

Rutgers: Antarctica Report

Evaluation Findings

Introduction

Rockman et al (REA), a San Francisco-based research and evaluation firm conducted a summative evaluation of the film: *Antarctic Edge—70° South*. The film was produced by the Mason Gross School for the Arts at Rutgers University.

Antarctic Edge—70° South. Is a documentary film is a documentary feature film, funded in part by the National Science Foundation, which follows a team of scientists studying climate change in Antarctica, the fastest winter-warming place in the world. This film highlights the work of the researchers and the researchers themselves, combining science, imagery and historical data. It is approximately one hour in length.

The evaluation sought to identify changes in viewer knowledge, general impressions about the program, explore viewer understanding of themes and concepts presented in the program, and assess any additional impacts of the program on audience members.

This report highlights findings from quantitative and qualitative data gathered from in March of 2015. Viewer responses to the program were generally positive and indicate that they find the film to be both educational and entertaining.

Method

A team of REA researchers visited the Rutgers to survey viewers attending a screening of the film on campus. Viewers were recruited by posting flyers and distributing emails about the screening. Efforts were made to recruit a diverse range of viewers from the Rutgers community. Two screening were held.

To increase the number of respondents, a class of Rutgers students was also shown the film and asked to complete the survey.

As they waited in line to enter the auditorium, viewers were asked to complete the first section of the two-part survey before the program started and complete the second part immediately after the end of the film. Researchers collected completed surveys as viewers exited the auditorium. As an incentive for attending the screening and completing the survey, participants were entered into a drawing for an Amazon gift card.

Respondents were also asked to indicate their willingness to participate in in-person focus groups where they would be asked to reflect on the film. Those selected were offered an incentive of \$50 for their participation.

Reporting of data

Quotations in this report were taken from surveys and focus group. For clarification purposes, these quotations have been edited slightly for grammar but are still considered to faithfully reflect the meaning of the respondents' statements.

Summary of findings from viewer surveys

This section summarizes data from viewer surveys collected after the screenings. In total, we received 91 responses, 23 of which were from the classroom screening.

Table 1

Demographics	n=	%
Gender		
Male	40	44%
Female	51	56%
Age		
Under 18	2	2%
18-24	58	64%
25-29	8	9%
30-39	8	9%
40-49	6	7%
50-59	6	7%
60+	2	2%
Race		
White	64	70%
Asian	9	10%
African American	5	5%
Latino	6	6%
Other	7	8%
Highest level of education		
High School Diploma	45	50%
BA	14	16%
BS	12	13%
MA	1	1%
MS	1	1%
PhD	5	6%
Other	3	3%

A slight majority of viewers were female (56%). As expected, nearly two-thirds of the viewers (64%) were between the ages of 18 and 24 years of age. 70% were white. Half (50%) of the viewers were undergraduate students with a high school diploma.

Viewers' understanding of climate change

Viewing the film helped viewers to gain confidence in their understanding of climate change. Prior to viewing *Antarctic Edge*, we asked viewers to indicate whether they had a clear understanding of climate change. The same question was asked at the end of the screening. Prior to viewing the film, 71% reported they had a clear understanding of climate change, 18% did not, and 11% were unsure. After the film, viewers reported their understanding of climate change had increased, with 91% reporting a clear understanding of climate change and 9% still indicating they did not have a clear understanding of climate change.

Prior to viewing the film, viewers were given the opportunity to share their questions about climate change. Those questions tended to focus on the following:

- effects of climate change
- whether there was anything humans could do to stop or reduce climate change
- how policy around climate change can be influenced
- local examples of climate change
- how to convince the general public climate change is an issue that needs to be addressed

Specific questions included the following:

How do we stabilize the planet?

How does climate change affect human's evolution?

How do we get the country to see climate change as real and as caused by us?

Can we stop or reverse the damage that we have done? If we keep continuing with the status quo, what'll happen to the human race and the earth in 100 years?

Is it realistic to think that there is anything that can be done now to reverse all the harm we have done to our planet?

Viewers' belief in climate change

Nearly all (97%) of those who viewed the film believed climate change will have an impact on human lives in the next hundred years before the screening, and that figure remained constant after watching the documentary. 2% of viewers indicated they did not believe climate change would be a problem, and 1 respondent (1%) was undecided.

Viewers' knowledge of issues relating to climate change and Antarctic research

Viewers were very well informed about issues surrounding climate change and Antarctic research, with the vast majority of them providing correct answers to the survey questions both before and after viewing the film. Questions where there was a measurable change included the following:

Phytoplankton and krill are needed as food in Antarctic waters. (True)

Prior to viewing the film, 90% of respondents indicate they thought it was true that phytoplankton and krill are needed as food in Antarctic waters, 3% thought it was false, and 7% were undecided. After viewing *Antarctic Edge*, 100% of viewers answered correctly.

Ecology is the study of living systems and attempts to measure and understand food webs. (True)

Before viewing the film, 89% knew this definition of ecology was true, 4% thought it was false, and 6% were undecided. After watching the film, 99% knew the statement was true and one person remained undecided.

Oceans are large and it is difficult to collect data over large areas. (True)

In the pre-questionnaire, 70% of viewers agreed that oceans are large and collecting data over large areas is a challenge. 4% thought the statement was false and 6% were undecided. At the conclusion of the film, a greater number of viewers (92%) were able to identify the statement as true, only 5% thought it was false, and 2% were undecided.

Antarctica's summer climate has not changed over the past 20 years. (False)

Before watching the documentary, 85% of viewers were able to identify the statement as false, 2% thought it was true, and 13% were undecided. After seeing the film, 95% of viewers were able to understand that Antarctica's climate has changed over the past 20 years. A few more (4% from 2%) thought that Antarctica's climate had not changed and one person was unsure.

Climate change has little or no impact on the size of penguin populations in Antarctica. (False)

After viewing the film, all but one person (99%) understood climate change has had an impact on the size of penguin populations in Antarctica compared to before watching the film when 94% thought the penguin population was not impacted by climate change.

Researchers do not collect a lot of data in the summer in Antarctica. (False)

The number of viewers who understood researchers collect a lot of data during Antarctica's summer rose from 78% to 91% after watching the film. The number of undecided viewers dropped from 21% to 7% as a result of viewing *Antarctic Edge*.

The ocean waters around Antarctica have no impact on the climate in New Jersey. (False)

By watching the film, the number of respondents who understood there is a link between the ocean waters around Antarctica and the climate in New Jersey rose from 89% to 97%. Those who were undecided about the statement dropped from 10% to 1%. The number of viewers who thought there was not a connection between the ocean waters and New Jersey's climate rose from one to two.

Compared to 20 years ago, summer season in Antarctica has increased in length. (True)

Before watching the film, fewer than two-thirds (60%) of viewers knew Antarctica's summer season had lengthened in the past two decades. After watching the film, 86% understood this to be the case. The percentage of respondents who were undecided about this statement dropped from 35% to 4% as a result of seeing the film. Some viewers who were no longer undecided came away from the film thinking the summer season in Antarctica has not gotten longer, as the percentage of respondents who reported the statement as false rose from 4% to 10%.

Biological samples are not collected in Antarctica. (False)

Most viewers (91%) knew biological samples are collected in Antarctica before they watched the film, but 8% were undecided as to whether this statement was true. After watching *Antarctic Edge*, 99% were able to identify that biological samples are collected in Antarctica.

Scientists work in teams. (True)

While most viewers (96%) knew scientists work in teams, 1% did not agree with the statement and 3% were undecided. After seeing the film, 99% answered correctly that scientists work in teams.

Researchers performed paired samples t-tests to determine the statistical significance of any pre-post differences for survey items pertaining to viewers' knowledge of issues relating to climate change and Antarctic research. First, researchers re-coded responses dichotomously as either correct or incorrect. In addition to incorrect true or false responses, responses of undecided or skipped items (i.e., no answer choice selected) were considered as incorrect.

Statistical significance of findings

Overall, participants performed highly on the pre-survey, answering on average 13 of the 15 knowledge items correctly ($SD = 2.37$). However, after viewing the film, the participants still made statistically significant gains in their overall performance on the post-survey knowledge items ($M = 14.0$, $SD = 2.03$; $t(90) = -5.11$, $p < .001$). On average, overall they answered an additional knowledge item correctly on the post-survey compared to the pre.

Additionally, participants made statistically significant ($p < .05$) gains for individual knowledge items, improving their performance on the post-survey for over half of the items ($n = 8$). See Table 2.

Table 2: Knowledge Items with Significant Pre-Post Gains ($N = 92$)

Statement	Correct Response Option	% of Respondents Answering Correctly		% Change Pre to Post	t	p
		Pre-Survey*	Post-Survey*			
Phytoplankton and krill are needed as food in Antarctic waters.	True	90% (n=83)	98% (n=90)	+8%	-2.74	.007
Oceans are large and it is difficult to collect data over large areas.	True	69% (n=63)	91% (n=84)	+22%	-4.90	.000
Antarctica's summer climate has not changed over the past 20 years	False	84% (n=77)	94% (n=86)	+10%	-2.38	.019
Climate change has little or no impact on the size of penguin populations in Antarctica.	False	92% (n=85)	98% (n=90)	+6%	-2.29	.025
Researchers do not collect a lot of data in the summer in Antarctica.	False	76% (n=70)	87% (n=80)	+11%	-4.90	.000
The ocean waters around Antarctica have no impact on the climate in New Jersey.	False	88% (n=81)	96% (n=88)	+8%	-2.39	.019
Compared to 20 years ago, summer season in Antarctica has increased in length.	True	60% (n=55)	84% (n=77)	+24%	-4.40	.000
Scientists work in teams.	True	94% (n=86)	98% (n=90)	+4%	-2.03	.045

*Responses of *undecided* or skipped items (i.e., no answer choice selected) are included and considered as incorrect.

Researchers also ran t-tests on the individual knowledge items, applying Bonferroni corrections to account for the multiple comparisons (adjusted alpha = .003). Participants made statistically significant gains for three individual knowledge items, improving their performance on the post-survey. See Table 3.

Table 3: Knowledge Items with Significant Pre-Post Gains ($N = 92$)

Statement	Correct Response Option	% of Respondents Answering Correctly		% Change Pre to Post	t	p
		Pre-Survey*	Post-Survey*			
Oceans are large and it is difficult to collect data over large areas.	True	69% (n=63)	91% (n=84)	+22%	-4.90	.000
Researchers do not collect a lot of data in the summer in Antarctica.	False	76% (n=70)	87% (n=80)	+11%	-4.90	.000
Compared to 20 years ago, summer season in Antarctica has increased in length.	True	60% (n=55)	84% (n=77)	+24%	-4.40	.000

*Responses of *undecided* or skipped items (i.e., no answer choice selected) are included and considered as incorrect.

However, one factor that may have limited the percentage of participants demonstrating positive growth from before and after the film was participants' pre-existing knowledge. For example, participants performed highly on the pre-survey. More than 90% of participants answered eight of the knowledge items (i.e., slightly over half of the items) correctly on the pre-survey, and for an additional four knowledge items, more than 80% of participants answered correctly on the pre-survey. This strong pre-survey performance may have resulted in a ceiling effect, leaving little room for growth on the post-test for these items. Interestingly, the three items for which participants made statistically significant gains were the only items for which less than 80% of participants answered correctly on the pre-survey.

Chart 1: Responses to pre-viewing questions

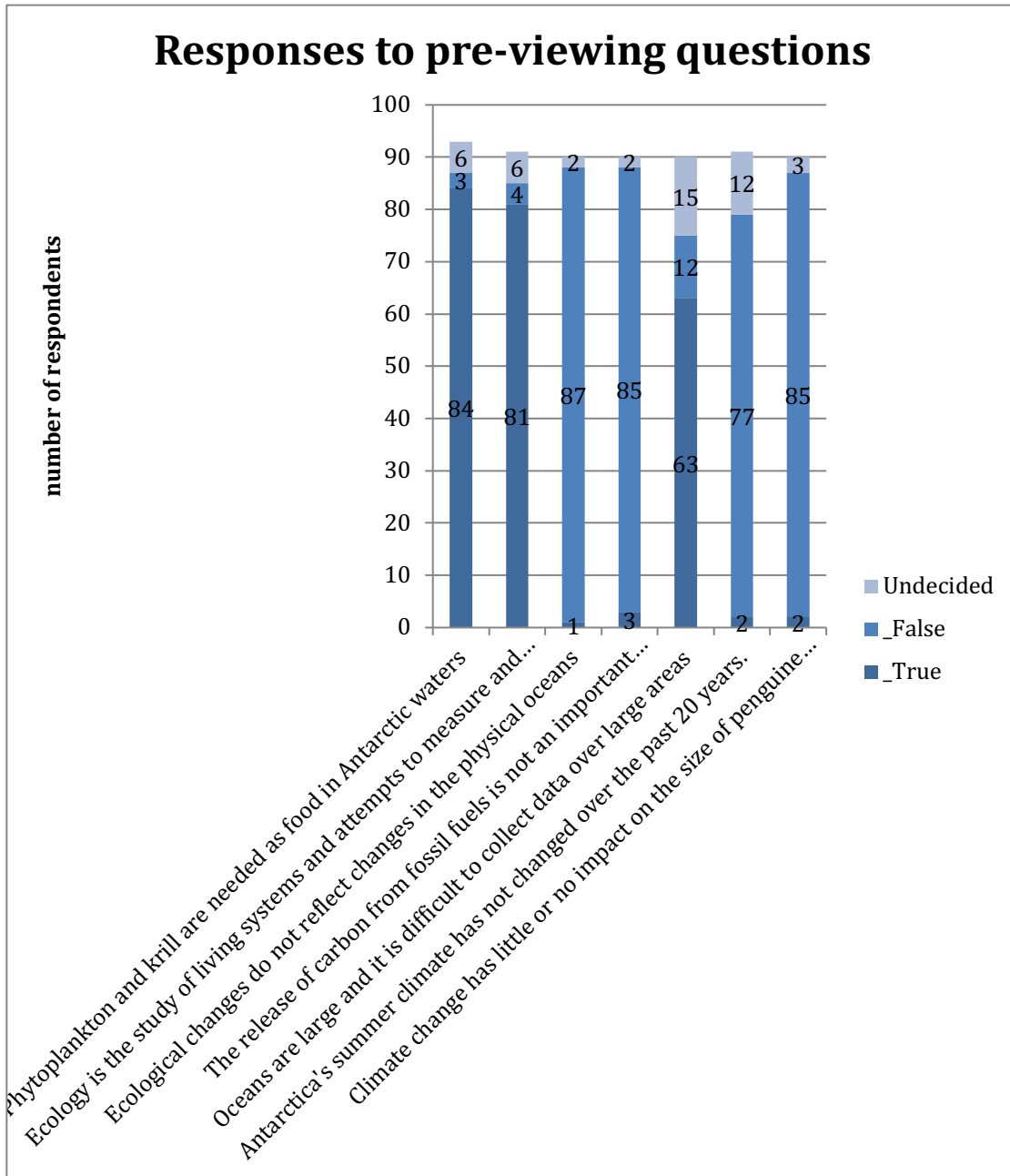


Chart 2: Responses to pre-viewing questions

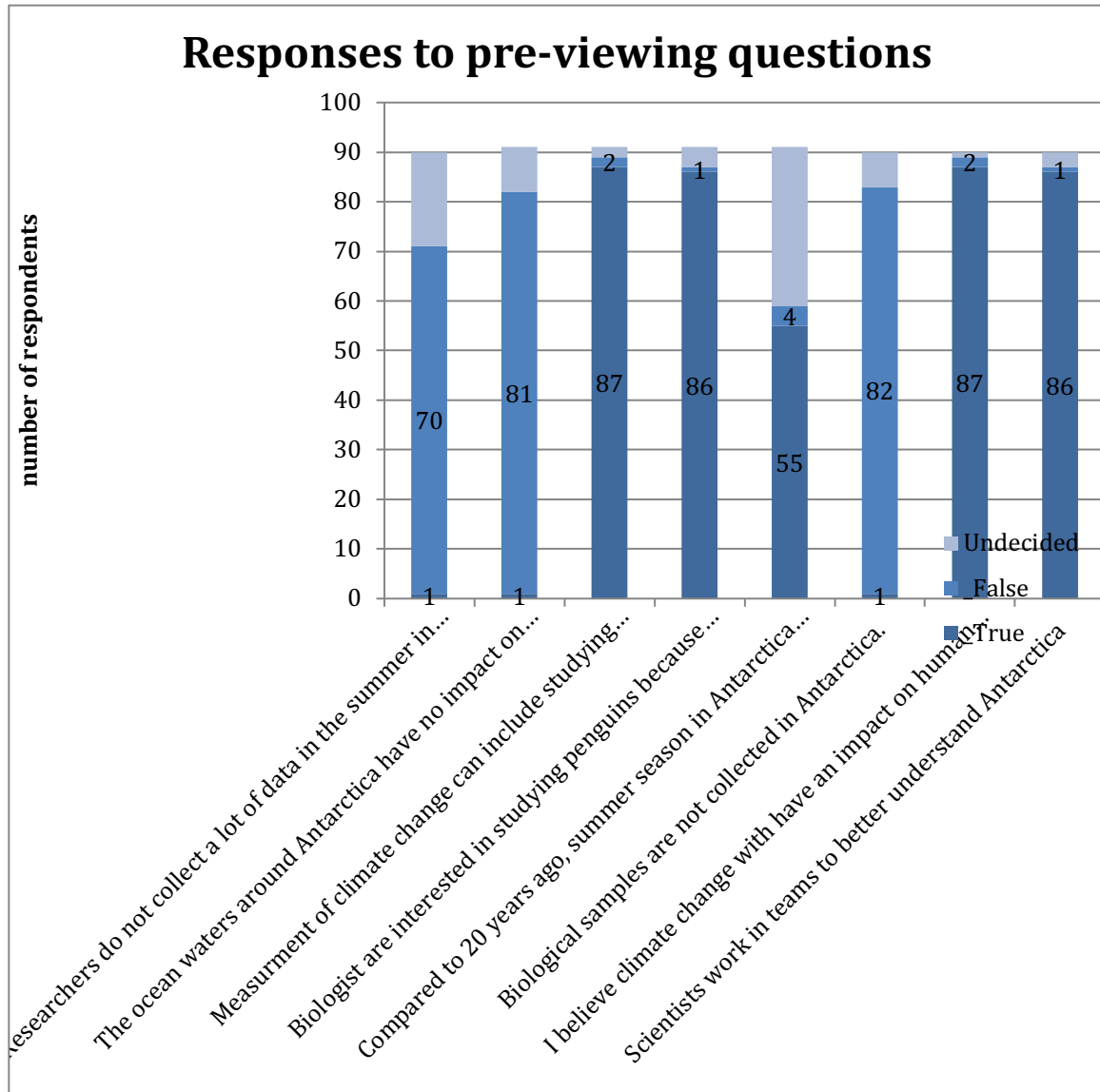


Chart 3: Responses to post-viewing questions

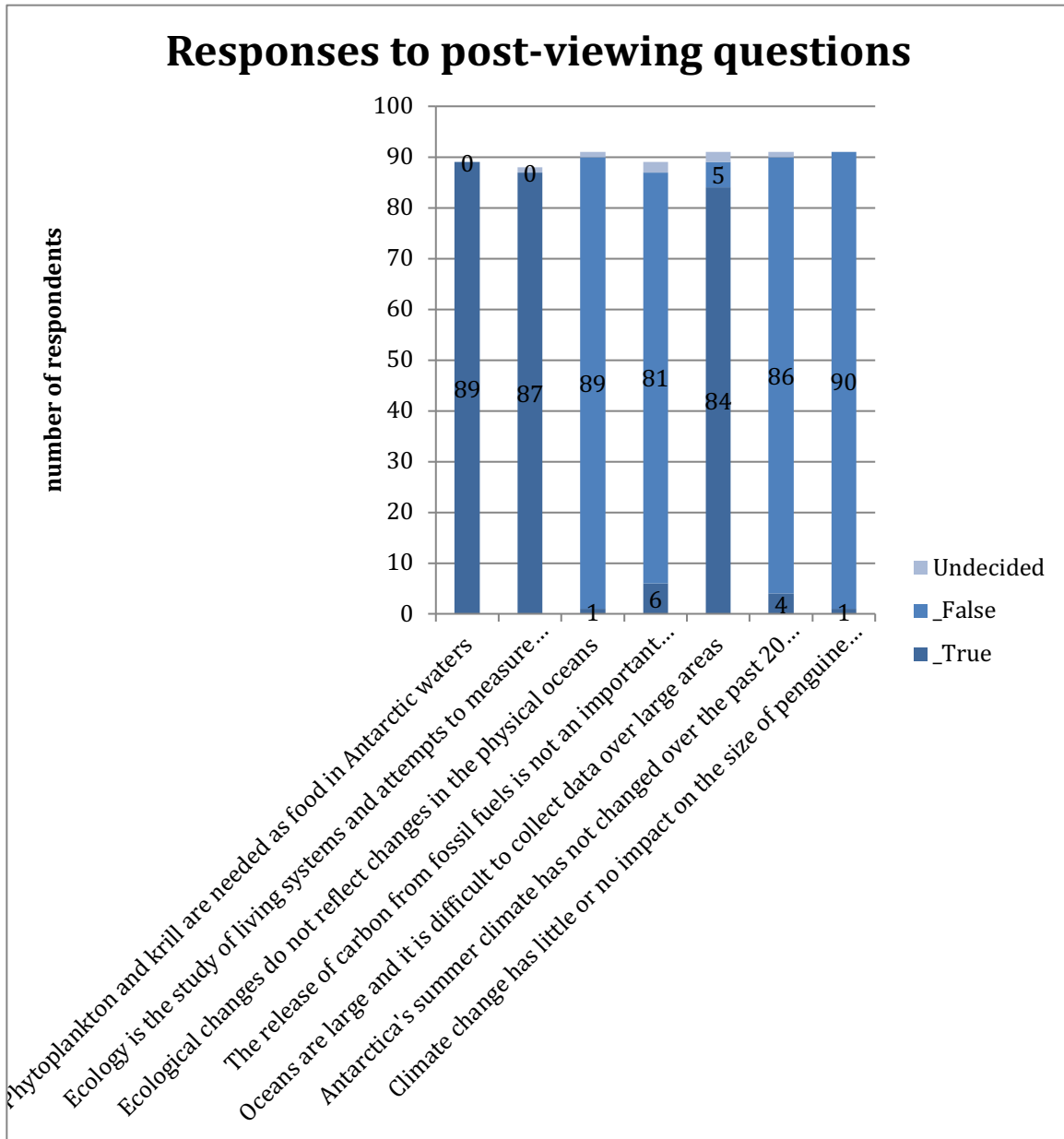
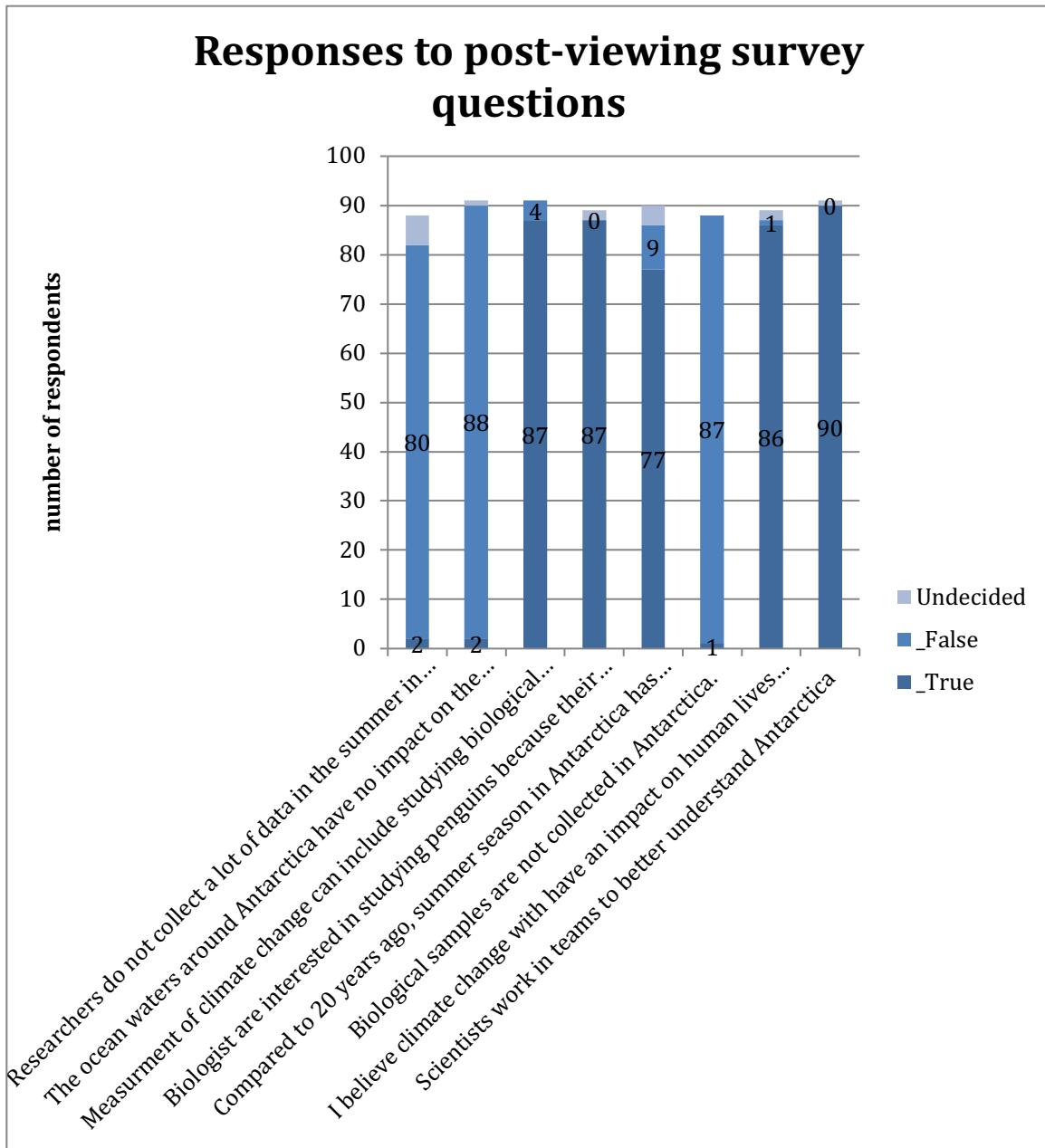


Chart 4: Responses to post-viewing questions



Responses to open-ended questions

At the end of the film, viewers were asked three open-ended questions. Those questions sought to identify the most memorable part of the film, new information learned, and questions the film raised.

There were many memorable features mentioned by those who watched the film, but the things that stood out generally fell into two categories, information learned and visual impacts. Information learned was about the life of the researchers and how their work is done and scientific facts. *Amazing visuals* mentioned by viewers included generated graphics and scenes from Antarctica.

Some people mentioned both:

Stunning images of the ice on land and sea amidst the remarkable efforts of all on board the ship.

Many viewers wrote about being shocked by the information they learned. They did not know the importance of krill or how quickly the penguin population is decreasing.

The memorable part of the film was when they spoke about how the ice melting affects the plankton, which affects the krill, which affects the penguins.

The loss of Adeles from the Palmer Station area within 5-10 years.

The penguins are on the verge of extinction, and we need to do something.

By watching the film, viewers gained an understanding of how interconnected our world is. The film really drove home how what happens in a remote part of the world actually influences the way we live in North America.

How one location affects the whole world.

For me, it was when they explained how Hurricane Sandy was as bad as it was because of climate change. It personally affected me.

The audience responded to the way the scientists work. Many mentioned the collaborative nature of their work and how much they put into it. Research can be opaque as the public general only has access to scientific results, but this film helped viewers to better understand the process behind the work and the story behind why researchers are so committed to the work they do.

The variety of science taking place in the research cruise.

The sacrifice of the scientists and the dangers they face to carry out their work.

Visuals the viewers mentioned included graphics used to illustrate scientific data. The use of quality visuals helped viewers to better understand the information addressed in *Antarctic Edge*.

The graphics that helped explain the more in-depth science was memorable and helped make the facts stick.

Other visuals that stuck with the audience focused on those they found particularly beautiful or shocking. Since most people do not have the opportunity to visit Antarctica, they do not experience the beauty and they don't see unexpected changes that can be jarring.

One respondent, when asked what was memorable wrote about *watching the icecaps fall into the ocean*. Others brought up scenes of birds flying into the camera.

The film provided the audience with beautiful scenes from a place they are not likely to visit, taught them new and important information that directly connects with their day-to-day life, and gave them insight into the way in which scientists work—both the collaborative nature and the challenges they face and sacrifices they make.

People working in such tough environments - inspiring!

Other new information the audience reporting learning fell into the same categories as the memorable information. Viewers were shocked:

The image of increasing ocean temperatures over the years was startling.

They learned how dramatic climate change is:

How quickly climate change is occurring.

That the temperature on the Antarctic peninsula has increased by 11 degrees and how drastic climate change has been in Antarctica.

And, they left the film with a clear understanding of science concepts they did not understand before:

Role of phytoplankton and krill in carbon movement and weather regulation.

The questions being addressed by this type of research, the tools this field uses, the changes occurring in Antarctica and the effects on animals and weather.

The audience left the film with a lot of questions, most of which revolved around why people do not know or care about climate change and whether there is anything we can do to reverse the trajectory of climate change.

Why doesn't the country wake up?

Is there any hope for preventing future risk?

Other viewers wanted to know more about the research itself, how it is done, and what is being learned:

I'd like to see more about how the ecological systems are tied to the physical systems. What ways can we stop the climate from changing? The movie only focused on collecting data and not on any of the ways that we can stop the climate from changing.

Summary of findings from focus groups

This section summarizes findings from focus groups. Two focus groups were held approximately one and a half weeks after the screening. Due to the number of survey respondents who expressed interest in the focus groups and were available to participate, recruitment was opportunistic in nature. All participants were screened to ensure they were articulate and willing to engage in an in-depth conversation about the film. A total of sixteen viewers took part in the focus groups. They were divided between two 90-minute sessions.

Environmental concerns

Focus group participants indicated that after watching the film, climate change was something they were thinking about. They wondered how, as the effects of climate change worsen, the planet will change and what impact it will have on our lives. Participants focused on global warming, sea level change, and water shortages.

An issue that arose was how messages about the environment and climate change are being communicated and why many members of the public are not hearing those issues.

While some participants felt they had an obligation to do something to reduce their contribution to climate change and did so, by making an effort to reduce their personal carbon footprint, others questioned whether it was too late to change our current trajectory. And, many participants said they felt they should be doing something, but they did not, either due to a lack of confidence in their ability to have any impact or because the way they live is complicated and it takes too much effort to change their behaviors.

Behaviors and attitudes after viewing the film

When asked if they spoke to others about the film, most participants indicated they had. Discussion revolved around content and tended to take place with people they saw the film with or close friends and relatives.

There were no people in the group who adamantly denied climate change, though there were some who wondered if we could do anything about it.

While some participants sought out additional information after watching *Antarctic Edge*, most activity was limited to cursory internet searches. Viewers expressed frustration with the fact that they could not find concrete ways to mitigate climate change and felt most information about actions they could take was vague or they were not convinced it would have an impact on any eventual outcomes.

One person said he tried to talk to people about the issues, but those that disagree are not going to change their minds.

I talk to people that deny that it's happening and you're trying to give them examples and if they still don't get it it's hard because you can't change a person's mindset.

While some viewers were depressed after seeing the film, one participant noted that seeing the penguin island was uplifting since it has not yet been affected by climate change. Seeing something worth saving inspired her and that might provide motivation towards change—if viewers knew what to do.

I thought it was hopeful since the penguin island in the middle hadn't been affected yet. There's hope there, there's something to be saved.

Overall, the film provided viewers with information they did not already know, but it did not change their belief in climate change—however, it should be noted that these were not people who doubted the fact of climate change. Participants said the film helped them to be more reflective about what is going on in Antarctica and throughout the world. And, though they did not alter their attitudes about climate change, many participants reported it did teach them about Antarctica and how what is happening there is connected to the rest of the world.

Viewers had a strong response to seeing how Antarctic researchers work and live. They were impressed by their commitment and tenacity, and some were surprised by the collaborative nature of the work scientists do.

It came as a surprise to some participants how young the researchers were and how much they sacrificed to do work in Antarctica. People also noted how much actual work was done on the ships, assuming before seeing the film that samples were collected in Antarctica and brought back to labs on land for analysis.

Some viewers were surprised by how few women were doing work in Antarctica, but they noted the film did feature women who were making meaningful contributions.

Response to the film linking climate change in Antarctica to the Philippines

Participants had mixed responses to the film opening where a Minister from the Philippines talks about how climate change is connected to world events. While some thought the approach was heavy-handed and said a “doomsday” perspective made people shut down, others felt it made the information presented more relevant.

It helped to provide the context and why this is important. It brought it home. If this can happen to the penguins it can happen to any species on Earth. It gave me perspective, next the birds, then it goes down the life cycle.

Some of those who responded well to the opening sequence felt the film should have closed with information about the global situation as well.

A lot of people are visual learners and seeing the disaster instead of being told how it is. If it brought it back, it would have been nice to loop back at the end.

Lingering questions

Focus group participants responded well to the film. They enjoyed it and learned a lot about the research taking place in Antarctica and how it relates to the rest of the world. There were questions about the film’s intended audience. Some viewers wondered if *Antarctic Edge* was directed at an educated, scientifically literate audience or whether its intent was to educate people and change their attitudes towards climate change.

Focus on who their intended audience is. It’s not clear. If you’re trying to convince people that climate change exists it has to be short and direct message, not talk at a much higher level than the audience, there was too much detail about the overall science. I don’t think that the average person would appreciate it. If it’s for an academic crowd they did a good job.

While viewers left the film with a better understanding of the work happening in Antarctica and how changes in one location impact others, there was some question as to what viewers could do to mitigate the damage of climate change.

I didn’t think that the message was to go home and recycle. It was this is climate change, this is what we’re doing and researching it. It wasn’t a message about what you could do.

The film was meant to raise awareness but it didn’t give you anything to initiate on what were the next steps that we could do.

Conclusions

Viewers responded positively to the film *Antarctic Edge*. While most of those who watched the film did not change their attitudes about climate change, the audience surveyed was overwhelmingly clear that climate change is occurring. What viewers did leave with was a greater understanding of how what happens in one part of the world has an impact globally.

Climate change was a theory or words before. After seeing the movie there are changes in water levels and animals are being affected.

The audience learned specific information about Antarctica, but the content that resonated with many viewers focused on how researchers work together to learn about a part of the world very far from where people live.

Many viewers were frustrated by not knowing what they could do to improve the grave situation the biological world faces as a result of climate change. This film might not be an appropriate place to address actions people can take, but some information about what they—as individuals—can do is something people are looking for.

Because the audience surveyed is was highly educated and understood climate change is an issue, there should not be an expectation that watching the film would change attitudes. If changing attitudes towards climate change is a goal of the producers, it might be worthwhile to recruit an audience that does not acknowledge climate change and survey them to see how it impacts their attitudes.