Steering the ship and learning sailing terms. Specific to Next Gen programming (Fig.6), raising the anchor was not considered especially important by teachers to the experience, nor was singing sea shanties. Maintaining a log book was considered appropriate but not integral, and teachers ranked peer teaching, the overall length of the program, and a moment of silence in similar ways; as many think it is integral to as think it is appropriate for the experience, which suggests that these are areas where changes can be made to shorten the overall length of the Schoolship experience. Specific to Diving Deeper programs (Fig.7), program length appears integral to the experience - the process of authentically 'doing' science in the program trumps the impact of the experience of being on the vessel where the work is done.

Design Input - Future Programs

When asked about the format of year-round programs, 50% of respondents preferred overnight programs to half day or day-long programs (Table 1), though interest in pilot programs for 2022 do not follow this pattern, perhaps due to COVID-related concerns.

When given brief descriptions of potential year-round program options and asked to rank them on a 1-5 scale from very interested to uninterested in participating, the most compelling programs to respondents were **conducting a watershed monitoring experience** and **dissecting invasive and native species** to explore their respective impacts on a watershed (Table 2). The programs bolded in Table 2 are being piloted in Winter, 2022.

Program Length	Half Day	Full Day	Overnight
First Choice	6	7	12
Second Choice	7	17	3
Third Choice	13	2	11

Table 1. Preferred Year-Round Program Length

	Watershed Monitoring	Dissect Watershed	Graph the Great Lakes	ROV Sailing Frozen Seas	Coastal Engineering	Groundwater	Winter Wetland Monitoring	Science by Design	Physics of Sailing	Navigation	Boatyard Wars (Solar Boat)	Climate Steward
Very Interested	15	15	11	11	11	11	10	10	10	9	9	6
Interested	8	7	9	4	8	9	8	10	5	6	9	14
Neutral	2	2	5	6	6	4	6	5	6	8	3	3
Uninterested	0	1	0	3	0	1	1	0	3	2	2	2
Not Appropriate	0	0	0	1	0	0	0	0	1	0	2	0
Int. or Very	23	22	20	15	19	20	18	20	15	15	18	20

Table 2. Proposed year-round program topics and respondents' interest level



Significant interest in nearly all other programs, including modifying our ROV and solar boat programs, was similar. Climate Stewards, a program proposed to explore the impact of climate change on the Great Lakes, had the fewest number of respondents indicating 'very interested.' The sum of 'very interested' and 'interested' responses were also totaled in the last column of the table, showing areas to consider adding programming to target elementary, middle and high school audiences.

Respondents were asked which month(s) they would most likely attend year-round programming offered by ISEA (Fig. 8). Teachers were most interested in April and March and least interested in December through February. It will be prudent to consider this when revising ISEA workflow - if land-based programming will be most popular in the shoulder months, volunteer instructor training and other important components of ISEA work may need to shift to accommodate teachers' schedules. Conversely, perhaps building a separate marketing model to advertise to K-12 groups outside the formal classroom (e.g Boy and Girl Scouts, after school programs, etc.) should be considered for populating year-round programs.

During What Time of Year Would You Participate in land-based ISEA programming?

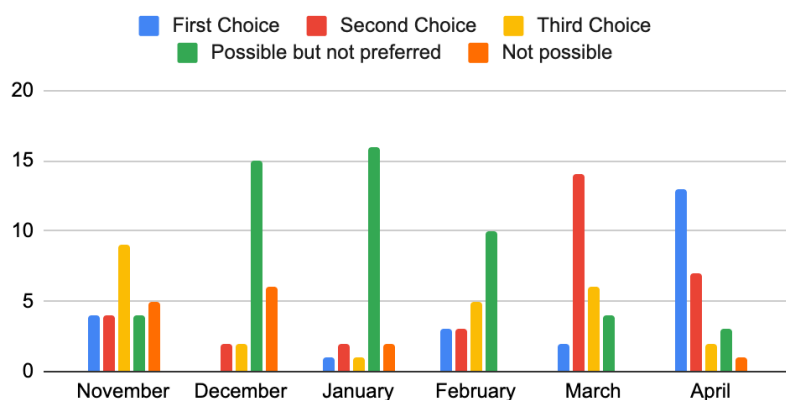


Figure 8. Interest in time of year-round program delivery

Design Input - Modifying Schoolship Programs

When asked if they would be more likely to stay for a full day of programming if it could fit into the length of a school day, most respondents said yes. When asked about ISEA increasing flexibility to ensure the comfort and learning of students aboard ship-board programs, respondents encouraged ISEA to pursue this. However, when asked if they would participate in a: 3 hour sail and 3 hour shore program, a current (4 hour) sail and 3 hour shore program, or continue to only participate in a Schoolship program, most chose NOT to select the condensed sail. There is likely the perception of 'what will we miss out on' from this dedicated demographic of teachers to ISEA programming, which accounts for the discordance among the responses.

Summary

A targeted request to long-standing allied teachers of ISEA was highly effective at soliciting feedback on current and future programs. Asking teachers to join a teacher advisory group to offer these insights and providing free pilot programming as a token of gratitude was well-received. In many ways, this feedback provides a depth that is lacking in teacher evaluations (see Appendix 1) and establishing a regularly-scheduled opportunity to solicit feedback from the teacher advisory group should be considered as an important supplement to current evaluation protocol.