

Northwest Passage Project  
**Synthesis of Impacts on Participants and Audiences**

Report #12 in the series of evaluation reports  
to the University of Rhode Island's  
Graduate School of Oceanography

prepared by  
People, Places & Design Research

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## Executive Summary

The Northwest Passage Project was a grand experiment. It created a unique format to explore several important questions about science education – for undergraduate aspirants to science careers as well as for the general public. The “real life” ocean expedition into the Northwest Passage had many goals and yielded considerable educational benefits and scientific accomplishments. Along this process, evaluation activities provided feedback and reflection, resulting in 11 reports and substantial qualitative and quantitative data about the nature of this experiment. This synthesis summarizes the overall process of those activities and puts the findings in a context about the benefits for the principal audiences.

### Background

Conceived by the University of Rhode Island's Graduate School of Oceanography and film maker David Clark [David Clark Productions], the Northwest Passage Project was supported by the National Science Foundation, the Heising Simons Foundation, and the institutional support of the University of Rhode Island, five other universities and three museums. It was a massive undertaking, complicated by difficulties and delays involving the ships intended to host the expedition, thereby complicating the process of recruiting undergraduate students from a shifting group of interested applicants. Ultimately, however, the network of participating organizations remained intact and was a key factor in the feasibility of evaluation to inform the project.

### Goals, Outcomes, and Audiences

The big idea of this project was to provide a research experience for undergraduates to investigate whether and how immersive fieldwork mattered in their perceptions of STEM and the potential for a STEM career. The special significance was to focus on underrepresented students. Along with that big idea came contextual issues of importance: would the experience of these students benefit other students too? and would the communications about this project (in live broadcasts while it was happening, as well as in a one-hour documentary film about the expedition) have any effect on general public audiences' awareness and understanding of what's happening in the Arctic environment and the scientific research that seeks to reveal current conditions?

### Summary of the impacts of the project

The benefits of NPP were different across the three principal audiences:

- 1: For undergraduate students on the expedition, the key impact is described as: launched into STEM careers.
- 2: For undergrads who didn't participate but found out about the project later, the key impact was: inspired about field research.
- 3: For general public audiences, the key impact was: increased awareness and appreciation of the Arctic environment.

Each of these principal impacts is described separately for the three audiences in the chapters that follow this summary.

## 1. The Impact on Undergraduate Students on the Expedition

A key question posed by the Northwest Passage Project in its original conception was: *Does the immersive experience of participating in a science expedition impact underserved and underrepresented students' perceptions of STEM and STEM careers?*

This question was investigated in several ways over the five years of the project. Prospective undergraduate applicants who were interested in the expedition, from five partner universities, were investigated in a baseline survey (Study #2) about STEM identity, attitudes toward climate change, and perceptions about the project. They also provided feedback about the webinars offered by URI as part of the coursework and preparation for the expedition (Study #3). The students who were eventually selected to go on the expedition provided evaluation feedback in multiple ways (journals, meaning maps, online surveys) and at multiple points in time – before, during and after the voyage (Study #10).

The five partner universities (state colleges) were selected because they have more diverse students (minorities, lower income) who are generally underrepresented in STEM careers. This resulted in a diverse group of expedition participants, including: 8 Hispanics, 3 Asians, 2 African Americans, 3 white males, 1 middle easterner, as well as 2 Inuit young adults recruited from Canada.

### The big impact: **LAUNCHED into STEM careers**

Undergraduates who journeyed on the icebreaker Oden were strongly affected by the experience. Investigating their thoughts and reactions *a year-and-a-half later*, several themes emerged which shaped this way of defining the impacts on them.

- + 1) High confidence in their suitability for a science career
- + 2) Recognition of fieldwork as providing growth in technical and teamwork factors
- + 3) For some, emerging awareness of a need to become a change agent in science roles

### THE DATA

The evidence for being “launched into STEM careers” comes from several measures involving perceptions of students' confidence in their suitability for becoming a scientist, changes in their science identity, and their aspirations for a STEM-related career.

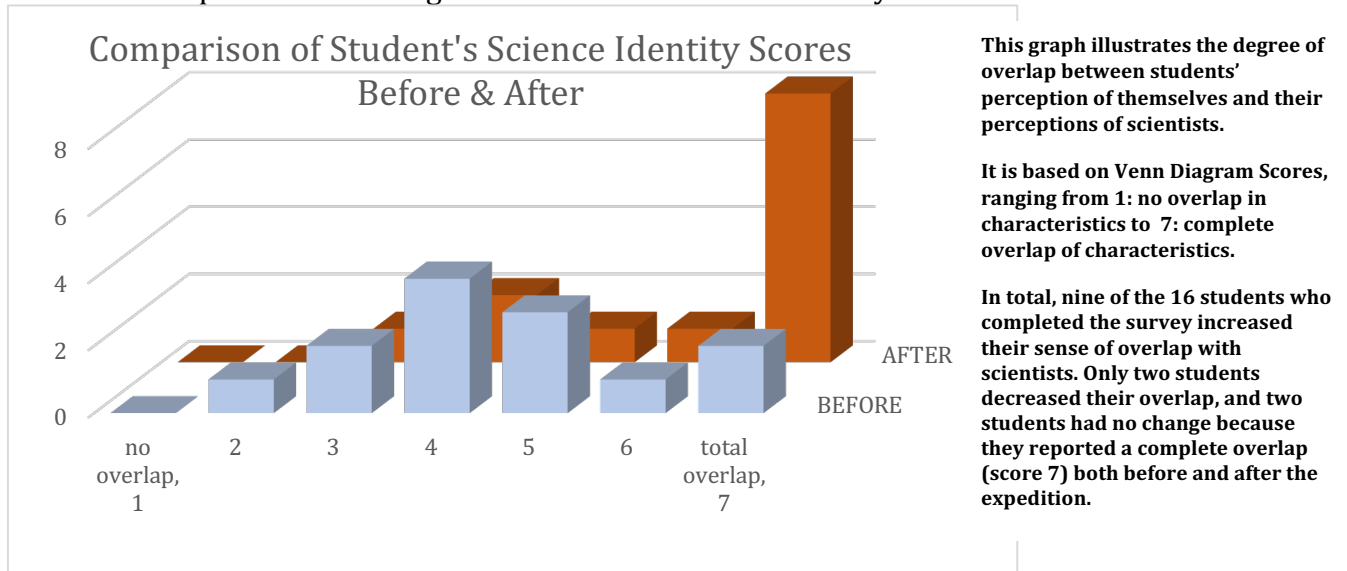
#### 1) High confidence in their suitability for a science career

Intentions for a STEM career: A year and a half after the NPP experience, 85% of these underrepresented students reported that they were “extremely likely” to pursue a STEM

career. Another 7% reported that they were “very likely” to pursue a STEM career – yielding a total of 92% with strong intentions to become a STEM scientist / professional.

NPP made a difference: 62% of the students reported that the NPP experience had an “extremely” or “very high” positive influence on their decision to pursue a science career. Another 30% reported that NPP had a “high” positive influence on their decision to pursue a career in science – yielding a total of 92% attributing an influence on their career aspirations to this project.

Growth in their self-perception as a scientist: This graph illustrates the empowerment of these underrepresented undergraduates in their science identity.



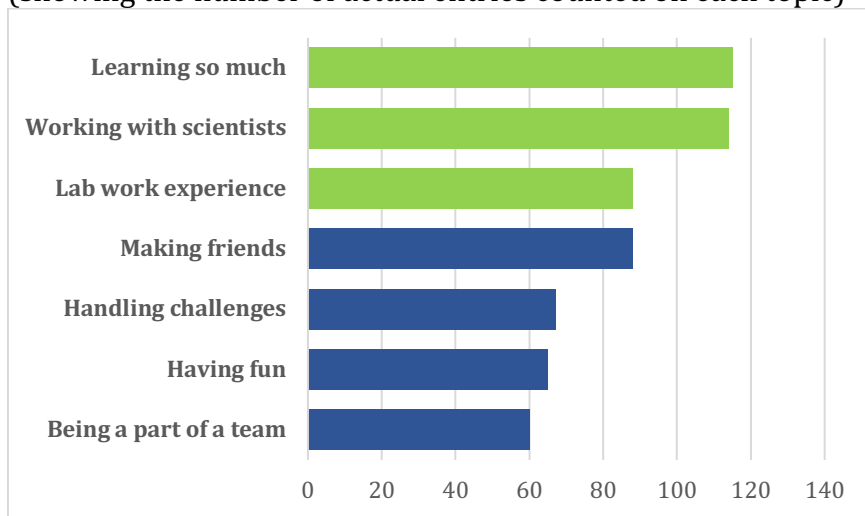
“The NPP fundamentally changed students’ frame of reference – their science identity – from that of a student of science to that of a scientist.”<sup>1</sup> Analysis of their journal entries suggested three narratives in support of this conclusion: 1) Science is a perfect fit for me; 2) I realize now that I AM a scientist; and 3) To be successful as a scientist it is necessary to be a realist. (A fourth narrative theme emerged from journal entries and post-expedition correspondence, and is presented as the last point of data below, evidence topic 3, about becoming a ‘change agent.’)

<sup>1</sup> The data and principal conclusions offered in this chapter are drawn from: Munley, M.E. (2021) “Training the Next Generation of Scientists (report #10).” Unpublished research report by MEM & Associates in collaboration with People, Places & Design Research, 17pps.

**2) Recognition of fieldwork as providing growth in technical and teamwork factors**

As part of students’ perceptions of becoming scientists and thinking about STEM careers, this fieldwork experience grounded them in content and scientific process – as would be expected. The students made many journal entries during the expedition about how much they were learning, the value of working with scientists, and their excitement about the lab work they were doing on the ship. However, perhaps not as expected in their fieldwork experience was the extent of their notes about teamwork – factors related to personal growth and social interaction such as making friends, handling challenges, having fun and being part of a team. The chart below summarizes the analysis of their journal entries in those two broad categories.

Analysis of students’ journal entries about the importance of features of the program (showing the number of actual entries counted on each topic)



**Factors related to science education**

**Factors related to personal growth and social interactions**

### **3) For some, emerging awareness of a need to become a change agent in science roles, seeking a more inclusive culture in the scientific community**

Supplementing the three narratives that were cited earlier,<sup>2</sup> there is also a social-cultural context to these students' professional development as they launch into a STEM career. So the following is a fourth narrative, derived from comments and qualitative 'meaning maps' that represented students' perceptions and identity in the roles they experienced on this project: Cultural practices and social relationships in the field of science are not conducive to fully accepting and respecting students of color. In order to pursue a career in science it is necessary to accept being a change agent.<sup>3</sup>

In other words, while understanding that the data collection needs were the key driver of the expedition's importance, more than a third of the students expressed concerns about the educational work experience they felt they were promised and deserved. For them, scientists' ways of operating, supervising, and awarding assignments took primacy over their perceived opportunities. Perhaps this is a consequence of some students being inexperienced, but what may not be obvious is how being a self-advocate in ambiguous situations is especially worrisome due to stereotypes they have lived with for much of their lives (e.g., being "pushy," stay in "your place," are you "good enough"?). All of the evidence for this part of the impact about being launched into a STEM career is qualitative, and most of it shows the ambivalence between a passionate quest for a science identity and a perceived lack of support to discuss their feelings. Two journal entries among many:

*You may be wondering now about where my motivation lives. Why persevere on the road with so many obstacles? The primary reason is likely that it is the only road that contains the steps which have brought me the greatest satisfaction and joy. I have arrived at one of those steps now, during this trip through the Northwest Passage. Like the other steps, the expedition has reintroduced me to the naive curiosity of a seven-year-old me who wasn't worried about who she was representing but only about who could answer her questions.*

*There's definitely been some things I've seen that have left me with a bitter taste in my mouth but it also left me determined to continue on my scientific path to hopefully be one of the people that can change the way our system is currently flawed.*

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<sup>2</sup> 1) Science is a perfect fit for me; I realize now that 2) I AM a scientist; and 3) To be successful as a scientist it is necessary to be a realist.

<sup>3</sup> As with the other parts of this analysis about the impact of the Northwest Passage Project on the students who participated in the expedition, much of the ideas and data for this section of the Synthesis are drawn from one of the evaluation reports prepared during the project: Munley, MaryEllen, (2021) "Training the Next Generation of Scientists (report #10)." Unpublished research report by MEM & Associates in collaboration with People, Places & Design Research, 17pps

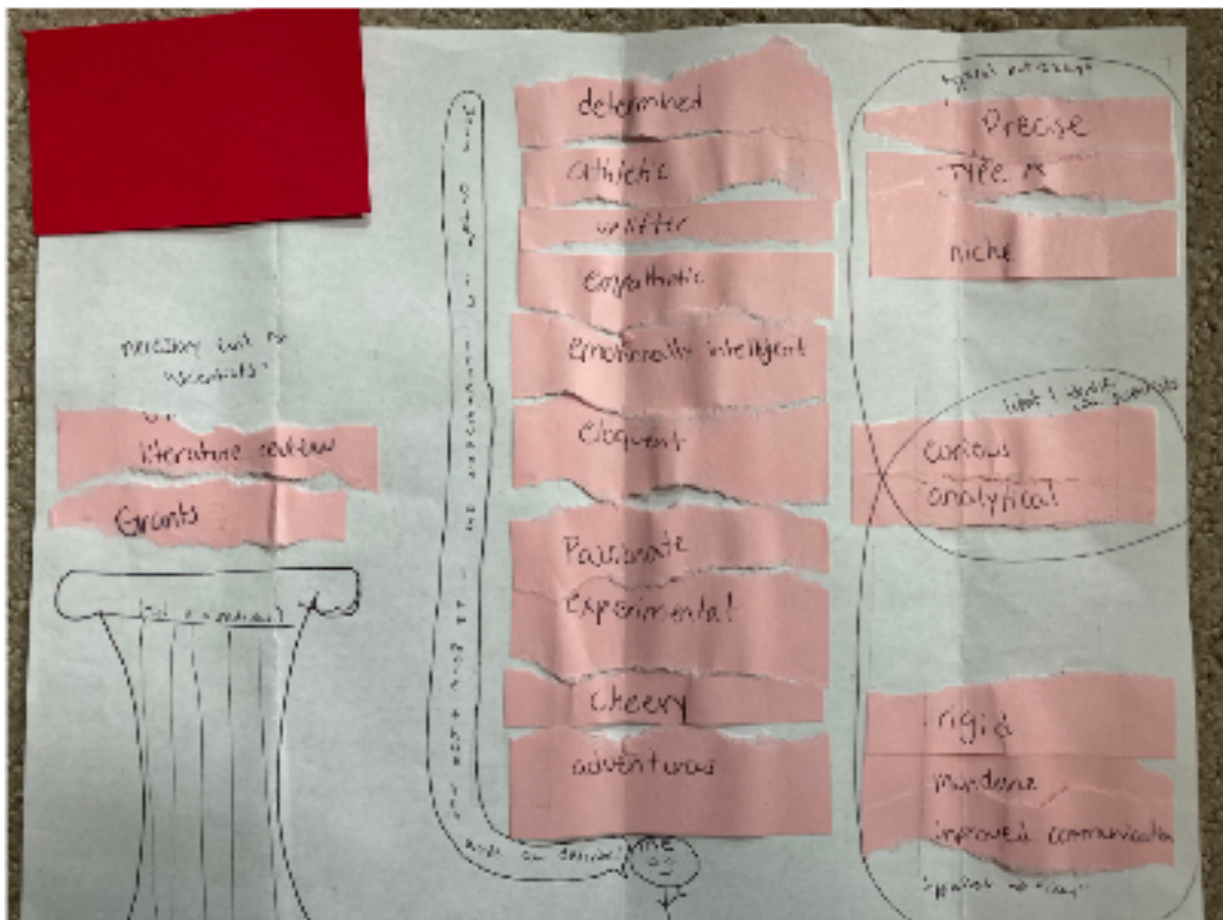
Comments from an online questionnaire, offered a year-and-a-half after the expedition:

*It felt like "if you [a student] say anything negative about us [project leaders] then we have power over you to blackball you from this project." And that's scary because it's an NSF funded project and a lot of us who are first generation students-- we don't know how the system works, and we just assume that any little thing we do can ruin our career.*

*Diversity should be at all levels. That would ease the burden because then we wouldn't have to be worried about standing up to someone who is above us, if someone is above us who is also in our shoes.*

Two examples of 'meaning maps' about their self-perceptions give additional insight to the perception of differences between an established scientific (and likely academic) way of working and a student's view of their ideals.

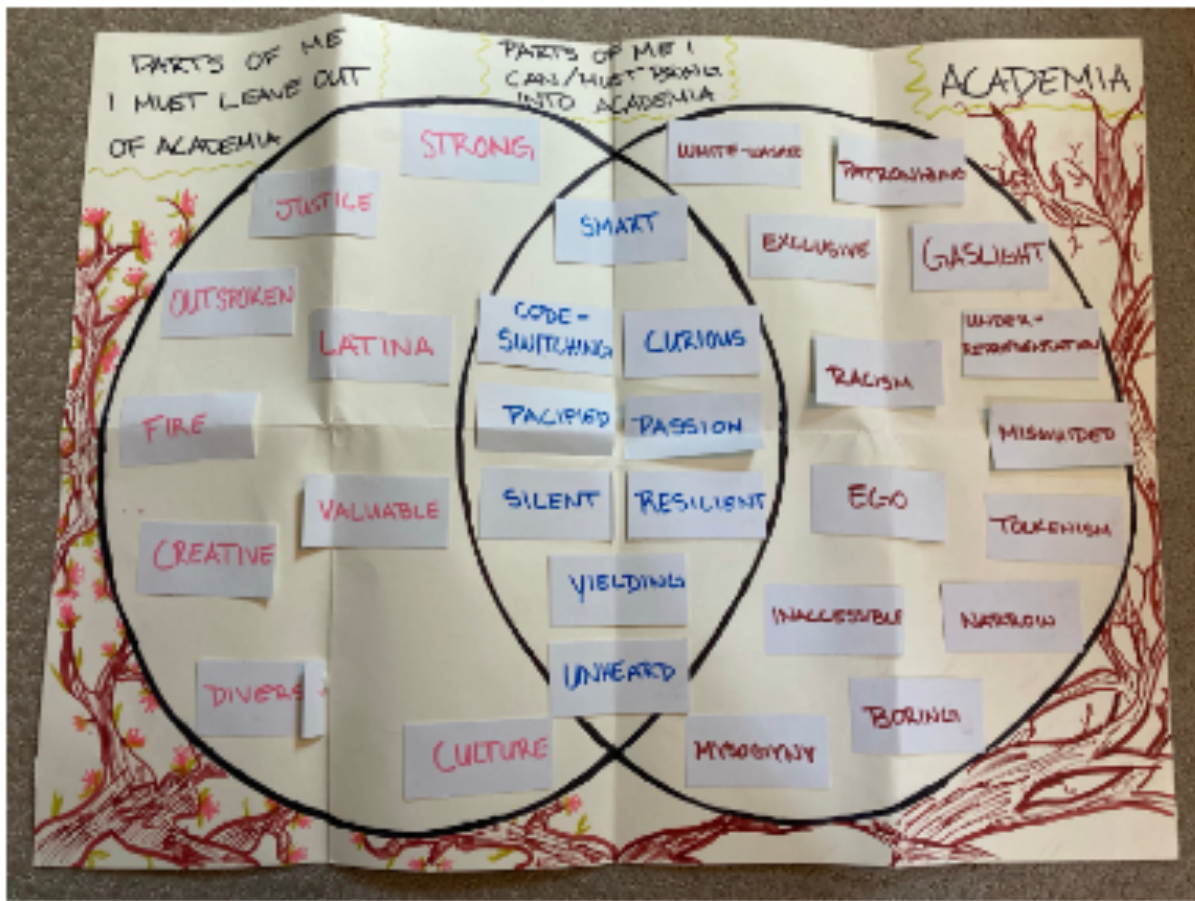
First example



This drawing places the student in the center of the map. The description of self is holistic including traits like “emotional intelligence,” “adventurist,” “passionate,” and “cheery.” This is in contrast to the description of scientists in the lower right-hand corner as “rigid,” “mundane” and “in need of improved communication.”



## Second example



This student's post-exhibition map is a commentary on the culture of academic science and how the student sees fitting within that culture. On the left the student calls out the parts of herself that must be left out of an academic career: "Latina," "strong," "justice," "diversity," and "valuable." On the right the student describes the culture of academia with words such as "patronizing," "underrepresentation," "narrow," "gaslight," and "exclusive." The overlap in the middle of the diagram makes it clear that this student's identity is that of an outsider in an unfriendly culture. The student will have to be "smart," "curious," "passionate," "pacified," "yielding" and "resilient" in order to survive. The student embellishes the map with trees on either side and writes, "The tree is flowering on the side of my qualities and dying on the side of academia...when I am in an academic setting, I feel life drained out of me, and I have to balance on a fine line between being true to myself and doing the right and just things – and not compromising my career." This student's identity is that of engagement and change maker, in response to the currently unacceptable aspects of the culture.

The realities of underrepresented students being on a path to a STEM career are not uni-dimensional. Even with acknowledging the negative realities of the professional culture of science (probably especially of academic culture, which is what students know), almost all students on this expedition say they are “extremely likely” or “very likely” to pursue a STEM career in scientific fieldwork. They also report that the overall NPP experience had a very positive personal effect and that it had a very positive influence on making a decision to pursue science as a career.

Students of color on the expedition are determined to pursue a career in science despite its flaws. Science is their passion. The work brings them joy. They are aware that their presence represents change in a culture that is not quick to change. They understand that they will be uncomfortable and that they will make others uncomfortable. By choosing a career in science, at this time, they are also aware that they position themselves as change agents, not as advocates of the status quo.<sup>4</sup>

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<sup>4</sup> Quoted from Munley, MaryEllen. (2021) “Training the Next Generation of Scientists (report #10).” Unpublished research report by MEM & Associates in collaboration with People, Places & Design Research, 17pps

## 2. The Impact on Other Undergraduate Students

A key question in this evaluation process was how 'other' undergraduate students – “peers” at the level of students who went on the expedition on the Oden – might benefit from exposure to this intense experience of field research in the Arctic. *Did the experience of students on the expedition have any benefits for other students at their universities?* The Northwest Passage Project was well-prepared to investigate this question:

- partnering universities created courses or special attention for groups of students who were interested in ocean science,
- a set of custom-created video webinars allowed all interested students who might apply for the expedition to learn about topics and issues,
- there was an applicant pool of students that far exceeded the number of students who could go on the expedition, and
- the likely prospect that when the expedition students returned to their university, their friends and peers might attend a presentation about the expedition, and we could investigate their perceptions from the perspective of students who did not participate in the expedition.

Unfortunately, the cancelled expeditions in 2017 and 2018 undermined these plans. Although the expedition proceeded in the summer of 2019, by the following fall and winter, we had more-or-less lost the pool of 'peer' undergraduates who participated in the educational preparations in early 2017 and who then did not have any of the secondary experience of the expedition. Also, the expedition-student presentations to peers that might have occurred in the spring of 2020 were abandoned because the pandemic forced universities to close; we waited to see how we could find and talk with undergraduates when 'normal' operations might resume. Eventually, we pivoted to another strategy: exploring the perceptions of any undergraduates who watched the documentary film of the expedition – screenings that were held virtually at the various universities. Consequently, this part of the evaluation changed to a qualitative approach, using focus groups of undergraduates (conducted virtually, within a few days after the screenings, in February 2021 when the documentary became available).

### **The big impact: *INSPIRED about field research***

The undergraduate-peer audience who did not participate in this expedition saw it as *a beacon of inspiration* in several ways:

- ✦ seeing peers qualify for an important opportunity in career development and scientific research;
- ✦ seeing students participating in a variety of science roles (data collection in the field, lab work during and after the expedition, communicating with the public);
- ✦ seeing undergraduate students be treated with respect by faculty and other scientists – showing trust in young scientists is encouraging;
- ✦ recognizing the initiative of overlapping with a cultural context – the Inuit people— which offered a tangible example of science connecting with society, not just being isolated in lab work somewhere;

- ✦ being excited at students participating in scientific research that is being done on critical environmental issues such as climate change; and
- ✦ getting insights about the cost and complexity of planning field expeditions.

Wrapped together with 'inspiration' is the feeling of 'empowerment' from seeing other students involved in field research, producing perceptions such as

*If they can, I can too; I'm capable of doing the same thing*

*Made me want to do the same thing, or something in the same direction*

*...it does show that you can have opportunities to do really cool things without having to get a PhD.*

*...great to see the variety of options in the jobs – what's available to do, working together, research and culture together; reminded me that research is a collaborative effort*

## THE DATA

Evidence for the above conclusions about impacts on undergraduate-peer students is drawn from data obtained from a series of focus groups.<sup>5</sup> The subheadings here support or elaborate on the components of inspiration cited above.

### Exposure to fieldwork

*I think that was a really good example. I've looked into research a lot and this develops a lot of different things that they do throughout the whole process.*

*I do have a lot of lab work experience especially with microscopes and cells. I think it [doing field work like this] would be both interesting and maybe something I would qualify for.*

*I am interested in field work and research and specifically with wildlife conservation...I don't know what that exactly looks like but it was really cool to see how that's actually done.*

*After watching this, I only wanted to be on the boat more. I thought there was incredible research being done and in such an incredible place, too. It just made me want to pursue that sort of field or at least go in that direction and explore it a little bit more.*

*I was inspired by learning about the different research methods and getting to see the nature in the film...it made me think a lot about my own relationship to the great watershed and how these issues of micro plastics especially already exist here.*

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<sup>5</sup> Jeff Hayward & Jolene Hart, Undergraduate Peer Perceptions and the Benefits from the Northwest Passage Project, Evaluation report #9. Northampton MA: People, Places & Design Research; unpublished research report for the University of Rhode Island, Graduate School of Oceanography, May 2021, 37 p.

### **Expanded perceptions of opportunities for me, as a science student**

*...before this, I spent an hour looking up different research internships for the summer or next winter. Watching things like these honestly get me really motivated. Just seeing the opportunity that those undergraduates got to have, I think that's just amazing and I'd really like to do something like that.*

*If I were there...it would be so encouraging. Even watching it now, I was like "oh my gosh! You mean I could be doing that?" Like, that's insane.*

*Seeing all the different things that the undergraduates got to do and how they had to work together...was eye opening to see what we could possibly be doing if we were ever to get accepted onto an opportunity like this. It was for me...just really cool.*

### **Inspiration about confidence and career decisions**

*I think going on a trip like that would help me explore careers and help me make up my mind about what I want to do.*

*I'm a psych major so I'm not really sure how applicable it is but I am really interested in going on something similar to this and seeing my work come out.*

*It provides a gateway into other fields of science and information about science that I wouldn't otherwise have access to immediately.*

*I've been tossing [around] a lot of ideas with myself, like what little niche I want to go into for my PhD eventually. So I always find it useful to look at the work that people are doing in lots of different areas of science.*

*...when you get to see someone your own age literally on the same path as you...it's nice and you know that ok, this is something I'm capable of doing.*

*Personally I'd love to do something like that, to educate people and to talk about it. I really think it would be a more uplifting part of the day – to have some pride in the important research you're doing.*

*...it was very inspiring...I always feel like a fake scientist but it feels good to know there's opportunities that do exist and you can qualify for them and do it.*

### **Recognition of respect for students**

*When they were talking about the cost of the trip and all the data they're collecting and what an important trip it is, I was just so happy to see young people with not necessarily the most experience given so much trust.*

*... the fact that you've got undergraduates out there in the Arctic doing this really high end important research, I think that's what opens some eyes. It's just a matter of making connections and applying for opportunities.*

*I've gotten a little infantilized sometimes, I've just been treated like not an adult in labs and seeing people give full trust, "you guys can handle this; this is the plan," and they*

*really did important research out there, I was very surprised to see it. And happy to see it.*

*I definitely changed my perspective on the students themselves and how much they're capable of doing.*

### **Inspired by the public outreach (cultural connection) in a science venture**

*The whole point about public outreach and communication really hit home with me because that's exactly what I want to do. When I get more involved, I want to be on that track to do what they're doing.*

*The way I was feeling, I wanted to be out there in the village there, talk with some of the elders and learn more about them.*

*The main thing I got out of it was you CAN include things besides just hard science on a research cruise. The fact that they were able to learn about culture, learn about history in 24 hours of constant sampling was really impressive.*

*I was getting so into it because it touched base on not just the science aspect of it but the culture aspects and how it was affecting the tribe. That was a huge bit for me.*

### **Linking scientific research with real-world environmental issues**

*It made me more aware that there might be more research opportunities like say, in the Arctic, for conservation in those areas.*

*I remember from the documentary someone said indigenous knowledge and science shouldn't be separated and I think this concept can be applied to any environmental issue.*

*I'm really motivated to look into the policies that are governing us, that are governing environmental laws, and I'm interested in researching further what kind of policies there are and how I can use my voice to make a difference in that area.*

*There was a lot talked about in the film that I wasn't even aware of. Like I knew the icebergs were dissolving, but I didn't know much about it and I liked learning about the technology that's behind it and it went further into telling us what it was.*

*It was really impactful for me to see that, to see the environmental issues really taking shape in the Arctic.*

*I think you hear more about Antarctica than even the Arctic when it comes to people wanting to do research [in the Arctic], so just more appreciation that it is an area we need to study more, to make up some more questions to find answers about.*

*[Local culture is] something you need to acknowledge and it is a big part of science. Especially when you're gathering samples like that...its more than the fish that live in that environment or the air quality in that environment, the people and what they use in that area too, so I know if they're having issues with water or say like high levels of*

*mercury, there goes their fish and that entire tribe no longer has a source of food and that becomes an issue.*

*It's part of being part of something bigger or something that matters more. Just feeling like you're doing actual change. I don't care what kind of money I make. I just want to do something that matters to me.*

*It was really impactful for me to see...the environmental issues really taking shape in the Arctic...it was really important for me to see all of this happen in the film.*

### **Appreciating the interdisciplinary character and complexity of field research**

*...it's eye opening to see the amount of variety we have in the marine field and what's at our disposal, like the different machines and equipment we're able to use in order to figure out what we're trying to do.*

*...it reminded me not to get tunnel vision about one particular thing; that science is a collaborative effort and these kind of projects don't work without lots of different people with lots of different interests...*

*I knew that research was expensive, to take out a boat like that in Arctic...I was like "Whoa, that is really special to be up there..."*

*I also think the collaboration of people in all the different fields, working together in the same ship. A lot of time when you're in a lab you're just working on micro biology or you're just doing one thing, but then collaborating is more like how the real world is.*

*If I remember correctly there was also a tour guide involved. ... So it seemed clearly very interdisciplinary as a trip. The fact that they had the students in an almost classroom setting and they were learning about culture and history as well, that's very important.*

*Obviously you'd gain lots of hard, concrete skills...but also soft skills ... Teamwork is a huge part of soft skills, so is organization and even project management and project design. If you were in a project like that you have to know how it works and why you take the samples and why someone gets a water sample before you and that kind of thing. Collaboration across all the projects is huge as well.*

*For me, it opens a lot more opportunities. I would generally think there aren't that many jobs in the Arctic but, at least for me conservation-wise, if I want to go that route, it made me more aware that there might be more research opportunities...*

### 3. Assessing Impacts on General Public Audiences

The Northwest Passage Project was, of course, a scientific expedition investigating the status of the Arctic ocean and ecology. But it was also designed to communicate the science activities to the general public, embracing the idea that science contributes to public understanding of real-world issues. There were two major initiatives serving this broad purpose: live broadcasts from the expedition when it was in progress, and a documentary film that was aired on dozens of PBS stations around the country. For the evaluation process, there were numerous questions, and the biggest two were: *Did this project increase public knowledge and understanding of the Arctic?* and *Did this project increase public understanding of the science and research being conducted in the Arctic?*

Some context is needed here about the nature of measuring impacts. From the point of view of project developers, “increase knowledge and understanding” seems straightforward, but it’s somewhat complicated. “The public” is diverse, and existing states of knowledge are varied. Even measuring ‘knowledge’ is not as clear as, say, a classroom test about a curriculum unit, especially where there are ‘right’ and ‘wrong’ answers. So the range of general public knowledge is probably not well represented by an average (a mean, median, bell-shaped curve, or other measures of central tendency), and a range or distribution of knowledge is more difficult to assess and compare in broad brush strokes. Therefore, we offer some insights about how we approached the measurement of impacts from the two initiatives of this project (the live broadcasts from the ship, and viewers’ reactions to the documentary film):

- \* Knowledge is rarely ‘all-or-none.’ So, for example, if you were to ask me something that I wasn’t completely clear about, but then you tell me the full explanation, I might say “Oh, I knew that; I just couldn’t explain it myself” (in the science of learning, there are several types of indicators of knowledge such as recognition, recall, reinforcement of previous knowledge, and ability to apply a concept).
- \* Rather than focusing solely on content-specific test questions, we tended to focus on individuals’ own self-reports of learning – e.g., “I knew this before,” “I learned something about this,” or “I learned a lot about this.” In this type of assessment, we considered their self-reports to be valid, even though one person’s “learned something” and another person’s “learned something” might not be the same in content or extent of learning.
- \* Also, the measurement of ‘interest’ is related to learning. People who are not interested in a topic are not likely to want to learn about it. And people who already know a lot – perhaps even as much as the presenter of a program – may say that they “knew all this” before, but their interest in it, the reinforcement of their existing interest and knowledge, might be strengthened by seeing their knowledge and understanding in a new context. So we include indicators of interest in the content as part of the broad picture of awareness and knowledge.
- \* Sometimes the things that people learn, say, from a program (broadcast from the ship, or a PBS documentary) might be different than what the program’s specific “talking points” were, and that’s not necessarily bad. Therefore, audiences’



knowledge might be different than the specific measures of knowledge in the project's goals.

- \* Ultimately, in our assessment of impacts, we tried to be as fair as possible to all perspectives and levels of knowledge. Among the measures of impact that we are reporting, "learned a lot" is a rating that we think is unquestionably positive as an educational outcome, and you will see that in some of the data that follow. Becoming 'aware' of something is also a useful impact, as is a change in attitude – all self-reported, but considered to be valid.<sup>6</sup>

The methods for studying general public audiences are described in previous evaluation reports, but as a recap: the live broadcasts from the icebreaker *Oden* in the Arctic were evaluated with paper forms in viewing rooms at three museums and science centers across the US,<sup>7</sup> and public reactions to the documentary film *Frozen Obsession*<sup>8</sup> were elicited by a national sample of online respondents who were experienced in reacting to media presentations of various types.<sup>9</sup> They watched the film on home computers, not cell phones, and answered questions before and after viewing the film.

### **The big impact:**

### ***INCREASED AWARENESS AND APPRECIATION of the Arctic environment***

Of course most adults have heard of the Arctic, especially the audiences one would find in a museum seeing a live broadcast from a ship in the Arctic, or those who took the time to watch an hour-length documentary film about the Arctic. But we were investigating more than simple awareness, we were investigating awareness of the Arctic environment and

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<sup>6</sup> The issue of validity is important when considering 'self report' measures as well as testable knowledge questions in the same perspective. With self-reports there are concerns about validity, such as: people want to seem as smart as they can be, so "I knew that before" is probably overstated but "I learned a lot" would not be overstated. Also, people usually aren't eager to say that they changed their attitudes about something if it isn't obvious to them that they had done so.

<sup>7</sup> Hayward, J. & Hart, J. (2019). *Evaluation of Live Broadcasts to Museums and Science Centers* (Report #6). Unpublished research report for the University of Rhode Island and NPP partners.

<sup>8</sup> Hayward, J. & Hart, J. (2021) *Perceptions of the Film, 'Frozen Obsession,' among the General Public* (report #11). Unpublished research report for the University of Rhode Island and NPP partners.

<sup>9</sup> The strategy of using online respondents was chosen for several reasons. Most importantly, the viewing simulated the way that the PBS program would be seen: in individual households, with or without family members, but not in a public setting such as an auditorium or theater where other viewers' reactions might influence an individual's opinions. Secondly, the online sample did not know the subject of the film when choosing to watch it (people enrolled on research databases do this for 'points' which can be used to redeem merchandise, and the demographics of respondents was controlled to be somewhat representative of the US population), so the sample represents a more diverse set of viewpoints than the self-selected sample of people who watched a PBS broadcast of the film based on the subject. Thirdly, the supplier of this pool of respondents was selected because they frequently do media evaluations, so respondents were likely to watch the whole duration of the hour-long film, knowing that was "part of the deal" in their responsibilities to get their points. Lastly, there was no feasible method (based on conversations with PBS program managers) to create a good sample of respondents from the actual broadcasts.

ecosystem, awareness of life including human settlements, and awareness of the role of the Arctic in terms of climate, as well as its role as a route of passage – in other words, awareness, knowledge, and interest (appreciation) are overlapping dimensions of people's perceptions of the Arctic.

Data from general public audiences indicate several components of this impact:

- + Public audiences found new sources of interest in the Arctic.
- + All five goals about increased knowledge were met; on four of them the impacts were substantial with 55% to 61% of public audiences saying they 'learned a lot' about those issues or topics.
- + The project enhanced public opinions about the importance of research in the Arctic.
- + The project enhanced public attitudes about science.

## THE DATA

### **Public interest and awareness of the Arctic environment before seeing the documentary film was low.**

only 24% expressed high interest in the topic 'Arctic environment.'

only 23% strongly agreed that 'climate change in the Arctic affects my life.'

only 20% said they knew this: 'The Arctic region has an impact on climate and people around the Earth.'

only 22% said they knew this: 'Arctic ecosystems are under stress due to a changing climate.'

only 31% said they knew this: 'The Arctic environment is warming faster than other places on Earth.'

only 22% said they knew this: 'Current changes in the Arctic are impacting indigenous communities' way of life.'

only 18% said they knew this: 'The Northwest Passage is a sea route connecting the northern Atlantic and Pacific oceans.'

As an aside, awareness and knowledge before seeing the documentary film was significantly higher among partner university and museum audiences.

### **Having the project presented by the documentary film, *Frozen Obsession*, led to increased appreciation whereby everyone found something of interest**

58% rated the film very highly (compared to the 24% initial interest in the Arctic).

The general public really appreciated the Beluga Whales, the scenery, learning about climate change in the Arctic, the discovery of plastics in the ice, and learning about the history of exploration in the Northwest Passage.

*I loved seeing the whales and hearing them talk*

*The vastness and beauty of the Arctic was inspiring.*

*WOW, I learned so much about the Arctic, the loss of the glaciers, live little organisms that live in the water and are so important*

*To see the visual of the ice melting throughout the 90's and into modern day made me tear up, this film really taught me so much.*

*The story of the Franklin expedition and the lost ships that were found in 2016 was compelling*

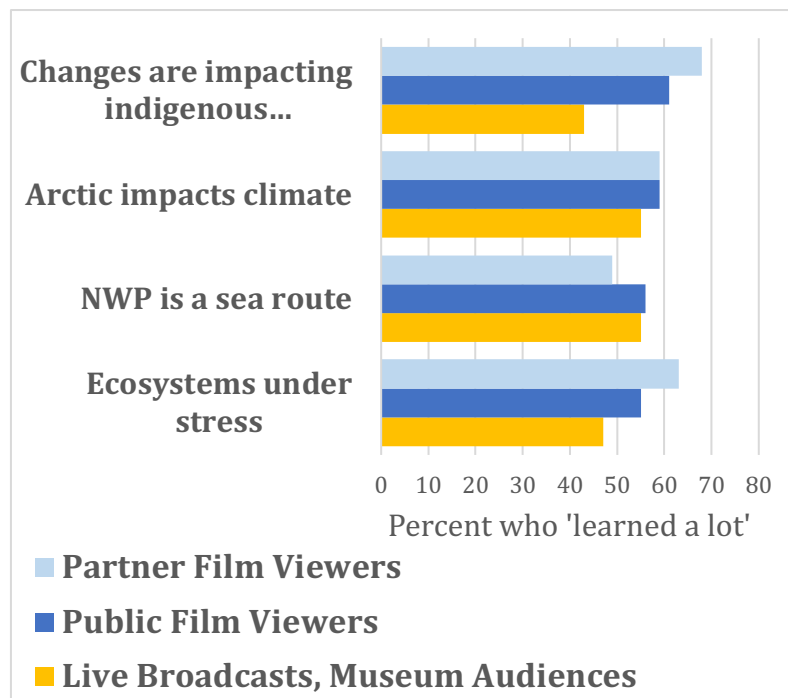
**We found substantial indication of learning on four educational goals about the Arctic environment: 55%-61% of the 'general public' film viewers said they 'learned a lot' about these topics:**

61% said they learned a lot about: 'Current changes in the Arctic are impacting indigenous communities' way of life.'

59% said they learned a lot about: 'The Arctic region has an impact on climate and people around the Earth.'

56% said they learned a lot about: 'The Northwest passage is an important sea route connecting the northern Atlantic and Pacific Oceans.'

55% said they learned a lot about: 'Arctic ecosystems are under stress due to a changing global climate.'



*I never really understood how the climate change was coming about and why the sea level was rising.*

*Another highlight would be the plastic in the ice, I thought it was so crazy to see how prominent it was in a place so far away from big civilization and it made me want to rethink my purchasing choices and patterns.*

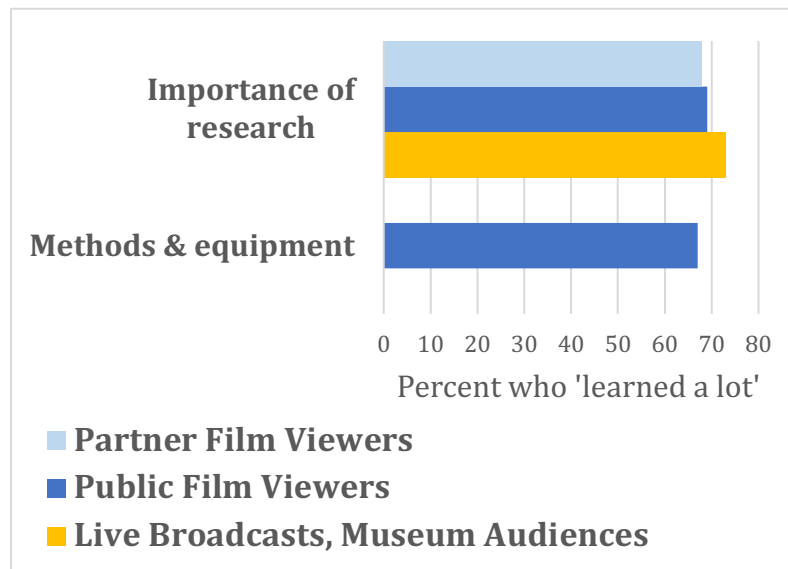
*The film was awesome and opened my eyes to a lot of things I didn't know. Thinking about the microbiology aspect and how that determines so much of the big things we typically look at. I was in awe of the science and the machine with all the technology used to test the water. Seeing the ice drilled and brought out and explaining the layers was fascinating.*

**The project created an enhanced view of the importance of research in the Arctic**

71% of 'general public' viewers thought the project (conducting scientific research in the Arctic, engaging students in the process, and producing a film about it) was extremely worthwhile

The film and live broadcasts were equally effective (69% and 72%, respectively) at conveying the message: 'It is important to conduct scientific research in the Arctic.'

The public audience viewing the film also learned about 'methods and equipment for research in cold places.' (not measured in the other two studies)



**The project enhanced public attitudes toward science**

Compared to the national baseline of public attitudes about science at the beginning of the project, this project enhanced positive perceptions of science in multiple ways.

