

Engaging Faith-based Communities in Citizen Science¹ through Zooniverse (#G-2020-14055)

Evaluation Report

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¹ Recent conversation among the public science community has favored the use of the phrase “people-powered research” over “citizen science” to describe public participation in research. This reflects the fact that persons do not need to be citizens to participate and that platforms used for such projects may also provide opportunities for participation in humanities and other non-scientific research. However, for consistency with the original project proposal and title, the phrase “citizen science” is used in this report.

Executive Summary

Introduction: *Engaging Faith-based Communities in Citizen Science through Zooniverse* was an 18-month pilot initiative funded by the Alfred P. Sloan Foundation and led by Dr. Grace Wolf-Chase, formerly of the Adler Planetarium, and currently Senior Scientist and Senior Education and Communication Specialist with the Planetary Science Institute with support from the Dialogue on Science, Ethics, and Religion (DoSER) program at the American Association for the Advancement of Science (AAAS). The overarching goal of this initiative was to create intentional and sustainable pathways for faith-based and interfaith communities to engage with science either by participating in existing projects on the online *Zooniverse* platform, or by supporting these organizations in building and leading their own *Zooniverse* projects. More fundamentally, the initiative's intent has been to cultivate new relationships and build trust with diverse religious communities by inviting them to become collaborators in the process of scientific discovery. Challenges imposed by the pandemic and a change in grant management necessitated some modifications in the original vision and scope of the initiative and its evaluation. As a result, implementing ongoing new programs using *Zooniverse*, and the creation of new citizen science projects, have taken a back seat to recruitment of new audiences. Most of the project leader's efforts throughout the grant period were directed toward (1) organizing and leading remote tutorials and workshops to showcase the capabilities of *Zooniverse*; (2) generating awareness of the initiative through articles, blogs, newsletters and website contributions; and (3) forming new relationships and plans for sustainable engagement beyond the grant period.

Information collected for this report was designed to assess views on science and scientists; evaluate interest among faith leaders and communities in participating in citizen science; gather information on the types of projects and messaging that would appeal to different audiences and motivate continuing engagement; and obtain feedback regarding what worked and didn't work in integrating *Zooniverse* into various programs of religious organizations.

Methods: Data for evaluating this initiative consist of online surveys designed to be completed by individuals before and after participating in *Zooniverse*, and a focus group conducted during the summer of 2021. Additionally, the project leader gathered feedback from participants and prospective participants through informal conversations throughout the grant period. Because the faith communities reached by this initiative were so diverse (seminaries, youth groups, interfaith audiences), surveys were distributed using convenience sampling to different audiences participating in four specific events, and through an e-newsletter of the *Clergy Letter Project* that reaches ~8,000 - 10,000 religious leaders on a monthly basis. Beginning in February 2021, it was also possible for individuals to access surveys through the project website: <https://ScienceReligionDialogue.org/projects/zooniverse/>.

Main Findings: A major outcome of this initiative has been raising awareness of citizen science in general, and the *Zooniverse* platform in particular, among diverse new audiences through large faith and interfaith organizations that cumulatively reach on the order of 100,000 people. These lines of communication are quite distinct from typical *Zooniverse* channels and public media. One-off events showcasing *Zooniverse* and demonstrating its use were very popular. A number of presentations, tutorials, articles, and blogs are archived online through some of these organizations and continue to get views. Religious communities currently using *Zooniverse* in long-term or continuing programs as a result of this initiative (1) had prior interest in bringing science into their programs; and/or (2) had some sort of established programs into which *Zooniverse* projects could easily be integrated. However, the project leader receives ongoing inquiries from communities interested in using *Zooniverse* in the

future, and the successful utilization of *Zooniverse* in seminary classes, and with youth and family church groups, provides models for other groups.

Although survey respondents were diverse in religious affiliation, the majority tended to be highly-educated, White, older adults who have mostly favorable views of science and scientists, and see no conflict between science and their religious views. Even so, individual responses to open-ended questions revealed diverse reasons for these views, why respondents would or wouldn't be likely to participate in citizen science, and highlighted several shortcomings of the surveys themselves that should be addressed as this effort is expanded to engage new communities in different settings. The informal discussions with religious leaders and individuals that took place throughout this initiative were invaluable in creating new partnerships and identifying needs and interests of different communities of faith. Results suggest new paths forward to attract more religiously and ethnically diverse audiences and establish larger networks of engagement.

Recommendations that emerge from this initiative include technical and practical considerations for improving the surveys that were used, features of *Zooniverse* research projects, and features of the *Zooniverse* platform, such as creating a “user group” functionality that could be used by formal and informal educators leading group projects. Other recommendations include suggestions for engaging new audiences, building trust with faith communities, and leveraging results to extend the reach of this initiative in the future. Particularly important to establishing long-term engagement of faith communities with science is the involvement of scientists themselves working in partnership with these communities. Respectful two-way communication between scientists and religious audiences is important in building trust, particularly with community members who may be willing to participate, but doubt their ability to contribute.

Future efforts to engage minority populations should be made in concert with religious leaders that serve these populations, and should identify scientists from within minority populations to help serve as role models. Research teams leading *Zooniverse* projects and the internal *Zooniverse* web development and leadership team remain primarily White. The *Zooniverse* team should consider a targeted effort to partner with under-represented groups in STEM in project-building, perhaps through outreach to HBCUs and other minority-serving institutions. Through this initiative, project leader Wolf-Chase has developed a partnership with a professor at a minority-serving seminary who also leads an intergenerational science and faith program involving the local African-American community. This partnership is a first step in a longer process that will include co-planning strategies to attract minority communities through networks that serve these communities, and identifying minority scientists to assist in outreach efforts.

Introduction

Project Background: [*Engaging Faith-based Communities in Citizen Science through Zooniverse*](#) was an 18-month pilot initiative funded by the Alfred P. Sloan Foundation and led by Dr. Grace Wolf-Chase, formerly of the Adler Planetarium, and currently Senior Scientist and Senior Education and Communication Specialist with the Planetary Science Institute. The overarching goal of this initiative was to create intentional and sustainable pathways for faith-based and interfaith communities to engage with science either by participating in existing projects on the online *Zooniverse* platform, or by supporting these organizations in building and leading their own *Zooniverse* projects. Initially managed by the Adler Planetarium, due to conditions brought on by the COVID-19 pandemic, there was a break in the initiative for several months as management was transferred to the American Association for the Advancement of Science (AAAS) Dialogue on Science, Ethics, and Religion (DoSER) program.

While the initiative was motivated in part by the desire to expand and diversify the community of citizen scientists participating in *Zooniverse*, more fundamentally, its intent has been to cultivate new relationships and build trust with diverse religious communities by inviting them to become collaborators in the process of scientific discovery. Challenges imposed by the pandemic, together with the change in grant management and participating personnel, necessitated some modifications in the original vision and scope of the initiative and its evaluation. Like everyone else, faith communities have struggled to maintain themselves and their programs during the pandemic. As a result, implementing ongoing new programs using *Zooniverse*, and the creation of new citizen-science projects, have taken a back seat to recruitment of new audiences. Most of the project leader's efforts throughout the grant period were directed toward (1) organizing and leading remote tutorials and workshops to showcase the capabilities of *Zooniverse*; (2) generating awareness of the initiative through articles, blogs, newsletters and website contributions; and (3) forming new relationships and plans for sustainable engagement beyond the grant period. A list of organizations contacted by project leader Wolf-Chase, including events or programs that were established as a result of the initiative, is provided in Appendix A.

Evaluation Focus: The information collected for this report was designed to assess views on science and scientists; interest among faith leaders and communities in participating in citizen science; gather information on the types of projects and messaging that would appeal to different audiences and motivate continuing engagement; and obtain feedback regarding what worked and didn't work in integrating *Zooniverse* into various programs of religious organizations.

Methods

Data for evaluating this initiative consist of online surveys designed to be completed by individuals both before and after participating in *Zooniverse*, and a focus group conducted during the summer of 2021. Additionally, the project leader gathered feedback from participants and prospective participants through informal conversations throughout the grant period.

Online Surveys: Together with input from project leader Wolf-Chase and *Zooniverse* Co-P.I. Laura Trouille, *Zooniverse* postdoctoral scholar Molly Simon (currently Assistant Professor in the School of Earth and Space Exploration at Arizona State University) developed online pre- and post-participation surveys to evaluate this initiative. Both surveys are included in Appendix B. The pre-participation survey was designed to gather demographic information, views on science and scientists, interest in participating in citizen science, and information on whether science was perceived to conflict with religious beliefs. The post-participation survey was designed to gather feedback on participants'

experiences with the platform and likelihood of further participation. Surveys were finalized and ready for distribution in June 2020. Because the faith communities reached by this initiative were so diverse (seminaries, youth groups, interfaith audiences), surveys were distributed using convenience sampling to different audiences participating in four specific events:

1. Seminary faculty at a virtual DoSER *Science for Seminaries* retreat during the summer of 2020
2. Remote middle- and high-school youth groups at a Presbyterian church in February 2021
3. Attendees of a virtual international multi-cultural workshop in March 2021
4. Attendees of a virtual interfaith environmental webinar in April 2021 (the pre-participation survey was included as a step in the registration process)

Surveys were also distributed through the e-newsletter of the *Clergy Letter Project*, reaching ~8,000 - 10,000 religious leaders on a monthly basis. Beginning in February 2021, it was also possible for individuals to access surveys through the project website:

<https://ScienceReligionDialogue.org/projects/zooniverse/>.

A total of 185 pre-participation surveys were returned; however, only 27 post-participation surveys were returned, with an overlap of only 18 people who completed both surveys.

Focus Group: Project leader Wolf-Chase conducted a small focus group on July 22, 2021 to get additional feedback from participants who used *Zooniverse* in different ways. The focus group consisted of a retired Lutheran pastor who used *Zooniverse* as an individual and helped market the platform among science & religion organizations; a professor at a minority-serving seminary in the African Methodist Episcopal (AME) Zion Church tradition who integrated several *Zooniverse* projects into her seminary classes and into intergenerational summer camps in North Carolina; and a lay member of a Muslim community in Chicago, who is actively involved in marketing citizen science among Muslims. On August 2, 2021, Wolf-Chase conducted an additional conversation with the pastor of a 600-member Lutheran congregation in a small Texas city, who used *Zooniverse* with his confirmation class, and could not be present on July 22.

The following questions were distributed in advance to focus group participants to stimulate and guide an informal discussion:

1. This project was announced through various venues (e.g., conferences, newsletters, email, various social media, word of mouth). What venues are most effective for your respective communities?
2. What types of messaging are most effective in encouraging the communities you connect with to participate (e.g., appeal to values, opportunity to connect with science/scientists, other)?
3. Are there any ongoing programs/learning opportunities in your communities where *Zooniverse* might be a natural fit for your program's goals? Is there any way we can improve the platform for participants?
4. What resources/support would you need to integrate *Zooniverse* into an ongoing program? What could we provide to help in this regard? What obstacles/challenges might you face?
5. What are the most appealing types of research projects to you or your communities, and/or what types of projects would you like to see developed for *Zooniverse*?
6. Would you and/or your community be more, less, or equally interested in participating in in-person venues for citizen science as opposed to online?
7. What do you see as the biggest challenges and/or impediments to participation, for you and the faith communities you work with?

Limitations of the Evaluation: Most of this pilot initiative took place during the severe restrictions imposed by the COVID-19 pandemic. Furthermore, a change in institutional management at the height of the pandemic interrupted the project for several months. The vast majority of presentations, tutorials, programs, and events led by project leader Wolf-Chase were conducted remotely from her home. Wolf-Chase's contact information was provided in email announcements of this initiative that were distributed to organizations listed in Appendix A, as well as in newsletters, blogs, articles, presentations, workshops, and, since February 2021, via the initiative's website maintained by DoSER. However, this sort of general advertising was not very effective in generating responses from communities interested in using *Zooniverse* in their programs. Direct contact with individuals through phone conversations or videoconferences was typically necessary to initiate a conversation, and even with direct contact, "priming the pump" was difficult; i.e., individuals with whom the project leader spoke tended to want examples of what worked with other groups before attempting to incorporate *Zooniverse* into their own programs. Therefore, most of the feedback provided by *Zooniverse* participants comes from one-off events led by Wolf-Chase rather than long-term programs. Because of this, and because of the low rate of return of post-participation surveys, it is not possible to correlate participation in *Zooniverse* with any changes in attitude toward science or scientists.

Another factor limiting evaluation was the inability to track new participants *resulting directly* from the outreach efforts that were a huge component of this initiative. Although *Zooniverse* acquired over 250,000 new participants during the pandemic, it is impossible to estimate how many of these participants joined specifically because they learned about the platform through the project leader's many announcements, articles, blogs, presentations, and tutorials to the diverse organizations listed in Appendix A. We estimate these combined venues reached on the order of 100,000 individuals; however, many of these individuals may also be plugged into other communication channels featuring *Zooniverse* that are not targeted specifically to religious organizations.

Results and Discussion

Online Survey Results: As Table 1 indicates, the vast majority of survey respondents have favorable views toward science. Most of the 185 individuals who returned pre-participation surveys were White (86%), male (67%), highly educated (87% Masters or Doctorate), older adults (74% over 50). Respondents self-identified across diverse faith traditions (see Figure 1). The 27 individuals who returned post-participation surveys were mostly White (75%), more evenly spread in gender, with a somewhat higher percentage of younger people at a lower level of education; however, 50% of the post-participation respondents were over 50, and 68% had Masters or Doctorate degrees. The fractional increase in younger people at lower levels of education who returned post-participation surveys is because the middle- and high-school groups were asked by their youth leaders to fill out post-participation surveys before the end of these classes (even so, not all returned surveys).



Figure 1: Word Cloud visualizing the frequency and diversity of responses among individuals asked to self-identify their religious traditions. Note: The relatively large representation of “Evangelical” is mostly due to respondents who identified as members of the Evangelical Lutheran Church in America (ELCA), which is typically considered a progressive Christian denomination, rather than from individuals specifically identifying as Evangelical Christians. This figure is meant to give readers a sense of the diverse religious traditions represented.

Given the high level of education of most respondents, it is not surprising that a majority felt they could contribute in meaningful ways to real research; however, we note the wording of the question did not specify *scientific* research. It's interesting to note that all the middle- and high-school children who returned surveys during the February 2021 youth group event "agreed" that they felt they could contribute in meaningful ways to research.

One question that was included in both surveys asked respondents to agree to one of two statements: “The scientific method generally produces accurate conclusions” or “The scientific method can be used to produce any conclusion the researcher wants.” Nearly all survey respondents (99% pre-participation, 93% post-participation) agreed with the statement, “The scientific method generally produces accurate conclusions,” while the remainder chose “The scientific method can be used to produce any conclusion the researcher wants.” Interestingly, two people, both minority women under 40 with advanced degrees, who agreed or strongly agreed that science is important and helps improve our daily lives, also agreed with the statement “The scientific method can be used to produce any conclusion the researcher wants.”

		Strongly Disagree	Disagree	In Between	Agree	Strongly Agree
I feel that I can contribute in meaningful ways to real research.	Pre: Post:	3% -	6.5% -	27% 7.4%	36% 55.6%	26% 37%
Science is important.	Pre: Post:	4% -	- -	0.5% -	4% 7.4%	91% 93.6%
Science helps improve our everyday lives.	Pre: Post:	4% -	- -	1% -	6% 11%	89% 89%

Table 1: Pre- and post-participation views toward contributing to research and to science. Percentages are based on 185 pre-participation respondents and 27 post-participation respondents.

Notes: Based on answers to other questions, those who “strongly disagree” that science is important and helps improve our daily lives likely misinterpreted the sense of the question and meant to answer “strongly agree.” These respondents were all over 60 years old.

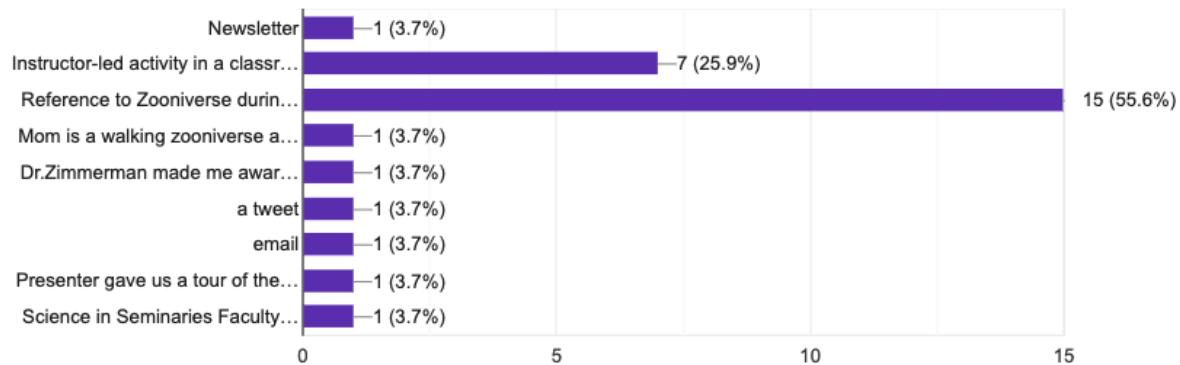
		Very Unlikely	Unlikely	In Between	Likely	Very Likely
How likely would you be to try a <i>Zooniverse</i> project?.	Pre:	6%	22.2%	34.1%	22.7%	10.3%
How likely would you be to participate in <i>Zooniverse</i> again?	Post:	0%	7.4%	18.5%	44.4%	29.6%
How likely would you be to try an in-person citizen science project?	Pre: Post:	8.2% 3.7%	22.8% 25%	32.6% 28.6%	23.9% 35.7%	8.7% 7.1%

Table 2: Likelihood of participating in *Zooniverse* or in-person citizen science. Percentages are based on 185 pre-participation respondents and 27 post-participation respondents. Percentages do not sum to 100 in the pre-participation survey because a small fraction of respondents had previously participated in a *Zooniverse* (4.3% – 8/185) or an in-person (3.8% – 7/185) citizen science project.

Table 2 indicates responses to questions regarding the likelihood of participating in *Zooniverse* and in-person citizen science projects. The distributions of pre-participation respondents on both questions were very similar. Roughly one-third of pre-participation respondents were “in between,” with close to one-quarter “likely” or “unlikely,” and $\leq 10\%$ who would be either “very likely” or “very unlikely” to participate. Whereas only 33% of pre-participation respondents were “likely” or “very likely” to try a *Zooniverse* project, 74% of post-participation respondents were “likely” or “very likely” to participate again, and post-participation respondents were also somewhat more favorably inclined to trying an in-person citizen-science project.

How did you hear about Zooniverse? [Check all that apply]

27 responses



In what type of Zooniverse activity did you participate? [Check all that apply]

26 responses

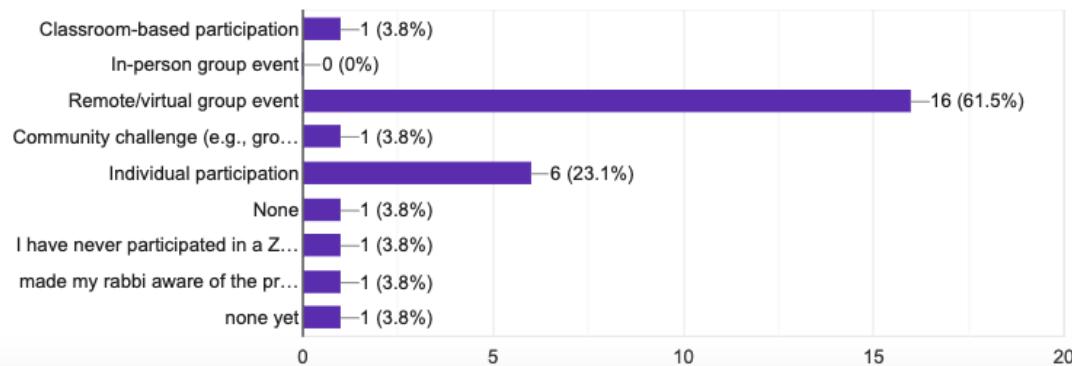


Figure 2: Post-participation responses indicating how individuals heard about *Zooniverse* and the type of activity in which they participated. Individuals could select multiple options as well as write in their own answers.

Figure 2 indicates how post-participation respondents heard about *Zooniverse* and the type of activity in which they participated. It indicates that most of the respondents heard about *Zooniverse* during a presentation or during a classroom activity, and most participated during a remote group event or individually.

Open-Ended Responses

The pre-participation survey included a prompt for respondents to explain their responses to how likely they would be to try a *Zooniverse* project, while the post-participation survey included a prompt for respondents to explain how likely they would be to participate again. Both surveys included three identical prompts for respondents to explain their confidence in scientists, whether they would consider participating in an in-person citizen science project, and whether science was perceived to conflict with a respondent's religious beliefs. Since few post-participation surveys were returned, and the majority of these followed one-time *Zooniverse* events unlikely to have a significant impact on attitudes, sample responses for identical questions are grouped together. Project leader Wolf-Chase identified common themes among responses to open-ended questions. What follows are a few

examples of themes that emerged from these responses. A large number of sample responses, categorized by themes, are provided in Appendix C.

Zooniverse and In-Person Citizen-Science Participation

Roughly $\frac{1}{3}$ of pre-survey respondents indicated they were likely or very likely to participate in *Zooniverse*, either individually or with students. Some respondents particularly liked the variety of projects on *Zooniverse* or the sense of involvement in contributing to the advancement of knowledge or societal benefits. Themes that emerged from the 74% of post-survey respondents who indicated they were likely or very likely to participate again were the variety of projects, the sense of being involved and being able to contribute without being an expert, and the experience of participating, which was described as fun, engaging, and interesting. Platform-related responses were mixed. Some found the platform to be easy to use and liked the field guide, while others had problems with poor images or photos, and wished there were an easier way to access projects with mobile devices.

The most common (and indeed, overwhelming) reason cited in survey responses for not being likely to participate in *Zooniverse* was lack of time and overcommitted schedules. It should be noted that respondents included some clergy members who have backgrounds, or even degrees, in science. Nearly 30% of respondents mentioned time as a limiting factor for participation in *Zooniverse* or in-person citizen science projects. This is perhaps not surprising since the majority of respondents have advanced degrees. Many respondents are also advanced in age and cited age and energy levels as limiting factors. Some retirees responded that they were even busier in retirement, while others felt they had more time. Several respondents felt they did not have the expertise or interest to contribute to research specifically described as “scientific.” Although transcribing historical documents was cited as an example of a *Zooniverse* project in the survey question, *Zooniverse* itself was described as engaging the public in scientific research rather than research in the sciences and humanities. This may have negatively impacted responses by those with degrees in the humanities. Some respondents also felt they needed to know more about the projects and the actual time required to participate in order to decide how likely they’d be to participate. Many respondents included various combinations of these themes as reasons both for participating or being disinclined to participate.

Confidence in Scientists

When asked, “How much confidence do you have that scientists act in the best interests of the public?” respondents were split between “a great deal” and “a fair amount,” with only 4 pre-participation respondents choosing “not much,” and no one choosing “no confidence at all.” Only one of the respondents who chose “not much” provided a reason: “I think science as it is practiced today serves the dominant culture, and the dominant culture is killing [the] all life on the planet including humans (the public).” One African-American man attending the seminary retreat confided informally that he was unsure how to answer the question, noting the history of abuses African Americans have suffered as a result of unethical scientific and medical experimentation, and underscoring the relationship between trust and representation in the scientific community.

Some responses were about scientists themselves, who were either viewed as subject to the same fallibility and selfish motivations as everyone else, or as primarily driven by reason and logic. Respondents who knew scientists were inclined to view the motivations of scientists favorably. One response praised scientists for including non-scientists in citizen science: “Scientists let their experiments be participated in by citizens (using zooniverse) which makes us feel like our thoughts are being heard.” Some responses indicated a higher level of trust in scientists who are employed in independent or academic research, as opposed to scientists employed by corporations or industries that might be motivated by economic, rather than humanitarian, interests. Other responses included ethical concerns about the application of science and technology. Still others expressed trust in the methodology of science and the process of research to self-correct errors.

Science and Religious Beliefs

Roughly 90% of respondents saw no conflict between science and their religious beliefs. It should be noted that most of the respondents who specified Christian affiliations represent mainline Protestant and Catholic denominations. The relatively large representation of “Evangelical” in the Word Cloud depicted in Figure 1 is mostly due to respondents who identified as members of the Evangelical Lutheran Church in America (ELCA), which is typically considered a progressive Christian denomination, rather than from individuals specifically identifying as Evangelical Christians. Furthermore, many responses came from clergy members whose views may not reflect the views of their typical congregants.

Many view science and religion as complementary, addressing primarily different questions. Examples in this category of response include:

- “Science is a tool for exploring the physical world around us, religion is a tool for exploring the spiritual world.”
- “My faith, as a Lutheran pastor, is not based on science. I find it exciting to explore the meaning of scientific discoveries or theories in the context of my religious convictions.”

Some respondents see a synergy, or direct influence between, science and religion:

- “Their overlapping domains leave much room for each to inform the other.”
- “MY GOD IS THE AUTHOR OF SCIENCE.”

Others feel that science can inform, challenge, deepen, or modify religious understandings. Examples in this category include:

- “Because we don't see the science or the Scriptures clearly all the time. When things change, we observe new things (especially in science), we have to pause and reflect on how to reconcile. This is a long-term project, and ultimately any temporary tension is not final (in a metaphysical, eternal sense).”
- “I've always been religious (Christian), but grew up in a pro-science denomination (United Church of Christ) and am now an ordained minister in that denomination - and I firmly believe, following the advice of Augustine, that religious belief must conform to science and not the other way around.”
- “My religious beliefs as a Roman Catholic have constantly been modified through history as science has progressed. The changes have involved interpretations, and not essential beliefs.”
- “Science reflects 'God;' to the extent that scientific changes conflict with religious beliefs, those religious beliefs need to be reconsidered.”

In Appendix C, responses in the above two categories are grouped together, since many responses included both “complementary” and “synergistic” ideas. One respondent who saw no conflict simply commented “My answer requires more space and time to answer,” illustrating reticence to provide any kind of simple or pat answer.

Regarding perceived conflicts, only one person mentioned evolution, one person mentioned resurrection, and one person saw a conflict only if science drew a person away from faith. Other

conflict responses reflected ethical or political views and technological applications of science. Examples in this category include:

- “Depends on the context. Politics and the drug industry give me pause from time to time.”
- “Science may conflict with ethical POV. My ethics might conflict but not based on my religion.”
- “On the issue of the humanity of an embryo, I am still considering the science against my tradition's consideration of the embryo as a "human being".”
- “Science often explores issues which are not in the best interest of people or the planet, such as making new weapons or new poisons or exploits people, animals, nature or the planet.”

Focus Group Results:

Summary of Discussions

The following summarize major points that emerged during the focus group discussions.

- There is no one size fits all approach when it comes to venues for marketing *Zooniverse* to religious communities; however, the direct involvement of a religious leader in helping to communicate what citizen science can bring to their respective faith communities is highly desirable.
- There is also no one size fits all approach when it comes to the kinds of citizen science projects that are of interest to religious communities – much of this depends on local conditions and interests, age, and other factors that aren't directly related to religious views. Scientists need to work closely with community leaders to identify the best fits for a given community.
- Two focus group participants mentioned that monetary or other awards would help provide an incentive to accompany *Zooniverse* challenges – events where participants would receive some sort of compensation for completing a specific number of classifications on a given project.
- Once a religious leader (seminary professor, pastor, youth group leader) decides to implement *Zooniverse* in a specific program, it is best for the religious leader to work in concert with a scientist, other researcher, or *Zooniverse* team member, to help implement the program, at least the first time. This is important in order to help instill confidence in the leader and the participants using the platform.
- When implementing a *Zooniverse* science project, unless religious leaders themselves have strong science backgrounds (some do), the most effective model is for the religious leader and a scientist to work in tag-team style, where the scientist can interact directly with participants on the science, and the religious leader can address questions within their own area of expertise. This doesn't mean the scientist has to be present throughout the duration of the project; however, putting a human face on science at the start of a program is very important.
- There is no substitute for personal interactions between scientists and the public – discussion boards are helpful, but probably not sufficient, in getting many people to understand that they can play an important role in doing science. People who come to know scientists personally are

also more inclined to see them in a positive light. Two-way communication is very important. Here, diversity is also critical. Project leader Wolf-Chase notes that both the research teams leading *Zooniverse* projects and the internal *Zooniverse* web development and leadership team remain primarily White. The *Zooniverse* team should consider a targeted effort to partner with under-represented groups in STEM in project-building, perhaps through outreach to HBCUs and other minority-serving institutions.

Individual Participant Responses

Participant A: Retired Lutheran Pastor

Participant A used several of the Physics/Space projects featured on *Zooniverse*. He felt the platform would be improved if it were possible to do practice classifications to compare with expert classifications beyond the tutorial and field guide (a few projects have this capacity, but not all.) Regarding advertising and promoting *Zooniverse*, Participant A noted that in general you “need to say it 5 times in different ways.” For church programs specifically, pastors could announce opportunities on Sunday morning, as well as through church bulletins and newsletters. Regarding messaging to engage religious communities in participation, Participant A noted the importance of a commitment to truth among religious communities, and felt that highlighting that we get at truth in different ways in science and religion would be helpful. Both faith and science say that there is truth that matters.

Participant B: Professor at a Historically Black Seminary in North Carolina

Participant B had students work in six small teams on five different *Zooniverse* projects they chose during her Spring 2020 seminary classes. This was her first attempt to integrate *Zooniverse* into seminary education. Students were originally asked to produce podcasts based on their experiences, but due to the pandemic, they wrote essays summarizing their experiences instead. Participant B found that about half the class was excited about using *Zooniverse* and half participated begrudgingly because it was an assignment. The average age of students attending this seminary is late 40s, with a few young students just coming out of college, but many nearing retirement age in their late 50s/early 60s. Participant B found that the students had a significant learning curve, and would have benefitted from more training in using the platform as well as more background in the project content. She will use *Zooniverse* projects again in her Spring 2022 classes, with an eye toward providing suggestions for improving the platform.

Participant B also integrated *Zooniverse* into activities during her intergenerational summer camps. She found that participants were “a bit intimidated,” and needed more time to go through the platform and to absorb the project content. They didn’t want to complete post-participation surveys. She suggested we co-organize a future event with African-American congregations on using the *Zooniverse* platform, followed by a focused family challenge with some sort of monetary prize, such as a sponsored gift card. Families would participate over a period of weeks, and then would present during a group event where they would share what they did and what they learned. Making this an extended intergenerational activity could help bridge different levels of computer literacy across older and younger generations, while encouraging families to interact in meaningful ways. Participant B further noted that the summer 2021 camp theme on climate change helped evoke an interest among senior participants in bringing back more nature hymns into churches (e.g., “For the Beauty of the Earth”). She felt these songs stimulate the imagination, encourage people to observe and think about creation, and might help some people who are “nature-phobic,” underscoring how churches might help stimulate a greater interest in science among congregants.

Participant B indicated that the biggest challenges to participation in her faith community were not anti-science views, but have to do with different local interests and priorities. For example, many

older seniors in religious communities are concerned first and foremost with just keeping their churches afloat. An appeal to values is critical for these older adults – their priorities include healthcare and genome editing possibilities. There is also a strong concern about A.I. taking jobs away from human beings. On the other hand, kids love A.I. and robots. Many kids are already “hooked” on science and would love to talk with scientists. Participant B noted that while *Zooniverse* discussion boards enable participants to ask questions, they don’t offer the opportunity for real-time interactions with scientists. She also felt that most kids would prefer outdoor citizen-science projects where they could take actual samples and measure things.

Finally, Participant B would like to explore the possibility of integrating *Zooniverse* experiences into educational curricula being developed for *Project 2061*, a long-term AAAS initiative to help all Americans become literate in science, mathematics, and technology.

Participant C: Lay Member of a Muslim Community in Chicago

Participant C has been eager to share her passion for citizen science with fellow Muslims, but related that the pandemic has made it very difficult to promote *Zooniverse* to Muslim communities. She is hopeful that post-pandemic efforts will be more fruitful. She noted that social media is most effective for messaging in her community, and that messaging is best done by highlighting connections to religious values, addressing everyday problems, marketing family opportunities, and creating challenge incentives by offering rewards such as free museum tickets, etc. Participant C further noted that connecting the beauty of nature and the universe to values expressed in the Quran was important for Muslims, as well as highlighting science as a way of connecting with God. She loves citizen science because of its power to demonstrate science as a process that doesn’t end with facts, but uses observations and experiments to gain knowledge of nature.

Participant D: Pastor of a 600-member Lutheran congregation in a small Texas city

Participant D used *Zooniverse* during faith and science discussions with his confirmation class of 10 middle-school students. He had students choose projects individually and then the class voted on a single project to do as a group. The winner was *Penguin Watch*, which was considered both intuitive and addictive. Students were given a number of classifications to do; however, not all students had the same level of interest. They were not as engaged as participant D had hoped, and they didn’t use the discussion boards. This was Participant D’s first attempt to use the platform, and next time students will be allowed to find individual projects that best match their interests.

Participant D didn’t get a sense that students felt they were really contributing to research; however, he also noted that they didn’t really explore *Zooniverse* discussion boards. Participant D also noted that mobile devices are important to many young people, and better functionality in this regard across *Zooniverse* projects would be desirable to attract more of this audience and assist in community-building. Continued engagement could grow organically, especially if individuals could participate under a community group name.

In the future, Participant D would like to see the establishment of affinity groups like virtual community centers that connect people with common interests, both within congregations and across larger communities like senior centers and philanthropic groups. He noted that his location in a small town would make it relatively easy to call the editor of the local paper and write an article to announce and introduce *Zooniverse*, inviting people to get together once a month or so to share a meal and what they’ve been learning. Churches could also set up computer stations on special event days such as *God’s Work, Our Hands* Sunday, where people could explore citizen science as one example of what serving God and neighbor might look like.

Success Stories:

Engaging New Audiences

The biggest successes of this initiative have come through the interest in *Zooniverse* generated via the project leader's presentations, tutorials, and workshops. One-off events showcasing *Zooniverse* and/or demonstrating its use were very popular. Several of these have been archived on YouTube or other platforms and get continuing views (e.g., [Community Building through Zooniverse: Learning Science through Participation](#); [Preaching with the Sciences: Reawakening the Religious Imagination with \(Space\) Science](#); [Community Building with Zooniverse](#); [Navigating Crises and Bridging Cultural Divides with Citizen Science](#); [Community Building with Zooniverse](#); [“Zooniverse” Lets You Expand Scientific Knowledge from Home](#); [The Power of Citizen Science: A Conversation with Dr. Grace Wolf-Chase](#); [Using Zooniverse for Your Classroom](#)). Some of the articles and blogs written about this initiative are also accessible online (e.g., [AAAS DoSER Makes Inroads Into Communities of Faith with Help from Citizen Scientists](#); [Serving God and Neighbor through Citizen Science](#); monthly posts in the [Astrobiology News archive](#); [Building Stronger Communities and a Better World through Citizen Science](#); [Covidence articles about the Zooniverse initiative](#)).

Wolf-Chase continues to receive many requests from faith and interfaith communities based on her outreach to organizations listed in Appendix A. For example, through her *Zooniverse* presentation at an online workshop organized by the American Association of Physical Anthropologists that was designed to give educators resources for teaching biology and evolution in culturally sensitive ways, Wolf-Chase has received a request to provide a similar experience at a teacher workshop coinciding with the 2021 Society of Vertebrate Paleontology meeting in November.

Zooniverse in Seminaries

Through DoSER's *Science for Seminaries* program, Wolf-Chase has showcased *Zooniverse* capabilities to individuals from at least two dozen seminaries over the past couple of years. The purpose of the program is to help seminaries integrate scientific content into core classes and programs.

During the Spring 2020 semester, a professor from a minority-serving seminary in North Carolina used several different *Zooniverse* projects in core seminary classes. At the end of the courses, students wrote papers reflecting on their *Zooniverse* projects, and relating the science to various themes raised during the courses. For example, students working on *Hubble Asteroid Hunter* reflected on the potential threat of asteroids to life on Earth; students working on *Notes from Nature* reflected on the relationship of plant and animal habitat loss to human health; and students working on *Parasite Safari* reflected on the Church's ecological responsibility. Particularly creative papers by students who worked on *Snapshot Elephants for Africa* contained reflections relating social behaviors of male elephants to structures in the Black church.

The seminary professor intends to continue incorporating *Zooniverse* into future classes, using lessons learned in the first attempt to evolve the model. By continuing to expose seminaries to the possibilities, we have generated interest from other seminaries that we expect will follow this seminary's successful model.

Zooniverse with Church Youth and Family Groups

Zooniverse has been used with youth and family groups in a few different ways. A Lutheran pastor in Texas used *Zooniverse's Penguin Watch* project over the course of a confirmation class science and faith program. This pastor has a strong science background. Upon learning about *Zooniverse*, the pastor had no problem implementing its use with students, although the degree to which students were engaged by the project was mixed. In the future, the pastor will make more extensive use of discussion boards to encourage students to interact with team scientists.

Many pastors and youth leaders will not have a background in science, and will need to work more closely with a scientist to implement *Zooniverse* in a program. In some cases, scientists might be pulled from local congregations (or remotely, from *Zooniverse* project teams) to work directly with religious leaders. One example of this took place in February 2021, when project leader Wolf-Chase worked in remote tag-team fashion with a youth leader at a Presbyterian church in California. Middle- and high-school youth groups each took part in a session themed around “God and Physics.” Wolf-Chase introduced students to *Zooniverse* and led them through sessions classifying galaxies in *Galaxy Zoo*, highlighting the potential for students to discover new objects or new types of galaxies, such [Hanny’s Voorwerp](#) or [“Green Peas,”](#) while the youth leader encouraged students to reflect on how the vastness of the Universe in time and space might expand and deepen the way they thought about God. Although this was a single-event program, the youth leader is interested in exploring other ways to bring *Zooniverse* into church programs, perhaps through adult education.

Zooniverse provides a great platform for families to learn together. It was used in 2020 and 2021 during a minority-serving intergenerational summer camp, which is co-organized by a seminary and community organization in North Carolina. Wolf-Chase helped showcase *Zooniverse* during both camps, which were conducted virtually using a Zoom platform during 2020 and 2021. Highlighted projects were related to camp themes. In 2021, the camp was devoted to ecology and the climate. Wolf-Chase spoke about climate change and how the *Zooniverse* project *Fossil Atmospheres* engages everyone in helping to track how Earth’s atmosphere has changed over time. The camp’s leader is interested in continuing to provide a *Zooniverse* component in future years.

Zooniverse in Parochial Schools

Two parochial high schools used *Zooniverse* physics and space projects with physics and astronomy students during the Spring 2020 semester: a Catholic school in Arizona, and a Christian school in California. Unfortunately, contact was lost with the instructors through the pandemic; however, we note that parochial schools in general tend to provide excellent science education. Our ongoing efforts (see subsection “Ongoing Efforts” below) to engage religious schools are being directed toward more science-apprehensive communities.

Interfaith Programs

There are many interfaith organizations that are devoted to mobilizing diverse religious communities toward action on scientific issues that intersect with issues of social justice. For example, the organization [Interfaith Power and Light](#) maintains a list of affiliated interfaith organizations across the United States that are dedicated to environmental justice. These organizations devote the majority of their efforts to empowering communities to take climate action through local projects. In April 2021, Wolf-Chase co-hosted a webinar with the [Chicago Muslims Green Team](#) and Chicago-based environmental organization [Faith in Place](#) to highlight how individuals can take meaningful climate action during the pandemic and beyond through participating in environmental research on *Zooniverse*. A future effort could coordinate a *Zooniverse* challenge across several of these organizations, engaging *Zooniverse* team leaders to discuss their research.

Ongoing Efforts

The above examples all represent the introduction of *Zooniverse* into new communities. They provide models for extending the reach of this initiative to communities who may have been reluctant to take on new projects during the pandemic, or who may be more apprehensive about science in general. As this report is being written, project leader Wolf-Chase is continuing to make inroads into evangelical Christian communities through discussion with leaders in the [American Scientific Affiliation](#) (ASA), [BioLogos](#), the [Emerging Scholars Network](#) (a network within [InterVarsity](#)’s Graduate and Faculty Ministry), and Christian homeschool networks. One future plan is to provide

Zooniverse training workshops for ASA chapter members who would then connect with local leaders of evangelical congregations to discuss programming possibilities. Future programming efforts should make use of revised versions of the pre- and post-participation surveys that were used in this initiative. Recommended changes to these surveys are provided in the next section.

Conclusions and Recommendations

This initiative generated much interest in *Zooniverse* via the project leader's presentations, tutorials, and workshops. The successful integration of *Zooniverse* into seminary education and youth and family programs provide excellent models for expanding this initiative in the future. Despite challenges in evaluating this initiative's success, the surveys, focus groups, and one-on-one conversations yielded useful conclusions and recommendations. This section is organized into six subsections; the first three subsections detail technical issues encountered and present recommendations for improvement based on lessons learned, and the last three subsections contain broader suggestions for engaging new audiences, building trust with faith communities, and leveraging results to extend the reach of this initiative in the future.

Improved Tracking

The inability to track new participants resulting from the extensive outreach efforts that were a major part of this initiative severely limits our ability to evaluate the reach of the initiative. It is not possible to estimate realistically the number of individuals who joined *Zooniverse* as a result of these efforts for several reasons:

1. Registration isn't a requirement to participate in *Zooniverse*
2. Registration only requires creating a username and password – other information (e.g., real name and email address) is optional
3. Although trackable links specific to this initiative were created to navigate to the main *Zooniverse* website or directly to a specific project of interest, two shortcomings nullified their usefulness, so their distribution was discontinued shortly after launching the initiative:
 - a. The links were long and cumbersome compared to simply going to zooniverse.org to begin a project.
 - b. Once the user navigated to any other link (for example, to read more about the project or to begin project classifications), the ability to track was voided. Participants found it far easier to navigate directly to zooniverse.org and from there to the project of their choice rather than to copy and paste complicated pre-designed links into their browsers.

Survey Recommendations

This initiative has provided significant information about our potential audiences and how *Zooniverse* can be used as a tool to increase science engagement. Responses gathered through pre-participation and post-participation surveys provide valuable insights into respondents' views on science and scientists, science and religion, and why they would or would not be inclined to participate in citizen science. Responses also point to ways the surveys could be improved in the future as we expand this effort to engage religiously and ethnically diverse communities in different settings. In this section, we offer suggestions that would strengthen the surveys based on lessons learned through this initiative.

Lack of Diversity

Although intentional efforts were made to reach ethnically and religiously diverse audiences, the people who provided feedback were primarily White, highly educated (although not necessarily in science), and predisposed to view science and scientists in mostly positive ways. The vast majority of people who returned surveys (a) self-identify as White/Caucasian (86% pre-participation, 75% post-

participation); (b) hold advanced degrees (87% Masters or PhD pre-participation, 68% Masters or PhD post-participation); (c) have confidence that the scientific method generally produces accurate conclusions (99% pre-participation, 93% of post-participation respondents); (d) have a great deal (56% pre-participation, 50% post-participation) or a fair amount (42% pre-participation, 50% post-participation) of confidence that scientists act in the best interests of the public (98% pre-participation total, 100% post-participation total); and (e) perceive no conflict between science and their religious beliefs (90% pre-participation, 93% post-participation.)

Future efforts to engage minority populations should be done in concert with religious leaders that serve these populations. Our partnership with a professor at a minority-serving seminary is a first step in a longer process that will include co-planning strategies to attract minority communities through networks that serve these communities, and identifying minority scientists to assist in outreach to these communities.

Survey Shortcomings

As ongoing programs are developed with new audiences, several changes should be made to survey questions to enhance survey effectiveness. The question assessing how people view their ability to contribute to meaningful research should be changed to specify meaningful *scientific* research. For example, it is not surprising that seminary professors would self-assess as being able to contribute in meaningful ways to humanities research! The pre-participation survey should include a question about what types of research projects/areas of interest might entice participation. This question would help better assess interest among and across different demographics (age, ethnicity, religious affiliation, etc.). Since many pre-participation respondents mentioned a lack of time and felt they didn't have a clear view of what *Zooniverse* participation would entail, inclusion of a preamble clarifying that participation doesn't mean making any particular time commitment would be helpful – engagement might entail a matter of minutes for some and months-long participation for others.

Responses to the question allowing people to specify their own religious affiliation were difficult to interpret. It would be more useful to provide limited categories that would enable gathering quantitative data. Categories such as Christian - Catholic, Christian - Orthodox, Christian - Mainline Protestant, Christian - Evangelical, Jewish, Muslim, Hindu, Buddhist, Humanist, Agnostic, Atheist, and Other might be listed, with a box provided to allow individuals to expand on any of these categories if they wanted to (such as specifying a specific denomination within a general category – e.g., “Methodist,” “Reform Jewish,” etc.; specifying association with categories not listed – e.g., “Religious Naturalist,” “Pantheist,” “Wiccan,” etc.; or even clarifying involvement in the tradition such as “not practicing.”)

The post-participation survey should include questions regarding what project(s) the individual used; other *Zooniverse* projects they would be interested in trying; whether there are any types of research projects they would like to see developed (project areas that participants feel are currently missing or underrepresented on *Zooniverse*); duration of engagement with *Zooniverse* (e.g., short-term vs. long-term); and whether ancillary features of the platform, such as discussion boards, were used during engagement. Furthermore, the post-participation survey should be redesigned to measure incremental changes in attitudes rather than absolute positions. This could be done on a Likert Scale with wording to highlight whether participation in *Zooniverse* changed an individual's self-assessment of their ability to contribute in meaningful ways to real scientific research and whether/how it affected their attitude toward science, scientists, and the scientific method. A more elaborate assessment could also be designed to measure whether *Zooniverse* participation facilitated a better understanding of the process of science.

Ideally, future surveys will be distributed to specific groups at the start and finish of programs that involve participation over an extended period of time. Survey questions will then also need to take into account whether participation was optional or part of a class project. If participation is a mandatory

part of a class project, students might be asked whether they would be inclined to participate in *Zooniverse* outside of their class project.

Survey Distribution

This initiative used convenience sampling in distributing online surveys because the types of audiences recruited were so diverse in age, level of education, and religious affiliation. Surveys were distributed during specific programs and made available informally through email networks and websites. People who submitted pre-participation surveys included individuals who may not have subsequently engaged in a *Zooniverse* project, as well as individuals who participated but may or may not have returned post-participation surveys. For the purpose of this pilot initiative, pre-participation responses from individuals who may not have subsequently engaged with a project were very useful, because most of these respondents provided important feedback regarding why they would not be inclined to participate. This feedback was useful in considering flaws in the design of the survey itself, as well as in highlighting the many complex reasons, most of which were unrelated to religious views or negative views of science, that affected individual choices not to participate.

Survey Return Rate

Asking individuals to fill out and return surveys always suffers from the possibility of a low return rate. This initiative took place during a period of extreme uncertainty, challenges, and even despair, for many people, which further complicated this issue. Most of the surveys that were returned were those that were distributed for single online events or classes, or by a special solicitation through an email to *Clergy Letter Project* members. Only one event included filling out a pre-participation survey as part of the registration process. Clearly, some sort of incentive is desirable to encourage survey participation, especially for post-participation exit survey feedback. For a formal class, an incentive might take the form of extra credit; for informal programs, a reward might be based on local interests or needs. In either case, the incentive should be determined in advance, and in partnership, with the community leader who will lead the project and is most likely to understand the needs of community participants.

Zooniverse Recommendations

The *Zooniverse* has a mobile app available on both iPhone and Android devices. Several participants noted that mobile devices are increasingly preferred by young people. Over a dozen *Zooniverse* projects are offered through the mobile app. However, one limitation reported by participants is that not all 80+ active *Zooniverse* projects are available on the *Zooniverse* app. While there will never be 100% of *Zooniverse* projects on the mobile app (e.g., some projects do not work well on a mobile phone because of the small display size, like transcription tasks of handwritten text), more task types could be supported.

This initiative has provided further incentive to the *Zooniverse* leadership team's plans for creating user group functionality within *Zooniverse*, which has also often been requested by instructors in classroom settings. The lack of a function that would enable grouping participating individuals under a single designation is a severe limitation of the current *Zooniverse* platform. Such a function would allow group leaders to better assess participation, and would also facilitate tracking the engagement of new communities resulting directly from specific targeted outreach efforts. It would be particularly useful if the group function included access to private discussion boards, where the group leader could moderate interactions between group participants. The *Zooniverse* leadership team plans to incorporate this function into *Zooniverse* in 2022, through a recent NASA-Zooniverse partnership. Community leaders will be to share a unique join link with their group, and maintain a page that would record the group's participation, including time spent and number of classifications on individual projects.

Participants also expressed a desire for individual *Zooniverse* projects to allow practice classifications for comparison with expert classifications prior to actual participation, particularly for classifying subjects that don't fall into obvious categories. A handful of *Zooniverse* projects currently employ this feature; however, most do not. Project leader Wolf-Chase continues to provide suggestions for the *Zooniverse* platform and project development to the *Zooniverse* leadership team through *Zooniverse* Co-PI Laura Trouille.

Engaging New Audiences

A major outcome of this initiative has been raising awareness of citizen science in general, and the *Zooniverse* platform in particular, among diverse new audiences through large faith and interfaith organizations that cumulatively reach on the order of a hundred thousand people (see Appendix A). These lines of communication are quite distinct from typical *Zooniverse* channels and public media. One-off events showcasing *Zooniverse* and demonstrating its use were very popular. A number of presentations, tutorials, articles, and blogs are archived online through some of these organizations and continue to get views.

To the best of the project leader's knowledge, religious communities currently using *Zooniverse* in ongoing programs as a result of this initiative are those who (1) already had an interest in bringing science into their programs; and/or (2) had some sort of established program into which *Zooniverse* projects could easily be integrated. This is true of the seminary and churches who communicated their intent to continue to use *Zooniverse* in their classes and family programs. However, it is impossible to estimate the number of individuals, communities, or organizations who might be using *Zooniverse* as a result of our outreach. Based on informal feedback, establishing new programs using *Zooniverse* was hampered by the pandemic and the struggle by religious communities to keep existing programs going; however, many expressed interest in brainstorming new programs post-pandemic. This is especially true of communities that have had limited engagement with science to date, including, but not limited to, some evangelical and Christian homeschool communities with whom Wolf-Chase is currently engaged in building relationships.

Building Trust

Although nearly all people who returned surveys expressed "a great deal" or "a fair amount" of confidence that scientists act in the best interest of the public, a common theme among the comments provided with these answers was that the motives of scientists are no purer than those of other human beings, and that although many are committed to the public good, others are motivated by self-interest. Survey respondents who personally knew scientists were more inclined to view scientists in general more favorably, underscoring the importance of having interactive experiences with scientists. DoSER has recently released a [series of videos](#) to help scientists engage effectively with religious communities. Two-way dialogue and interactions are highlighted as a critical feature of successful engagement.

It should also be noted that most survey respondents self-identified as White/Caucasian. Minority populations, in particular, have good historic reasons to distrust scientists. Scientists and doctors have unethically used minority community members in medical experiments without their consent. The level of trust is also affected by the representation of one's own culture within a given community, and recent research through the

[Religion and Public Life Program at Rice University](#) indicates that scientists need to incorporate discussion about religion to help address race and gender disparities in science. Minority scientists who belong to religious communities, in particular, have a critical role to play in building bridges of trust to enhance ethnic and religious diversity in science.² To this end, a targeted effort by the *Zooniverse* team

² See Bolger, D., and Ecklund, E. 2020, "Seeing is Achieving: Religion, Embodiment, and Explanations of Racial Inequality in STEM." *Ethnic and Racial Studies*. DOI: 10.1080/01419870.2020.1791354.

to partner with under-represented groups in STEM in project-building, perhaps through outreach to HBCUs and other minority-serving institutions, would help to build trust and engage audiences that remain severely underrepresented in scientific communities.

Going Forward

Despite the limitations imposed by the COVID-19 pandemic, successes and information gathered during the course of this initiative demonstrate promise for expanding this effort in the future. It is clear that the best models for long-term engagement with science among religious communities include continuing partnerships between these communities and scientists. In general, a one-time interaction with a scientist will probably not result in a sustainable program or building a community of trust. There are many possible venues for recruiting scientists to work with religious communities in an ongoing fashion - (1) from within religious communities themselves, (2) through networks such as the [Scientific Consultants](#) in the [Clergy Letter Project](#), and (3) through professional scientific societies, such as the AAAS. Additionally, religious communities themselves could help identify scientific volunteers from within their congregations.

During this initiative, the project leader worked primarily with discrete communities; however all of these communities are members of larger religious organizations or networks that could help individual communities connect with each over common interests. For example, one of the focus group participants suggested the formation of “Affinity Groups” across different churches and community organizations, where people from different backgrounds would participate in citizen science projects reflecting common interests. One such group might be formed through a coordinated effort, such as a *Zooniverse* challenge, that would recruit participants through the numerous interfaith organizations that are concerned with environmental justice. This could be advertised through organizations like *Interfaith Power & Light*, whose mission is to inspire and mobilize people of faith and conscience to take bold and just action on climate change, and the *Interfaith Youth Core*, which is dedicated to building interfaith leaders on college campuses. Working together on projects is a powerful way to build bridges across differences.

As Wolf-Chase continues to bring *Zooniverse* into seminary education, it would be particularly helpful if members of *Zooniverse* research teams could be identified who would be willing to help the seminary professor or students with the scientific content of chosen projects. Wolf-Chase could serve as liaison with the seminary, connecting the professor to *Zooniverse* project leaders. Opportunities for *Zooniverse* project leaders to connect with interested groups could be advertised through *Zooniverse* new media.

While all scientists should be respectful of cultural differences and religious views, it is not in general necessary for scientists to share the faith of religious communities with whom they work; however, personal interactions between the project leader and evangelical Christian organizations indicate that it is important to identify scientists who share the faith of these particular groups in order to build trust. As Wolf-Chase continues to pursue partnerships with evangelical Christian organizations and homeschool networks, we intend to recruit scientists from within the American Scientific Association to work with evangelical churches and schools.

Despite the challenges of the past couple of years, the [Engaging Faith-based Communities in Citizen Science through Zooniverse](#) initiative provided many valuable insights into working with diverse religious communities, and demonstrated that there is great potential for using citizen science in general, and *Zooniverse* in particular, to increase engagement in science among these communities.

Appendix A: Project Communication

Throughout the grant period, the project leader used multiple venues to communicate this project to diverse audiences. These venues include conferences, presentations, blogs, newsletters, email, website PR, and various types of social media, as well as word-of-mouth. Using one or more of these venues, this project has been announced to/through the following organizations, which combined reach on the order of a hundred thousand people:

- **AAAS DoSER** (ScienceReligionDialogue.org): Facilitates communication between scientific and religious communities since 1995 [Announcements and presentations on *Zooniverse* during Science for Seminaries retreats and curriculum meetings; Article [AAAS DoSER Program Makes Inroads Into Communities of Faith With Help From Citizen Scientists](#); web page devoted to this initiative, [Engaging Faith-based Communities in Citizen Science through Zooniverse](#)]
- **American Academy of Religion** (aarweb.org): The largest scholarly society dedicated to academic study of religion and enhancing public understanding of religion (>8,000 members) [Initiative announcements were distributed at the 2019 Annual Meeting, which was held from 23-26 November 2019 in San Diego, CA.]
- **American Association of Physical Anthropologists** (AAPA): the world's leading professional organization for physical anthropologists [Presented *Bridging Cultural Divides through Science Engagement with Zooniverse* presentation at the Online Educator Workshop, *Teaching Biological Anthropology in Inclusive and Culturally/Religiously Sensitive Ways*. Primary audience: Assorted educators at all levels and venues (colleges, schools, homeschoo)]
- **American Religious Sounds Project** (explore.religioussounds.osu.edu): A collaborative initiative co-directed by Amy DeRogatis (Michigan State University) and Isaac Weiner (Ohio State University) to document and interpret religious diversity through sound [Videoconference to assess possible future interest in utilizing the archive to create a *Zooniverse* project]
- **American Scientific Affiliation** (asa3.org): Christian religious organization of scientists [Helped [advertise programs](#) related to this initiative; Wolf-Chase is continuing conversations on organizing a web event showcasing *Zooniverse* for local chapter leaders to raise interest among evangelical congregations.]
- **Arolsen Archives** (arolsen-archives.org): International Center on Nazi Persecution; developed *Zooniverse* project *Every Name Counts*
- **Biologos** (biologos.org): Promotes science and faith working together in the Christian tradition [Blog for their network on [Serving God and Neighbor through Citizen Science](#)]
- **Brophy College Prep High School** (brophyprep.org): Used *Zooniverse Planethunters* & *Galaxy Zoo* in physics and astronomy class
- **Catholic Theological Union** (scienceforseminaries.org/school/catholic-theological-union): Roman Catholic seminary in Chicago, IL [Presentation for Catholic schools (archived on YouTube): [Community Building through Zooniverse: Learning Science through Participation](#); Presentation for Homilists (archived on YouTube): [Preaching with the Sciences: Reawakening the Religious Imagination with \(Space\) Science](#)]
- **Center for Advanced Study in Religion and Science** (casiras.org): Society of scholars & scientists who pursue interdisciplinary studies to constructively relate religion & science [Possible future co-creation of *Zooniverse* projects such as transcribing historical records of CASIRAS]
- **Center for Christian-Muslim Engagement** (lstm.edu/academics/ccme): Fosters building bridges of mutual understanding, respect, & cooperation among people of all faiths [Email and phone conversation to announce the initiative]

- **Center for Theology & the Natural Sciences** (ctns.org): An affiliate of the Graduate Theological Union in Berkeley, CA that promotes creative mutual interaction between theology and the natural sciences through research, teaching and public service [Conversations/email with CTNS Director and staff]
- **Chicago Commons Project** (chicagocommonsproject.org): A program supported by the Lilly Endowment, Inc. and the University of Chicago Divinity School to equip early-career religious leaders to engage with other community leaders and society in Chicago [Zooniverse presentation at the Adler Planetarium on 1/13/2020]
- **Chicago Muslims Green Team** (CMGT: chicagomuslimsgreenteam.org): Connects Chicago Muslims and the greater community to issues of environmental justice [Ongoing collaboration to raise awareness of citizen science and Zooniverse among Muslim communities. Co-wrote [Building Stronger Communities and a Better World through Citizen Science](#) an article about Zooniverse for CIOGC (see below); co-organized a webinar/workshop with Faith-in-Place]
- **Chr-Astro** (sites.google.com/site/chrastronomer): E-list for Christian professional astronomers (~250 members) [emails promoting the Zooniverse initiative]
- **Christ Crossman United Methodist Church** (christcrossman.org): A United Methodist Church in Falls Church, VA. [Zoom presentation including Zooniverse on 5/9/2021]
- **Clergy Letter Project** (theclergyletterproject.org): Endeavor to demonstrate that religion and science can be compatible across diverse religious traditions; e-newsletter reaches ~ 8,000 - 10,000 religious leaders [[Zooniverse information and surveys](#) web page; example projects highlighted monthly throughout the grant period, archive on [Astrobiology News](#)]
- **Congregation Kneseth Israel** (ckielgin.org): A *Scientists in Synagogues* grant recipient located in Elgin, IL [Conversation about various Zooniverse projects of interest]
- **Council of Islamic Organization of Greater Chicago** (CIOGC: ciogc.org): Leading advocate of Muslim community interests, and a catalyst for enriching American society [Article with CMGT promoting Zooniverse]
- **Countryside Community Church** (CCC: countrysiducc.org): United Church of Church in Omaha, NE, that, together with the American Muslim Institute (AMI) and Temple Israel, is part of the Tri-Faith Initiative to foster empathy, invite understanding, and advance common action between people of diverse faiths through the shared efforts of intentionally co-located congregations of the Jewish, Christian, and Muslim faiths [Remote Zooniverse presentations to youth groups on 2/23/2020 & 3/1/2020; conversation with lead pastor regarding organizing a Tri-Faith Zooniverse challenge event - postponed due to pandemic and change in CCC leadership]
- **Dominican University** (dom.edu): The St. Catherine of Siena Center examines critical issues of church and society in light of faith and scholarship [email announcing the initiative]
- **East End Temple** (eastendtemple.org): A Reform Jewish community in downtown New York City [Conversations with the rabbi regarding Zooniverse projects and possible integration into Temple programs]
- **Emerging Scholars Network** (ESN): A 4,000-member network affiliated with InterVarsity that supports Christian scholars through their early careers. [Ongoing conversations with the Associate Director about incorporating Zooniverse experiences in Christian churches. Blog post in-progress about how to invite your church to do a citizen science project]
- **Equipping Christian Leadership in an Age of Science** (ECLAS: eclasproject.org): Project that creates opportunities for church leaders to connect with world-class science and scientists [[Blog](#) including Zooniverse initiative on 7/28/2021]
- **Evangelical Lutheran Church in America** (elca.org/About/Churchwide): The churchwide organization is based out of the Lutheran Center in Chicago and functions with the ELCA's 65

synods and nearly 10,000 congregations across the 50 states, Caribbean and U.S. Virgin Islands.[Email announcement/conversation with the Office of the Secretary regarding *Zooniverse*]

- **Faith in Place** (faithinplace.org): Empowers Illinois people of all faiths to be leaders in caring for Earth – provides resources to educate, connect, and advocate for healthier communities [Initiated communication in January 2020; co-organized and co-presented webinar [Community Building with Zooniverse](#) workshop on 4/6/2021 (archived on YouTube), which was announced through diverse social media including [Daily Zooniverse](#)]
- **First Unitarian Church** (firstchicago.org): Unitarian Universalist church in Chicago, IL [Zooniverse presentation on 2/2/2020]
- **Grace Lutheran Church** (graceglenellyn.org): Lutheran church in Glen Ellyn, IL [Zooniverse presentation on 10/23/2019]
- **Grace Lutheran Church** (graceriverforest.org): Lutheran church and school in River Forest, IL [Zooniverse presentation on 10/6/2019]
- **Gustavus Academy for Faith, Science, and Ethics** (gustavus.edu/chaplain/academy): Program to prepare high school students to become leaders who cultivate creative alliances between religion and science in order to ethically address contemporary challenges [email announcement/ conversation with program staff about the *Zooniverse* initiative]
- **Hood Theological Seminary** (scienceforseminaries.org/school/hood-theological-seminary): A graduate and professional school in North Carolina sponsored by the African Methodist Episcopal Zion Church [Zooniverse tutorial with seminary professor on 2/4/2020. Professor is using *Zooniverse* projects in seminary classes and with summer intergenerational camps.]
- **Howard University School of Divinity** (scienceforseminaries.org/school/howard-university-school-of-divinity): A historically black theological school [Preliminary conversation with Howard faculty regarding possible interest in creating a *Zooniverse* project using [Ethiopian Manuscripts collection](#)]
- **Illinois Holocaust Museum & Education Center** (ILHMEC: ilholocaustmuseum.org): Museum located in Skokie, IL that is dedicated to preserving the legacy of the Holocaust by honoring the memories of those who were lost and by teaching universal lessons that combat hatred, prejudice, and indifference [Co-led Zooniverse Project Builder workshop with Zooniverse Co-PI Dr. Laura Trouille on 12/2/2019; ILHMEC “educator e-blast” on *Zooniverse* projects was sent to 30,000+ individuals during December 2020.]
- **Institute on Religion in an Age of Science** (iras.org): Cultivates informed & respectful inquiry & dialogue at the intersection of science, religion, spirituality & philosophy in service of society [[Navigating Crises and Bridging Cultural Divides with Citizen Science](#) *Zooniverse* webinar presented on 9/17/2020, archived on YouTube]
- **Interfaith Youth Core** (ifyc.org): National nonprofit that equips the next generation with the knowledge and skills needed for leadership in a religiously diverse world [Conversations with Founder, President, and Initiative Advisory Board member, Eboo Patel and Teri Simon about *Zooniverse*]
- **Loyola University Chicago** (luc.edu): Jesuit Catholic university in Chicago, IL [Conversation with Loyola Professor about *Zooniverse* initiative]
- **Lutheran Alliance for Faith, Science, & Technology** (luthscitech.org): Promotes conversation about the implications of science & technology for Christian faith & life; their *Covalence* e-newsletter archive attracts 2,000-3,000 unique users each month [Covalence editor and Advisory Board Member Susan Barreto has written several [articles about the Zooniverse initiative](#).]

- **Lutheran School of Theology at Chicago** (LSTC: lstc.edu): Lutheran seminary in Chicago, IL, that hosts the ZYGON Center for Religion and Science (ZCRS)[see below]
- **Luther Seminary** (luthersem.edu): Lutheran seminary in St. Paul, MN [email announcement of Zooniverse initiative; Wolf-Chase was their plenary convocation speaker in January 2018]
- **Malvern Festival of Ideas** (malvern festival of ideas.org.uk): Annual multidisciplinary festival of ideas, based in Malvern, UK, that originated as a Clergy Letter Project Evolution Weekend event in 2012 [[Community Building with Zooniverse](#) webinar on 3/6/2021, archived on YouTube]
- **McCormick Theological Seminary** ([scienceforseminaries.org/school/mccormick-theological-seminary](#)): Seminary in the Reformed tradition located in Chicago, IL [Conversations with *Science for Seminaries* project leaders regarding using Zooniverse in seminary classes]
- **Parliament of the World's Religions** (parliamentofreligions.org): Cultivates harmony among world's religious & spiritual communities to foster engagement with critical issues of our time [Email announcement of initiative; pre-initiative Zooniverse presentation at the 2018 meeting in Toronto]
- **Presbyterian Association on Science, Technology and the Christian Faith** (pastcf.org): Integrates science & technology into theological, ethical, and moral reflections [Article on Zooniverse initiative, *Science for Everyone: Community Building with Zooniverse* for the May 2020 issue (Vol. 29, No. 2) of [SciTech](#); link to Zooniverse on [pastcf](#) home page]
- **Rice Religion & Public Life Program** (rplp.rice.edu): Uses research on religion to build common ground for the common good [Email conversation with Director about Zooniverse initiative]
- **Sinai & Synapses** (sinaiandsynapses.org): Equips scientists, clergy and laypeople with knowledge & skills to grapple with the most important questions facing society [Recorded [interview on Zooniverse](#) with Rabbi Geoff Mitelman and Zooniverse Co-PI Laura Trouille on 4/8/2020; recorded [interview on the power of citizen science](#) with Rabbi Geoff Mitelman on 8/4/2021]
- **Skype-A-Scientist** (skypeascientist.com): Connects scientists with classrooms and educators across the world [[Using Zooniverse with your classroom](#) presentation with former Zooniverse postdoctoral scholar Molly Simon on 3/20/2021 (archived on YouTube)]
- **St. Paul Lutheran Church** (stpaulwheaton.org): Lutheran church in Wheaton, IL [Presented zoom tutorial on using Zooniverse on 4/26/2020]
- **St. Peter's Lutheran Church** (stpetersmarblefalls.org): Lutheran church in Marble Falls, TX [Pastor is using Zooniverse projects with confirmation classes.]
- **Sunnyvale Presbyterian Church** (sunnyvalepres.com): Presbyterian church in Sunnyvale, CA [Project leader co-led Zooniverse programs on “God and Physics” for middle- and high-school [youth groups](#) with their youth leaders.]
- **University of St. Mary of the Lake, Mundelein Seminary** ([scienceforseminaries.org/school/university-of-st-mary-of-the-lake-mundelein-seminary](#)): The major seminary and school of theology for the Archdiocese of Chicago, located in Mundelein, IL [Project leader was the speaker at a public science event including Zooniverse and announcement of initiative on 11/9/2019.]
- **Valley Christian High School** (vcs.net): A Christian high school located in San Jose, CA [Conversations with physics and astronomy teacher during January 2020 regarding using Zooniverse in the classroom]
- **Vatican Observatory** (vaticanobservatory.org): Established by the Holy See for astronomical research and public outreach to advance the scientific understanding of our universe [The V.O. has helped publicize Zooniverse and Zooniverse events through social media. Advisory Board

member for the *Zooniverse* initiative and Vatican Observatory Director Br. Guy Consolmagno initiated contact with Brophy College Prep.]

- **ZYGON CENTER FOR RELIGION & SCIENCE** (lstc.edu/academics/zygon): Relates religious traditions & science to gain insight into the origins, nature, & destiny of humans and their environment [Presentation to seminary students on 3/22/2021]

Appendix B: Online Surveys

Pre-Survey: Zooniverse & Faith-based Communities

This survey is part of an evaluation effort around the impact of our work engaging faith-based and interfaith communities in citizen science through Zooniverse.

Zooniverse.org is a website with ~100 active projects engaging the public in scientific research (for example, classifying galaxies, marking cell structures for cancer research, transcribing historical documents, etc.), in partnership with 100s of researchers and over 2 million participants worldwide.

The survey will take ~5 minutes. Thank you for your participation.

This effort is made possible in part thanks to a grant from the Alfred P. Sloan Foundation.

1. What are the last four digits of your phone number? (This is a way for us to match your pre-survey with your post-survey, while maintaining your privacy/anonymity.)

2. Please answer the following:

Mark only one oval per row.

	Strongly disagree	Disagree	In between	Agree	Strongly agree
I feel that I can contribute in meaningful ways to real research.	<input type="radio"/>				
I think science is important	<input type="radio"/>				
Science helps improve our everyday lives	<input type="radio"/>				

3. Which of the following best describes what you think about the scientific method (as defined as the approach that science uses to gain knowledge, based on making observations, formulating laws and theories, and testing theories or hypotheses by experimentation)?

Mark only one oval.

The scientific method generally produces accurate conclusions.
 The scientific method can be used to produce any conclusion the researcher wants.

4. How much confidence do you have that scientists act in the best interests of the public?

Mark only one oval.

No confidence at all

Not much

A fair amount

A great deal

5. Please provide a brief explanation for your response above (about your confidence in scientists acting in the best interests of the public).

6. Zooniverse.org is a website with ~100 projects engaging the public in scientific research (for example, classifying galaxies, marking cell structures for cancer research, transcribing historical documents, etc.). How likely would you be to try a Zooniverse project?

Mark only one oval.

Very unlikely

Unlikely

In between

Likely

Very likely

I have already participated in Zooniverse project(s)

7. Please provide a brief explanation for your response above. Why or why not would you consider trying a Zooniverse project?

8. There are hundreds of in-person "citizen science" projects that engage the public in scientific research (for example, collecting water samples, monitoring birds, etc.). How likely would you be to try an in-person citizen science project?

Mark only one oval.

- Very unlikely
- Unlikely
- In between
- Likely
- Very likely
- I have already participated in in-person citizen science project(s)

9. Please provide a brief explanation for your response above. Why or why not would you consider trying an in-person citizen science project?

10. Does science sometimes conflict with your own religious beliefs?

Mark only one oval.

- Yes
- No

11. If you responded 'yes' to the above question, please explain why. If you responded 'no' to the above question, please explain why not.

12. What is the highest level of school you have completed or the highest degree you have received?

Mark only one oval.

- Currently in elementary school
- Currently in middle school or high school
- High School Diploma or GED
- Some college / currently in college
- Bachelor's Degree
- Master's Degree
- Doctorate
- Prefer not to answer

13. I identify my ethnicity as (select all that apply):

Check all that apply.

- Asian
- Black/African
- White/Caucasian
- Hispanic/Latinx
- Native American
- Pacific Islander
- None of these categories describe my family (I'll use the box below)
- Prefer not to answer

Other: _____

14. Age

Mark only one oval.

- 0-11
- 12-18
- 19-30
- 31-40
- 41-50
- 51-60
- 60+
- Prefer not to answer

15. Gender

Mark only one oval.

- Male
- Female
- Non-binary
- Prefer to self-identify (I'll use the box below)
- Prefer not to answer
- Other: _____

16. Please specify your religion and/or denomination.

Post-Survey: Zooniverse & Faith-based Communities

This survey is part of an evaluation effort around the impact of our work engaging faith-based and interfaith communities in citizen science through Zooniverse.

Zooniverse.org is a website with ~100 active projects engaging the public in scientific research (for example, classifying galaxies, marking cell structures for cancer research, transcribing historical documents, etc.), in partnership with 100s of researchers and over 2 million participants worldwide.

The survey will take ~5 minutes. Thank you for your participation.

This effort is made possible in part thanks to a grant from the Alfred P. Sloan Foundation.

1. What are the last four digits of your phone number? (This is a way for us to match your pre-survey [if applicable] with your post-survey, while maintaining your privacy/anonymity.)

2. How did you hear about Zooniverse? [Check all that apply]

Check all that apply.

- Newsletter
- Instructor-led activity in a classroom setting
- Reference to Zooniverse during a presentation

Other: _____

3. In what type of Zooniverse activity did you participate? [Check all that apply]

Check all that apply.

- Classroom-based participation
- In-person group event
- Remote/virtual group event
- Community challenge (e.g., group challenge to contribute 1,000 classifications)
- Individual participation

Other: _____

4. Now that you've participated in Zooniverse and/or had a Zooniverse-related experience, how likely would you be to participate in Zooniverse again?

Mark only one oval.

- Very unlikely
- Unlikely
- In between
- Likely
- Very likely

5. Please share with us feedback about your experience participating in Zooniverse and/or a Zooniverse-related activity. What did you like? What did you not like?

6. Please answer the following:

Mark only one oval per row.

	Strongly disagree	Disagree	In between	Agree	Strongly agree
I feel that I can contribute in meaningful ways to real research.	<input type="radio"/>				
I think science is important	<input type="radio"/>				
Science helps improve our everyday lives	<input type="radio"/>				

7. Which of the following best describes what you think about the scientific method (as defined as the approach that science uses to gain knowledge, based on making observations, formulating laws and theories, and testing theories or hypotheses by experimentation)?

Mark only one oval.

- The scientific method generally produces accurate conclusions.
- The scientific method can be used to produce any conclusion the researcher wants.

8. How much confidence do you have that scientists act in the best interests of the public?

Mark only one oval.

- No confidence at all
- Not much
- A fair amount
- A great deal

9. Please provide a brief explanation for your response above (about your confidence in scientists acting in the best interests of the public).

10. There are hundreds of in-person "citizen science" projects that engage the public in scientific research (for example, collecting water samples, monitoring birds, etc.). How likely would you be to try an in-person citizen science project?

Mark only one oval.

- Very unlikely
- Unlikely
- In between
- Likely
- Very likely
- I have already participated in in-person citizen science project(s)

11. Please provide a brief explanation for your response above. Why or why not would you consider trying an in-person citizen science project?

12. Does science sometimes conflict with your own religious beliefs?

Mark only one oval.

Yes

No

13. If you responded 'yes' to the above question, please explain why. If you responded 'no' to the above question, please explain why not.

14. What is the highest level of school you have completed or the highest degree you have received?

Mark only one oval.

Currently in elementary school

Currently in middle school or high school

High School Diploma or GED

Some college / currently in college

Bachelor's Degree

Master's Degree

Doctorate

Prefer not to answer

15. I identify my ethnicity as (select all that apply):

Check all that apply.

Asian

Black/African

White/Caucasian

Hispanic/Latinx

Native American

Pacific Islander

None of these categories describe my family (I'll use the box below)

Prefer not to answer

Other: _____

16. Age

Mark only one oval.

- 0-11
- 12-18
- 19-30
- 31-40
- 41-50
- 51-60
- 60+
- Prefer not to answer

17. Gender

Mark only one oval.

- Male
- Female
- Non-binary
- Prefer to self-identify (I'll use the box below)
- Prefer not to answer
- Other: _____

18. Please specify your religion and/or denomination.

Appendix C: Sample Responses to Open-ended Questions

Zooniverse.org is a website with ~100 projects engaging the public in scientific research (for example, classifying galaxies, marking cell structures for cancer research, transcribing historical documents, etc.) Please provide a brief explanation of why you would or wouldn't consider trying a Zooniverse project.

Time: (NOTE: Nearly 30% of respondents mentioned time as a limiting factor.)

- It would be worthwhile, but I'm really loaded up with projects and responsibilities right now, so my time is quite limited.
- Pros, B.S. degree in electrical & electronic engineering technology, plus MDIV degree, ordained ELCA since 2004. Con, time and energy.
- I do not have time
- Time! Though, as my kids get older and can be involved, this would be an excellent way to practice science.
- I'm already engaged in a number of scientific projects, so I think it's great, but don't have extra time.
- I would love to but so busy right now.
- not having enough time to do a project
- It looks awesome but my time is already overcommitted
- it's not the most impactful thing I can do with my time
- My time in retirement and being a caregiver is limited.
- I am busy with my paid profession.
- I don't know how much bandwidth I have to add on extra tasks during a pandemic.
- I continue to be involved as a professional scientist. I am busy enough. I do note that citizen science has made contributions to my own field of research.
- I'm curious and I have time, being retired.
- The idea is intriguing, but I am already incredibly busy with work, family, and church responsibilities and thus reluctant to take on any new commitments.
- I am already engaged to the max of my time in paleontology research and in writing.
- Until I know what is entailed I remain neutral. I might and I might not. Tell me more. Having just retired I realize my time is more limited than when I worked!
- I am busier now since I've retired than ever. i.e., new projects, "Stand in line."
- Time is a problem—I always seem to find other things to do.

Expertise

- Not a skill area of mine.
- Not sure I know enough to be helpful
- Know nothing about it.
- I've heard so many exciting things about this possibility, but I wonder how much I'd actually be able to contribute.
- I am not trained in science but am an Old Testament exegete (unlikely)
- I don't think I would be good at it
- I do not have much scientific knowledge to be of help
- I have the interest but not the training, experience, or equipment to do so.

Age or Health-related

- It seems interesting but I am 88 years old and, with the pandemic, basically house bound.

- I am a senior with less energy and mobility now, but maybe sometime if the right project came along
- I am 89 years old and have enough on my plate already.

Interest

- For many years we participated in the SETI project, so I'm interested to learn more.
- It sounds fun if it is something I am interested in.
- Zooniverse is awesome!
- I like participating in interesting projects
- I work in regenerative agriculture and climate change as well as theology and religion and would like to ground my work in active research
- I know very little about Zooniverse; if it contained projects within my fields of addictions, grief/bereavement, religiosity/spirituality, social connectedness/compassion, and moral injury, I would certainly be inclined to try it.
- I don't know what it would entail, but I am always ready for exciting and new opportunities for research.
- I teach in the area of urban ministry/studies, I am sure that zooniverse would have some projects that would intersect with what I teach
- Because I grew up wanting to be a scientist
- I like science and want to contribute.
- Because it sounds interesting and it sounds like it could be a fun experience
- I would explore it if I had a project to utilize it with
- Science is fun! Anything that increases our understanding of the universe is worth doing.
- I don't know a lot about it, but I would be interested. Not sure what is involved in try a project.

Lack of Interest in Science

- I am not very engaged with questions of science on a daily basis, nor am I asked by many I serve to respond to scientific inquiries.
- Approaching retirement and science is not my "interest".
- I do not consider myself a scientist and have only a marginal interest in science.

Variety

- I like the idea of helping in many fields of study.
- learning and have a wider perspective
- Am not familiar enough with their projects to make a thoughtful choice.
- I did not know about it, but I have more time now and will examine, should be something I can do with 100 options!

Involvement & Societal Benefit

- More likely to do it if we have another Reading and Science Camp
- Science is important and I would like to be helpful if possible.
- I've participated in one citizen science project before (not on Zooniverse) and appreciated the chance to be involved in real research.
- Projects through Zooniverse seem like an incredibly fun way to engage in the work of science especially in the midst of a pandemic when we're not able to gather in-person for such work.
- I want to get middle and high school students doing this.
- I am a humanist who believes in learning and that a more educated society benefits everyone.

Combined

- Feel skills are limited and starting to feel my age. If time requirements are flexible it might be fascinating to try.
- full research plate already; not immediately clear how it would integrate with my current research; wondering how helpful my participation would actually be
- I'm usually very busy especially with PSAT, school, soccer, and church and I don't have much interest in science.
- Feel skills are limited and starting to feel my age. If time requirements are flexible it might be fascinating to try.
- I'm 74, a legislator, child advocate, and clergyman and am compelled to Zoom constantly. I do not want to take on yet another project or new responsibility. I strongly believe in science; however, scientific exploration is not one of my strengths or interests.

Previous Participation

- I enjoy participating in Galaxy Zoo
- I have participated. In astronomy, and some others.
- I started doing them as a way to pass the time in quarantine but its also helped me identify the birds I see on walks and being able to see an animal and go "oh, that's this thing" feels really good!!
- For many years we participated in the SETI project, so I'm interested to learn more.
- I am VERY busy right now in retirement, so I cannot sign up at this moment for a Zooniverse project. In the past I participated in the SETI effort.

Now that you've participated in Zooniverse and/or had a Zooniverse-related experience, how likely would you be to participate in Zooniverse again? Please share with us feedback about your experience participating in Zooniverse. What did you like? What did you not like?

Platform-related

- Very easy to use. I wish there was a more streamlined/easier way to access via mobile devices
- Some projects yielded photos so bad as to be nearly uninterpretable.
- I liked the field guide! But it seemed to get harder the more galaxies I classified. They progressively got smaller/blurrer.
- I thought it was really cool, I liked the field guide and it was very user-friendly

Variety

- I liked learning about different parts of the world and about the kind of research being done.
- I like the variety of projects.
- The public's participation in new scientific discoveries AND the fact that the subject areas are not limited to the sciences but include the arts and humanities AND the diversity of projects. I took note of the Holocaust and Anti-slavery projects
- I liked learning about different things. It was a short amount of time for the amount of information.

Engaging/Interesting/Informative

- The experience was engaging and informative.
- Zooniverse Zoom conference was very informative and encouraging of faith and science cooperation.

- It's just so interesting. I would actually be interested in trying to put a project together for zooniverse.

Invovlement

- This has given ideas about using this with a youth group.
- Liked being able to contribute to science and explore the universe.
- This was great! I would need to explore more to see the relevance to my classes, but I will definitely be keeping this in mind as my kids get older.
- Tremendous fun! It made it clear that I did not have to be an expert and could contribute simply from my careful observations. I really enjoyed my participation. Looking forward to the feature of being able to dialogue with others.
- Many persons, even non-experts, can be involved in scientific research.
- creative to see how we all can participate and augment machines and scientists

Time

- [Unlikely] only because I am too busy and trying to cut down, but if/when that changes I could definitely see it. Fascinating.
- It was fascinating. The idea is great and it seemed easy to use. Just not sure when I would have the time to do this now.

Please provide a brief explanation for your response regarding your confidence in scientists acting in the best interests of the public.

Scientists are Human / Fallible

- Majority of scientists are good, but there's always the risk of a few bad apples lopsiding data/scientific results to back up the claims they want. Science is not perfectly objective!
- As in any enterprise scientists may also act in self interest and for personal gain.
- Scientists are all human but often have the best interests of the world at heart
- Greed and power sometimes come into play. In other words, sin is always a part.
- I am Lutheran. So I believe that all humans make choices based on self interest. No one can be completely objective. Not even scientists.
- I have faith in the good will of ordinary people, even scientists
- There are some scientists that don't, but most try to learn more about the world to help the public
- I believe most scientists truly want to contribute to our body of knowledge.
- I think most scientists today act with good intentions. However, science can cause adverse outcomes because people are biased.
- No one is above self-interest, as evidenced by a scientist who had financial connections to the lab in Wuhan China and so directed independent researchers to look elsewhere than the possibility of a lab leak of the Sars CoV-2 coronavirus. In general Scientists do act in public interest, but conflicts of interest occur in every field.
- I believe scientists do/ want to act in the best interest of the public. Scientists also need financial support, and corporations/ drug companies/ even universities/ etc are not necessarily working for the best public interest so much as for profit and funding.
- Actually, it depends on who is funding any particular project. I have a great deal of confidence in folks working on publicly funded research; much less on corporately funded projects with an intended outcome.

- While I think scientists (like most people) intend well, I believe they can be swayed by bias and self-interest (like most people).
- Some, even most, are in it to discover and document and learn. Others are in it for the grants, etc, or to make a name for themselves, or to find a way to prove their assumptions.
- Trust them more when they are independent in the research and not beholden to financial or military interests.
- I am a retired PA, wife, daughter and niece of physicians. I've been exposed for a long time to the best and worst of "science" to determine outcomes that move all of creation forward. Profit, elitism, mistrust and tradition can be a dark side of research. I have a general trust of people to want to weave and leave a legacy for advancing the common good.
- Werner Von Braun was a scientist. He was also an ardent Nazi. Science is a method used by a person. It is orthogonal to the person's ethics and political orientation. A scientist is a combination of all three and an evaluation of their actions must not only consider the methods of one but the motivations of the other two.
- While there surely are exceptions, I believe scientists are curious and helpful folks striving to make life better for as many people as possible - a goal I share as a pastor!
- I believe the majority of scientists believe and strive to act in the best interest of the public. But because of the gender, cultural and racial identity of scientists they may overlook the ways in which their implicit bias (and the bias of institutions, research subjects, funders, etc) shapes and affects research and research outcomes.

Confidence in Research Process/ Scientific Method

- I have confidence in the methodology for scholarship.
- The evidence accumulated across several centuries provides the best evidence of how good science impacts human life.
- The scientific method is good and open about correcting any mistakes that may inadvertently happen.
- I believe in scientists and the scientific method.
- I am a professional scientist (a faculty member now retired from a church-related college). The checks and balances built into the scientific community's work weed out most (but not all) biases and errors rather quickly. Rooting out some biases and misconceptions, especially those instilled by society, can take decades to centuries.
- Truly using the scientific method yields results that may not be what was expected or desired but can be duplicated, confirmed, & built upon.
- I don't believe that most scientists walk into their workplaces and think, "Today I'm going to help the public!" Rather, the public good is served by seeking accurate understanding of how our world works, and science is the process of inquiry most likely to yield that understanding. That is what scientists do, ergo; scientists work to help the public.
- Fraud exists in every human endeavor, but is most easily exposed by the very nature of the scientific enterprise: observation, inference, experiment, conclusions. False claims aren't testable as any hypothesis.
- Making decisions based on accurate information is typically in the best interest of the public. Science is the best mechanism for generating accurate information.
- I am clergy now, but my first career was as a liberal arts college psychology professor. Science works!
- The rules of the scientific method are protection against the natural bias of individuals whose employers want them to come up with certain results.
- The process of peer review and the scientific method makes science extremely trustworthy.

Ethical Concerns

- scientists generally create things and discover things that improve quality of life but scientists and engineers also created weapons like nuclear warfare.
- SOme scientists focus on the science and can be blinkered to the application. i.e. they can turn off their minds when they enter their institution
- I think science as it is practiced today serves the dominant culture, and the dominant culture is killing the all life on the planet including humans (the public).
- Ethical issues are complex and some scientists may feel that ethics should be left to philosophers and theologians.
- Who determines what is in the best interest of the public? There is a certain ranger of opinion on 'best interest'. Example: . pro/anti abortion

Scientists are Logical/ Driven by Facts/ Commitment to Truth

- I think scientists do not alter their answers to benefit anyone. I think they just tell the facts from their research.
- I believe that scientists want to find the truth and be able to share that with the public.
- My experience is that people go into the sciences because they are very curious about how things work and are very dedicated to facts - they are willing to adjust their worldview to match the facts/findings, and not the other way around. (Creation scientists/Intelligent Designers, of course, go the opposite way, and are not trustworthy, but those in the legitimate sciences are, by and large, very trustworthy). Also, since there is little financial gain in the sciences, those who have a predilection to charlatanism will find less labor- and education-intensive fields in which to ply their "art".
- The ones who stay in science (some leave to pursue wealth or power-not meant to be judgmental) seem devoted to discovery of truth, solving problems or opening new frontiers. A handful have been "bought" by corporations or political interests but still the exception.
- I think most scientists are honest and care about the planet. Rational thinking creates the best world.
- They generate critical questions about our universe and aid us in understanding it more effectively
- the purpose or goal of science is not to act in the best interest of the public, it is to use science to test the goal or hypotheses of the scientists or scientific endeavor.
- I believe that the quest for accurate explanations of natural phenomena is the primary motivation of science and most scientists, whether in the physical or social sciences. Accurate explanations are much more likely than ideological or personal opinions--no matter how logical they may sound--to promote public understanding and well-being
- Scientists tend to be interested in the facts for their own sake, and often ignore the impact that information and new technology can have on the public welfare. The "increase of function" research on coronaviruses is an example
- They are brilliant!
- Scientists are curious and methodical to analyze ideas and hypothesis

Personal Connection with Scientists/ Benefited from Science

- I know more scientists than I can count!
- I know many scientists and trust them and trust that science works in the long run.
- Because of the scientists I know and have collaborated with -- and because of my daughter who is a research environmental aquatic biologist.

- I have worked in science and believe scientists are incredibly ethical. The economics of funding and politics are the sources of corruption not science.
- I think the only time scientists don't act for the public are when they are forced to act against us, whether that's for funding or clout. But I generally trust that most scientists are scientists because they're curious and want to help folks, at least that's most of the scientists I know
- I have taken science seriously for childhood on. I subscribe to Science News to keep in touch with serious science developments, and my son is a biology professor!
- Simply, my experience. The scientists I know are all people I trust.
- personal acquaintance with a physicist, some college science
- I have been trained in biological sciences and have done research. I have worked with other scientists and all of those I have met and worked have acted in the best interests of the public
- My father had stomach ulcers and was incorrectly identified with emotional problems. A scientist proved that stomach ulcers were caused by pathogens and showed the 'old' thoughts were not sufficient to help heal people with this problem. In addition I was vaccinated for polio, as were many others, and polio is no longer the problem it once was.

There are hundreds of in-person “citizen science” projects that engage the public in scientific research (for example, collecting water samples, monitoring birds, etc.) Please provide a brief explanation of why you would or wouldn’t consider trying an in-person citizen science project.

Time (NOTE: As with Zooniverse participation, time was mentioned as the biggest limiting factor to participation.)

- [In between] As a retiree and a caregiver for my wife my free time is limited.
- Lack of time
- It would be worthwhile, but I'm really loaded up with projects and responsibilities right now, so my time is quite limited.
- I would consider it, but time restrictions might lessen my opportunity to participate.
- If it would be possible with my schedule and time demands I would like to.
- Again, too busy at this stage of life.
- not having enough time to do a project
- too busy, committed in my area of expertise
- Again, I already have a job!
- Depending on time requirement and focus
- Depends on time/ work involvement
- too busy already
- I'm juggling many projects; it's just a matter of time - and not having enough of it. But, otherwise, I would participate.
- I have more time available now, and also feel the need to contribute my ideas about inclusion and equity.

Age or Health-related

- I've only chosen unlikely due to the global pandemic of COVID-19. If there wasn't a pandemic, I'd probably have chosen likely.
- I'm a quadriplegic, and these kinds of activities are extremely difficult.
- I'm recovering from cancer treatments and I am unsteady on my feet.
- we're in a pandemic
- I don't have much interest in science and my family is being pretty strict about quarantining and social distancing

- Depends on the pandemic
- It depends what we'd be asked to do. We are - ahem – elderly!
- Limited mobility and intestinal issues.
- Time demands and family demands; health issues
- simply not sure I want at this point in life to invest my energy in such an effort

In-Person Venue

- I prefer to do things online.
- Just not a social person
- Unlikely to participate in person. I do not have the discipline to do something so detail oriented.
- not overly social
- Seems like a good way to contribute to science and do something fun outside.
- I know about some of these such as bird counts and lake weeds
- It would be cool to do one but it might be difficult to actually go to a place to do it.
- I would like to be engaged with nature outside
- A lot of the barriers between my willingness to engage in an in-person project currently are bound-up in pandemic restrictions, but I'm also mindful of a reasonably full and variable work schedule that makes it difficult to plan for such gatherings. I'm hopeful this will change in the future!
- Is there one in my area?
- I would participate in watching birds and other animals, plant flowers, observe seasons, etc.

Expertise

- While interested, I am unsure what I really have to offer.
- I am a bit nervous but with some research I would give it a try
- This sort of project fits with my interests and capabilities
- You gave me an example that I can get my head around and see I would be able to help.

Involvement/ Interest

- I'd love to contribute and follow a research project closely.
- I'm interested and would also like to get my students involved
- I would be interested in the projects that cover issues that people experience in urban spaces and globally.
- I watch birds.
- environmental projects integrate nicely with my current research and teaching
- I like science and want to contribute.
- Show how science works and do it together with my family
- This was something I engaged in as part of coursework during my education. I would potentially be interested in participating again, if the opportunity was something manageable and not a major time commitment. Ideally, it would also be something my kids were able to and interested in participating in, as well.
- IT would be great to nest the work within the broader discussion of both how science works (it's messy!) and why this kind of science matters.
- need to know goal of project and my input.

Please provide a brief explanation for your answer as to whether science sometimes conflicts with your religious beliefs.

Complementarity, Harmony, or Synergy between Science and Religion

- The[y] aren't inverse of one another
- Science is a tool for exploring the physical world around us, religion is a tool for exploring the spiritual world.
- [Science] doesn't conflict [with my religious beliefs] because God created everything.
- Using the gift of reason and scientific method to study the world is a way of getting to know and understand the world of God's creation.
- As a retired pastor I am secure in my personal faith and I see science as answering the question of how things happen while religion focuses more on why they happen.
- **MY GOD IS THE AUTHOR OF SCIENCE**
- Does not conflict because everything in the world was created by God.
- Anglican theology tends to be very pro-science
- Science helps us to understand the universe in a different way than faith does. Both are useful.
- They can live side by side and support each other
- I believe that God created the world the way it is, which includes all of the science
- Science properly practiced is valuable and valid; when it tries to explain metaphysical realities it appears reductionistic.
- because I believe God can coexist with science. Science just explains how God's creations work.
- Science and religion are answering different questions
- God created this world and calls us to learn, explore and care for this world
- As a religious person and scientist, I do sometimes experience conflict over particular issues. But rarely so. Mostly the two perspectives are complementary and synergistic.
- Absolutely not! Good grief. Those of us who truly believe in God as Creator realize that nothing science discovers could be anti-God! That means good science. Not science as scam (e.g. anti-climate-change "research").
- I believe that both my religious faith & science can be sincere efforts to ascertain truths about God's creation--since there's one creation, there is one truth, however little of it we understand.
- As a scientist and a Christian, I see no conflict between the two, and I have given several invited talks on the subject.
- I am an Episcopalian - a denomination that values and respects science and sees the search for knowledge as compatible with Christian belief and practice.
- I don't view my religion as providing answers for how the universe works — it is there to help guide ethical decision making, and that can only be done well by understanding the world around me as best I can. The latter is what science provides us; religion doesn't do that.
- In my view, science deals with the Q How? Religion with the Q Why? Science shows us more of the universe God created, enriching both religion and the process of scientific discovery.
- This conflict all boils down to the interpretation of Gen 1,2 and "miracles". The argument is bogus (profitable but bogus). Theology is about the ineffable and it is touched by *stories*, poetry, and myth (in the true sense). Science is about exploring and describing the universe in which we live. They are complimentary, not conflicting, pursuits. One explains the world and the other rejoices in our place in it (or it should). If there is a conflict, the conflict comes from bad theology, some of it bordering on idolatrous heresy. As the Dean of my seminary once said, "All of the present day heresies have been around since the beginning except one - the literal

interpretation of Scripture." That is not to say there is no bad science. There is lots of that, usually funded by big money, but that gets sorted out by reality.

- Religious beliefs depend on the interpretation of sacred texts and commentaries. Scientific theories depend on human understanding of natural phenomena. Neither can claim perfect accuracy, but both can claim enormous value.
- Science and religion address different questions about the universe. Science attempts to understand the physical operation of the universe. My religious outlook explores how humans should live in relationship with each other and with the rest of the universe.
- Science is about discovery, curiosity, and wisdom -- all characteristics God delights in our embracing.
- I believe there is no conflict between true science and religion. For me, it is not a choice between God or science; it is God and science.
- My faith, as a Lutheran pastor, is not based on science. I find it exciting to explore the meaning of scientific discoveries or theories in the context of my religious convictions.
- Their overlapping domains leave much room for each to inform the other.

Perceived Conflicts

- resurrection
- I think evolution is a battle between church and science.
- If science leads a person to atheism or agnosticism, there is a conflict. However, I know that there are many scientists who are devout Christians.
- Depends on the context. Politics and the drug industry give me pause from time to time.
- Considering the science of the human embryo and my tradition's claim that this is a full human being.
- Science may conflict with ethical POV. My ethics might conflict but not based on my religion.
- On the issue of the humanity of an embryo, I am still considering the science against my tradition's consideration of the embryo as a "human being".
- There will always be sometimes, even if that sometime is a minority scientific position. I have, as do many scientists, have concerns with CRISPr and other scientific technologies.
- The neutron bomb was plausible as a scientific endeavor but was questionable ethically and in conflict with my faith.
- my ethics might conflict but not based on my religion
- Science often explores issues which are not in the best interest of people or the planet, such as making new weapons or new poisons or exploits people, animals, nature or the planet.

Science Informs, Challenges, Deepens, or Modifies Religious Understandings

- my religion follows my scientific beliefs
- My faith is based on observation of the creation and creator over millennia. We may have clearer observations but they seem to support earlier hypotheses.
- I think God helps us through science.
- If science conflicts with my religious beliefs, my beliefs are too literal and limited.
- Scientific discoveries have changed the way I view things over time.
- I believe that if science conflicts with your interpretation of religion then that interpretation is wrong.
- My religious beliefs are based on what I know and science.
- Science reflects 'God;' to the extent that scientific changes conflict with religious beliefs, those religious beliefs need to be reconsidered.

- I believe that Science is almost like God's second word he has given us so if science in conflict with your interpretation of the Bible then your interpretation is wrong.
- My religious beliefs are guided by science.
- I've always been religious (Christian), but grew up in a pro-science denomination (United Church of Christ) and am now an ordained minister in that denomination - and I firmly believe, following the advice of Augustine, that religious belief must conform to science and not the other way around.
- I am humanist, an explicit part of my belief system is that truth is discovered through the application of the scientific method.
- I am a Humanist Atheist so I don't believe in the supernatural which plays large roles in most religions.
- My religious beliefs as a Roman Catholic have constantly been modified through history as science has progressed. The changes have involved interpretations, and not essential beliefs.
- I feel my religious beliefs (and I'm a priest) benefit greatly from the work of science, and have frequently been guided by such work in significant ways.
- My religious beliefs are based on what I know and science
- I wish more people of faith heeded science. We would have had an easier time adapting to the pandemic.
- Because we don't see the science or the Scriptures clearly all the time. When things change, we observe new things (especially in science), we have to pause and reflect on how to reconcile. This is a long-term project, and ultimately any temporary tension is not final (in a metaphysical, eternal sense)
- Science helps to challenge and in the process, deepen my religious understandings
- always changing and growing in my religious +++++ perspective
- I don't believe it does [conflict] in reality, but in moments of not knowing, there are times of tension as we think through implications and revise beliefs, etc. So, any tension is not problematic with a long-time view.
- God is big. The Bible is not a science book. If there were to be conflict, it probably means something wrong in my belief system.
- After retiring as PA I became an Episcopal priest. Science could be seen as unveiling the "blue print" of creation. God is a mystery as is the weaving complexity of the cosmos and beyond. As science uncovers more of the mystery of creation how could I see it as purely secular? Science is one of many gifts that are sacred. When I worked on my cadaver in PA training I was brought to tears to see such beauty of creation and to learn the Krebs cycle - wow! I could go on....when is science not of a larger mystery?
- Science is part of revelation in my view. Truth is truth, even if it is contradictory - when there is conflict, it just means there's more research to be done, more truth-seeking.