SOLAR ECLIPSE ACTIVITIES FOR LIBRARIES

SEAL 2023/2024 ECLIPSE RESULTS

A Final Report for the Gordon and Betty Moore Foundation

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TABLE OF CONTENTS

Your funder's generosity reminded communities across the United States of the value of libraries. Free information and resources, like free eclipse glasses, improve everyone's quality of life and are endlessly valuable. Thank you for contributing to this momentous event.

-Kelly Page, City of Garland - Nicholson Memorial Library System, 2024

All maps created by Brooks Mitchell (Space Science Institute)
Eclipse Photos: NASA

SEAL Solar Eclipse Activities for Libraries

NASA@ My Library

ABSTRACT

In 2016, the Gordon and Betty Moore Foundation funded the Space Science Institute to provide subject-matter-expert support and over 2 million solar-viewing glasses to libraries ahead of the 2017 eclipse. In 2022, the Foundation followed up with funding for an even more dramatic plan: to provide glasses, activity kits, and professional development in every state and U.S. territory as we approached the dual eclipses of 2023 and 2024.

With two eclipse paths traversing the continental US in under a year — an annular eclipse on October 18, 2023, and a total on April 8, 2024 — Solar Eclipse Activities for Libraries (SEAL) was tasked with reaching as many libraries as possible through "bigger, better, and deeper engagement," helping them become community hubs of solar science exploration and eclipse preparedness. Ultimately, SEAL distributed approximately 6 million safe solar viewing glasses to public, school, tribal, and military libraries, held 78 workshops across 42 states and 4 territories, delivered 211 circulating science kits to 46 state and 5 Territory Libraries, and provided access to over 350 Eclipse Experts and NSTA affiliated teachers for programs and training. SEAL provided approximately 85-90% percent of the United State's public libraries with solar science and eclipse-related resources and training.

The spectacular extent of this project was made possible through financial support and guidance from the Gordon and Betty Moore Foundation, and through meaningful collaborations between SEAL and tens of thousands of public libraries across the nation, over 50 State and Territory Libraries, and 143 trained Eclipse Experts. Additionally, the SEAL team was able to collaborate with other solar science and education-focused organizations and projects (such as NASA, GLOBE, Eclipse Ambassadors/Astronomical Society of the Pacific, Eclipse Soundscapes, Solar System Ambassadors, and others) to leverage existing resources and distribute eclipse and solar science materials to an even greater audience.

PROJECT GOALS AND DELIVERABLES

KEY PROJECT DELIVERABLES:

Deliver eclipse glasses, educational materials, and online trainings to 6,000 library systems, reaching approximately 10,000 individual library locations (compared to 4,100 and 7,200, respectively, in 2017), plus enlist and train a cadre of astronomers and educators to work with their local libraries on outreach programs and events.

Provide circulating solar science kits to all 50 State Library Agencies (4 copies each), which they then will be able to circulate to up to 1,500 public libraries prior to the 2023 Annular Eclipse, and can continue circulating up to the 2024 Total Eclipse, and long after.

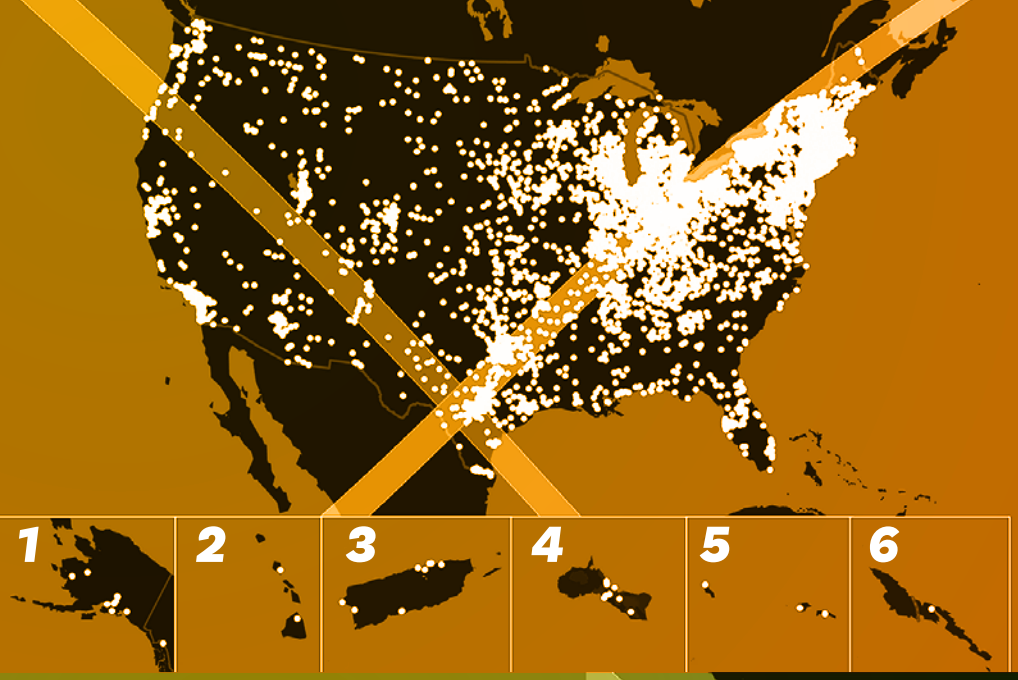
Offer in-person workshops, in coordination with all 50 State Library Agencies, at state meetings to provide training on the State Library Kit, share solar and eclipse science, and build community around preparing for the 2023 and 2024 eclipses.

Images:
Bottom: Oak Park Public Library
Right: Total Eclipse in Bloomfield, Indiana

KEY STATISTICS

Solar-Viewing Glasses Distributed	**~ 6,000,000**
Individual Library Locations Provided with Glasses	**~15,000** 50 states, Washington DC, 5 territories, 3 Freely Associated States, Canada, Samoa, and New Zealand
Library Programs Facilitated Around the Two Eclipses	**~ 49,000**
Number of Patrons Participating in Programs	**~3,000,000**
State-wide Workshops Held for Library Staff	**78** 42 states, 4 territories, the District of Columbia, and Palau
Number of Library Staff Attending Workshops	**2146**
Solar Science Hands-on Kits Distributed Through State and Territory Library Systems	**211** 44 states, 5 territories, and the District of Columbia
Eclipse Experts Trained to Help Libraries	**143**
Science Teachers Engaged as Community Resource Partners	**306**
Community and School Programs Facilitated by Teachers through NSTA Partnership	**800**

In addition to the above statistics, a large amount of data was collected from participating libraries through their initial applications to join the project, as well as surveys completed after both the Annular (2023) and Total (2024) Eclipses. The full list of application and post-event survey questions can be found in the appendices, as well as a full description of the statistics and qualitative responses. These statistics represent a large percentage of the total library field and are relevant for work beyond the Eclipses. Please see Appendix C and D for the full reports.

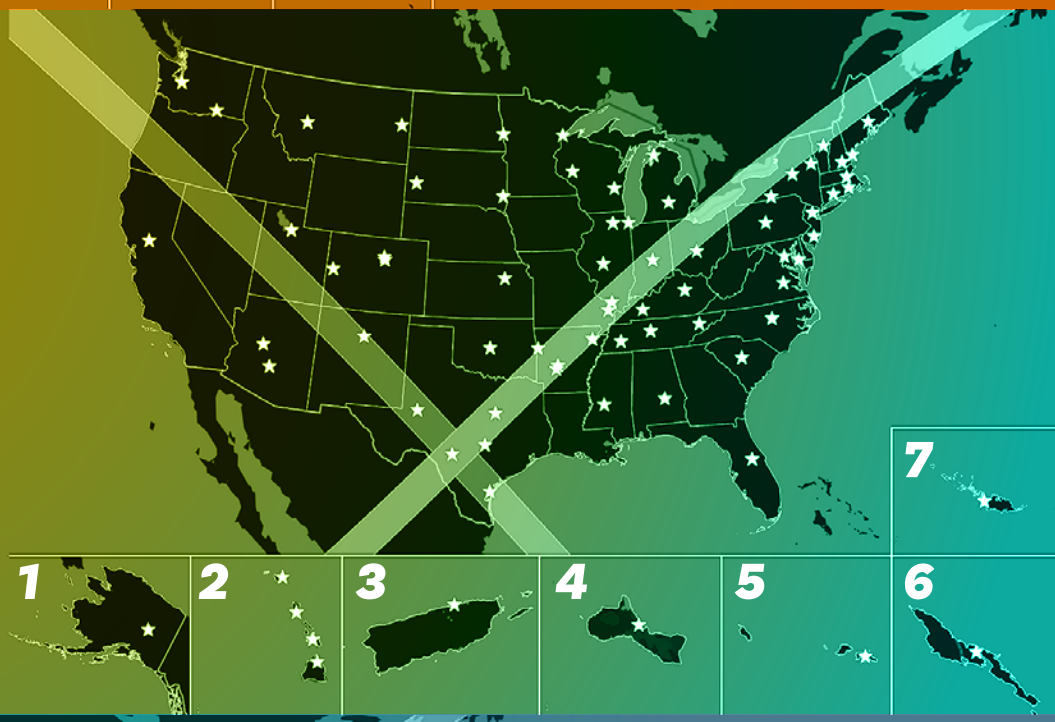


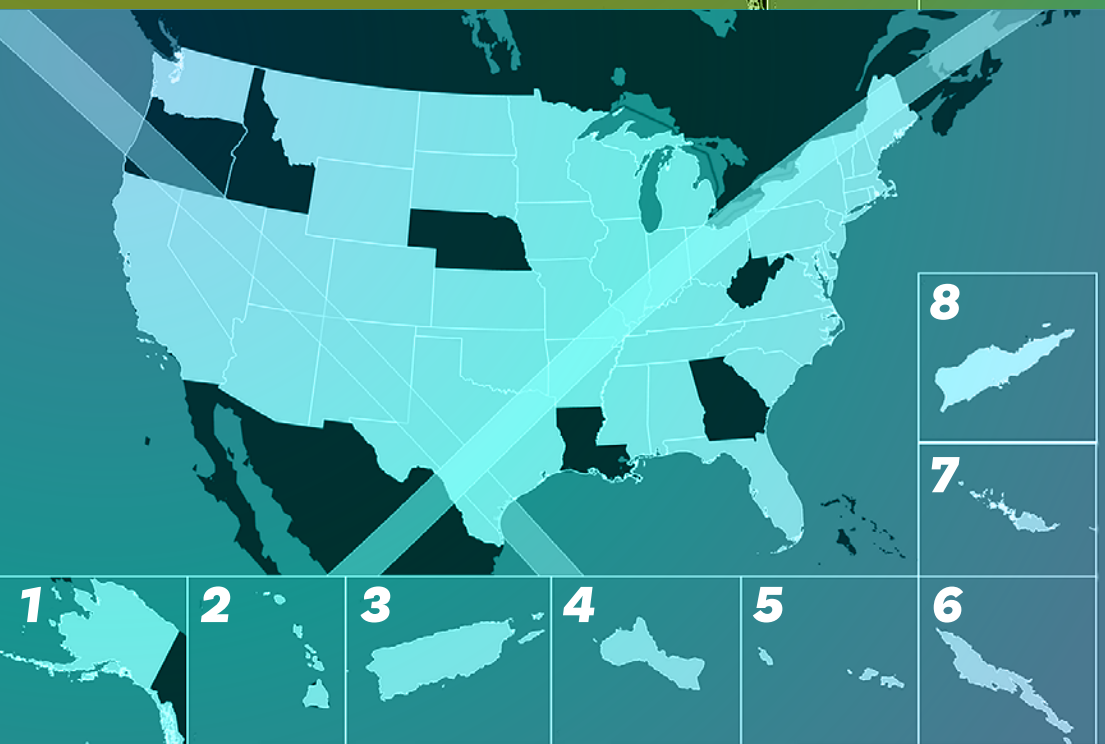
Solar-Viewing Glasses Distributed

1. Alaska
2. Hawaii
3. Puerto Rico
4. Guam
5. Northern Marianas Islands
6. American Samoa

SEAL Workshops Facilitated

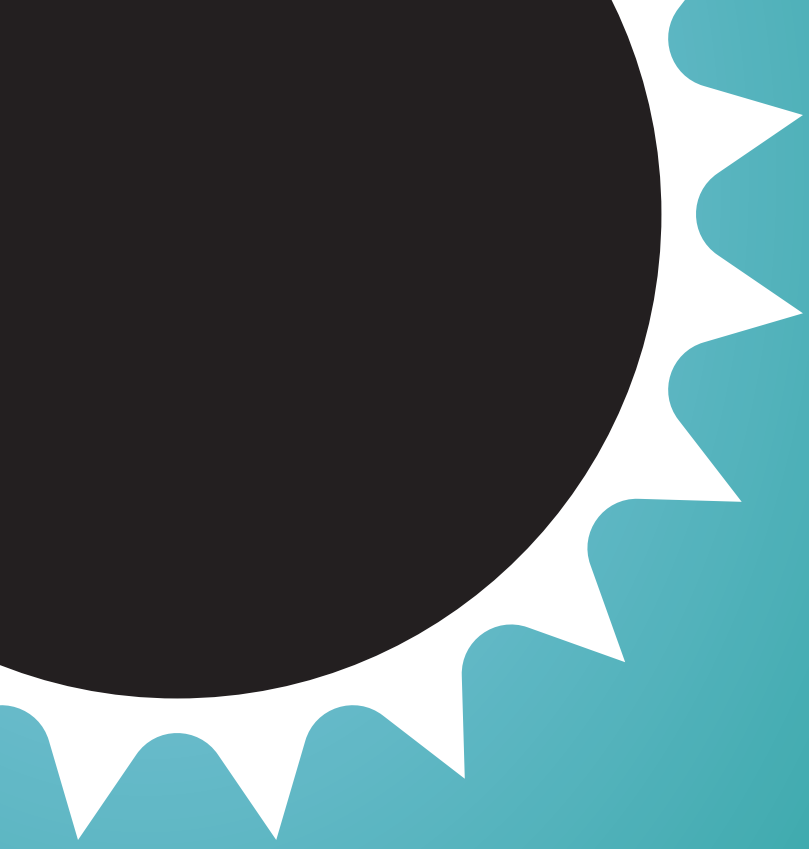
1. Alaska
2. Hawaii
3. Puerto Rico
4. Guam
5. Northern Marianas Islands
6. American Samoa
7. Republic of Palau





Solar Science Kits Provided

1. Alaska
2. Hawaii
3. Puerto Rico
4. Guam
5. Northern Marianas Islands
6. American Samoa
7. Republic of Palau
8. US Virgin Islands



PROJECT BACKGROUND

“WHY LIBRARIES?”

The Space Science Institute’s Education and Learning Research Group (formerly the National Center for Interactive Learning) has primarily worked with public libraries to increase STEM programming and access for the last 15 years. Science learning is a complicated, iterative, and continuous process that takes place in both formal and informal settings. Learning outside the classroom plays an important role in engaging youth to investigate the natural world and develop the skills needed for thinking scientifically. While museums, science centers, zoos, and aquariums have long been viewed as the primary loci of informal science learning, there is a natural fit between libraries and science programs.

Images:
Right: City of Wolfforth Library
Bottom: Redwood City Public Library
Bottom Right: The Library Station

Image: Ojibwa Community Library

As institutions that offer their services for free, public libraries serve as a "public square" by providing a place where members of a community can gather for information, educational programming, and policy discussions. And they are being used now more than ever. In 2019, there were 1.2 billion in-person visits to the 16,560 public libraries and 647 bookmobiles in the U.S. (IMLS 2021). About 4 million visits per day. In the same year, public libraries offered 5.90 million programs across all age bands and on a variety of topics, attended by over 124.7 million people (IMLS 2021), an increase over prior years, with public programming expanding 17% from 2012-2017 (IMLS 2019).

SUCCESSES AND LESSONS-LEARNED FROM THE 2017 ECLIPSE

In late 2016, the Gordon and Betty Moore Foundation approached STAR Net to conduct work focused on the approaching 2017 Eclipse. Up until this point, STAR Net had worked with small numbers of libraries at a time (e.g., 10-15 libraries on an exhibition program) and had approximately 150 libraries in the network. After the 2017 Eclipse, membership increased exponentially (and after the 2023/2024 eclipses, currently stands at around 14,000 public library staff). The original goal of reaching 500 libraries in the network was reached within hours of glasses registration opening!

The 2017 Eclipse Project benefited both libraries and the public they serve. STAR Net delivered an estimated 2.1 million glasses to over 7,000 library locations across the United States, giving an estimated six million people the chance to experience the eclipse at no cost. Libraries were provided a chance to supplement their public program offerings, or even try STEM programming for the first time. More than 100 participating libraries indicated the project was their first STEM program, and approximately 50 that it was their first public program of any kind.

With these successes came challenges and lessons-learned that would impact SEAL's approach to the future Eclipses. The logistics of tracking registrations and shipping was new territory for SSI and the team encountered several bottlenecks, including manufacturer delays, last minute orders, and trouble verifying duplicate or incorrect orders. This last issue led to some libraries having multiple staff members order glasses independently, with those libraries ultimately receiving more glasses than they wanted. Having more lead time and a standardized, internal process for registrations was critical for success in the 2023//2024 eclipses.

Another hurdle was public awareness. Too much of it! Media attention towards the project led to an (in)famous flood of people asking libraries for far more glasses than were available. To avoid putting stress on library staff, it was determined that promotion should be as focused towards libraries only, if possible, and any statements to the press should not imply libraries had free glasses. In-person and virtual trainings could also provide strategies for distributing glasses and navigating high demand and pushy patrons.

One particular lesson of note: demand for glasses – both on and off the path of totality – was far higher than anticipated. These lessons and newfound institutional knowledge could be put to the test with two more eclipses in the near future!

Image: Fairbanks AK Alaska state library workshop

"We had one of the biggest events our Library has ever seen. So, in my language, we say Waewaenen –Thank You–!"

- Menomin Hawpetoss, Menominee County Library, 2017

"Our eclipse programming has connected us with community collaborators for future programming and has created excitement from our patrons about future STEM programming."

- Fort Fairfield Public Library, 2017

Image: Montrose Regional Library

SCALING UP FOR 2023/2024

The spectacular extent of this project was made possible through financial support and guidance from the Gordon and Betty Moore Foundation, and through meaningful collaborations between SEAL and tens of thousands of public libraries across the nation, over 50 State and Territory Libraries, and 143 trained Eclipse Experts. Additionally, the SEAL team was able to collaborate with other solar science and education-focused organizations and projects (such as GLOBE, Eclipse Ambassadors/Astronomical Society of the Pacific, Eclipse Soundscapes, Solar System Ambassadors, and others) to leverage existing resources and distribute eclipse and solar science materials to an even greater audience.

To build upon the success of 2017, the project would need to increase the quantity and quality of resources distributed, provide sufficient training opportunities, and furnish library patrons with multiple avenues of solar science engagement. Viewing a solar eclipse can be an awe-inspiring, life-changing moment. By pairing this opportunity with additional types of engagement activities – such as seeing detailed prominences and sunspots with a solar telescope, viewing through indirect methods, learning about other culture's ways of celebrating eclipses, or participating in an interactive activity about orbital mechanics – libraries around the country would be able provide a more comprehensive, deeper level of engagement.

Image: Northern Mariana Islands

MAJOR PROJECT ACTIVITIES OVERVIEW

WORKSHOPS

The SEAL project held 78 workshops across states, territories, DC, and freely associated states. Each was planned in coordination with relevant regional agencies and held either at the State Library or a public library in a central location. Workshops covered core project content, as well as tailoring programs to be locally relevant, and reached an estimated 1.5% of US library staff!

Image: A participant in the Pacific Islands Association of Libraries, Archives, and Museums —PIALA— workshop in Saipan tries out eclipse glasses.

SOLAR SCIENCE KITS

Supplementing the workshops, solar science kits were distributed to 50 State and Territory Libraries, including DC, and came in two variations: younger audiences and multigenerational. Systems received two of each. Kits came with solar viewing devices, relevant books and activities, and other items (see Appendix E for kit images and item specifics). The kits aimed to be relevant to solar and lunar science broadly, not just the eclipses, with durable items and evergreen activities that libraries can circulate for years to come.

Image: Pago Pago, American Samoa workshop

SAFE SOLAR VIEWING GLASSES

SEAL opened online applications for libraries to receive glasses starting in June 2022. The registration process was much improved over 2017, with new procedures implemented to avoid past issues and bottlenecks. Ultimately, nearly 6 million glasses were distributed to roughly 15,000 individual library locations. Nearly three times as many glasses and twice as many locations as 2017!

Image: Southwest La Plata Library District

WEBINARS

In addition to the in-person workshops, the SEAL project hosted virtual training webinars that reached an additional 1,938 library staff. The webinar recordings were made available on the STAR Net YouTube channel, opening access to thousands more views. Topics covered similar material to the workshops and provided opportunities to give project updates, address questions and concerns, and identify areas of further support for library staff.

NETWORKING SITE

In order to support the thousands of new library staff joining STAR Net, a networking site was created to host all eclipse related content, facilitate participant communication, and to connect library staff with vetted eclipse experts from SEAL and partner programs. Members of the site received a monthly eclipse-specific newsletter. Post-eclipse, members retain access to the general STAR Net community site and newsletter, providing relevant grant, activity, and other information for public libraries.

PARTNERSHIPS

While the funding for SEAL was provided by the Moore Foundation, the project leveraged several strategic partnerships outside of this core relationship. Notably, the NASA Science Mission Directorate funded NASA@ My Library program, another SSI project. In tandem, the two projects were able to extend their collective reach, expert guidance, and outreach opportunities. SEAL also partnered with various NASA expert networks (such as Eclipse Ambassadors, Night Sky Network, Solar System Ambassadors, and others) to provide programs for library staff.

In addition, Dennis Schatz and Andrew Fraknoi, in collaboration with the NSTA, led the outreach and training efforts of the project's Eclipse Experts: over 300 subject matter experts solicited and given training on hosting public outreach events for both eclipses. These experts held events in at least 39 states, with many hosting multiple events, an additional avenue of public engagement and education.

ECLIPSE DAY EVENTS

Public libraries held approximately 49,000 events before or during the Annular and Total Eclipses. These events reached an estimated 3 million patrons and included expert lectures, hands-on art activities, solar cooking, not to mention actual eclipse viewing!

Beyond their own programs, libraries distribution of glasses in advance meant many patrons participated at home. And approximately two thirds of participating libraries said they shared glasses with other community organizations, such as schools and assisted living homes.

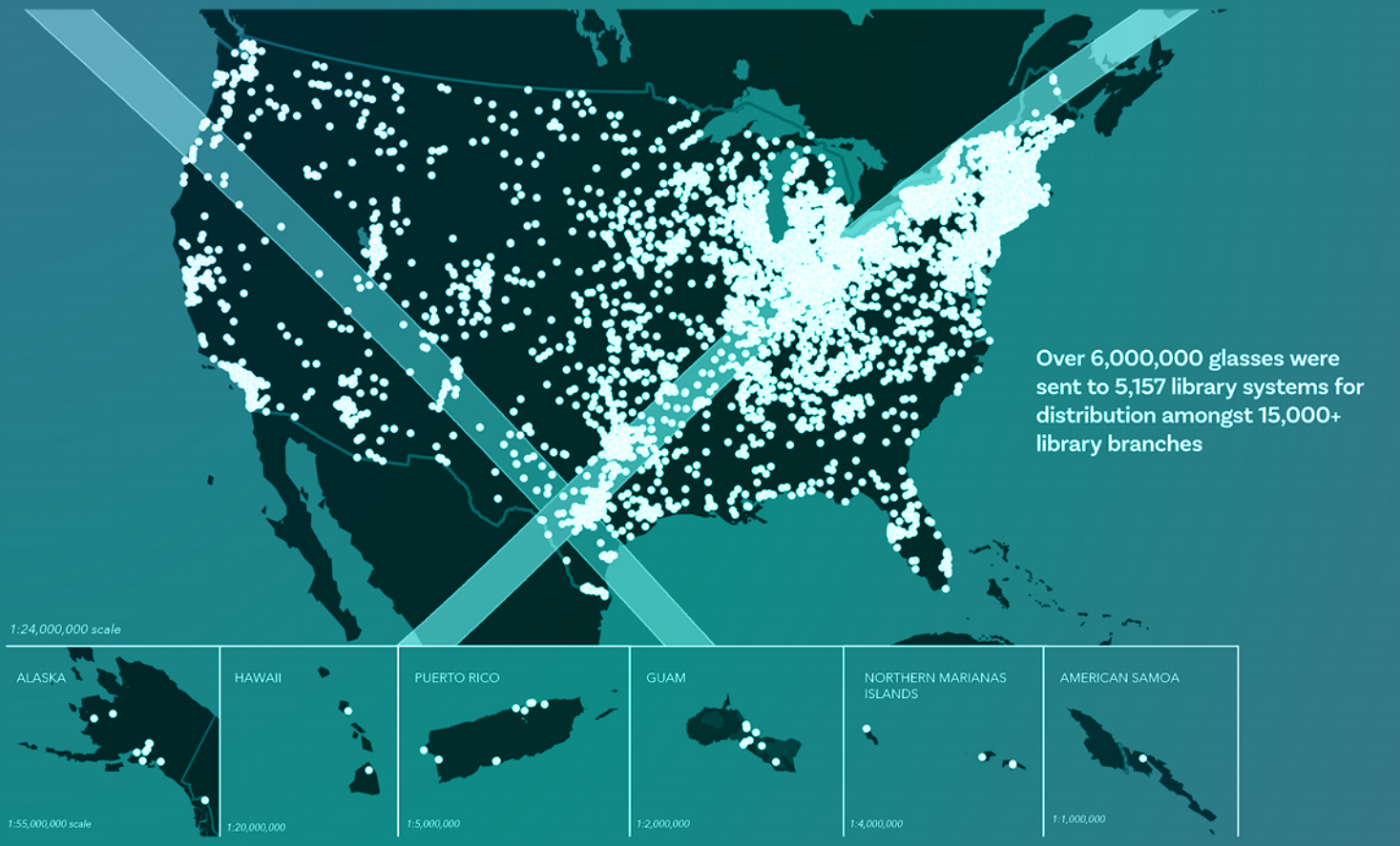
But it doesn't end there! After the eclipses, the SEAL project collected gently used solar viewing glasses to share with military libraries, Antarctic research installations, and other public libraries around the globe for eclipses coming up in 2025 and 2026!

Images used on page 19 and 20 listed in Appendix C

The annular eclipse captured using a colander as a pinhole viewer.

KEY DELIVERABLES AND OUTPUTS

GLASSES DISTRIBUTION



A major adjustment from 2017 was the project's earlier, more proactive approach to notifying libraries about the opportunity to receive solar viewing glasses, as well as in-person and virtual trainings. An emphasis was placed on beginning work well in advance of the eclipses to allow more flexibility, time to deal with emergent complications, and reach as many libraries as possible. Existing contacts and established relationships with large networks (such as key library systems and State Libraries) amplified this early outreach.

Proactive list building began very early in the project. Before SEAL, STAR Net already had an active library focused community built up through previous endeavors, including the 2017 Eclipse Project. This gave SEAL a base of thousands of already engaged library contacts from the outset, and initial emails announcing the project solicited over 1,000 signups in the first few weeks, as early as June 2022.

Beyond preexisting contacts, project staff identified three other avenues for early, direct outreach: State/Territory Libraries, project partners, and conference sessions. State/Territory Library outreach (as well as a few large, urban library systems with preexisting contacts, such as the Los Angeles Public Library) ended up playing a key role in disseminating information about the SEAL project to local libraries, with over half of accepted requests for glasses identifying they heard about the opportunity through a State Libraries communication, kit distribution, or eclipse related event such as a workshop.

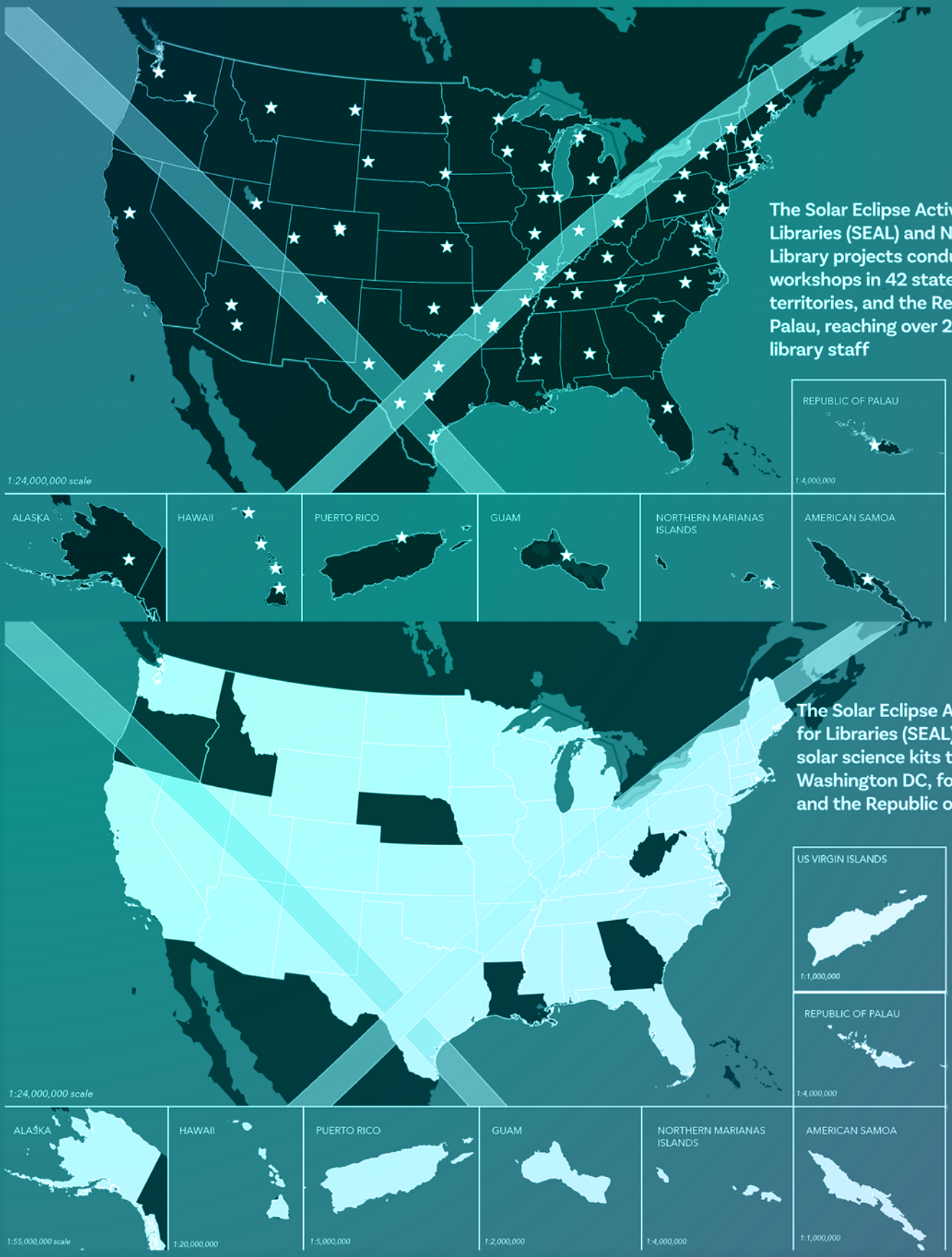
One partner of note was the American Library Association (ALA), whose Facebook groups for programming librarians was a significant avenue for spreading word about the project. While early conference sessions didn't provide the same long-term uptick in requests for glasses, they provided early opportunities to shape and receive feedback on efforts to come, in the form of relationship building and testing workshop formats that would be used for the duration of the project. While SEAL conducted direct outreach to states, large systems, and STAR Net newsletter lists throughout the project, most signups began to come from networks outside of the project as time went on, primarily through word-of-mouth discussions happening in more informal library networks.

Regardless of how libraries heard, SEAL received steady signups throughout the project timeline, and the need to process the thousands of applications was one of the key challenges of the project. However, even with shipping delays from manufacturers, libraries applying multiple times, and confusion within systems about if they had applied at all, distribution was ultimately a major success. Nearly all libraries who requested glasses for the Annular Eclipse received them in time for viewing, with the remainder being largely very late submissions who were informed the project could not guarantee timely arrival, and only one report of a library failing to receive glasses they requested for the total eclipse. Even when items were lost in the mail, extra supplies were ready to ship either from the SSI office or PI Holland's home office, ensuring that last-minute issues were dealt with in a timely fashion.

One issue during the 2017 Eclipse Project was of multiple staff members from individual libraries requesting glasses, resulting in some libraries getting more glasses than intended, sometimes more than they could give away. The solution arrived at was to request a signed letter be uploaded by the library director (or equivalent responsible individual), attesting to not charge for the glasses and to host eclipse related events. This both reiterated intended use of the glasses while necessitating requests have some kind of central sign off procedure at each library, massively reducing the amount of duplicate applications versus 2017. It also had an unintended benefit of creating a higher bar for counterfeit applications from non-libraries, a problem that arose as the annular eclipse began to gain public attention and growing immediately after as people started to plan for April.

This new process, while important, had the downside of increasing the barrier to entry for requesting glasses. This was especially true for smaller, understaffed, and predominantly rural libraries, one of the audiences SEAL most aimed to reach. In response, staff was assigned to proactively look through applications for errors or missing letters, and rather than rejecting them outright, reached out to confirm the applications. This approach was thorough, with a broader reach than an automated procedure, but was highly labor intensive and significantly increased the time between a submission being submitted to it being finalized and added to the next shipment of glasses. Thanks to the decision to begin distribution more than a year in advance of the Annular Eclipse, this did not develop into a significant issue for SEAL's ability to achieve projects goals, but did lead to some periods when additional labor was needed to finalize shipments.

STATE LIBRARY KITS AND WORKSHOPS



The Solar Eclipse Activities for Libraries (SEAL) and NASA@ My Library projects conducted 78 workshops in 42 states, four territories, and the Republic of Palau, reaching over 2,100 public library staff

The Solar Eclipse Activities for Libraries (SEAL) provided solar science kits to 44 states, Washington DC, four territories, and the Republic of Palau.

Image: Participants at the PIALA (Pacific Island Association of Libraries, Archives and Museums) workshop try out the "Moon Bear's Shadow" activity.

Running eclipse information workshops and the distribution of solar science kits were seen from the outset as key project deliverables. Despite being two distinct objectives, both goals were strategically related to three pillars of the project: building relationships with State Libraries, having State Libraries act as a key avenue for the dissemination of information about SEAL itself, and supporting library staff as a whole with information and programs for engaging in informal STEM education. In this way, much of the relevant work was overlapping.

Initially, SEAL reached out to all State and Territory Libraries, informing them about the project and seeking to schedule workshops and kit delivery. While a large number responded quickly, many took multiple attempts to make sustained contact or only responded late in the project term. Some offices never responded despite repeated attempts.

After making contact with a given State/Territory Library project staff discussed two main items: holding one or more workshops in their state for library staff and sending Solar Science Activity Kits for distribution among public library branches. Even with a less than 100 percent response rate, coordination was already a time-consuming task. Timing was imperative to be able to make the most of SEAL's limited staff available to run workshops, as was making sure individual staff members gained the level of experience needed to facilitate workshops and related assignments. SEAL worked closely with State Libraries to coordinate dates within the limits of other systems' availability leading up to the eclipses, and project staff time constraints.

In coordination, kits had to be created and shipped ahead of the workshops, necessitating a secondary, subordinate work timeline.

State Libraries received two copies of each Solar Science Activity Kit. A "Multi-generational Programming" kit, aimed at a broad age range, included: a solar viewing telescope and related equipment, two pairs of binoculars with internal solar filters, a copy of the book "When the Sun Goes Dark" by project team member Andrew Fraknoi and Dennis Schatz, and instructions for the activity "Big Sun, Small Moon" that demonstrates the how relative size and distance relate to viewing celestial objects. The other kit was intended for a "Younger Audience" and included: a Sunspotter indirect solar viewing device, two pairs of child-sized solar viewing binoculars, an activity guide and materials for SSI's space themed "Sorting Game" about organizing different categories of objects, and the children's book "Moonbear's Shadow" along with materials for a shadow casting activity based on it.

While most recipients received two of each kit, in some cases additional kits were provided based on context. For example, to large states like California and Texas, or to states that felt they wouldn't be able to coordinate the logistics of wider circulation and requested extra to furnish local districts with one kit each. Since State and Territory Libraries often have vastly different structures and local conditions, we left it to each library to coordinate further distribution within their jurisdiction.

While kits were eclipse related, care was taken to ensure they also had a broader solar science focus, as well as durability of components and links to online resources for replacements, that would allow them to be used by libraries long after April 2024. With this in mind, staff chose to actively avoid including components that would only be usable during an eclipse, such a pinhole viewing mechanisms, and instead focused on items, like solar telescopes, that are usable whenever the sun is out, and on activities that had relevance to multiple topics, such as both eclipses and shadows. Libraries were explicitly discouraged from using the kits during eclipse day events. From past experience in 2017, SSI learned that telescopes and other high-profile items can quickly cause crowd control issues for limited library staff who may already be spread thin for such a large event.

Beyond the shipping schedule, the main challenge for kits was storage space. Lacking a warehouse, SEAL had to use SSI office space, limiting the amount of kits able to be built ahead of time. Instead, staff had to build a few kits, ship them, and then proceed to build more before space for other office tasks was constrained due to the size of the containers. This made kit building a recurrent task across the project period, rather than a simpler, one-time affair.

The other major project activity coordinated with State and Territory Libraries was full-day, in-person workshops. These allowed SEAL to reach approximately 1.5 percent of the US public library workforce (2146 total public library staff) with training on eclipses, solar science, and other STEM topics. The workshops covered the basics of eclipse and solar science,

provided hands-on experience with circulating kit components (such as solar telescopes and Sunspotters), and provided training and guidance on how libraries could engage the public on solar science as non-subject matter experts.

Although each workshop covered core content areas, such as eclipse viewing safety and "Solar Science 101," content was customized for each location by highlighting the extent of the eclipses they would see (i.e., partial, total, or annular) and incorporating cultural elements. Workshops in Hawaii, for example, drew upon PI Holland's cultural knowledge of Hawaiian star charts and Polynesian wayfinding. Working with State Libraries also provided the opportunity to customize workshop content based on their constituent libraries' requests. States within the path of totality often asked to spend more time on Eclipse Day programming and crowd control advice, while states off the path of totality frequently requested a focus on solar science and best practices in STEM facilitation. From Wells, Maine to Pago Pago, American Samoa, each SEAL workshop was truly unique; the only consistent thing was the eagerness and excitedness of the library staff to learn more about the sun!

SEAL had an ambitious initial goal of conducting 56 total workshops; one workshop in each state, territory, and Washington DC. During two years (September 2022 – August of 2024), the project team conducted 78 workshops in 42 states, Washington DC, four territories, and one Freely-Associated State (Palau), reaching library staff from all 50 states, four territories, DC, three Freely-Associated States (Federated States of Micronesia, the Marshall Islands, and Palau), and New Zealand. The additional 22 workshops were requested on an as-needed basis by State Library staff, typically in either larger rural states (e.g., Texas and Arkansas) or states with significant populations along the path of totality (e.g., Ohio and New York).

Image: Kentucky workshop sunspotter

ECLIPSE EXPERTS AND NSTA COLLABORATION

In order to support public and State Libraries participating in the SEAL project, a group of experts was trained through a partnership with the National Science Teachers Association (NSTA), as well as a group of informal science educators who weren't already part of other programs, like Eclipse Ambassadors and Solar System Ambassadors. (See Appendix G for the full Eclipse Expert and NSTA Collaboration Report.)

In support of the Annular Eclipse, 94 trained experts conducted over 100 events in 24 states. Venues included 24 libraries, 17 community events, 13 community groups, 34 school (classes or district) events, and 14 training events for other teachers. Most experts hosted between two to five programs in support of the Annular Eclipse.

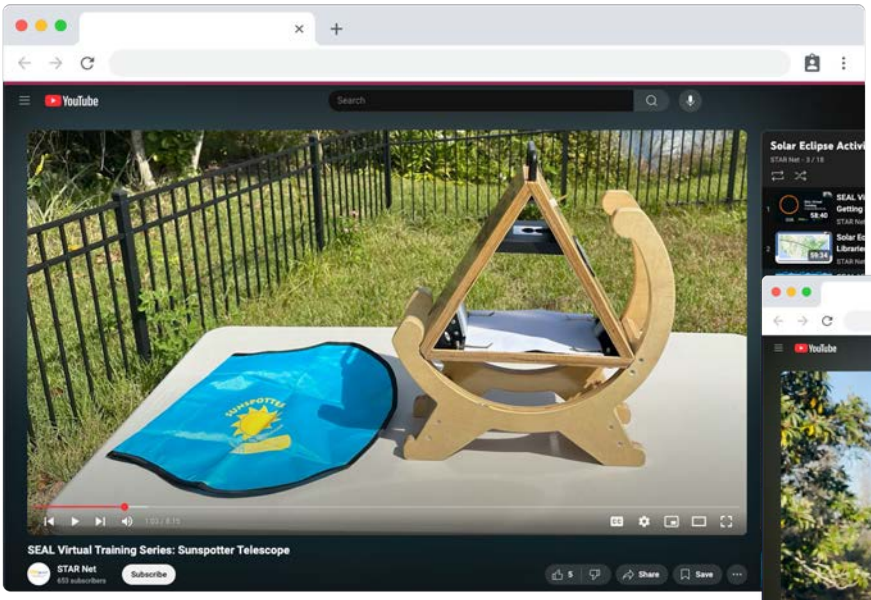
In support of the Total Solar Eclipse, 306 trained experts conducted over 400 events in 39 states. Venues included 35 libraries, 39 community events, 46 community groups, 126 school (classes or district) events, 40 training events for other teachers, and 15 media interactions. Most experts hosted between two to five programs in support of the Total Solar Eclipse.

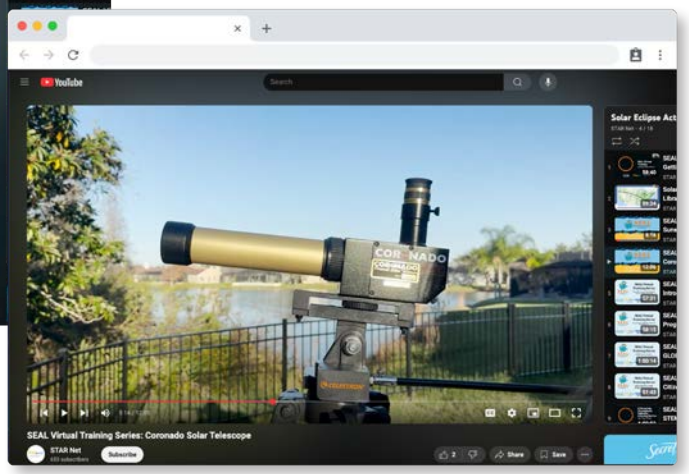
Images used on this page are listed in Appendix F

VIRTUAL TRAINING

Virtual professional development opportunities were conducted to reach library staff unable to join the in-person workshops. Monthly *Getting Started with SEAL* webinars began in January 2023 and ran until February 2024. These hour-long webinars were an abbreviated version of the in-person workshops, covering the contents of the circulating Solar Science Activity Kits, demonstrations of hands-on activities, and discussions of eclipse event programming.

Topic specific webinars were also offered throughout the duration of the project and covered content relating to solar eclipses and solar science. These webinars often featured subject matter experts and were available to all library staff through STAR Net. The webinars were promoted on the STAR Net and SEAL Newsletters, the STAR Net Blog Series, the SEAL Networking Site, and across STAR Net social media platforms.





A comprehensive list of the webinars and topics are as follows:

- SEAL Virtual Training: Introduction to Citizen Science and Eclipse Programming for Libraries —4/12/2023
- SEAL Virtual Training: GLOBE Observer Eclipse —5/4/2023
- SEAL Virtual Training: Citizen Science with Eclipse Soundscapes —5/16/2023
- SEAL Virtual Training: SEAL STEM Activity Clearinghouse Unboxing Webinar —8/22/2023
- SEAL Virtual Training: Eclipse Programming Share-a-Thon —9/12/2023
- SEAL Virtual Training: Eclipse Books and Authors —9/19/2023
- SEAL Virtual Training: Preparing for Eclipse Day —9/27/2023
- Eclipse Outreach Programs: Role Model Strategies for Engaging Youth in STEM —2/1/2024
- Viewing Eclipses Through Cultural Lenses with Dr. Isabel Hawkins —3/12/2024

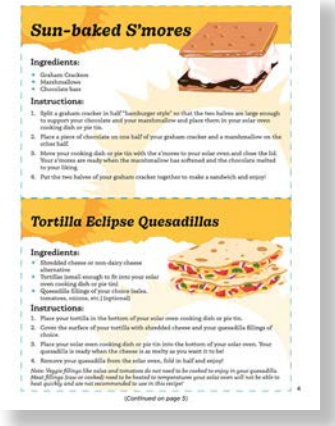
In addition to the monthly Getting Started with SEAL webinars and the SEAL Virtual Trainings, a series of short how-to videos were produced for library staff to learn about project related solar viewing equipment and hands-on activities. These videos, along with the webinar recordings, were made available on the STAR Net YouTube channel and cross-promoted throughout the above STAR Net channels::

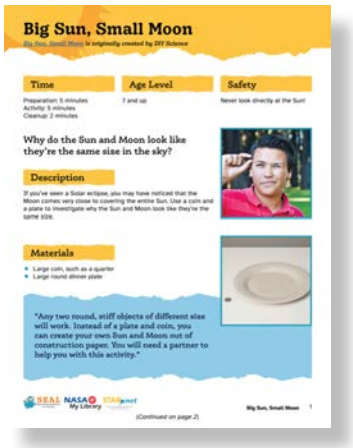
- How-To Video: Sunspotter —940 views
- How-To Video: Coronado Solar Telescope —346 views
- How-To Video: Parker Solar Probe Papercraft —30 views
- How-To Video: Build Your Own Sun Clock —98 views

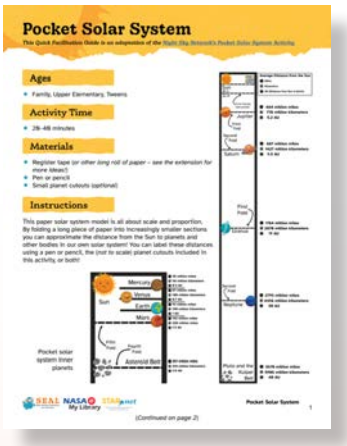
Image: Morgan County Public Library

ACTIVITY DEVELOPMENT

Development for solar science activities began in summer 2022. Team members started with a comprehensive inventory of pre-existing solar science and solar eclipse activities on the STAR Net STEM Activity Clearinghouse and from the NASA 2017 Eclipse Activity Guide. Activities appropriate to library educational settings (multigenerational, hands-on, efficient instructions) were identified to include in the Clearinghouse's SEAL collection (https://clearinghouse.starnetlibraries.org/180-solar-eclipse-activities-for-libraries).





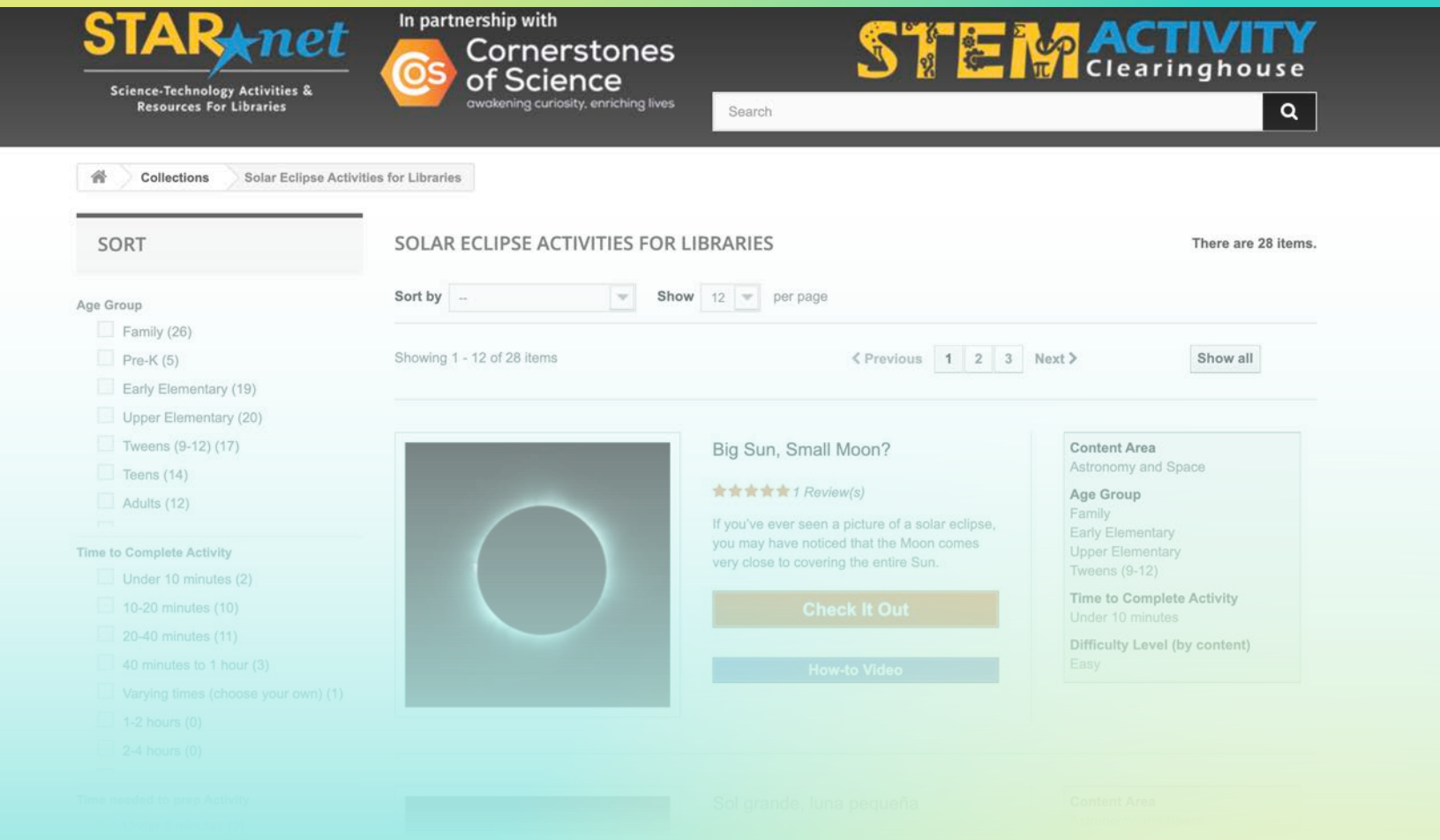


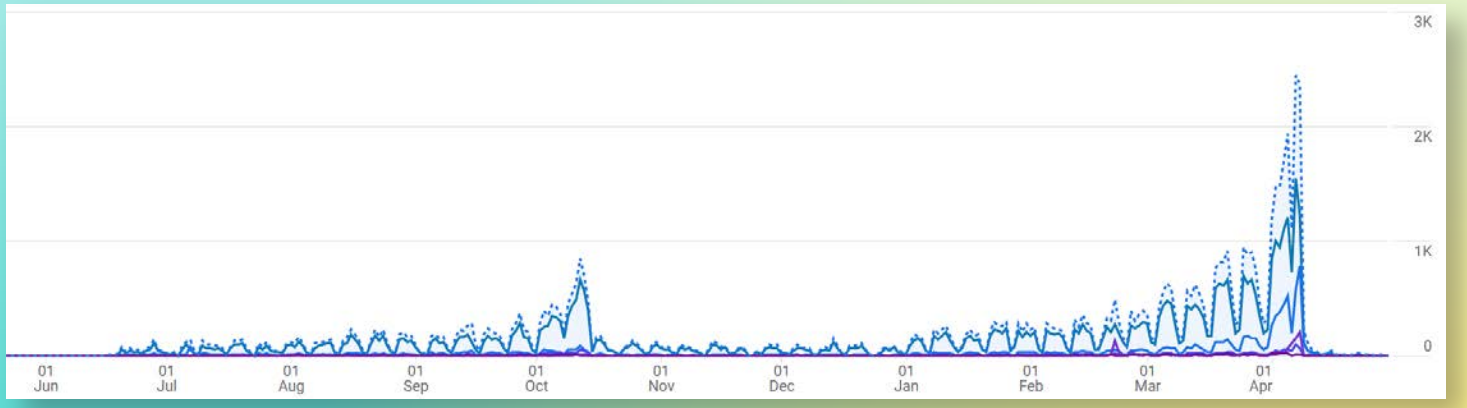
Ten activities were selected to modify to be more relevant and better suited for library eclipse programming. Modifications included adding quick facilitation tips for library staff, updated graphics and images, patron-facing materials translated into Spanish, adding relevant science updates for the Annular Eclipse, and providing updated supplementary resources such as NASA videos, book recommendations, and activity extensions. The updated activities were disseminated to library staff during the SEAL Virtual Training: SEAL STEM Activity Clearinghouse Unboxing Webinar in August 2023.

The ten activities are listed below:

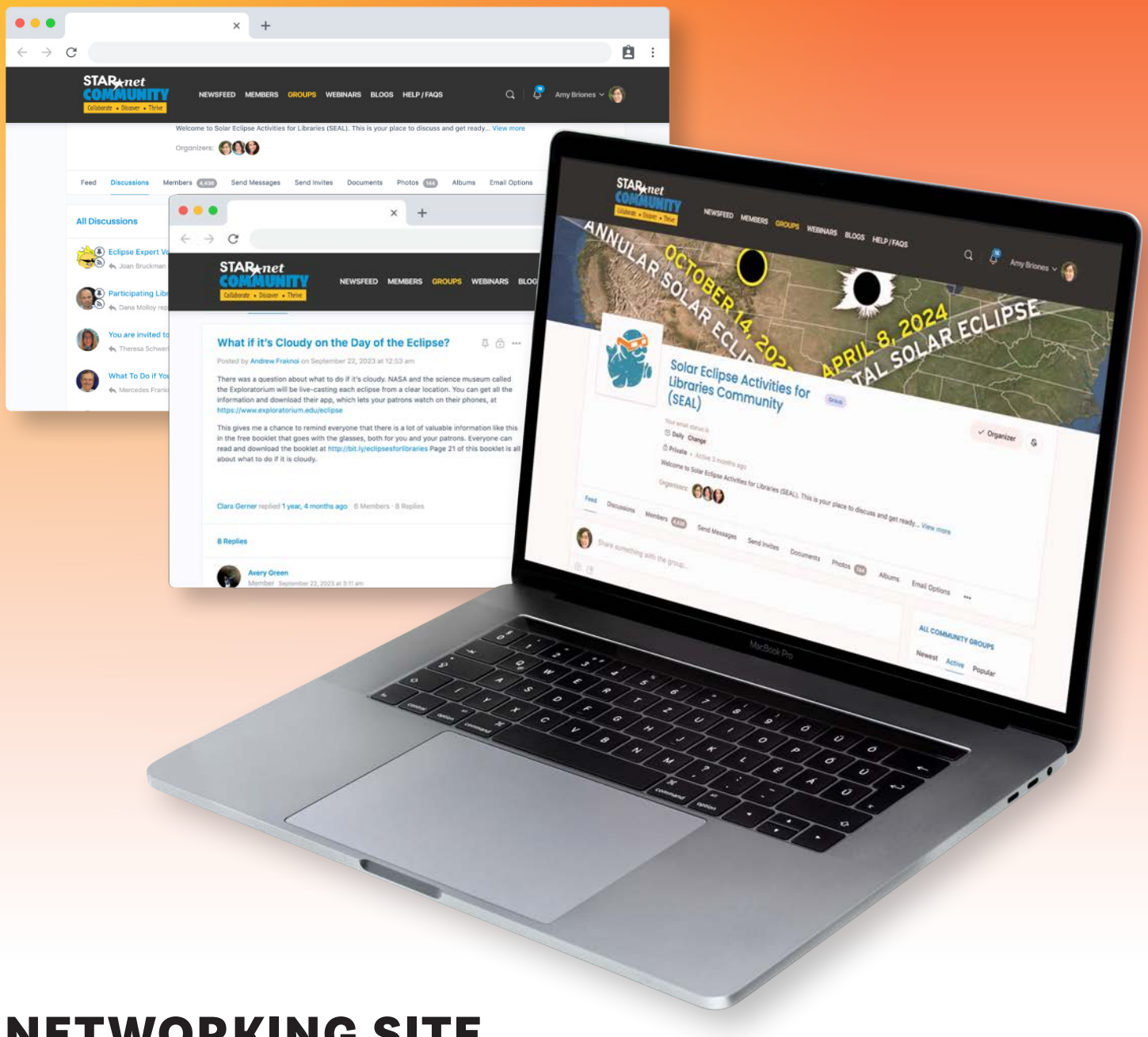
- Big Sun, Small Moon —https://clearinghouse.starnetlibraries.org/astronomy-and-space/71-big-sun-small-moon.html
- Eclipse Chalk Art —https://community.starnetlibraries.org/wp-content/uploads/2025/01/Eclipse-Chalk-Art.pdf
- Guide to Building Solar Eclipse Viewers —https://clearinghouse.starnetlibraries.org/home/737-guide-to-building-solar-eclipse-viewers.html
- Pocket Solar System —https://clearinghouse.starnetlibraries.org/home/736-pocket-solar-system.html
- Solar Energy Quick Facilitation Guide —https://clearinghouse.starnetlibraries.org/home/734-solar-energy-quick-facilitation-guide.html
- Make Your Own Sun Clock —https://clearinghouse.starnetlibraries.org/home/733-make-your-own-sun-clock.html
- Make a Protective Case for Your Solar Viewing Glasses —https://clearinghouse.starnetlibraries.org/astronomy-and-space/731-make-a-protective-case-for-your-solar-viewing-glasses.html
- Build a Sizzling Solar Oven —https://clearinghouse.starnetlibraries.org/solar-eclipse-activities-for-libraries/727-build-a-sizzling-solar-oven.html
- Shadow Tracing —https://clearinghouse.starnetlibraries.org/astronomy-and-space/149-shadow-tracing.html
- Shadow Tracing Take & Make Kit —https://community.starnetlibraries.org/wp-content/uploads/2023/02/Shadow-tracing-take-make.pdf

In total, the eclipse related Clearinghouse pages garnered over 64,000 views in the year leading up to the April Eclipse, with clear ramp-ups of interest before both the Annular and Total events.





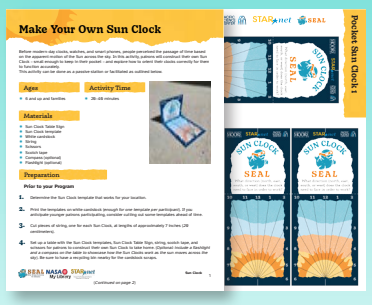
Visits to eclipse activity pages in the year leading up to the April total eclipse.

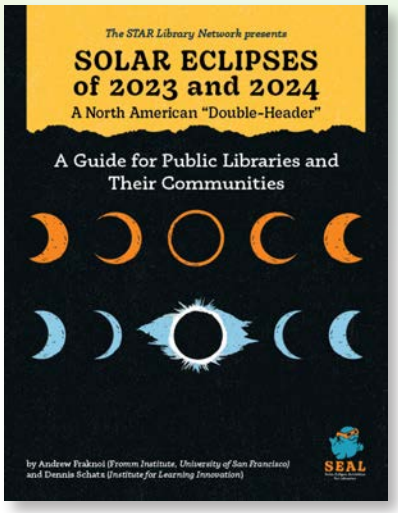


NETWORKING SITE

STAR Net developed a community site that provided library staff with a central hub for exchanging ideas, accessing resources, and building a sense of connection while preparing for the upcoming eclipses. The site's user-friendly and familiar design ensured that all information uploaded was easily accessible, making it a valuable tool throughout the project. The site offered a direct way to contact either STAR Net staff or other libraries while preparing for the eclipses. This platform not only fostered collaboration and confidence among libraries to share solar science education ideas but also served as a place to promote virtual training opportunities, such as webinars, ensuring continued professional development. The site is still maintained after the eclipses guaranteeing the resources created during the event continued to support library staff in future science education programs.

SEAL
Solar Eclipse Activities for Libraries





ECLIPSE BOOKLET AND GRAPHIC ASSETS

In 2017, the majority of project engagement came from youth services and associated staff, leading SEAL to settle on a vibrant, playful brand, shifting away from traditional science themes in order to incorporate a more "summertime fun" feel. With a unique opportunity in having two eclipses so close together, each was assigned a color scheme: oranges for the Annular and blues for the Total. This eclipse specific theming was extended to the solar viewing glasses, which featured a different eclipse illustration, and the corresponding date, on each arm. Throughout the design process, SEAL prioritized scientific accuracy, collaborating with subject matter experts to ensure the visual representation of the eclipses was correct. The Eclipse Booklet layout was designed to be engaging, breaking up large chunks of information with strategic use of color, imagery, and placement, making it more digestible and appealing to a broad audience. The online version of the eclipse booklet was made 508-compliant to ensure accessibility. After the core project brand had been completed, much of the design work was also able to be shared with libraries for their own outreach. A variety of graphics were made available via the STAR Net blog to be used as needed, including customizable social media templates for their events.

LOOKING FORWARD/LESSONS LEARNED

An incidental impact from the SEAL project was the development of deeper working relationships with the majority of State Libraries in the US. State Libraries do not supervise or direct the public libraries within their state. Rather, they serve as advocacy and resource networks. They provide training, guidance, financial support, physical resources, and much more to all libraries within their borders. While SSI had previous relationships with a select number of State Libraries, SEAL provided the opportunity to expand this network and disseminate glasses, kits, and training opportunities to approximately 90% of the nation's public libraries. The reach of the State Libraries was a key instrument in reaching the majority of the nation's public libraries.

And one should not forget that there are more eclipses! While another eclipse visible in the mainland US is still a couple decades off, there are many eclipse viewing opportunities coming up across the globe, as well as many usable solar viewing glasses to go with them. After the April Total Eclipse, the SEAL project let library partners know they could send left over glasses back for reuse. In the coming months and years, SSI will disseminate these starting with US researchers in Antarctica and then to military libraries across the globe.

Another area of impact is the development of relationships with library staff serving the US Territories of American Samoa, Guam, Saipan, the U.S. Virgin Islands, and Puerto Rico. These relationships have already been leveraged into new projects for the SSI team and opportunities for the residents of these territories.

Ultimately, more than 15,000 of the nation's 17,000 individual library locations participated in the 2023 and 2024 eclipse festivities. This is an unprecedented level of participation, not just in science activities, but in any national event in public libraries. Just as in 2017, hundreds of libraries who had never participated in STEM events (or public events at all) reported participating in events for the first time as a result of the SEAL program. This momentum should not be ignored.

Image: Yorba Linda Library

Image: Salem South Lyon District Library

ACKNOWLEDGMENTS

The Space Science Institute would like to provide its sincere thanks and gratitude to the Gordon and Betty Moore Foundation for their support of this ground-breaking project. We'd like to especially thank our program officer, Janet Coffey, for her support, wisdom, and flexibility as we navigated this complex set of tasks.

We'd also like to acknowledge the hard work and dedication of public libraries and their staff across the country, who are increasingly faced with more and more work to support their communities yet always seem to find a way to support our projects with a smile and a list of suggestions to make them even better. We are library fans for life and will continue to promote your amazing work.

Lastly, our thanks to the State Library and Territory Library staff who made it possible to reach so many more libraries than we ever dreamed possible. Over 15,000 of the nation's 17,000 public libraries were able to participate in this event due to your support and belief in this work. We support you and all that you do.

APPENDICES

APPENDIX A: PROJECT TEAM

SEAL was a project of the Space Science Institute's Education and Learning Research Group (ELR) in collaboration with independent experts Andrew Fraknoi and Dennis Schatz, and the National Science Teachers Association (NSTA). The project operated as part of the STAR Library Network (STAR Net), SSI's network of library professionals, STEM learning resources, and training and activity support for library staff.

PROJECT LEADERSHIP:

Anne Holland is the Director of Education and Learning Research at the Space Science Institute and is the SEAL Principal Investigator. Dr. Holland was instrumental in SSI's 20217 eclipse efforts and brings over 15 years of experience providing accessible and equitable STEM learning opportunities to the public through public libraries. As PI, Holland managed project staff and partners and established the guiding principles that steered the project. In addition to providing "big picture" project guidance and strategy, Holland also served as one of the main workshop facilitators, facilitating 31 of the 76 SEAL workshops.

James Harold is the Director of Information Systems and Technology at SSI and a Senior Education Associate. In addition to decades of experience in working with informal STEM learning and public libraries, Dr. Harold also brought content expertise as a former researcher of space physics. Dr. Harold played an important role in the development of project resources and was also a workshop facilitator, helping lead 15 of the 76 SEAL workshops.

Andrew Fraknoi is Professor of Astronomy at the Fromm Institute at the University of San Francisco, and a senior educational consultant for the Astronomical Society of the Pacific. He served as a member of the American Astronomical Society Task Force for the 2023-24 Solar Eclipses. Fraknoi offered workshops at NSTA meetings, wrote articles for K-12 NSTA journals on eclipse preparation, and created training materials for science teachers at various levels. He coauthored Solar Eclipses of 2023 and 2024: A North American "Double-Header", a guide for public libraries and their patrons.

Dennis Schatz is a Senior Fellow at the Institute of Learning Innovation and BSCS Science learning board member. Previously, he spent 6 years as an NSTA board member and was President from 2019-2020. In addition to being the co-author of Solar Eclipses of 2023 and 2024: A North American "Double-Header", he trained astronomers, college-level educators, and informal science educators to help libraries across the nation with eclipse programming.

Brooks Mitchell led workshop and state-library coordination efforts for the project. Mitchell established communications with all participating state/territory libraries, coordinated logistics for all 76 workshops, and helped manage timing of kit shipments. Mitchell worked to ensure that the project's professional development efforts were comprehensive and accessible. He was also the primary SEAL workshop facilitator, leading 38 of the 76 SEAL workshops.

Sky Reid-Mills coordinated solar viewing glasses logistics, from registration tracking to distribution to libraries. Reid-Mills also managed internal efforts for State Library Kit distribution, preparing, packing, and shipping 217 kits with help from additional SSI staff, as well as providing support for online outreach.

ADDITIONAL SSI STAFF

Amy Briones was the project's illustrator and graphic designer who helped provide engaging and culturally relevant graphics and imagery for all print and digital material, including the eclipse booklet, digital items, facilitation kits, and ad hoc requests from the online community.

Beatrice Chavez provided Spanish translations for print and digital SEAL resources and assisted with the packing and shipping of State Library Kits. She also helped facilitate 10 SEAL workshops.

Dillon Connelly lead the project's virtual professional development efforts, facilitating webinars and helping develop how-to videos for project activities.

Claire Ratcliffe-Adams helped lead SEAL's online professional development, facilitating webinars and managing the development and digitization of resources and activity guides. Ratcliffe-Adams also helped lead 16 SEAL workshops.

Evaldas Vidugiris supported the digital infrastructure behind the project, including the project website and online Community of Practice, and also assisted in the packing and shipping of State Library Kits.

Stephanie Vierow-Fields helped manage the SEAL online community and project communications, engaging in discussions with thousands of participating public libraries related to eclipse-efforts. Vierow-Fields also helped lead 19 SEAL workshops.

APPENDIX B: SOLAR VIEWING GLASSES APPLICATION QUESTIONS AND RESPONSE SUMMARIES

APPLICATION DESCRIPTION:

In order to facilitate the distribution of over 6 million solar-viewing glasses, an application was created to gather both information relevant to shipping glasses, but also to gauge interest in training, plans for programs, and plans for partnership. Many questions in this application were later used to compare with final post-eclipse survey results.

The survey opened on 6/17/2022, and remained open until late 2023. Over 8,000 responses were received, and approximately 50% of these were "good" applications, meaning the application was complete, from a real public library, and not a duplicate from another application. In total, 5,157 individual library systems were registered through this process (a few hundred of these were registered through email or phone conversations due to technological issues). As described later in this document, these 5,157 individual systems distributed to their branches or partner libraries to reach a total of 14,953 individual library locations that include branches, state library agencies, bookmobiles, tribal libraries, military libraries, prison libraries, and territory libraries.

SURVEY QUESTIONS:

The remainder of this document lists the application questions, followed by the quantitative or summarized qualitative responses to those answers.

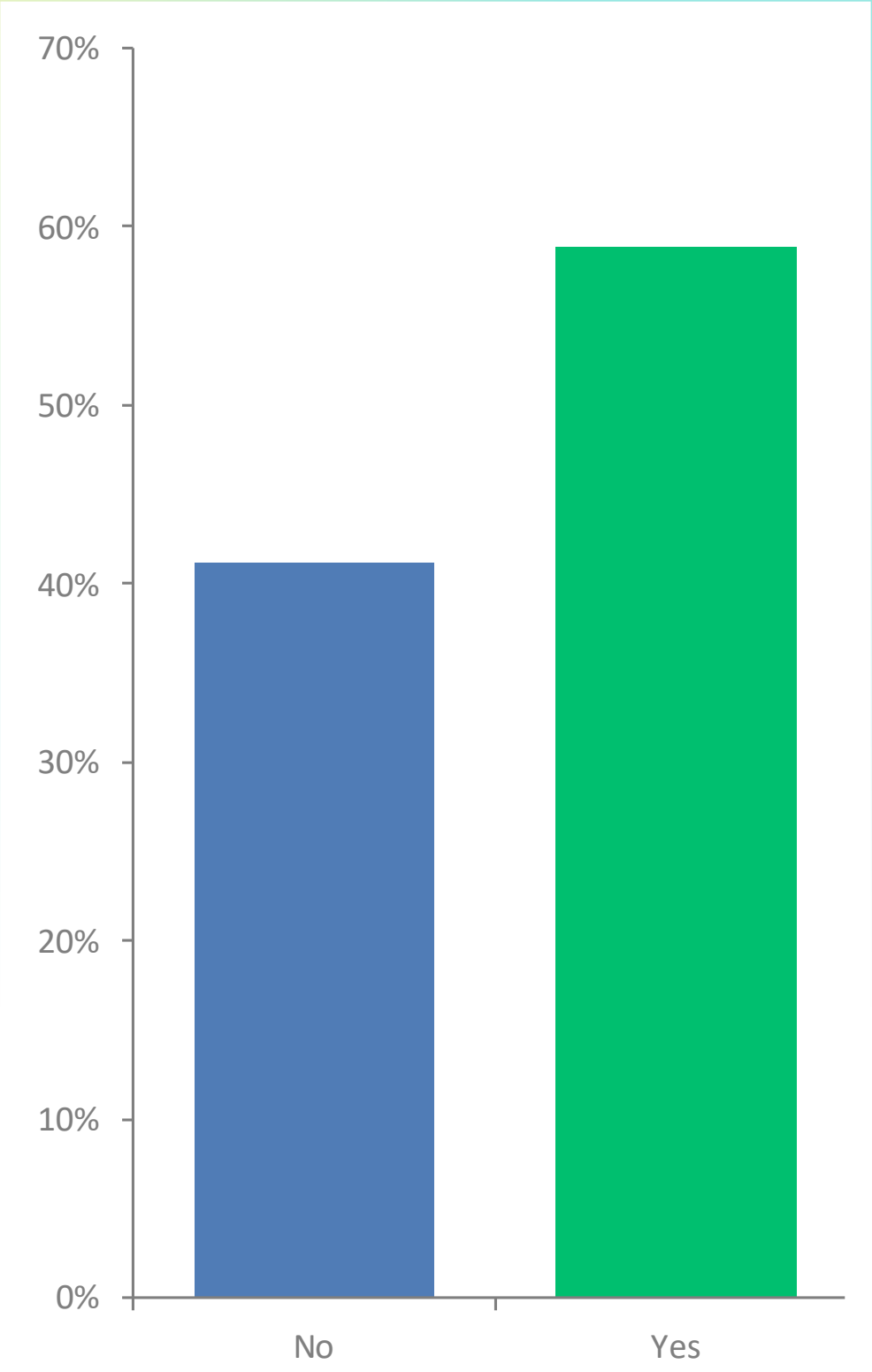
Q1. Contact Information

Contact information was gathered from all applicants including name, public library, physical street address, email address and phone number. Libraries were not able to use PO Boxes as shipping addresses due to our shipping constraints. Responses to the Contact Name, Library Name, and Address were used to identify duplicate orders.

During the 2017 eclipse, some of this demographic information was also shared on a webpage, so that library patrons and other individuals could contact libraries directly to see if they still had remaining glasses. This was an unmitigated mess for libraries, who requested we did not do this for 2023/2024. Instead, the only people who had access to this information were our NASA partner groups who could provide speakers —Eclipse Ambassadors and Solar System Ambassadors— as well as our internal group of trained experts through NSTA. Most libraries reported that the volume of phone calls and angry clientele was far less this time around

Q2. Will you be sharing glasses with other libraries or community centers in your city/ region/district?

This information was gathered for our own informational purposes, to compare to reports provided after the eclipse events. Institutions were not obligated to share their glasses unless they got a larger number of glasses than the default 500. (Quantities of 500, 1000, and 2000 were available).



Q3. Library Website

Library website data was collected only so that we could share with the volunteers who could conduct programs, and occasionally to vet if an application was from a real library.

Q4. If you are requesting 1000 or 2000 glasses, it is expected that you share your glasses with other libraries in your system, including bookmobiles, outreach centers, etc. Please indicate how many other venues you'll be sharing with. Use the comment box to provide specifics or to justify large numbers for a single library.

Respondents wrote in the answers to this question. The intent here was for venues to share a number of libraries they were sharing with, but most listed other venues (including libraries) or gave reasons why they were or were not sharing. The word cloud below provides a snapshot of the type of venues libraries were sharing with. Notice most were sharing with other libraries. We also used this question to estimate the total number of individual libraries receiving glasses.

Q5 and Q6. Is your shipping address different than the physical address provided above? Shipping Address and Point of Contact

This question was merely asked to make sure people received their glasses. Some library staff had to have glasses delivered to a neighboring business or their home address.

Q7. Describe (in a paragraph) what public events your library plans to do in the months and weeks leading up to the eclipse and on eclipse day. (For either or both eclipses).

Applicants shared many innovative and exciting programs. Some of these programs are shared with images in the main report body. We've provided a quantized version of these responses by program type below. The number represents the number of venues who indicated they planned on doing each type of program. Numbers add up to more than the total number of participating libraries, as many libraries planned multiple programs. Note that these are the categories listed by respondents, we did not provide categories for respondents to place their programs into.

The responses to this question can be useful for future programs focused on large charismatic events (such as launches, summer reading, large anniversaries, etc) as they provide a glimpse into the types of support libraries may need. Hands-on activities for example was listed by many respondents, making sure that they have access to safe and vetted activities was a major goal of the SEAL project, knowing this would be the case. A similar number of respondents also indicated sharing eclipse education and safety materials with patrons, this was another opportunity for the project team to proactively provide well-vetted materials.

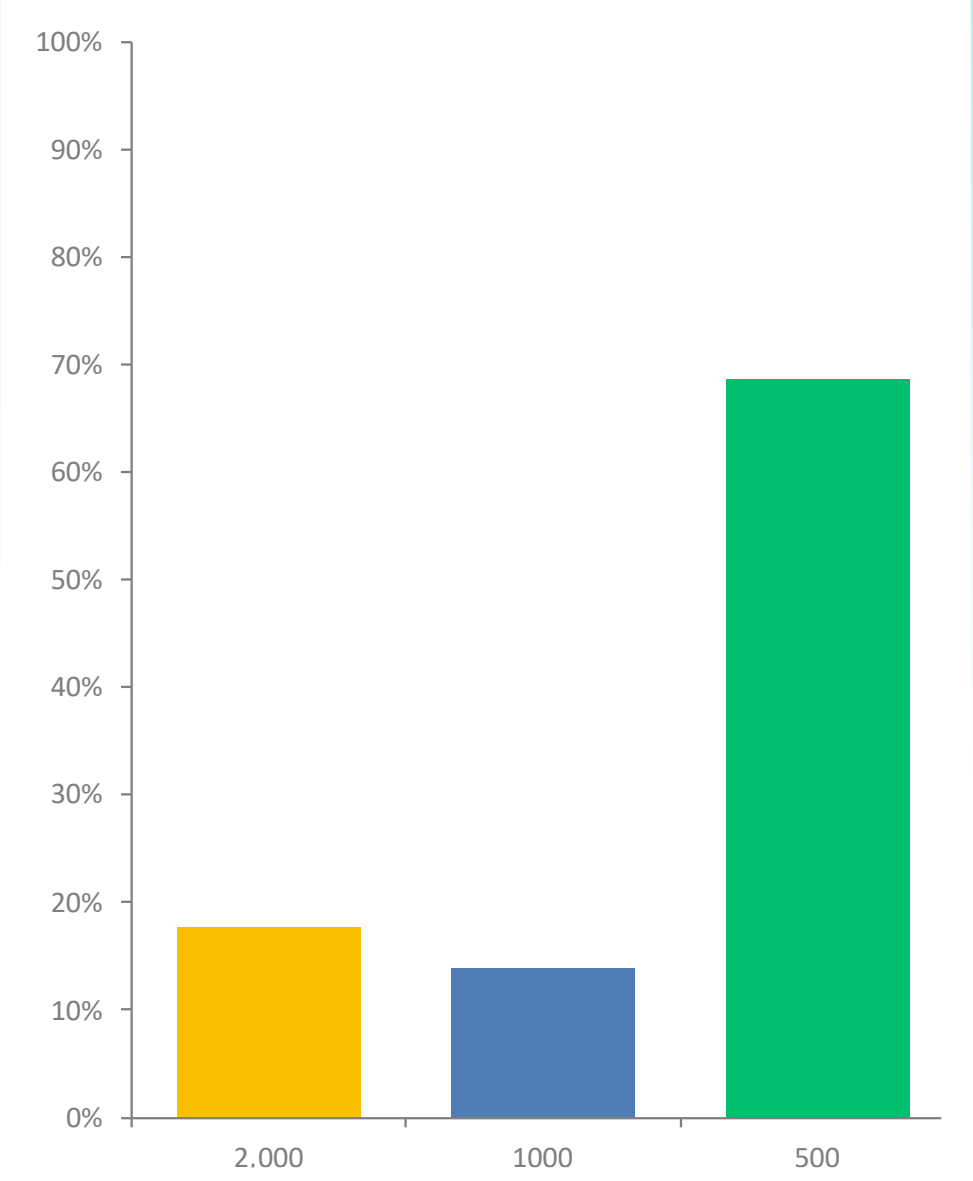
PROGRAM TYPE	NUMBER OF LIBRARIES INDICATING PLANS
Children's Programs	820
Teen Programs	302
Adult Programs	487
Family Programs	281
Programs with Partners	960
Hands-on Activities	1506
Story-time	1129
Visit from astronomer/scientist	867
Series of programs	1502
Participation across library district	203
Telescope programs	287
Afterschool programs	102
Homeschool programs	70
Bookmobile programs	59
Outreach	247
Lectures	114
Passive Programming	678
Providing snacks	226
Video activities	260
Safety Information	461
Social Media	283
Take-home kits	254
Viewing parties	2029
Online resources	71
Eclipse Education	1626
Book club	184
Walk/hike	31
Scavenger hunt	31
Observe the moon (night)	8
Stargazing	106
Planetarium activities	140

Q8. Upload a letter from your director (or similarly responsible individual) committing to provide glasses free of charge, host public programs related to the eclipse, and complete a survey after the events.

The purpose of this question was to avoid fake and duplicate applications, a problem that was rampant in 2017. Most "aborted" applications ended here. Because of this requirement we found very few duplicates, and people who were lying to get glasses were very easy to spot and ignore. Library staff themselves let us know this was a good idea, as it was easier for them to know who should be applying for the glasses, or who to check with to see if it had already been done.

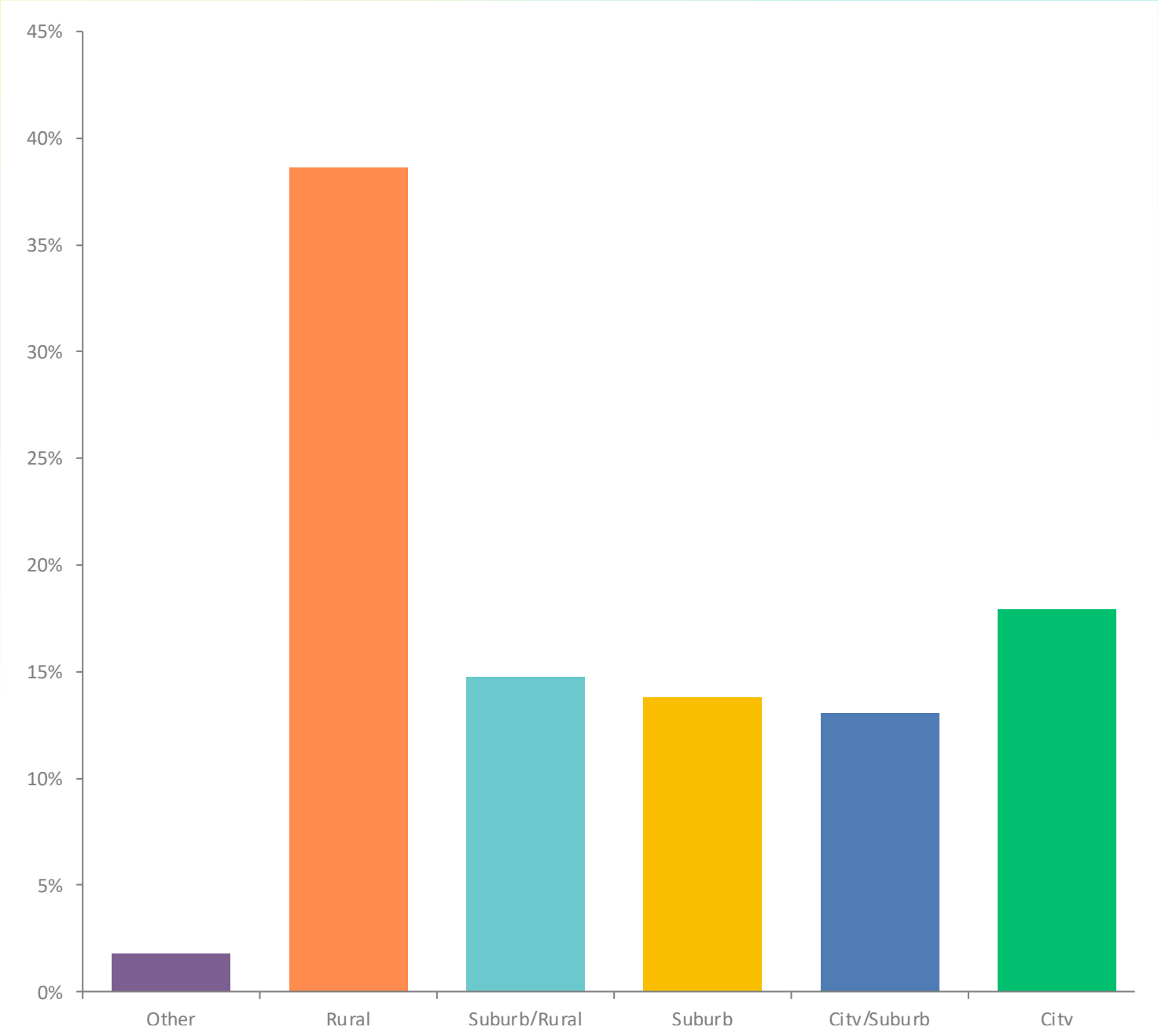
Q9. Please indicate the requested number of glasses.

This question was updated when the larger quantities ran out so folks could only request the smaller amounts. The majority of participating libraries received 500 pairs of glasses. Very large systems were encouraged to email to request larger batches, or to have their individual systems apply. In some cases, state libraries also requested larger amounts so they could distribute to the smallest and most rural libraries in their state.



Q10. Community Type

The responses to this question are overall in alignment with the library field at large, as most libraries fall under the rural or suburban header.



Q11. (Certification, required for application to be considered) I agree to host at least two public events 9in total— in the months and weeks leading up to either of the eclipses and/or on eclipse day. These events will be free and open to all members of my community.

Q12. (Certification, required for application to be considered). Our library will make an effort to include people who are underrepresented in STEM (e.g., African Americans, Latinos, the economically disadvantaged, people with disabilities, and women and girls).

Q13. (Certification, required for application to be considered). I agree that glasses provided by this program will be distributed free of charge.

Q14. (Certification, required for application to be considered). I agree to follow safe viewing guidelines and provide patrons with safety information for viewing the eclipses.

Q15. (Certification, required for application to be considered). I agree to complete one or both post-event surveys (available after the 2023 event, and again after the 2024 event).

Q16. How did you hear about the upcoming eclipses, and where did you learn libraries could register to receive glasses?

This question was used to determine who was sharing our promotional materials, and what venues might need more support. The below list quantifies the open responses. Please note some respondents gave more than one answer.

Colleague	1680	CA State Library	36	DE State Library	8
State Library	1470	TX State Library	32	RI State Library	8
SSI	1186	Local Government	31	AL State Library	6
Word of Mouth	236	PA State Library	31	GA State Library	6
Online Search	169	UT State Library	30	SciStarter	6
ALA	126	OK State Library	28	SD State Library	6
Colleague	1680	WebJunction	27	AR State Library	5
State Library	1470	DC State Library	26	FL State Library	5
MI State Library	126	CA State Library	36	NSTA	5
Local Science	93	AZ State Library	25	ID State Library	4
OH State Library	84	MT State library	25	MO State Library	4
IN State Library	68	ME State Library	23	Local Business	3
NASA	68	IL State Library	20	NM State Library	3
NJ State Library	67	University	20	NE State Library	2
NY State Library	66	WI State Library	20	OR State Library	2
NH State Library	65	ND State Library	16	PLA	2
School	57	IA State Library	15	Puerto Rico Department of Education	2
MA State Library	56	MA State Library	13	Puerto Rico State Library	2
VT State Library	53	MS State Library	13	CLSP/OCLC	1
WA State Library	51	ARSL	12	Globe	1
KY State Library	39	AAS	11	Guam Library System	1
TN State Library	39	VA State Library	11	KS State Library/NV State Library	1
CO State library	38	MN State Library	9	Library Aware	1
CN State Library	38	AK State Library	8	LA State Library	1

APPENDIX C: POST ANNULAR ECLIPSE SURVEY QUESTIONS AND RESPONSE SUMMARIES

ABOUT THE SURVEY

This survey was promoted to the STAR Library Network and many partner organizations beginning the day after the 2023 Annular Eclipse. In this promotion, it was stressed that submitting a report was a requirement of receiving solar viewing glasses, but libraries were also reminded that if they were only doing events for the 2024 event, they could wait until that event to submit a survey. The annular survey was closed a few months prior to the total eclipse event, to make certain people were completing the correct survey.

Data from this survey was used to learn more about events libraries conducted in support of the annular eclipse (as there was still time to provide additional support for the total) and to see how plans may have changed from initial applications. We also solicited images, quotes, and program plans that libraries may have wanted to share with the program funders.

Below is the full list of post-annular eclipse survey questions, as well as quantitative responses, summaries of qualitative responses, and select images and quotes collected in this report. More images and quotes can be found throughout the larger report document, and are also available upon request.

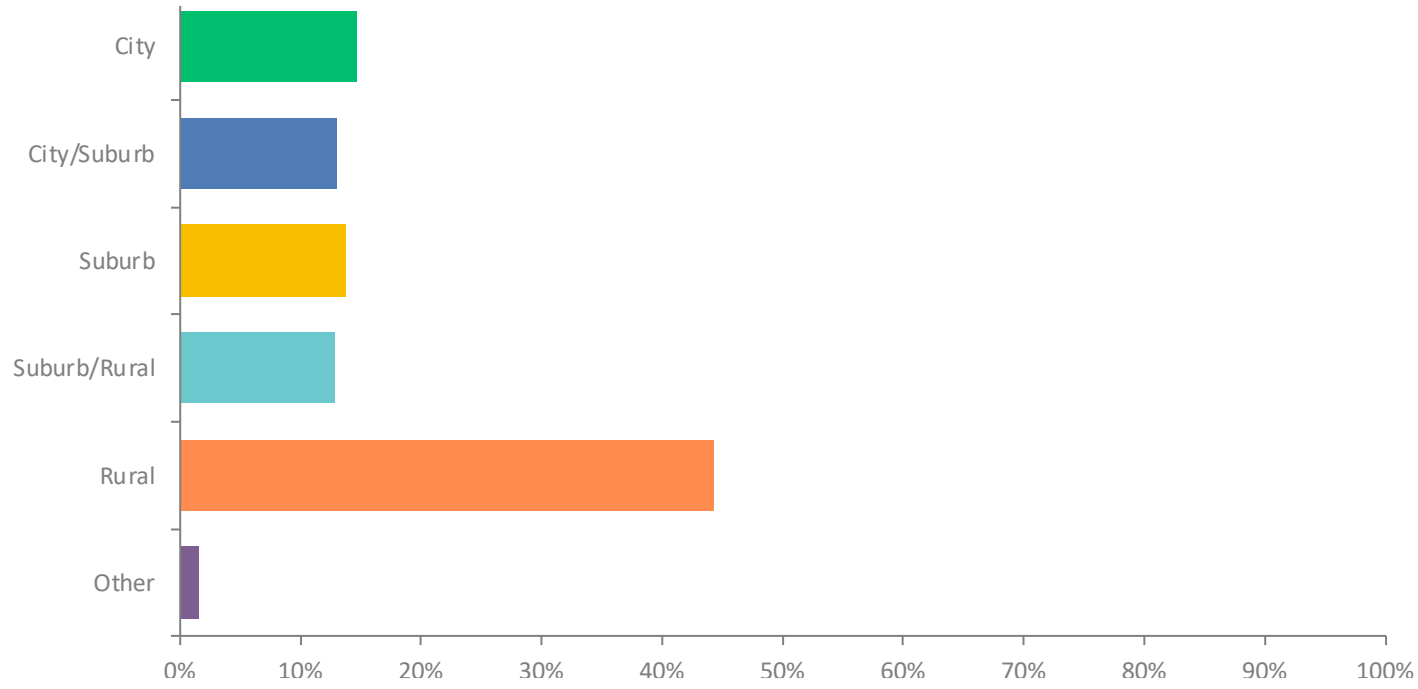
SURVEY QUESTIONS:

Q1. Contact information (including name, institution, zip code and email address)

This information was collected so we could follow up on any questions, and create a map of eclipse related events and programming.

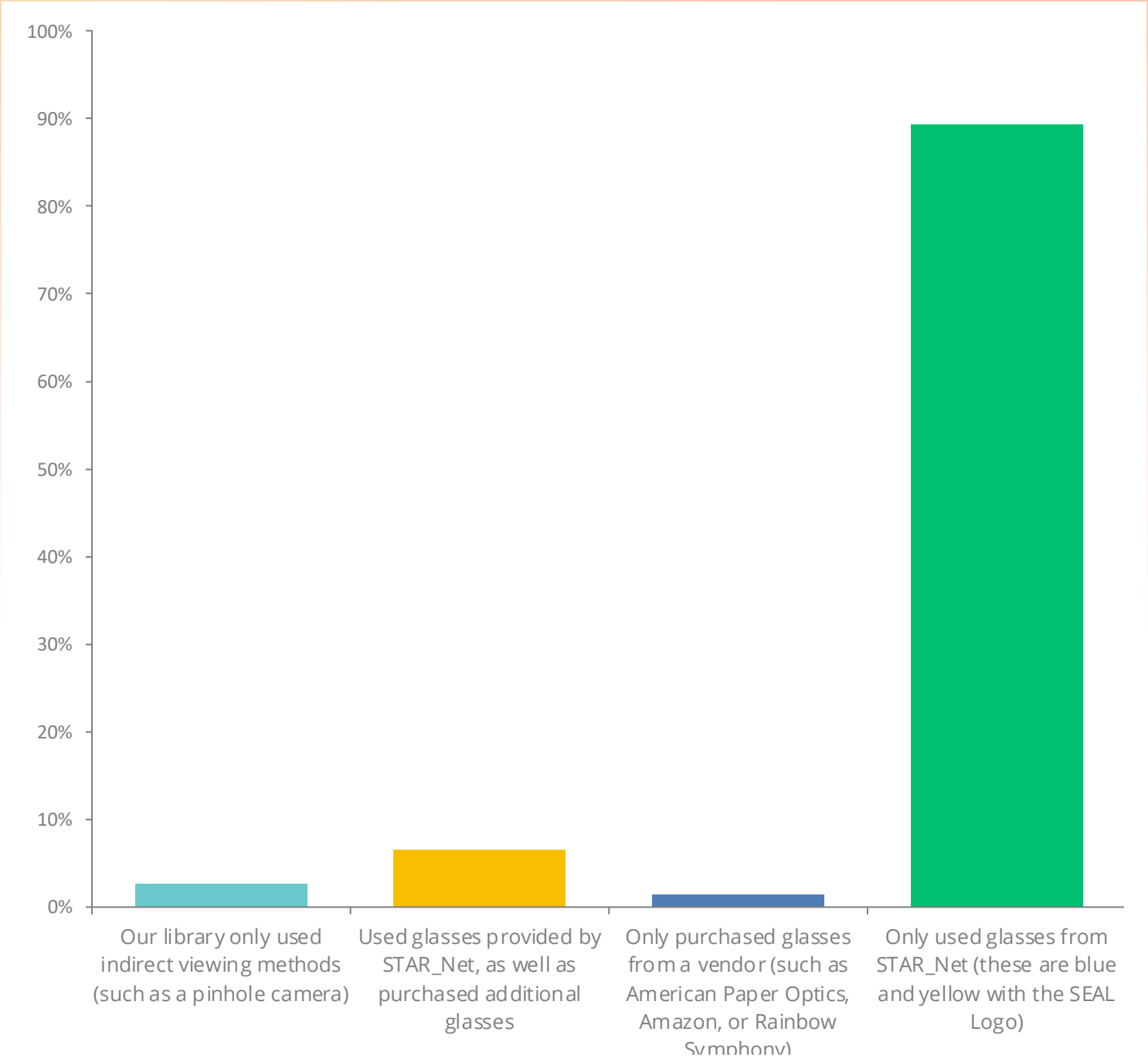
Q2. Community Type

The breakdown below is an almost 1:1 match with the original application question.



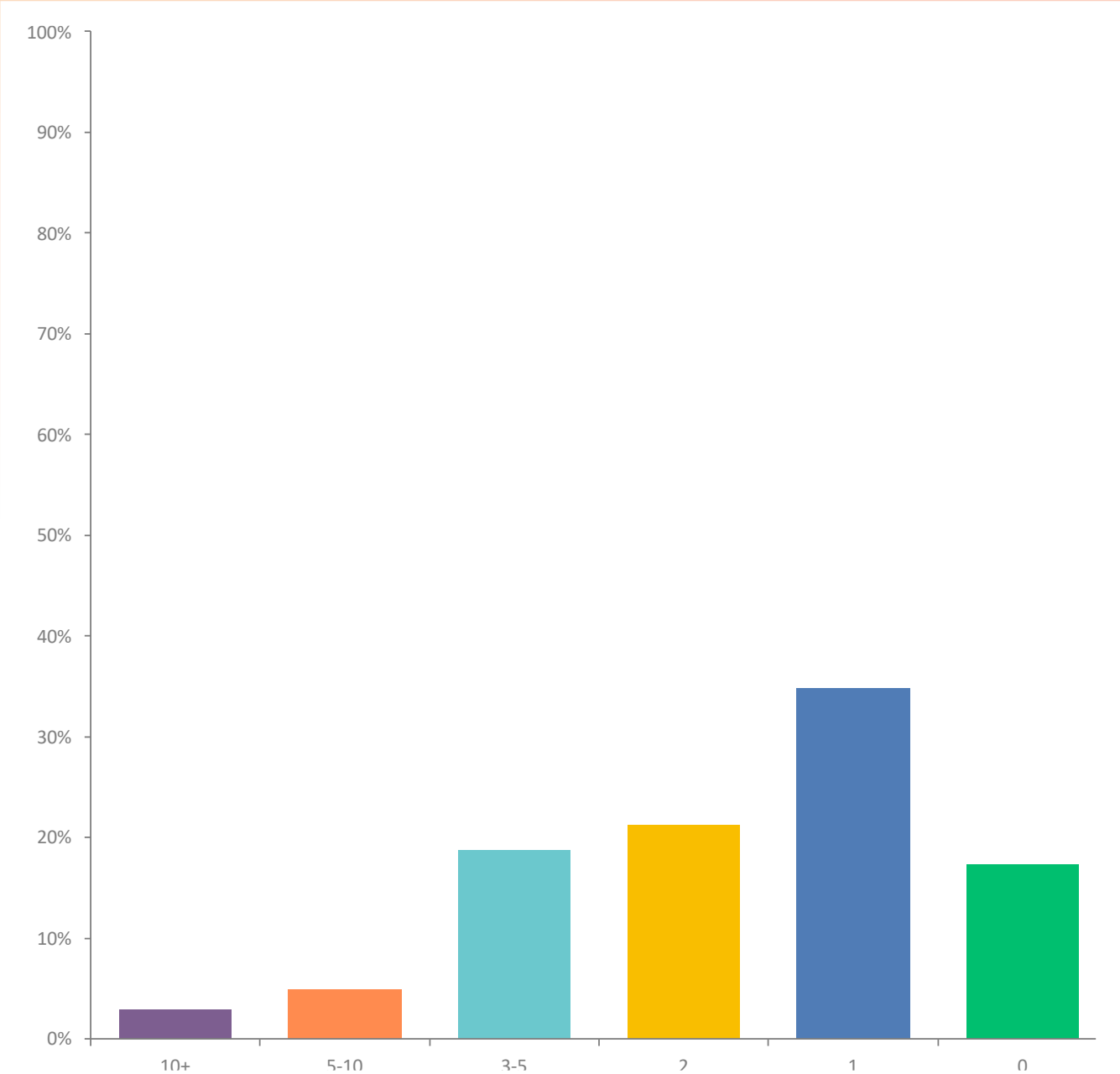
Q3. Did your library receive glasses from STAR Net, or did you purchase your own?

This question was asked because it was indicated to us that some libraries used our Clearinghouse or other resources and wished to report on their events, but they hadn't received glasses from us. We were curious if this was a large number. About 1% of respondent libraries purchased their own glasses, and about 3% didn't have glasses and only used indirect viewing methods.



Q4. How many programs around solar science and/or the eclipse did your library provide prior to and during the Annular Eclipse on October 14th?

When tallied with the Total Eclipse report numbers, this question was used to extrapolate the total number of events (when accounting for libraries who received glasses from other libraries, and therefore did not know to fill out the survey). While only 3% of libraries were in the 10+ programs category, some of these did 100 or more programs prior to the Annular Eclipse! Respondents with zero programs indicated they had planned day-of events and were clouded out, or were not intending to provide programs until the total eclipse. Respondents to the survey indicated a total of approximately 3440 programs. This number was multiplied by 3.4 to estimate the total number of programs (including libraries who didn't fill out the survey), for an estimated total of 11,700 programs across approximately 5,000 libraries. We estimated low at 5,000 total libraries participating in the annular eclipse based on initial plans in the original application. The actual number of participating libraries and programs is likely much higher.

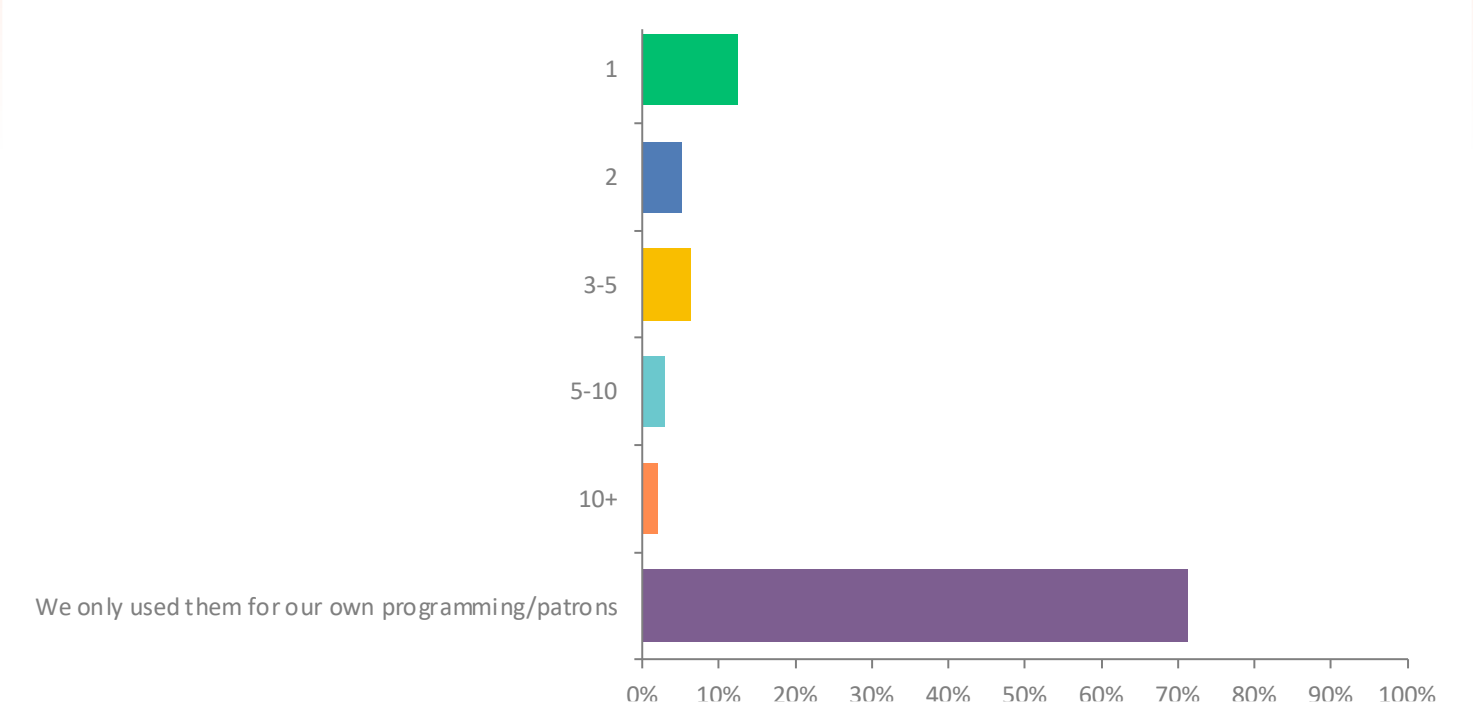


Q5. What is the estimated total attendance for solar science related programs provided prior to and during the Annular Eclipse on October 14th? Please type a single number representing the total participation across all programs.

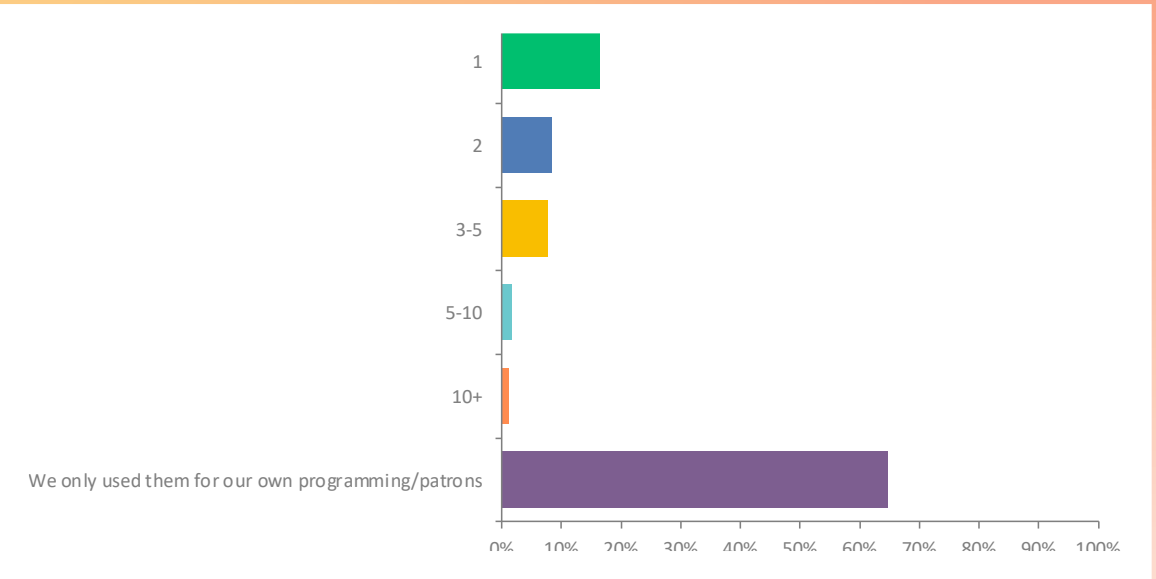
We utilized the numerical responses to this question to estimate total program attendance related to the annular eclipse. Survey respondents indicated a total of approximately 270,000 participants. We multiplied this number by 3.4 to capture the remaining libraries who had not filled out the survey, to arrive at an estimate of 915,000 annular eclipse program attendees. We estimated low at 5,000 total libraries participating in the annual eclipse based on initial plans in the original application. The actual number of participating libraries and programs is likely much higher.

Q6. If you received glasses from STAR Net, how many other public, tribal, prison or military libraries did you share them with?

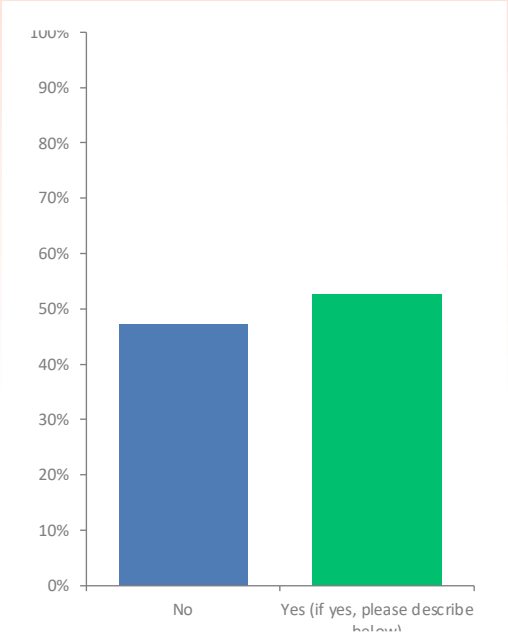
This question was reworded from the "sharing" question in the original application, and set ranges provided, as the responses in the original application were hard to interpret. Some level of inaccuracy was introduced by using ranges, but it was determined to be worth that uncertainty to make sure we had a good estimate of total number of library partners. Approximately 70% of libraries only used them for their own branch (this is higher than indicated in the original application), while around 12% shared with at least one other branch. The total number of libraries implied by this question (approximately 3,000) was used to arrive at the conservative 5000 total library participation for the annular utilized in questions 4 and 5.



Q7. If you received glasses from STAR Net, how many other non-library venues (schools, museums, food banks, other non-profit/education, etc.) venues did you share them with?



Q8. Did you purposefully distribute glasses to underserved/ underrepresented audiences? (Example, did you target promotion to these groups, or save a subset of glasses for them?) Groups underrepresented in STEM fields include Hispanics and Latinos, African Americans, American Indians, Alaska Natives, Native Hawaiians and Pacific Islanders, the economically disadvantaged, people with disabilities, and women and girls. Underserved audiences may include rural audiences, economically challenged regions or urban audiences. If your community would be defined as underserved or underrepresented, please answer "Yes" to this question.



In addition to responding affirmatively or negatively, participants were also asked to list the communities they served. A quantitative summary pulled from the quantitative answers is shown in the second chart below. It should be noted that many of the respondents who said "no" clarified that they provide access, programming and resources for all patrons, who fall into many of the categories listed.

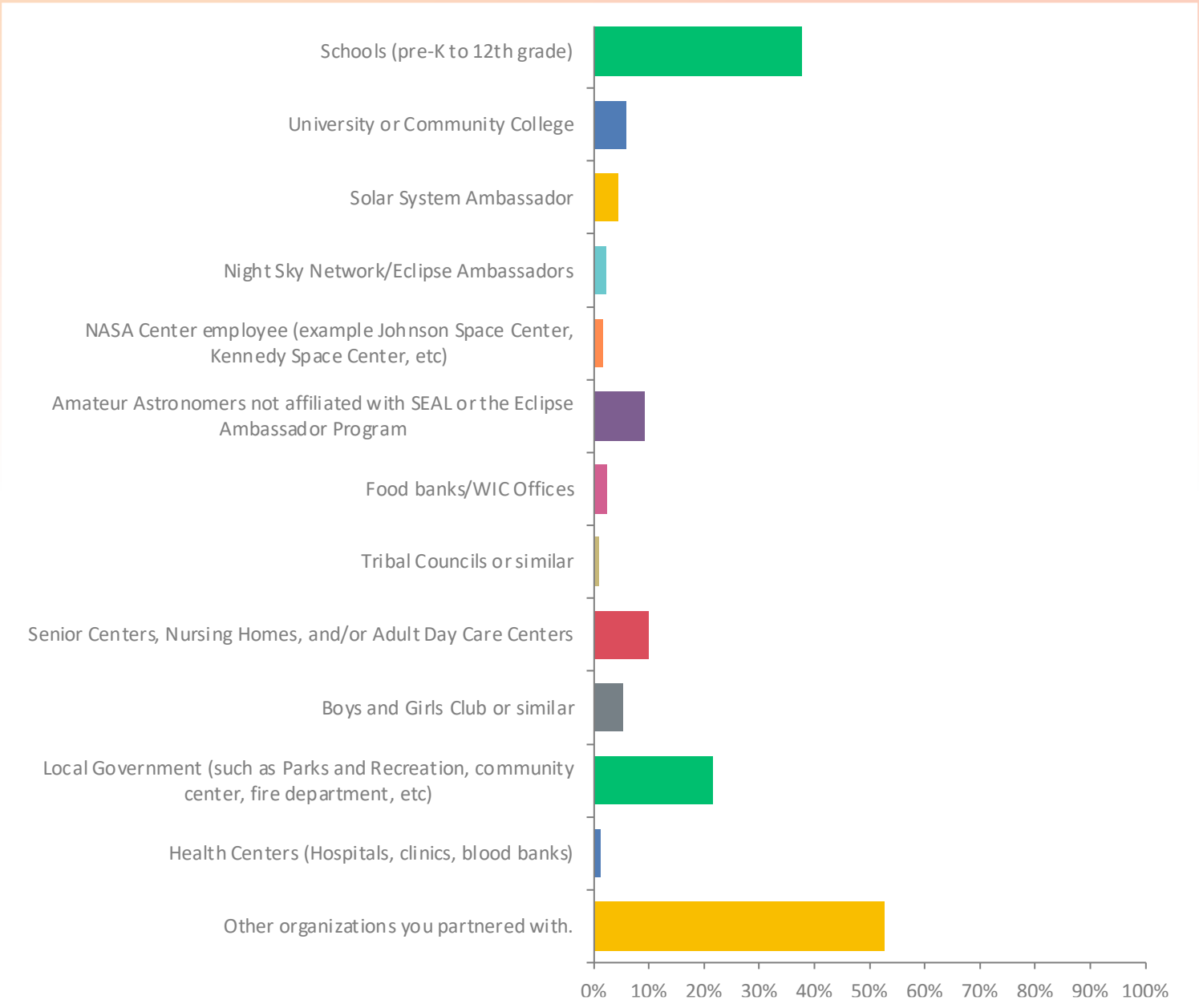
Latinx/Hispanic	204	Patrons with Disabilities	70
Black	82	Native Americans	57
Rural	271	Unhoused Patrons	27
Economically Disadvantaged	260	Seniors or Homebound	40
Women/Girls	80	Immigrant/ESL	49
Alaskan Natives	6	Incarcerated	5
Pacific Islanders	7	Food Banks	8

Q9. and Q10. Photos and Photo Releases Requested

A sample of these photos appear at the end of this report, and throughout the larger report document.

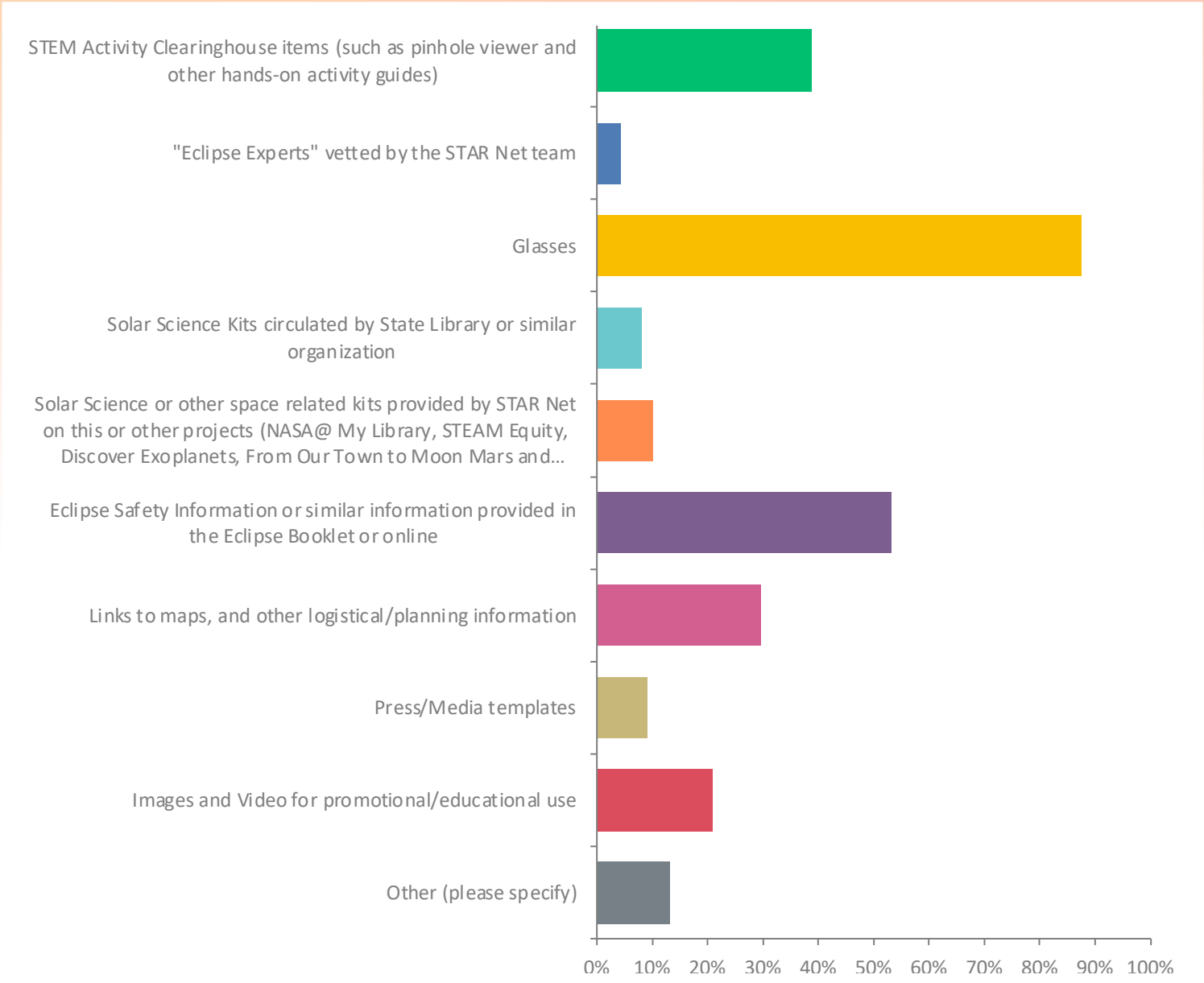
Q11. Please tell us about any community organizations with which you partnered. (Check all that apply, and include organization names if possible, in the comment box).

As shown in the chart below, K-12 schools were the most common partners for eclipse programming, followed by local government organizations, and amateur astronomers not affiliated with SEAL or the Eclipse Ambassadors programs. Most of the "other" responses were actually people listing specific organizations in the chart below, not new organizations.



Q12. Which resources from SEAL/STAR Net/the Space Science Institute did you use? Please check all that apply.

As expected most respondents utilized solar viewing glasses. The next most common resource utilized was the eclipse safety and viewing information provided by SEAL, and then hands-on activities from the STEM Activity Clearinghouse. We were surprised that so few libraries utilized the vetted experts provided by the project, and suggest future projects make them available sooner, and provide more opportunities for collaboration.



Q13. In what ways has the eclipse influenced your library's STEM programming?

Participants provided narrative responses to this question, which were used by the SEAL project team to develop ideas for professional development opportunities for the April 2024 eclipse, and to better understand how library programs have evolved since the 2017 eclipse events. The chart below shows the major themes that were pulled from the narrative responses. Similar to 2017, many libraries reported an increase in the number of programs they conducted, and that they expected this increase to continue post-eclipse. Many libraries were also pleased to report increases in library card signups, program participation, and interest in partnerships.

Increase in number of programs offered	243	Build excitement for 2024 and other future lunar/solar eclipses	299
Raised community interest in library programs	256	Built new or stronger partnerships	83
Added STEM focus to library programs	233	Increased staff knowledge and comfort	92
Attracted new patrons	58	Led to new library clubs and groups	7
Encouraged new equipment and library materials	53	Led to new passive program ideas	26
Raised community awareness of library resources	110	Increased amount of outreach conducted by library	6
Increased interest in space programming	71		

Q14. Would you like to share with us any quotes from your patrons or staff that we could share with our funders?

Below is a selection of quotes from participating libraries, followed by a selection of images also submitted in this report:

"'Wow, it's really free?!?' Was a comment a parent made when told she could take glasses for her child during one of our programs."

—Plainfield Public Library

"A 5-year-old wanted to let us know that our eclipse craft programs were, "Awesome!" Thank you for this great opportunity!"

—Mesa Public Library

"Our Teen Interns set up the Sunspotter at our Central Park Viewing and the crowd went wild! They absolutely loved being able to see the sun from a different viewpoint. People from all over Santa Clara and beyond visited the three sites to view the eclipse. One of our City attorneys and one member of the Santa Clara City Friends & Foundation attended the viewing events, and were happy to share the special moment with the community."

—Santa Clara City Library

"At the Warburton Park event, many attendees expressed how grateful they were to have information about the solar eclipse in Spanish. One parent particularly expressed how she did not know that her and her family needed special glasses to view the eclipse until her son told her that he learned that at school during the STEAM workshop. At this event, the Spanish books we distributed in behalf of NASA were quickly taken, but families shared the books and pinhole viewers with each other. Finally, the Sunspotter was a big hit during the eclipse, and provided a great alternative to viewing the eclipse!"

—Santa Clara City Library

"Time and time again, while pounding the sidewalk and handing out a pair of glasses to people I encountered, people would pause, quickly slip on their pair of glasses, turn and gaze upward at the sun. Seemingly transfixed by this unexpected opportunity to actually view the eclipse, many would then turn to me and very calmly and sincerely extend words of thanks to the library for bringing this science experience to the community. This program matters to a great number of people and it unites people, just as the sun shines for everyone."

—Washington Irving Branch, LA Public Library

"This is our first eclipse in America, as viewing one is considered taboo where we come from in India, thank you so much for doing this!"

—Holbrook Public Library

"Wow! These glasses make the sun look like my own private eclipse! " —5 year old participant—

—Bogart Library–

Lexington branch–An excited small child kept saying, 'I see outer space!' And people would pull into the parking lot and walk over to the eclipse group to ask, 'What's happening?'

—Lexington Branch, Athens Regional Library System

"As a public servant who strives to promote STEM programming, this opportunity brought people from all backgrounds, socioeconomic status, and ages together as a community. They collectively watched this phenomenon occur with awe and that wouldn't have been possible without the time and resources provided by you. You made building community possible."

—McKinney Public Library

"Space is so neat and when I get to do cool stuff like this, I can't wait to be a scientist!" A 7-year-old girl that attended our eclipse watching program.

—Williamson County Public Library System

On the day of the eclipse we had a young patron who exclaimed that "We have the best library ever! I got to see an eclipse!

—Spanish Fork Public Library

Another happy story is an elderly woman took her husband out of the nursing home to come to the library for the viewing party. He has been a longtime member of our library but hasn't been in since before COVID. They both had a wonderful time & I think that will be my lasting memory...the smiles that the eclipse brought to their faces.

— Ferris Public Library

"We would not have been able to enjoy the eclipse without the library."

—Beaumont Library District

"... it was an enthusiastic, diverse crowd, a real cross-section of Santa Fe including folks in strollers and wheelchairs, on skateboards and bicycles, and still other, self-powered walkers. All the SFCC provided protective glasses were distributed early to the hundreds of attendees. Amateur astronomers with open telescopes and the video feed into classrooms further extended the viewing experience for all. I saw a grade school group march into one of the classrooms to watch the video feed. I also heard someone in the crowd express his joy for seeing so many people interested in this astronomical event, which he equated with an interest in science."

— Santa Fe Community College

"We watched the eclipse and still have our eye sight thanks to you."

— Wedsworth Memorial Library

Figure 1. Using a SunSpotter at the International District Library

Figure 2. Tony Hillerman Library Event

Figure 3. Patrons at the Alpine Public Library get creative with their solar viewing glasses.

Figure 4. The Andrews Public Library —and many others— went all out with sun and moon themed snacks.

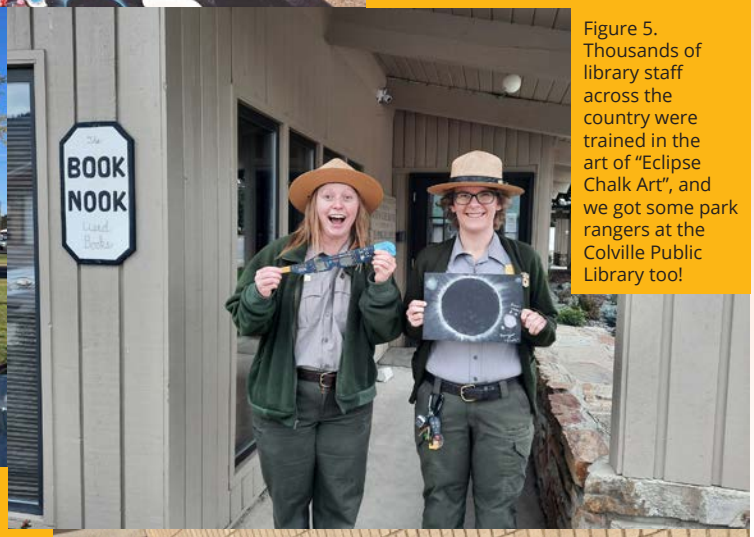


Figure 5. Thousands of library staff across the country were trained in the art of "Eclipse Chalk Art", and we got some park rangers at the Colville Public Library too!

Figure 6. Crescent shadows during the Annular Eclipse at the Crowley Public Library.

Figure 7. One of Crowley Public Libraries youngest patrons, Madelyn, seeing the Annular Eclipse

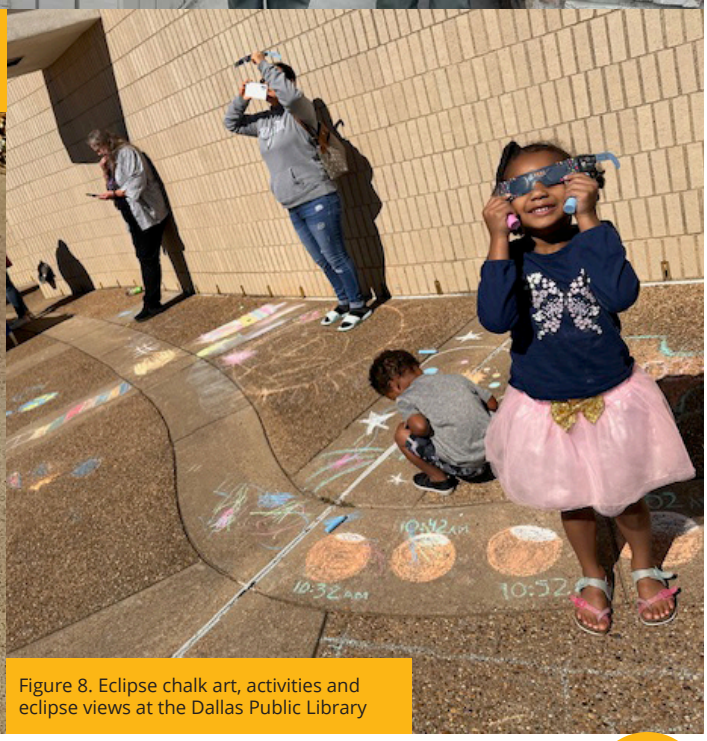


Figure 8. Eclipse chalk art, activities and eclipse views at the Dallas Public Library

Figure 9. A once in a lifetime opportunity at the Garden Valley Library District

Figure 10. Dogs were heckin' big fans of the solar ovens at the Grand County Library District.

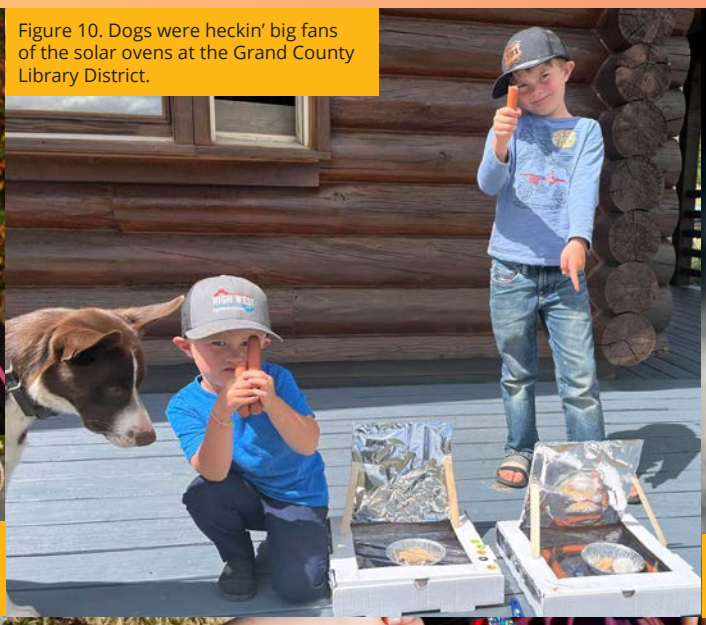


Figure 11. At the Harris County Library, even the clouds contributed to the show!

Figure 12. Seeing the partial Annular Eclipse through a solar telescope at the Jane Stern Dorado Community Library in Puerto Rico.

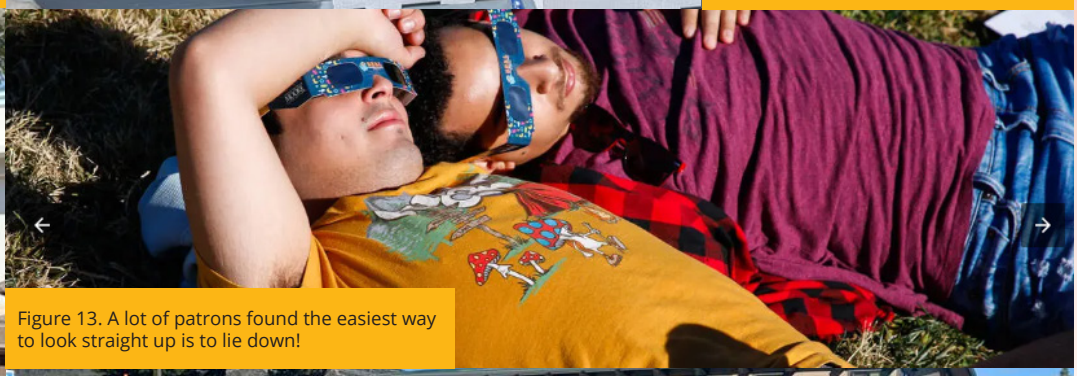


Figure 13. A lot of patrons found the easiest way to look straight up is to lie down!

Figure 14. Projecting the sun at Mammoth Lakes Library.

Figure 15. This patron at the Mission Viejo Library gets us.

Figure 16. The art of making solar viewing glasses fit at the Montrose Regional Library

Figure 17. Cami and her dinosaur enjoying the view at the Muleshoe Area Public Library.

Figure 18. Many libraries —like North Little Rock— also had indoor activities on eclipse day to get people out of the sun!

Figure 19. Orem library event in Utah.

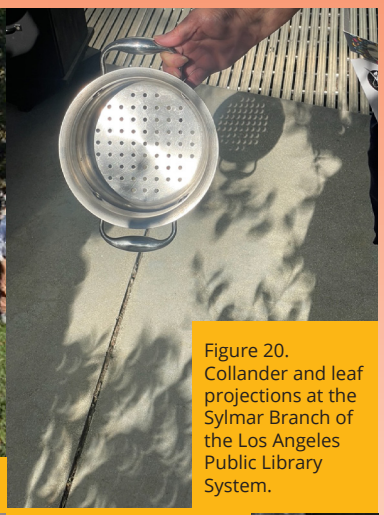


Figure 20. Collander and leaf projections at the Sylmar Branch of the Los Angeles Public Library System.

Figure 22. A patron at the Walls Public Library utilizing a tactile book describing the annular eclipse.

Figure 23. Full annularity through the SunSpotter provided to state libraries

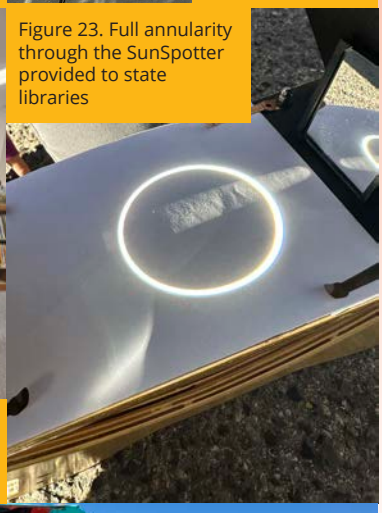


Figure 21. Eclipse progression taken from the Umatilla Public Library.

Figure 24. Using an umbrella with solar filter paper to view the eclipse at the Comfort Public Library

Figure 25. A young volunteer uses the shadow of a telescope to focus on the sun at the Comfort Public Library

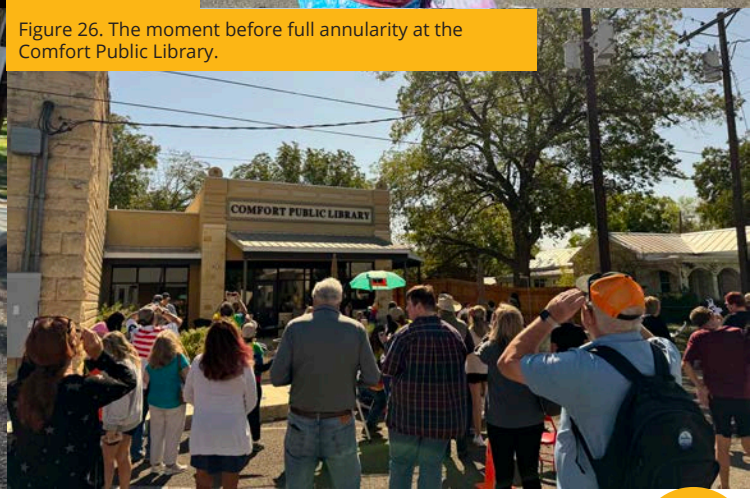


Figure 26. The moment before full annularity at the Comfort Public Library.

APPENDIX D: POST TOTAL ECLIPSE SURVEY QUESTIONS AND RESPONSE SUMMARIES

ABOUT THE SURVEY

This survey was promoted to the STAR Library Network and many partner organizations beginning the day after the 2024 Total Solar Eclipse. In this promotion, it was stressed that submitting a report was a requirement of receiving solar viewing glasses, but libraries were also reminded that if they were only doing events for the 2023 event, the did not have to complete this additional survey if they'd already completed one for the Annular eclipse. The annular survey was closed a few months prior to the total eclipse event, to make certain people were completing the correct survey.

Data from this survey was used to learn more about events libraries conducted in support of the total eclipse, and to see how plans may have changed from initial applications. We also solicited images, quotes, and program plans that libraries may have wanted to share with the program funders.

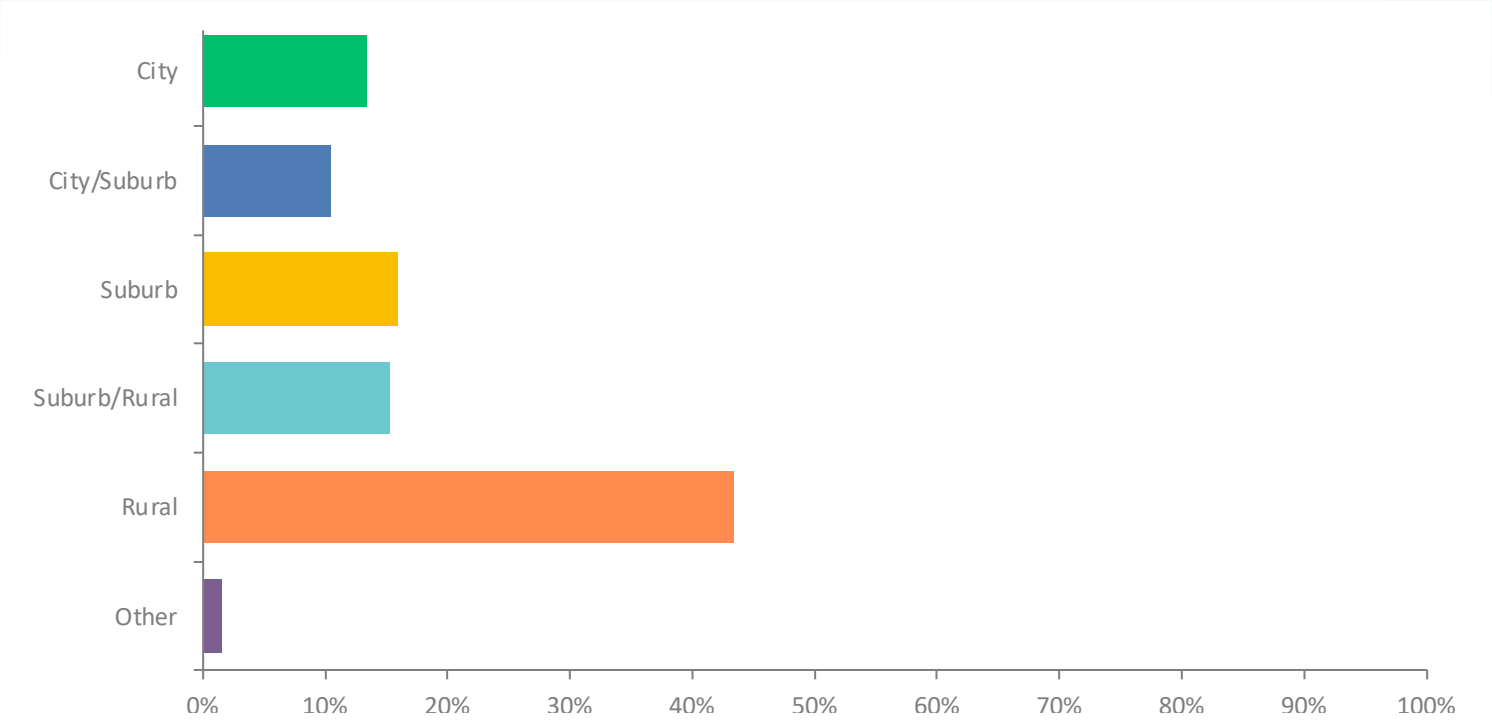
Below is the full list of post-total eclipse survey questions, as well as quantitative responses, summaries of qualitative responses, and select images and quotes collected in this report. More images and quotes can be found throughout the larger report document and are also available upon request.

Q1. Contact Information (including name, institution, zip code and email address)

This information was collected so we could follow up on any questions, and create a map of eclipse related events and programming.

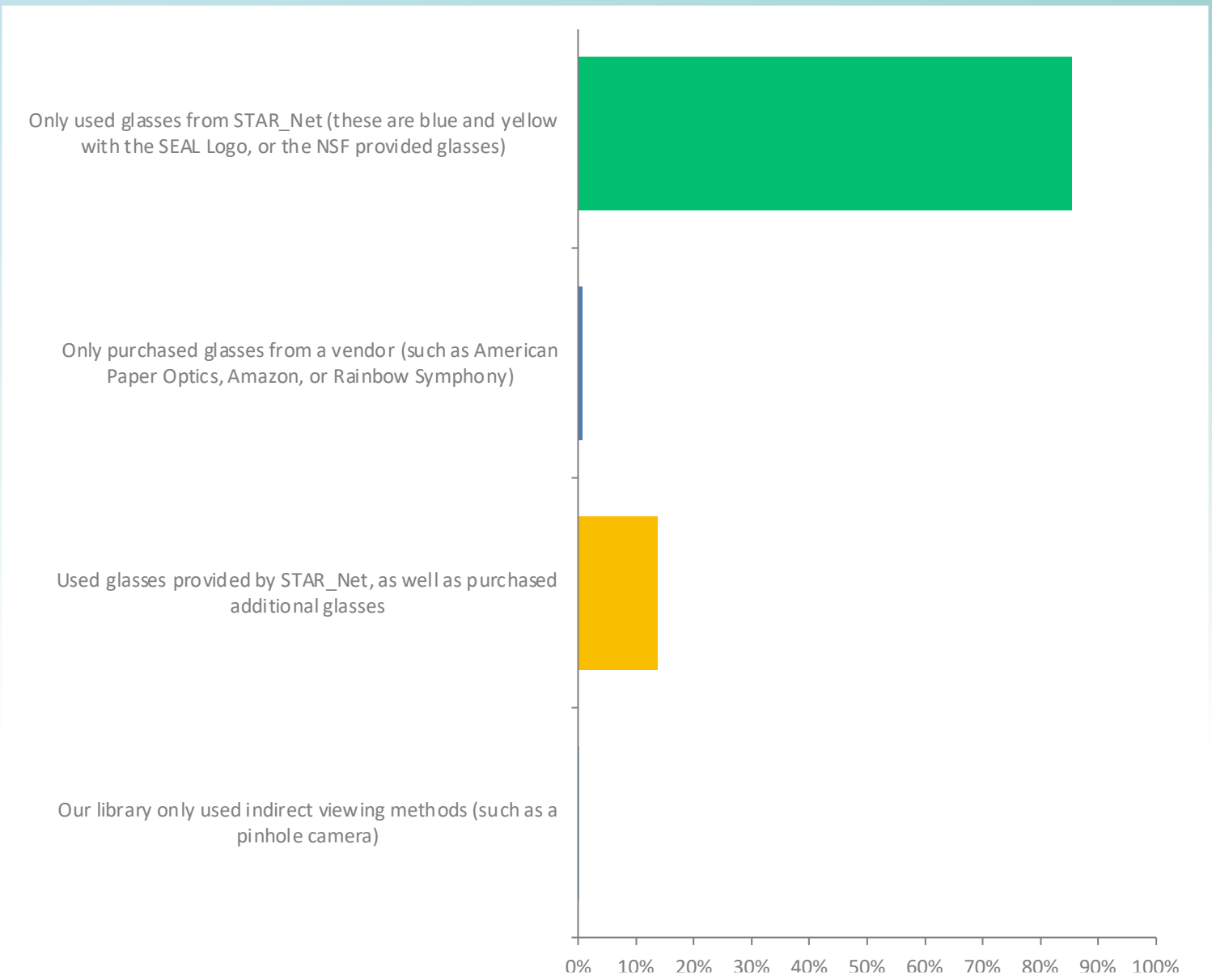
Q2. Community Type

The breakdown below is an almost 1:1 match with the original application question.



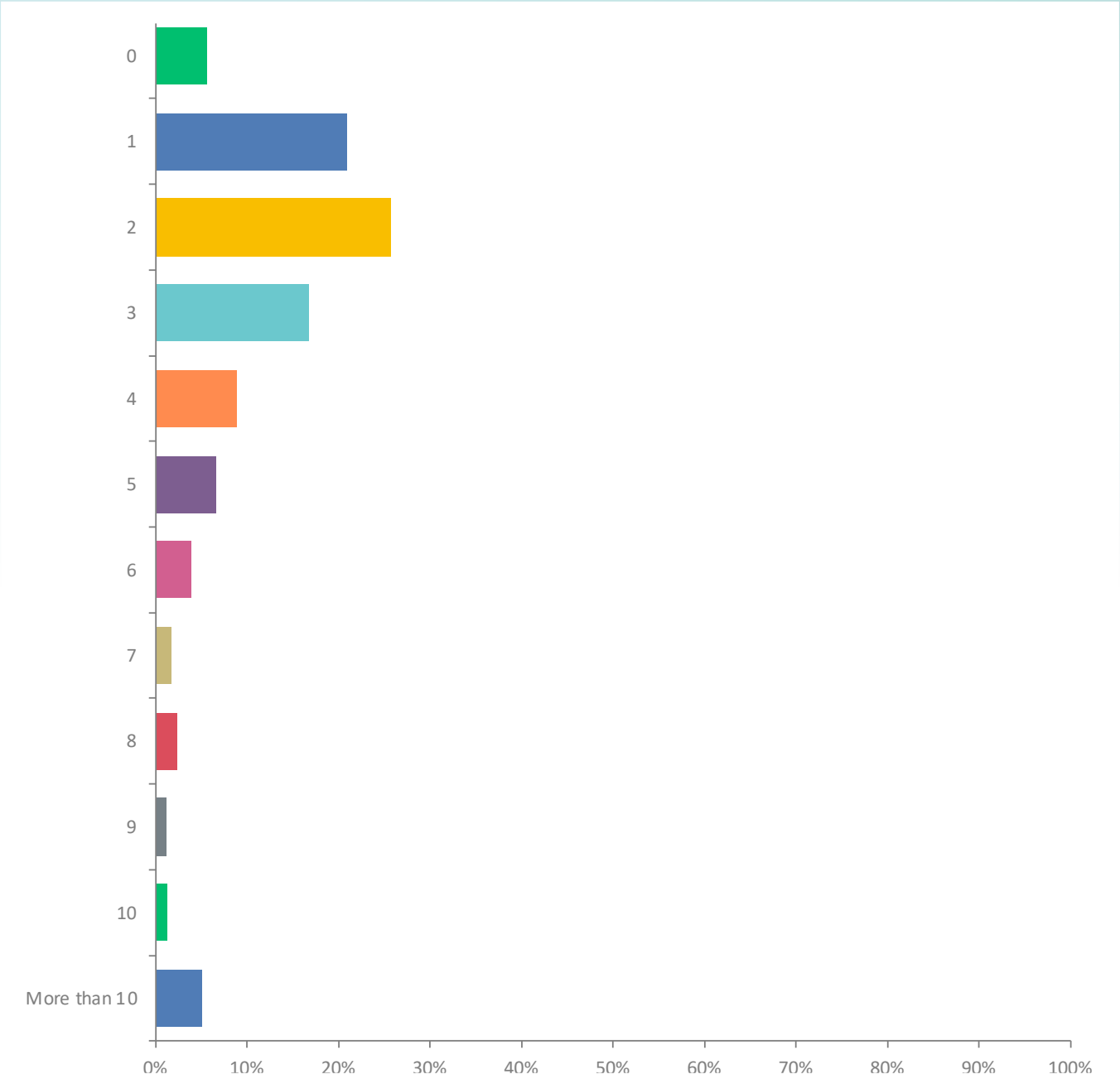
Q3. Did your library receive glasses from the STAR Library Network, or did you purchase your own?

This question was asked because it was indicated to us that some libraries used our Clearinghouse or other resources and wished to report on their events, but they hadn't received glasses from us. We were curious if this was a large number. Less than 1% of respondent libraries purchased their own glasses, 12% purchased glasses in addition to the STAR Net glasses, and no libraries reported only using indirect viewing methods.



Q4. How many programs around solar science and/or the eclipse did your library provide prior to and during the eclipse on April 8th?

When tallied with the Annular Eclipse report numbers, this question was used to extrapolate the total number of events (when accounting for libraries who received glasses from other libraries, and therefore did not know to fill out the survey). While only 1.5% of libraries were in the 10+ programs category, some of these did 100 or more programs prior to the Total Eclipse! Respondents with zero programs indicated they had planned day-of events and were clouded out, or that they had provided programs for the Annular Eclipse only. Respondents to the survey indicated a total of approximately 6469 programs. This number was multiplied by 6 to estimate the total number of programs (including libraries who didn't fill out the survey), for an estimated total of 33,800 programs across approximately 9,000 libraries. We estimated low at 9,000 total libraries participating in the total eclipse based on initial plans in the original application. The actual number of participating libraries and programs is likely much higher.

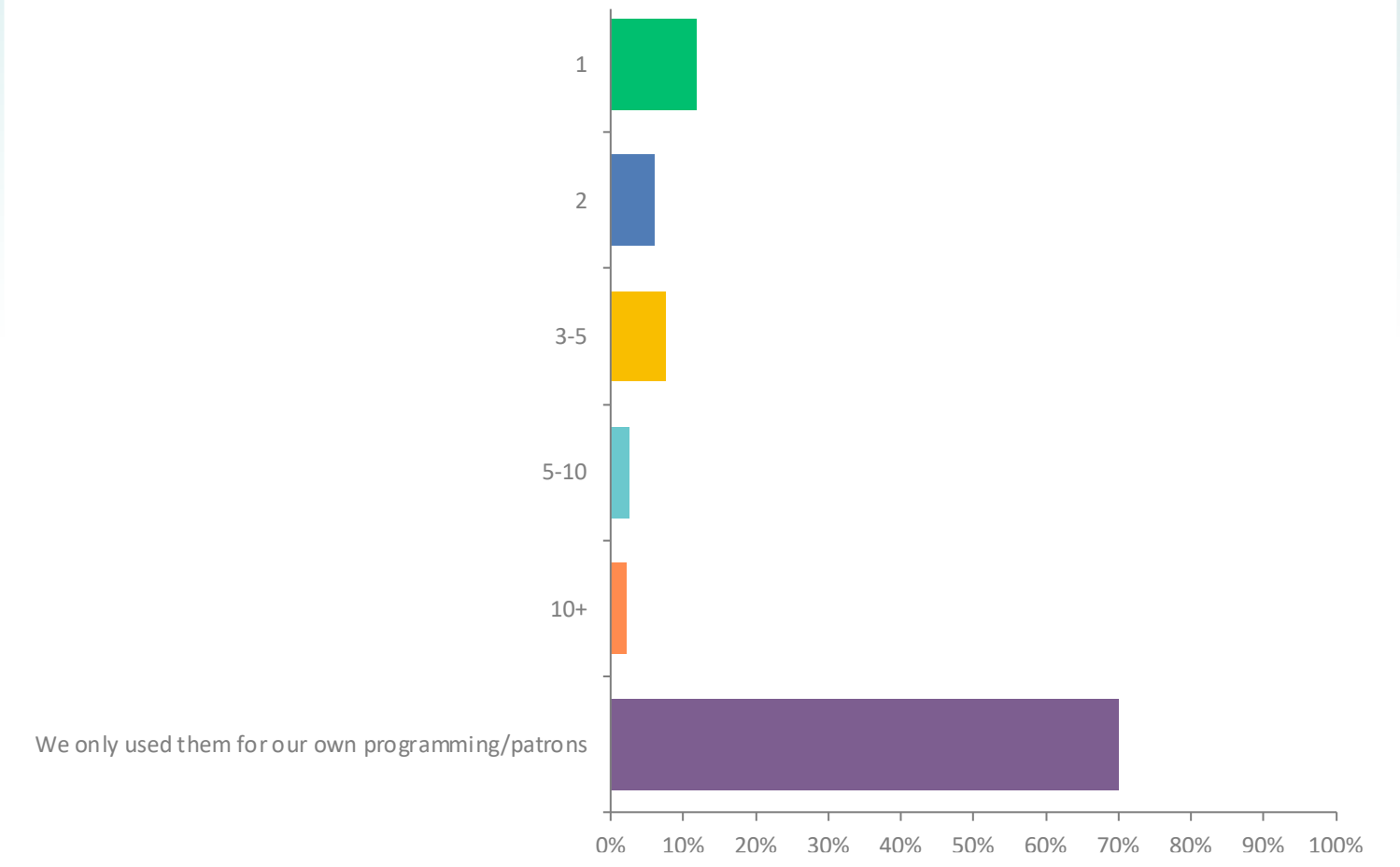


Q5. What is the estimated total attendance for solar science and eclipse related programs provided prior to and during the event on April 8th? Please type a single number representing the total participation in all programs.

We utilized the numerical responses to this question to estimate total program attendance related to the total solar eclipse. Survey respondents indicated a total of approximately 450,800 participants. We multiplied this number by 6 to capture the remaining libraries who had not filled out the survey, to arrive at an estimate of 2,704,800 total eclipse program attendees. We estimated low at 9,000 total libraries participating in the total eclipse based on initial plans in the original application. The actual number of participating libraries and programs is likely much higher.

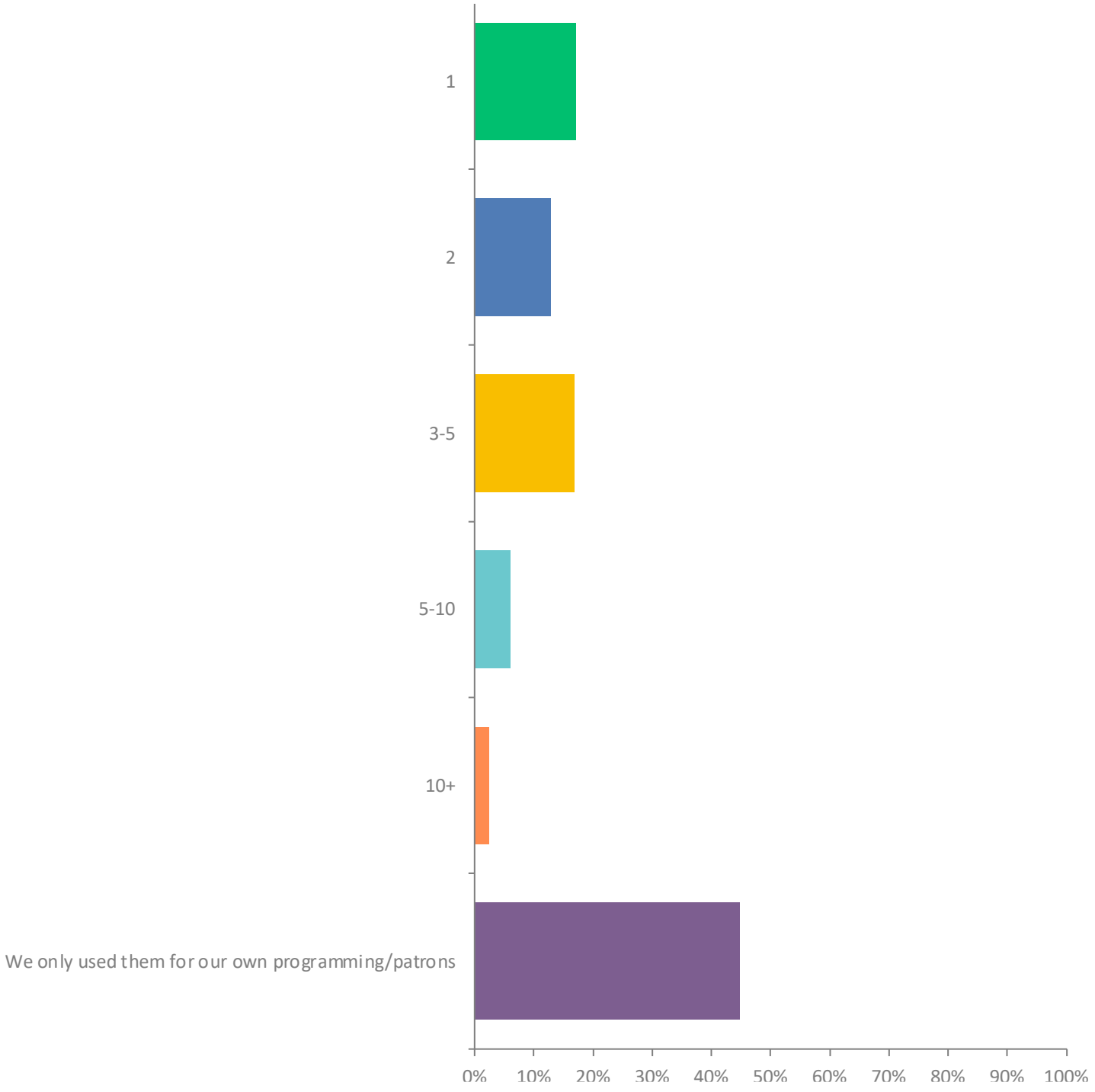
Q6. If you received glasses from STAR Net, how many other public, tribal, prison or military libraries did you share with?

This question was reworded from the "sharing" question in the original application, and set ranges provided, as the responses in the original application were hard to interpret. Some level of inaccuracy was introduced by using ranges, but it was determined to be worth that uncertainty to make sure we had a good estimate of total number of library partners. Approximately 70% of libraries only used them for their own branch (this is higher than indicated in the original application), while around 28% shared with at least one other branch. The total number of libraries implied by this question was used to arrive at the conservative 9000 total library participation for the total eclipse utilized in questions 4 and 5.



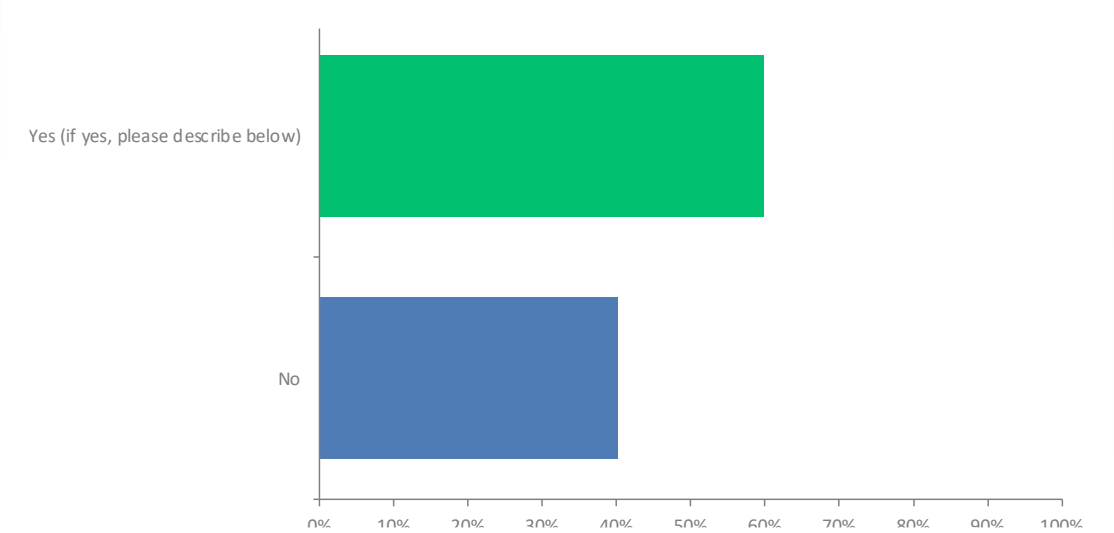
Q7. If you received glasses from STAR Net, how many other non-library venues (schools, museums, food banks, other non-profit/education, etc.) did you share them with?

The below result is interesting because it shows that many more libraries shared with other organizations in their community than they did with other libraries, which makes sense. What is interesting however is how many more libraries indicated sharing during the total eclipse (approximately 56%) versus the annular, where only about 33% shared with other organizations. This could be attributed to libraries "saving" glasses during the annular for the total eclipse.



Q8. Did you purposefully distribute glasses to underserved/underrepresented audiences? (Example, did you target promotion to these groups, or save a subset of glasses for them?) Groups underrepresented in STEM fields include Hispanics and Latinos, African Americans, American Indians, Alaska Natives, Native Hawaiians and Pacific Islanders, the economically disadvantaged, people with disabilities, and women and girls. Underserved audiences may include rural audiences, economically challenged regions or urban audiences. If your community would be defined as underserved or underrepresented, please answer "Yes" to this question.

In addition to responding affirmatively or negatively, participants were also asked to list the communities they served. A quantitative summary pulled from the quantitative answers is shown in the second chart below. It should be noted that many of the respondents who said "no" clarified that they provide access, programming and resources for all patrons, who fall into many of the categories listed. About half of respondents referred to the general demographics of their community when responding (such as rural, urban, or economically underserved), while half had specific efforts to reach folks in communities outside their own (for example a rural branch of their library) or through library services to groups like the disabled, homebound, or senior citizens. The category for ESL/Immigrant populations included Hispanic, Hmong, and Haitian populations.



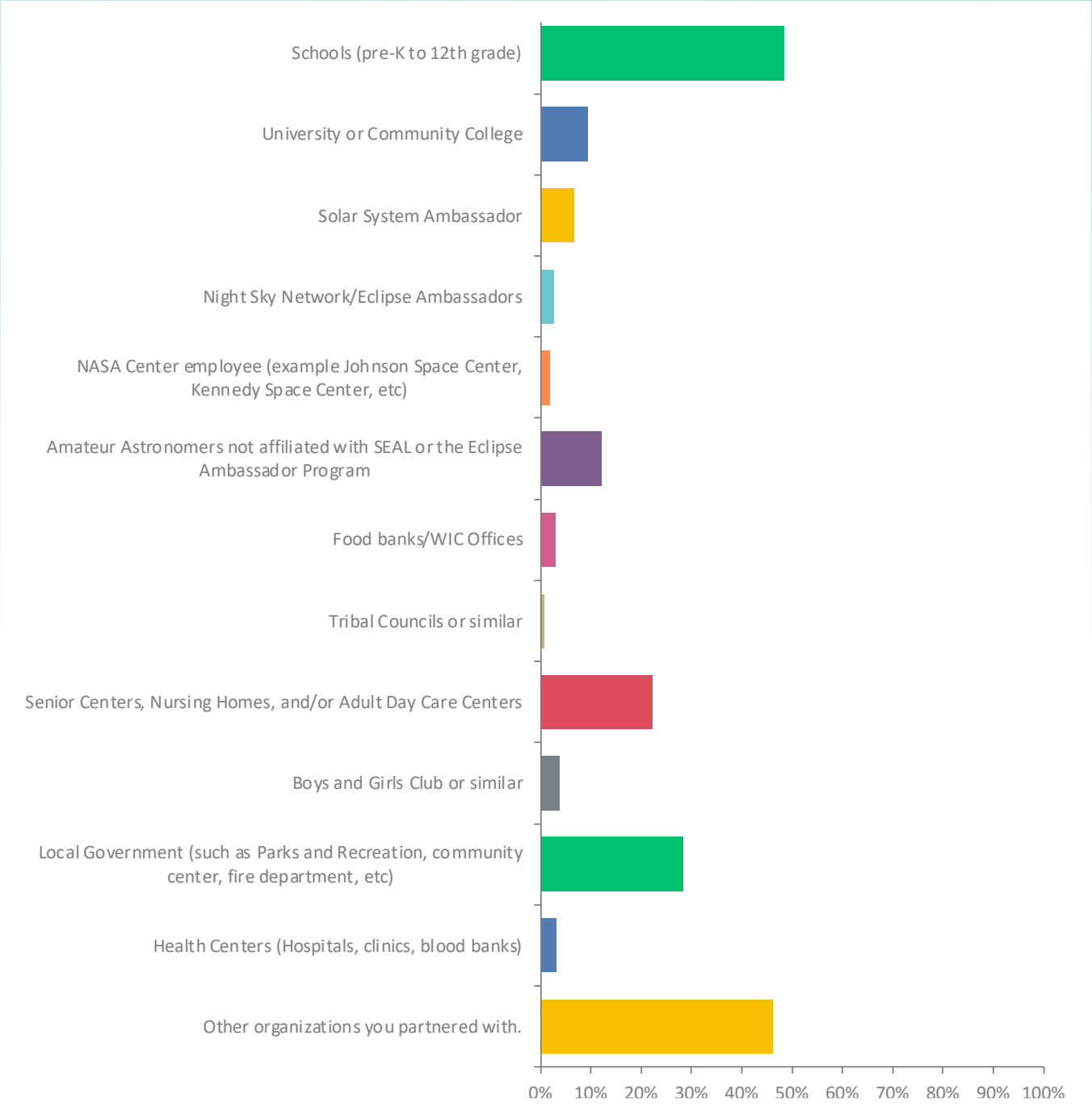
Economically Disadvantaged	333	Food Banks	25
Rural	329	Unhoused Patrons	23
Latinx/Hispanic	172	Urban	16
Seniors/Homebound	148	Pacific Islanders	11
Patrons with Disabilities	119	Amish/Mennonite	11
Unspecified Underserved	108	Homeschoolers	10
Women/Girls	91	Prison or Youth Detention	9
Black	90	Blind/Low Vision	2
Immigrant/ESL	52	Alaskan	1
Native American	49		

Q9. and Q10. Photos and Photo Releases Requested

A sample of these photos appear at the end of this report, and throughout the larger report document.

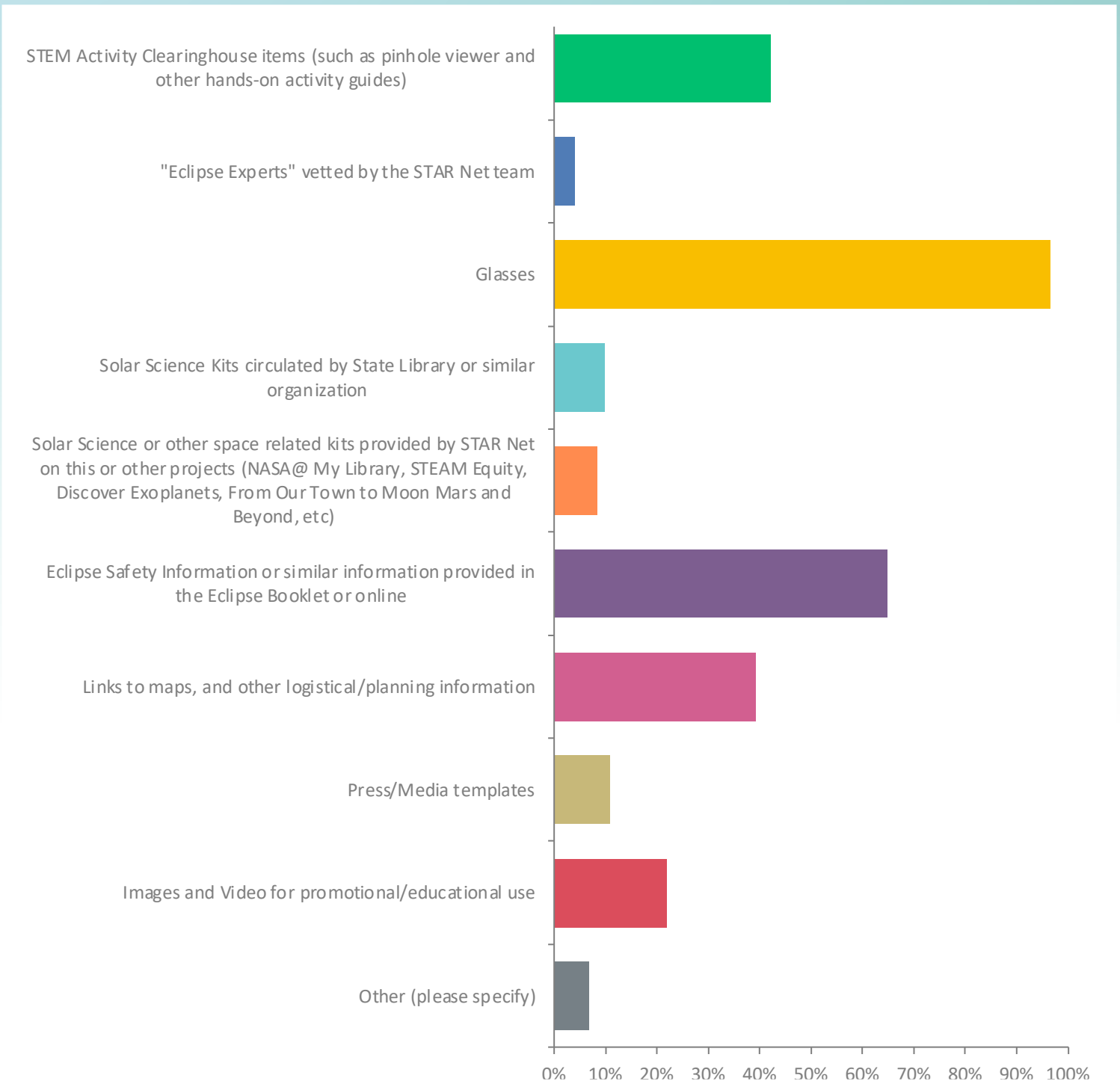
Q11. Please tell us about any community organizations you partnered with. (Check all that apply, and include organization names if possible in comment box).

From the chart below, it is clear that schools were the most common organization to partner with, followed by local government agencies (such as the Parks and Recreation Department). Please note the "other" category was used to provide specific names, and does not indicate different types of organizations partnered with.



Q12. Which resources from SEAL/STAR Net/SSI did you use? Please check all that apply.

As expected, most respondents utilized the STAR Net glasses (though not all). Safety information provided by the SEAL team was the next most common item, followed by hands-on activities in the STEM Activity Clearinghouse, and Logistical information such as maps.



Q13. In what ways has the eclipse influenced your library's STEM programs?

Respondents provided narrative answers, and we've summarized those responses below into 15 categories, in order of most common answer to least common.

Eclipse Allowed us to create more focused and topic-based programming	574	Built excitement for future library programs	70
Specifically increased our STEM-related programming	279	Created opportunities for more passive programming	70
Increased our staff interest in space and STEM programming	272	Strengthened community support	38
Expanded library patronage	122	Increased program attendance	21
Made community more aware of library resources	111	Raised eclipse awareness	20
Created new partnerships	102	Has led to more programs overall	16
Improved quality and quantity of current STEM programming	77	Has led to more "current event" focused programs	6
Increased staff confidence in conducting programs	74		

Q14. Would you like to share with us any quotes from your patrons or staff that we could share with our funders?

Below is a selection of quotes from participating libraries, followed by a selection of images also submitted in this report:

"We had so many patrons who did not understand the risks of looking at the eclipse with sunglasses, and were unable to purchase safe eclipse viewing glasses on their own. We were able to provide a much-needed resource for our community because of you. Thank you!"

— Derry Public Library

"One young patron said, 'this is the happiest day of my life!'"

— Graham County Public Library

"When staff distributed solar eclipse glasses at designated outreach dates at the library, we observed patrons in line to receive glasses commenting to others about all of the wonderful library programs we have an encouraging them to get cards. During those events there were always several new library card applications. The eclipse programming certainly allowed us to reach and attract new audiences."

— Middle Country Public Library

"The eclipse was a stressful time for librarians but the SEAL training helped a lot to prepare for the chaos. Having certified glasses to hand out was a great resource that we were able to offer our patrons. Thanks so much!"

— James Blackstone Library

"Almost makes you feel that human beings CAN come together in awe and wonder – if only for a brief moment."

— Ivy Tech Community College

"We had a kindergarten student who attended our programs for both the October and April eclipses. She was telling everyone at school and her neighbors at home the proper way to view the eclipse. She quoted us by telling them to "look at their feet, put the eclipse glasses on. NOW they can look towards the sun but NO peeking outside the glasses and NEVER, EVER look at the sun without eclipse glasses. Don't take the glasses off until you look at your feet again. Start with your feet and end with your feet!" She was paying attention at our programs!!!"

— Plainville Memorial Library

"We also saw many new faces (a few stated they didn't know there was even a library here!!) so hopefully they'll come back to visit the library for our other activities–and books! We are so thankful you provided us this opportunity to better serve our community."

— Jackson County Memorial Library

""I want to learn more" from an 8-year-old checking out a stack of 30 science books after a program. These five words made my day and reflects what a librarian's job truly is."

— Buffalo & Erie Public Library Central and City Branches

"The eclipse provided the opportunity to bring us together for this exciting celestial event during a time of such division in our country. Much appreciation to the organizers and funders for providing the glasses and helping to bridge the gap to bring us together to view this spectacular event. Thank you!"

— Bethlehem Public Library

"We had a "legally blind" person who was SO EXCITED that she could see the eclipse! She described it in detail coming and going! This would not have happened if we would not have been able to obtain these glasses. Thank You So MUCH"

— City Library

"This was just an amazing once in a lifetime event and workshop that really made me feel more involved in science fields i never saw myself included in before. this really opened my eyes to more possibilities to help and be involved in the community and really opened a lot of doors for me, I EVEN GOT TO BE AN NASA DATA COLLECTOR ON APRIL 8th AT THE INDIANA MOTOR SPEEDWAY because of how involved and interested I became in the Solar Eclipse—-and none of that would have ever happened if it weren't for the inclusion and start up interest made possible by SEAL and STARnet. SO THANK YOU SO SO MUCH!"

— City Library

"Your funders generosity, reminded communities across the United States of the value of libraries. Free information and resources, like free eclipse glasses, improve everyone's quality of life and are endlessly valuable. Thank you for contributing to this momentous event."

— Delphi Public Library

"Wadsworth Library was fortunate enough to receive glasses in 2017 and 2024. Being a resource for eclipse glasses helped make us a valued resource in our community and brought people to the library that otherwise might not have visited. Thank you for your support of libraries and rural communities!"

— *Wadsworth Library*

"I don't have a particular quote, but the recurring feedback we received was that the library came through for the community once again, and in a big way. We couldn't have made this possible without the support from you all at SEAL/StarNet and the Gordon and Betty Moore Foundation."

— *Wright Memorial Public Library*

"I wish that there could be an eclipse every week!" Zack Slisher age 7

— *Bath Township Public Library*

"The library has everything, doesn't it!"

— *Lamoni Public Library*

"Even though we're a public library, it's rare that we can champion a community-level event of this magnitude."

— *Bloomfield Public Library*

Figure 1. Total Eclipse in Bloomfield, Indiana

Figure 2. "Pin the Eclipse on the Sun" activity at the Barlett-Carnegie Sapulpga Public Library

Figure 3. The prettiest pinhole camera at the Betsie Valley District Library

Figure 4. The Comfort Public Library was mostly clouded out, but got a moment of totality!

Figure 5. Eclipse activities with patrons of the Jane Stern Dorado Library in Puerto Rico.

Figure 6. Definitely not a posed picture at the Watertown Public Library.

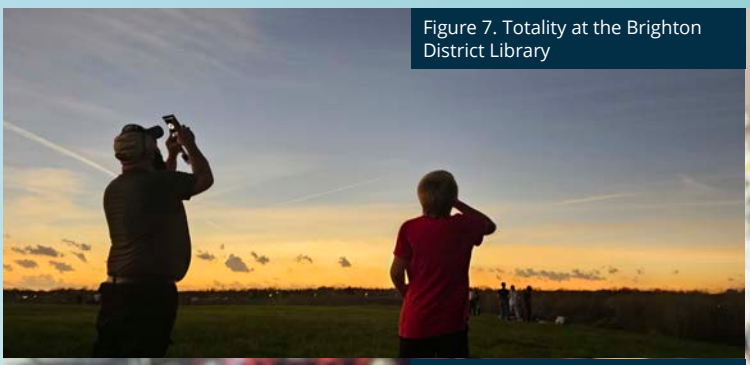


Figure 7. Totality at the Brighton District Library

Figure 8. First look at the sun at the Muskego Public Library.

Figure 9. Campbell County Library is Insta-Ready for the Eclipse!

Figure 10. Eclipse Art was a MUST!

Figure 11. Storytime with MoonBear's Shadow.

Figure 12. Eclipse viewing at the Schuyler Public Library.

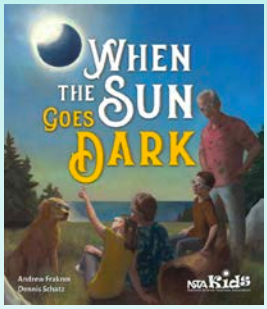
Figure 13. The eclipse is kind of a big deal...

Figure 14. Eclipse day event at the Conshohocken Free Library.

APPENDIX E: KIT LIST AND IMAGES

MULTI-GENERATIONAL PROGRAMMING KITS

- Tub
- 1 Coronado Personal Solar Telescope
- 1 Telescope Case
- 1 Telescope Mount
- “When the Sun Goes Dark” book
- 2 Large Sunoculars
- Big Sun, Little Moon (Handout Only)



YOUNGER AUDIENCE KITS

- Tub
- 1 Sunspotter
- Moon Bear's Shadow Book
- Moon Bear's Shadow Activity Pieces
- Printables
- 1 Stress ball sun
- Flashlights
- 1 Tree Stress Ball
- Toy Bears
- 2 Sunocular minis
- Sorting Game Printable Files

APPENDIX F: FINAL REPORT FROM NSTA

SUMMARY OF NSTA/SSI SOLAR ECLIPSE PARTNERS ACTIVITIES

Associated with the October 14, 2023, Annular Solar Eclipse

Based on Reports Requested in October 2023 Dennis Schatz,
Andrew Fraknoi, Flavio Mendez January 23, 2024

Thank you to the Gordon and Betty Moore Foundation for their generous support of this program

In late October, we asked the First Wave of Solar Eclipse Partners to tell us about their programs related to the October 14, 2023, annular solar eclipse.

Fifty-one —51— educators of the 94 responded to this survey. These Solar Eclipse Partners:

- Are in 24 different states
- Offered between one and 17 different programs in their communities
- Engaged in over 100 events with various public audiences.

The photos on the following pages show the excitement of participants and range of activities the Partners offered.

COLUMBUS GROVE, OHIO

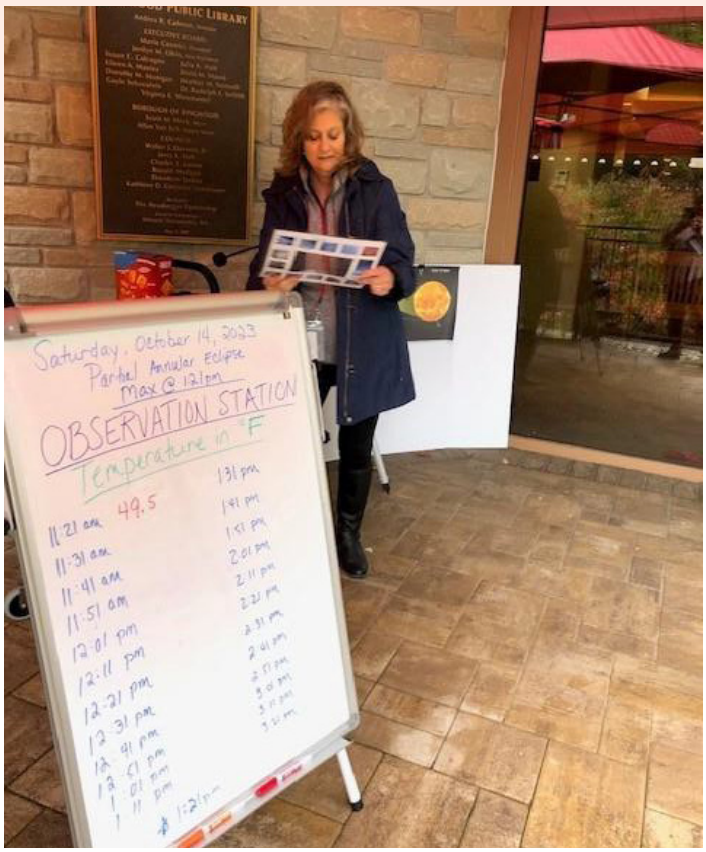
Eclipse Partner's Student Leading Eclipse BINGO Activity

Putnam County Public Library

Eclipse Partner's Students Posing in Front of Activity Station They Facilitated

Putnam County Public Library

RINGWOOD, NEW JERSEY



Measuring Temperature Changes During the Eclipse

Ringwood Public Library

Ready with Glasses to Observe the Eclipse

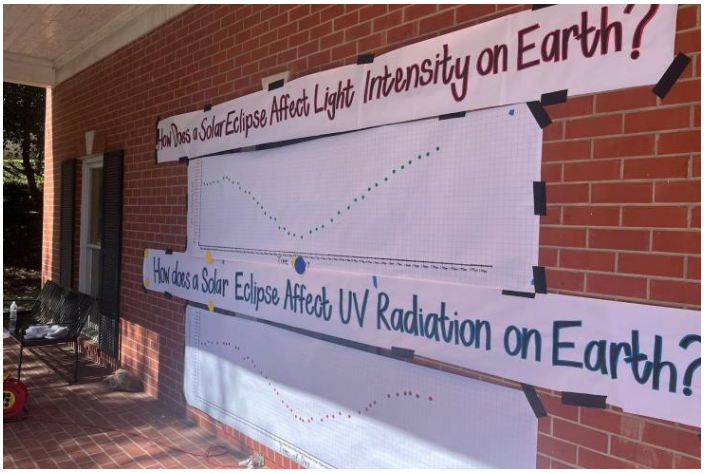
Ringwood Public Library

OXFORD, MISSISSIPPI

Eclipse Day Activities at Lafayette County and Oxford Public Library

OXFORD, MISSISSIPPI

Library Patrons Taking Measurements of Visible and UV Light at Lafayette County and Oxford Public Library



MARYSVILLE, OHIO

Science Club Activity Station at Community Fall Fest

FRESNO, CALIFORNIA

Left: Teacher with Her Students Facilitating Eclipse Activity Station at Fresno County Fair

Above: County Fair Goes Engaging with Eclipse Activities

SAN DIEGO, CALIFORNIA

Building a Cereal Box Pinhole Projector at School Event

HAMMONDSPORT, NEW YORK

Solar Eclipse Story Time a Public Library

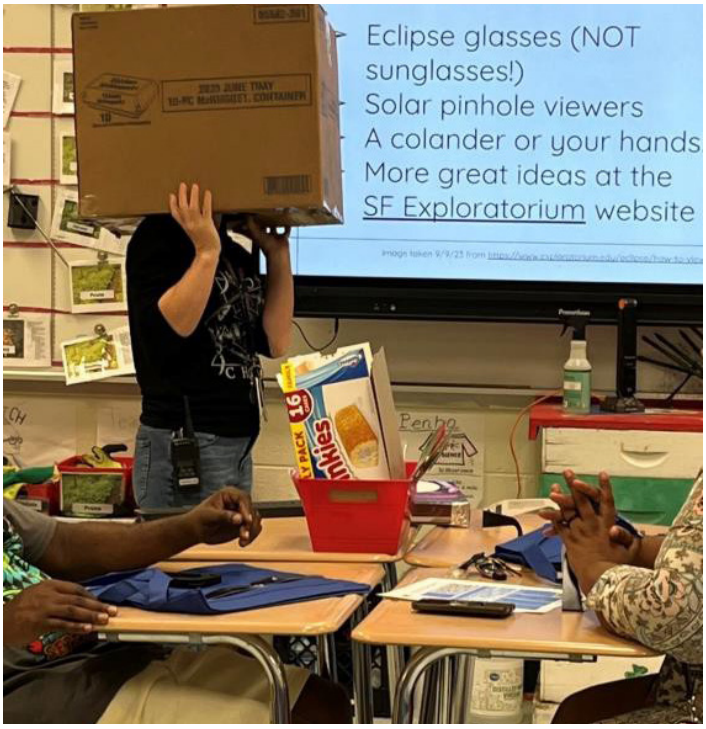
Solar Eclipse Activity at Public Library

COLUMBUS, OHIO

Left: Student Project at Focus High School Family Event

Above: Eclipse Demonstration at Little Miracles Early Development Center

PEACHTREE CITY, GEORGIA



Left: Building Pinhole Projectors at Countywide Title I Parent University

Above: Testing Pinhole Projectors at Countywide Title I Parent University

BOISE, IDAHO

Girl Scouts Learning About the Solar System to Earn Their ***Space Science Investigator*** Badge

Girl Scouts Experiencing the Solar Eclipse

DULUTH, GEORGIA

Eclipse Information Booth at ***Friday's Duluth*** Festival

DULUTH, GEORGIA

Recommendation of Children's Books

Observing the Eclipse on Day of the Eclipse

We are delighted with the results for the annular eclipse. With the additional financial support from the Moore Foundation, we identified an additional 165 Partners, for a total of 259 partners, who will offer programing leading up and during the total solar eclipse in April 2024.

REPORT OF NSTA/SSI SOLAR ECLIPSE PARTNERS ACTIVITIES

Associated with the April 8, 2024, Total Solar Eclipse

Based on Reports Requested in April and May 2024 Dennis Schatz, Andrew Fraknoi, Flavio Mendez

June 3, 2024

Thank you to the Gordon and Betty Moore Foundation for their generous support of this program

In April and May of 2024, we asked the 306 NSTA/SSI Solar Eclipse Partners to tell us about their programs related to the April 8, 2024, total solar eclipse.

One hundred twenty-eight —128— educators responded to this survey. These Solar Eclipse Partners:

- are in 39 different states.
- offered between one and more than 10 different programs in their communities.
- engaged in over 400 events with various public audiences.

The photos and statements on the following pages show the excitement of

- participants and range of activities the Partners offered.

Following the photos and activities are additional reactions to being a NSTA/SSI Solar Eclipse Partner and lessons learned for future eclipse outreach educators.

CRYSTAL TEBBE, MARYSVILLE, OHIO

Her freshmen and sophomores, tagged as "Eclipse Experts", organized an Eclipse Fair for grades K-8. Her students worked in groups to select topics relevant to the solar eclipse.

Each group organized a 7 to 10- minute presentation that they shared with the students attending the Eclipse Fair. On March 20th and 21st, the younger students spent approximately 50 minutes at the Eclipse Fair as they rotated through seven different "stations" to learn about topics related to solar eclipses. These "stations" were created and facilitated solely by the 9th and 10th grade students.

Adults who accompanied their children to the Eclipse Fair came back to me saying "I was able to answer all of my family's questions at our Easter gathering from what I learned that day!" Another coworker was talking with her husband who is a higher-up at the company he works for and he took the info and rescheduled his drivers to avoid eclipse traffic AND by changing up the drivers' times free up the employees working in the plant to be able to step out and view the eclipse too!

Being an NSTA eclipse partner added credibility. Not only was I speaking as a science teacher and 'local science nerd', but I also had the NSTA resources and the information from the many webinars that were offered! It has been a great experience!

STEPHANIE HOLTZMAN, EAST BRUNSWICK, NEW JERSEY

As a physics teacher, she arranged the programs for her school district, a neighboring Pre-K program, and our community at the East Brunswick Public Library. She had students apply to be part of these events and called the team the Solar Eclipse Ambassadors.

They had to fill out a written application and make an audition video of them explaining and modeling a solar eclipse in less than two minutes. When she got such a huge response —108 applications—, she expanded her original plans of just doing assemblies at the elementary schools to doing the talks at the library and the visit to the pre-K program. She wound up with a team of 23 high school students and did an absolutely stellar job!

STACEY SNYDER, SUMNER, IOWA

One of my events was our annual Cedar Valley STEM Festival. I had my 4th grade ELP —Expanded Learning Program or Talented/Gifted— students become “Eclipse Explorer Experts”. They spoke with people from the community as they came past our booth. The students designed the display and learned all about the solar eclipse to share. While we were not in totality, they still got our students at school fired up as well! They also shared in 1st and 4th grade classes. Three of my students traveled with their families to Totality!!

PAM WARREN, PETERSBURG, ILLINOIS

Being a NSTA/SSI Eclipse Partner has been one of the most rewarding experiences of my career! I enjoyed sharing with people of all ages —2-years-old to 86-years-old— about the wonder of nature.

After the eclipse, I have had many rewarding conversations with folks in the library, church, school, grocery store, park, etc. telling me about what they experienced on April 8th. Many of them told me they wouldn't have even noticed the event at all if it weren't for the program they attended.

Thank you for all you did to make this a worthwhile project.

Working with a group of seniors at a monthly social hour

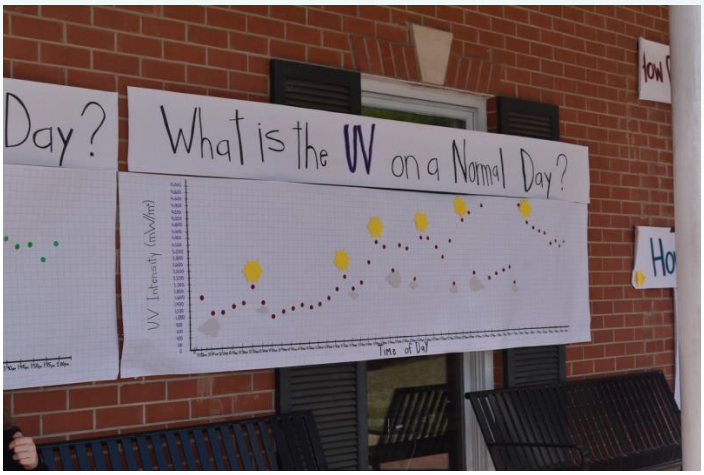
Providing eclipse information outside library

Using the power of Bluey to attract interest in the eclipse

Interactive educational display in the youth section of the public library throughout March and April.

CHRISTIAN CLARK, OXFORD, MISSISSIPPI

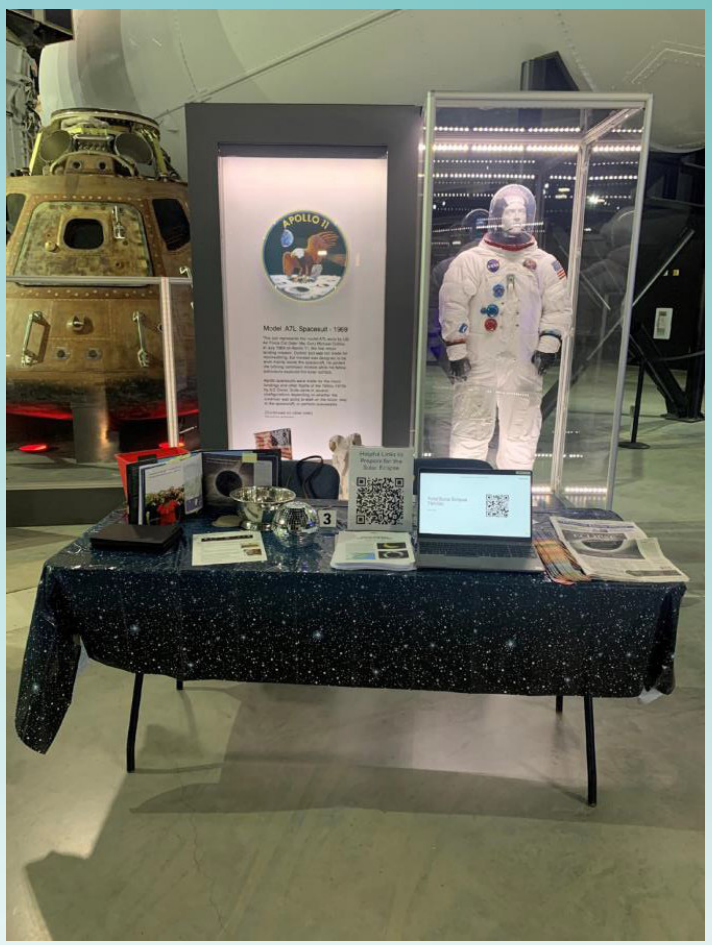
Saturday, April 6th - Held Eclipse Extravaganza, a weekend preview of the eclipse at the Lafayette County and Oxford Public Library. Similar to the Eclipse Extravaganza held before the annular eclipse in October, attendees received free solar eclipse glasses —many took more than one pair— and received information about the April 8th eclipse. Attendees could assist in graphing light and UV radiation for a normal day in comparison to the October eclipse. They could view the sun through a solar telescope and experience the eclipse virtually in a mobile planetarium.



LAURA DRAGER, DAYTON, OHIO

Hosted booth at STEM Future Fair at the Wright Patterson Air Force Base in Dayton, Ohio, for families to learn about the eclipse. It featured a Mentimeter solar eclipse trivia game with solar system themed candy, planet tattoos, and space pencils as prizes. Students could do a totality chalk art activity, learn about solar eclipse viewing methods, and get a handout with details and timing of the eclipse in Dayton, OH.

At a second grade Girl Scout troop meeting, the scouts learned about the celestial bodies in our solar system by modeling the motion of the earth, moon and sun. The girls also made totality chalk art and a holding cases for their solar eclipse glasses.



BRETT MOSELY, JUNCTION, TX

Thank you for allowing me to participate in the NSTA/SSI eclipse partners program. It was a great opportunity for us to get out in our communities and share solar science with a large number of K-12 students in West Texas.

We traveled to about 20 schools, 10 libraries, held five star parties, and attended one health care event. All told, we interacted with about 4,000 people to teach about eclipse safety, the reason why eclipses occur, and the wonders of astronomy.

On the day of the event, we hosted a special group of young female scientists at our campus. We got to meet other eclipse professionals from around the world. Fantastic opportunities!

ALLISON DOWNING, HATTIESBURG, MISSISSIPPI

This flyer was for the eclipse lessons that were recorded and dispersed to various teachers. I organized this within our Center for STEM Education and was able to use existing grant funding to integrate the eclipse lesson into our current outreach opportunity, STEM on Demand.

We hosted a viewing event at the university for students, faculty, and community members. Our resident astronomer was on hand with his telescope and filter. Even though eclipse day was cloudy and rainy, many people showed up and faculty brought classes outside in case they were able to see the eclipse. I also worked with a local preschool where I was able to teach the 3 and 4-year-old classes about the eclipse.

A SELECTION OF OTHER PARTNER ACTIVITIES FOR THE APRIL ECLIPSE

At our Elementary School in Celebration, about 100 K-5 students and family members made solar pinhole viewers, participated in a demonstration of how the sun, moon, and Earth move. At our local library, 25 people in a bilingual presentation made solar pinhole viewers, had a read-aloud story, and participate in a demonstration of how the sun, moon, and Earth move. **Amy Trujillo, Clermont, Florida**

The Carnegie Museum of Montgomery County, University of Chicago, and the city of Crawfordsville combined to create programming leading up to the eclipse and for the day of. Programming was for all ages. The day of the event, we had over 400 people in attendance for viewing totality. I had written a $10,000 grant to buy specialty telescopes, solar filtered binoculars, and eclipse glasses. Leading up to eclipse day, I created lessons for the entire school to prepare for the event. We taught these on Friday April 5 since the district declared April 8 an eLearning day. We hosted Spring Break Science at the Carnegie Museum. Patrons could come any time during open hours to listen to podcasts, complete experiments, build pinhole cameras, and pick up a Solar Eclipse survival kit (glasses, UV beads, a small eclipse model and safe viewing sheets). Shannon Hudson – **Crawfordsville, Indiana.**

My science club and I designed activities and presentations to give to participating classes at our local elementary school. Each grade had an activity and presentation geared toward them. Upwards of 100 students total in audience on Friday April 5th during the school day with 20 high school students presenting. We also offered an open-to-the-public presentation and activities on April 8th at 10 am, built pinhole observers for kids and answered lots of questions from the audience. I also did a presentation to my school staff on safety and what to look for after we cancelled school for eclipse day. **Cassy Baker, Robinson, Illinois.**

Offered Solar Eclipse for preK-4 students and adults with 14 stations led by 60 9th-12th grade students in 2 shifts. Activities including science demonstrations and mini-labs about the eclipse, 3 video stations, safety station, UV beads, UV prints, solar eclipse flip book, corona art, circuits with solar panels, GLOBE citizen science and surface temperature monitoring, comparing sun and moon size, time capsule etc. On eclipse day, we had K-12 and full staff viewing at school. Sadly, full cloud cover in Twin Cities, but still it was a good community builder. **Hannah Sullivan, St. Paul, MN**

I recorded interview with three NOAA space weather scientists to discuss the topic of space weather and how the total eclipse will be important to our understanding of the atmosphere. A video produced by the Science Teachers Association of Texas was posted on STAT Studio platform viewable by the public - https://www.statweb.org/stat-studio?wchannelid=hiljbflbz4&wmediaid=3e9yyqeafk. I led AAPT webinar, featuring easy, low cost, activities to do with students that would be easy to do in the week leading up to the eclipse. We also focused on safety and ways to view the eclipse that would not compromise vision. This program was done in collaboration with another NSTA/SSI Eclipse Partner - Amanda Petty. Finally, I participated in the NOAA/NASA eclipse event at Cotton Bowl in Dallas, TX, My 10- minute talk was focused on how we discover the world through science and this event could inspire the next wave of scientists or even teachers. **Kenric Davies, Bryan, TX**

I presented information about the solar eclipse to a group of pre-service teachers. We did a modeling activity to show the geometry/causes of eclipses and moon phases. I gave them all eclipse glasses and provided them with enough eclipse glasses to hand out in their practicum placements. Students were given access to materials and presentations to present to elementary, middle, and high school level students. Each student was also given access to a set of pencils, foam balls, and a light source to use with their students. Between March 21 and April 8 in Eastern KY Public Schools, each practicum student presented a lesson on the eclipse in their practicum placements. They did a modeling activity to show the causes of eclipses and moon phases. They also handed out eclipse glasses to their students. Many of the practicum students taught their lesson to multiple class periods. **Samantha Ringl, Alice Lloyd College, Prestonsburg, KY**

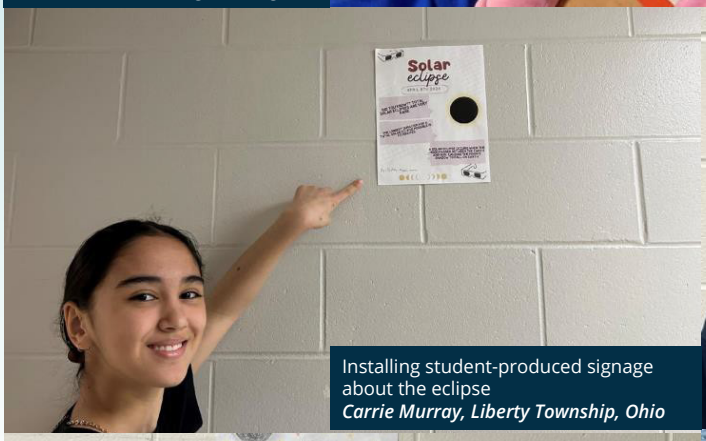
I prepared 7th & 9th graders to lead activities with elementary students. We met with pairs of elementary classes (two Kindergarten classes, two 1st grade classes, etc. through 4th grade) which covered all the elementary classrooms in our rural district. Students lead activities explaining how eclipses work using a Sun, Earth, Moon orrery; what the eclipse will look like using sandwich cookies; making pinhole viewers; viewing the eclipse safely with solar viewing glasses (distributed by the school district) and pinhole viewers; plus making corona chalk art. Activities were promoted on the school's social media. **Eric Sullenberger, Troy, OH**

PHOTOS SHARED FROM OTHER SOLAR ECLIPSE PARTNERS

Modeling paper plate glasses holder
Amy Walker, Air Zoo Aerospace and Science Center, Portage, Michigan

Solar corona art activity
Angela Lee, Gulfport, Mississippi

Making pinhole projectors
Kelly Kurtz, Montgomery, Pennsylvania



Installing student-produced signage about the eclipse
Carrie Murray, Liberty Township, Ohio

Carrie Murray, Liberty Township, Ohio

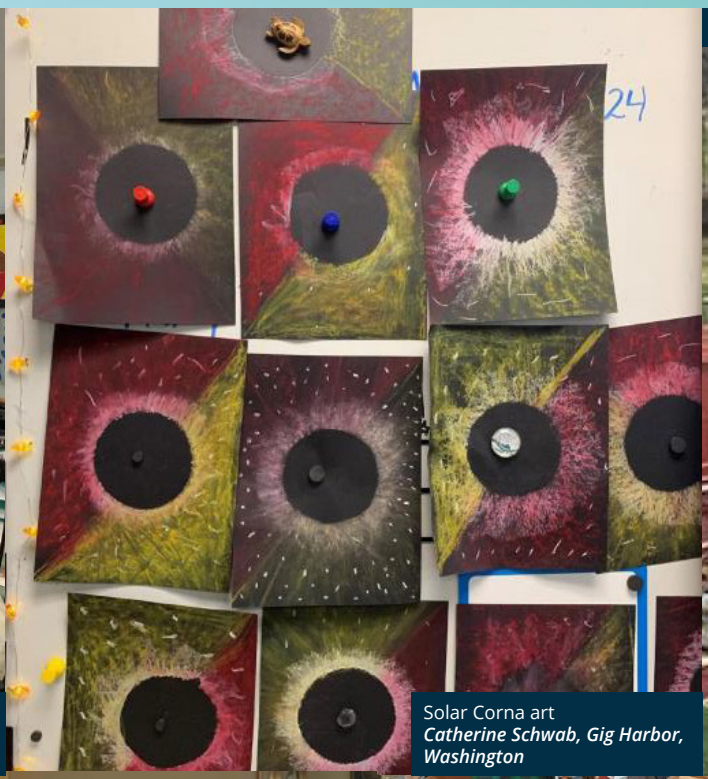
Carrie Murray, Liberty Township, Ohio

Building eclipse sliders and glass cases
Carrie Murray, Liberty Township, Ohio

Making holders for solar viewing glasses
Conover White, Long Branch, New Jersey

Demonstrating safe viewing using a colander
Conover White, Long Branch, New Jersey

Livestreaming the eclipse
Catherine Schwab, Gig Harbor, Washington



Solar Corna art
Catherine Schwab, Gig Harbor, Washington

Patricia Black Clay, Columbus, Ohio

Working with seniors
Vicki Bryan, Louisville, Kentucky

Observing the main event
Heather Marley Caldwell, Ringwood, New Jersey

Patricia Black Clay, Columbus, Ohio

Patricia Black Clay, Columbus, Ohio

Observing the big event
Patricia Black Clay, Columbus, Ohio

HIGHLIGHTS OF ACTIVITIES AND LESSONS LEARNED FROM NSTA SOLAR ECLIPSE PARTNERS

As part of our survey of NSTA Solar Eclipse Partners, we asked them to share two to three highlights of their experiences working with school and community members to get them ready for the eclipses.

We also asked for two or three lessons learned that can be shared with people planning similar kinds of events. One teacher succinctly summed up some of the top recommendations for future events:

Plan early, ask others to help, have fun!

Hopefully, educators 20 years from now will have access to this report, and it will give them a "step up" with their planning for the next total solar eclipses in the United States (August 23, 2044, and August 12, 2045).

The next pages give a summary of the most common highlights and key lessons learned.

PROGRAM HIGHLIGHTS

Sharing with Others

- My class and I were featured on the local news explaining the science of the eclipse, where to see it and how to view safely!
- The many groups I visited from kindergarten through senior citizens and their excitement for the eclipse!
- Being encouraged to reach out to the local library and present to the public. That was awesome.
- Watching & interacting with people who I hadn't taught in my classroom who didn't know much about the science behind what happens during an eclipse.
- Held event to connect with and build relationships with families by having science nights and eclipse viewing events.
- Having our Community Outreach Program televised. Having our Community Outreach Program on the Radio. Having other organizations reach out and request a Community Outreach Presentation
- Hearing my friends and family oooooo and awwww
- Presenting an interactive program for a local senior adult group

Generating Excitement

- Excitement in the large crowd we had - the engagement of all ages - science enjoyed by all!
- Building sense of excitement in our students about this natural phenomena as the day of the eclipse got closer.
- The feedback! Parents were telling us how excited their kids were and how they talked about everything they learned at our Eclipse Fair. Coworkers shared how they initially were indifferent and wondering what the big deal was about the eclipse, but paid attention and planned to watch it after hearing from me and my students.
- Listening to the student conversations after the eclipse. The excitement about the Sun, Moon, Earth interactions from the kids and parents.
- This event really united across schools, with all grade levels participating, and there were also community events at the same time.
- Watching people I never would have guessed be excited about science really get into seeing and understanding the eclipse.

Having Students Become Experts

- Getting the students to embrace the phenomenon and becoming subject matter experts.
- Seeing our high school students embrace teaching the younger students about the eclipse.
- Having high school students work with younger students to teach them about the eclipse Another highlight was attending the webinars and networking with other teachers and experts.
- My students teaching teachers from other schools how to teach their classes about the eclipse. My students meeting with nursing home residents about eclipse viewing safety. My students teaching elementary classes from our school about the eclipse.

Students/Community Members Engaging and Discussing Phenomena

- Amazing discussions students had about what they thought would happen during and after the Solar eclipse and why.
- Having some kids come up to model the positions of the sun, —flashlight— moon, and earth to visualize the eclipse and shadow. Getting great feedback and interesting questions- isn't that what science is all about? Asking questions!!
- Doing hands on activities with adults and making a difference, getting them excited.
- Using the solar eclipse events as an opportunity to educate teachers about the Sun-Moon- Earth system as it related to their standards —both NGSS and ELA—. This real-time, real-life phenomena motivated many elementary school teachers to incorporate science into their day.

Other Highlights

- Connecting with other educators to hear about their ideas and learn from them.
- Having a Wealth of Materials and Activities made available to us to explain eclipses.
- This was a lot of work, but it was so worth it and something I will never forget for the rest of my life. My students who worked with me said the same thing!

LESSONS LEARNED

Plan Early

- Start early! I got grants in the fall and bought eclipse glasses and teaching materials in January and still there was a lot of last-minute organizing and teachers wanting more supplies, books etc. Buy more glasses than you think you need. I bought enough for all teachers and students and then admin kept adding to my numbers —custodians, food service and other staff, preschoolers, school committee etc. who were not in my original plan or grants—.
- Use a spreadsheet to organize everything, dates, contacts, event locations etc.
- Order eclipse glasses well in advance, 6 months or more to ensure you have them for the eclipse.
- We absolutely need to impress early on the importance of proper viewing, but within the context that the sun is no different than any other day. There seems to be a misconception that it's more dangerous... it's not.

Ask For Help

- Coordinating activities for my entire school district was a HUGE LOGISTICAL CHALLENGE. I have never talked to so many administrators so many times in my teaching career. This project had so many moving parts and so many people involved to make it happen. If you do a district wide event, be sure to have people who can help you.
- Partner with local astronomy clubs or societies to offer public viewing events or talks.
- Recruit some other teachers to work with you on whatever your event is so you don't end up doing it all yourself.
- Don't be afraid to step out of your comfort zone and explore working with groups of people that you don't normally work with.

Get Your Students Involved

- Get your students involved! Their enthusiasm is contagious and will be much more powerful than you yelling from your soapbox about how special this is!
- Have teams of students to present assemblies at the elementary schools. My high school-aged students gained so many valuable lessons in leadership, working as a team, presentational skills, and learning to go with the flow. Our youngest students who participated in the assemblies loved the older role models coming to visit them!

Communicate with Administrators Early and Often

- Communicate with Library and School Administrators Early and Often. Stress that you are there to help.
- Do not assume all educators/adults know about eclipses. Administrators can be misled by incorrect information.
- Make sure to contact central administration prior to eclipse day. We thought we had the go ahead, but had to switch things up at the last minute.

Engage Everyone Regarding the Science of Eclipses

- Remember that not everyone knows and understands why an eclipse happens and what is going on during an eclipse.
- Engage students with activities like pinhole cameras, eclipse path mapping, or comparing temperatures during different eclipse phases
- Use models and hands-on as much as possible besides just coneying information.

Other Key Suggestions

- Do professional development early and often for teachers.
- Always have a Plan B if the weather does not cooperate!
- Use social media platforms to generate excitement and share educational content about the eclipse.
- Work with local media to promote the event within the community.
- Don't get discouraged when plans need to be changed, don't work out, or others are not initially interested. You will find someone and/or some place that will be willing to work with you.
- For the big day, make sure you don't spend all your time taking measurements and data. Take time to experience the moment.
- Make time in your observations to just look around during totality and recognize the beauty of what is happening.
- Don't try to do too much. Prepare others & yourself, but enjoy the eclipse and don't stress about getting photos or data during totality.

We appreciate the dedicated work done by the NSTA/SSI Solar Eclipse Partners and the support from the Moore Foundation for this effort.

We hope there are other science-based phenomena that can be used to engage students in the same way, especially to offer them opportunities to work with community partners as science outreach experts.

APPENDIX G: FULL LIST OF PRESENTATIONS, EVENTS AND ACTIVITIES

TIMELINE OF SEAL PRESENTATIONS AND MEDIA

2022

- ***June 23-28:*** ALA Booth and Presentation
- ***July 21, 2022:*** Workshop and presentation NSTA summer conference in Chicago, IL.
- ***July 26:*** Solar Eclipse Activities for Libraries FAQ Webinar
- ***Aug. 22, 2022:*** Book Beat presentation for NSTA (virtual presentation)
- ***Sept. 8-10:*** CALCON Booth and Presentation
- ***Sept. 12:*** Solar Eclipse Activities for Libraries Invites you to Register for Eclipse Glasses! STAR Net Blog
- ***Oct.15, 2022:*** Workshop at the WSTA annual conference in Wenatchee. WA.
- ***Oct. 20:*** National Webinar for NSTA (National Science Teaching Association): "Science Update: Getting Ready for Two Spectacular Solar Eclipses in North America," recorded at: https://zoom.us/rec/play/HAYRV-uYBvbEYhmwSqTA-u1m-9SyLHE7l4lD85I268wCVn7Pt-Jp1DNx4eMA80KDxCktvK2PRWii8pM.-espZ3JnB_YbUVmc
- ***Oct. 22, 2022:*** Workshop to preservice teachers at Western Washington University in Bellingham, WA
- ***Oct. 25, 2022:*** Online Workshop for NISE Net: Kick-Start Your Planning for 2023 and 2024 Solar Eclipse Events
- ***Oct. 26:*** Prescott, AZ Library Workshop
- ***Oct. 28, 2022:*** Workshop at West Virginia Science Teachers Association in Charleston, WV.
- ***Nov. 30:*** Grand Junction, CO Library Workshop
- ***Nov. 30:*** Kuam News Interview https://youtu.be/TMARSBcjd9o?si=77dPFyl3zht9X3oZ
- ***Dec. 1:*** Hagatna, GU Library Workshop
- ***Dec. 8:*** Saipan, MP Library Workshop

2023

- ***Jan. 10:*** SEAL Virtual Training: Getting Started with SEAL
- ***Jan. 18:*** SEAL Virtual Training: Getting Started with SEAL
- ***Jan. 25:*** Graphics, Flyers, and Illustrations for the SEAL Project STAR Net Blog
- ***Jan. 26:*** SEAL Virtual Training: Getting Started with SEAL
- ***Jan. 29:*** Presentation at AAS Annual Conference in Seattle, WA.
- ***Jan. 31:*** Talk to the San Francisco Rotary Club
- ***Feb 7:*** SEAL Virtual Training: Getting Started with SEAL
- ***Feb. 8:*** SEAL Virtual Training: Sunspotter Telescope
- ***Feb. 13:*** Midland, TX Library Workshop
- ***Feb. 15:*** Leakey, TX Library Workshop
- ***Feb. 17:*** Corpus Christi, TX Library Workshop
- ***Feb. 22:*** SEAL Virtual Training: Getting Started with SEAL
- ***Feb. 23:*** Presentation and discussion with JPL Education group, Pasadena, CA.
- ***March 7:*** Van Buren, AR Library Workshop
- ***March 7:*** Presentation to BSCS board of directors, Colorado Springs, CO.
- ***March 8:*** Hot Springs, AR Library Workshop
- ***March 9:*** Jonesboro, AR Library Workshop
- ***March 14:*** Columbus, OH Library Workshop
- ***March 16:*** Cape Girardeau, MO Library Workshop
- ***March 18:*** Kennewick, WA Library Workshop
- ***March 20:*** Puyallup, WA Library Workshop
- ***March 22:*** Presentation at NSELA annual Summit, Atlanta, GA.
- ***March 23:*** Workshop at NSTA annual conference, Atlanta, GA.

- ***March 23:*** Fairbanks, AK Library Workshop
- ***March 28:*** Guam Elementary Students: Solar Eclipse Presentation
- ***April 4:*** Santa Fe, NM Library Workshop
- ***April 4:*** Orlando, FL Library Workshop
- ***April 6:*** Anythink Public Library Outreach Event
- ***April 10:*** Gilcrest Elementary Outreach Event
- ***April 11:*** Guam Elementary Students: Solar Eclipse Presentation
- ***April 11:*** Lafayette, CO Library Workshop
- ***April 12:*** SEAL Virtual Training: Introduction to Citizen Science and Eclipse Programming for Libraries
- ***April 13:*** Framingham, MA Library Workshop
- ***April 19:*** Texas Library Association Conference and Workshop
- ***April 19:*** Lansing, MI Library Workshop
- ***April 20:*** Charlevoix, MI Library Workshop
- ***April 24:*** Painted Post, NY Library Workshop
- ***April 25:*** Warwick, RI Library Workshop
- ***April 25:*** SEAL Virtual Training: Programming with Citizen Science for the Eclipse
- ***April 26:*** Utica, NY Library Workshop
- ***April 27:*** Lake George, NY Library Workshop
- ***April 27:*** National webinar for NSTA/ASTE on engaging with the eclipses and observing them safely recorded at: https://my.nsta.org/resource/127550/archive-nsta-aste-a-solar-eclipse-double-header-the-perfect-way-to-engage-yo
- ***May 2:*** Moorhead, MN Library Workshop
- ***May 2:*** Salt Lake City, UT Library Workshop
- ***May 4:*** Duluth, MN Library Workshop
- ***May 4:*** National webinar for NSTA Eclipse Partners introducing the eclipses and the program.
- ***May 4:*** SEAL Virtual Training: GLOBE Observer Eclipse
- ***May 8:*** Harrisburg, PA Library Workshop
- ***May 10:*** Cambridge, MD Library Workshop
- ***May 10:*** Talk for the Silicon Valley Astronomy Lectures on the "Eclipse Double-Header" at Foothill College, recorded on YouTube: https://www.youtube.com/watch?v=AL0OQ9gJHT4
- ***May 11:*** Jackson, MS Library Workshop
- ***May 16:*** Helena, MT Library Workshop
- ***May 16:*** SEAL Virtual Training: Citizen Science with Eclipse Soundscapes
- ***May 18:*** Glendive, MT Library Workshop
- ***May 18:*** Bangor, ME Library Workshop
- ***May 19:*** Wells, ME Library Workshop
- ***May 23:*** Barre, VT Library Workshop
- ***May 25:*** Hooksett, NH Library Workshop
- ***June 2:*** Sacramento, CA Library Workshop
- ***June 6:*** Middletown, CT Library Workshop
- ***June 8:*** Mullica Halls, NJ Library Workshop
- ***June 9:*** Parsippany, NJ Library Workshop
- ***June 10:*** Talk on partnerships for eclipse outreach to the American Astronomical Society Eclipse Workshop in Albuquerque, NM: https://www.youtube.com/watch?v=XvRoRimUwlY
- ***June 13:*** SEAL Virtual Training: Getting Started with SEAL
- ***June 22:*** Led national webinar from NSTA Eclipse Partners on whom to help and whom to ask for help in eclipse outreach. Recorded at: https://zoom.us/rec/play/V0-1s996CHakJS-8N_2xokL65HcWLNOUfigGlZk0DW1e3NRzJp2pOp99-LtGS5gh1Lg_SYpxQVyL1rw9.YThTKk1wUJbUuUrc
- ***June 23:*** Introductory talk on the eclipses for Doc Waller's Earth & Space Report on YouTube and Cape Ann Community Access TV: https://www.youtube.com/watch?v=Et07gs6N0f0
- ***June 24-27:*** American Library Association Conference Booth and Workshop
- ***July 3:*** Introductory talk on the eclipses for BayCon2023, the Bay Area Science Fiction convention, in Santa Clara, CA.
- ***July 13:*** Training webinar for "eclipse experts" to help libraries in the SEAL project. Recorded and available at https://www.youtube.com/watch?v=O09Vjwio2EU

- ***July 19:*** Recorded a Zoom video for all the San Francisco public library staff about the upcoming eclipses, how to answer public questions, and how to help patrons observe them safely.
- ***July 19:*** SEAL Virtual Training: Getting Started with SEAL
- ***July 23:*** Presentation to the NSTA board and council members via Zoom.
- ***July 25:*** SEAL Virtual Training: Coronado Solar Telescope
- ***July 25:*** The Bridge Assisted Living Home Outreach Event
- ***July 27:*** Training webinar for the NSTA eclipse partners (science teachers) on activities to do with libraries and community groups and talking with school administrators about eclipses. Recorded at: https://zoom.us/rec/play/-TzNv1PlaRBdLwLal-gKjktt9mVxapD3WNmavXuMikBAQr-TMGsLkZhTJnYd11T63qg2wD8JGcvyQ9tY.nnwhfQ2mYMdTTvWj
- ***Aug 7:*** Bismark, ND Library Half-day Workshop 1
- ***Aug 7:*** Bismark, ND Library Half-day Workshop 2
- ***Aug. 10:*** SEAL Virtual Training: Getting Started with SEAL
- ***Aug. 15:*** Indianapolis, IN Library Workshop
- ***Aug. 16:*** Portal to the Past: Make Your Own Eclipse History Exhibit STAR Net Blog
- ***Aug. 17:*** Training webinar for the NSTA eclipse partners (science teachers) on eclipse science, space weather and eclipse history. Recorded at: https://zoom.us/rec/play/_kEb-A3Giw6vbpqkF1kos_Qzo36ONV2LTE11Lu274Idpzj_OK7MpVU_WtIezEYuVrjaZbIvj9yWjG0Ao.BhhaAFzCbaTPGFxI
- ***Aug. 22:*** Jackson, TN Library Workshop
- ***Aug. 22:*** SEAL Virtual Training: SEAL STEM Activity Clearinghouse Unboxing Webinar
- ***Aug. 23:*** Hillsboro, TX Library Workshop
- ***Aug. 23:*** Brentwood, TN Library Workshop
- ***Aug. 25:*** Jefferson City, TN Library Workshop
- ***Aug. 26:*** Explaining Eclipses for Little Kids STAR Net Blog
- ***Aug. 28:*** Talk to the Commonwealth Club of California on the two eclipses coming up. Available on YouTube at: https://www.youtube.com/watch?v=1xqDcgkmbPE
- ***Aug. 29:*** Mesa, AZ Library Workshop
- ***Aug. 30:*** Activity station at Northgate Public Library, Seattle, WA.
- ***Aug. 30:*** Get Ready for the 2023-24 Solar Eclipse "Double-Header" - https://www.nsta.org/blog/get-ready-2023-24-solar-eclipse-double-header
- ***Aug. 31:*** Talk to the National Science Teaching Association: "Science Update: An Eclipse 'Double Header' is Coming This School Year!"
- ***Sept. 7:*** Zoom talk on understanding and viewing the eclipses to staff at the many branches of the Smithsonian Institution, through the Smithsonian Science Education Center; recorded for both staff and Smithsonian patrons to watch.
- ***Sept. 11:*** Manhattan, KS Library Workshop
- ***Sept. 11:*** Presentation to State Science Supervisors via Zoom
- ***Sept. 12:*** Activity station at South Park Public Library, Seattle, WA.
- ***Sept. 12:*** Online Workshop for NISE Net: Kick-Start Your Planning for 2023 and 2024 Solar Eclipse Events
- ***Sept. 12:*** Zoom "Eclipse Experts" Webinar: How Can We Support Libraries Most Effectively During the Upcoming Eclipses?" for Space Science Inst. Available at: https://www.youtube.com/watch?v=Df-VIk6nubE
- ***Sept. 12:*** SEAL Virtual Training: Eclipse Programming Share-a-thon
- ***Sept. 13:*** Zoom talk to the National Science Education Leadership Association on the eclipses and how to view and explain them (200 leaders registered). Recording is here (nonmembers must pay to watch): https://nsela.org/Sys/Store/Products/344349
- ***Sept. 14:*** NSTA webinar Solar Eclipse Partners - Safe Solar Viewing Techniques and Working with School or District Administrators
- ***Sep.14:*** Virtual presentation for the STEM Learning Ecosystems national network

- ***Sept. 16:*** Presentation and solar viewing at Pacific Science Center.
- ***Sept. 19:*** Zoom program for librarians across the country on books to read to prepare for the eclipses (with several other authors); recorded and online through Space Science Institute.
- ***Sept. 19:*** SEAL Virtual Training: Eclipse Books and Authors
- ***Sept. 19:*** Eau Claire, WI Library Workshop
- ***Sept. 20:*** Activity station at Douglas Truth Public Library, Seattle, WA.
- ***Sept. 20:*** Fon du Lac, WI Library Workshop
- ***Sept. 21:*** San Juan, PR Library Workshop
- ***Sep. 21:*** Public talk on the upcoming eclipses for the Menlo Park, CA Public Library
- ***Sept. 22:*** Jane Stern Dorado Community Library Outreach Event
- ***Sept. 22:*** Activity station at Broadview Public Library, Seattle, WA.
- ***Sept. 23:*** Activity station at Northeast Public Library, Seattle, WA.
- ***Sept. 25:*** Sioux Falls, SD Library Workshop
- ***Sept. 25:*** Puerto Rico STEM Academy Outreach Event
- ***Sept. 26:*** Montgomery, AL Library Workshop
- ***Sep. 26, 2023:*** Talk on the upcoming eclipses and report on the Solar Eclipse Activities for Libraries Project, to the staff of the Gordon and Betty Moore Foundation
- ***Sept. 27:*** Rapid City, SD Library Workshop
- ***Sept. 27:*** Activity station at Ballard Public Library, Seattle, WA.
- ***Sept. 27:*** SEAL Virtual Training: Preparing for Eclipse Day
- ***Sept. 30:*** Talk on education and outreach projects for the upcoming eclipses to a plenary session of the American Astronomical Society Solar Eclipse Task Force workshop in San Antonio, Texas
- ***Oct. 3:*** Activity station at High Point Public Library, Seattle, WA.
- ***Oct. 7-10:*** ASTC Conference Booth
- ***Oct. 7:*** Two sessions at the ASTC annual conference, Charlotte, NC.
- ***Oct. 10:*** Zoom talk (1 hr) for the Oakland Public Library system on the eclipses, recorded and available free at: https://www.youtube.com/watch?v=djUpzy6eutU
- ***Oct. 12:*** recorded (1/2 hour) segment of the Mark Thompson interview show on line about safe viewing of the eclipses: https://www.youtube.com/watch?v=J0xLhPf-1GE
- ***Oct. 12:*** International District Library: Solar Crafts Outreach Event
- ***Oct. 12:*** STEAM Night at the Balloon Museum Outreach Event
- ***Oct. 12:*** Interview with the San Francisco Chronicle: https://www.sfchronicle.com/bayarea/article/solar-eclipse-watch-california-18409448.php
- ***Oct. 13:*** Los Griegos Library: Solar Viewing Outreach Event
- ***Oct. 13:*** International District Library: Pinhole Projectors Outreach Event
- ***Oct. 13:*** Lomas Tramway Library: Solar Viewing Outreach Event
- ***Oct. 13:*** Appearance on KQED Radio's Forum program (broadcast twice) with host Alexis Madrigal. Recording at: https://www.kqed.org/forum/2010101894728/rare-solar-eclipse-coming-to-the-bay-area
- ***Oct. 13:*** Presentation at science education conference, San Angelo, TX.
- ***Oct. 13:*** Appearance on KGO TV's Live Midday news program.
- ***Oct. 13:*** Interview with the San Jose Mercury News: https://www.mercurynews.com/2023/10/13/where-to-watch-the-partial-ring-of-fire-solar-eclipse-at-sunrise-on-saturday/
- ***Oct. 14:*** Juan Tabo Library: Annular Eclipse Booth
- ***Oct. 14:*** Main (Downtown ABQ) Library: Annular Eclipse Booth
- ***Oct. 14:*** Tony Hillerman Library: Annular Eclipse Booth
- ***Oct. 14:*** Observing session of annular eclipse in San Angelo, TX.
- ***Oct. 21:*** Workshop at the Washington Science Teachers Association in Chehalis, WA.

- ***Oct. 24:*** Oklahoma City, OK Library Workshop 1
- ***Oct. 25:*** Oklahoma City, OK Library Workshop 2
- ***Oct. 26:*** Workshop at the NSTA fall conference in Kansas City, MO.
- ***Nov. 6:*** Greenville, KY Library Workshop
- ***Nov. 8:*** Winchester, KY Library Workshop
- ***Nov. 9:*** Hagatna, GU Library Workshop
- ***Nov. 12:*** Kuam News Interview https://youtu.be/oYsQcqzPvCw?si=kiDzwzkeQEOwyfT-
- ***Nov. 14:*** PIALA Conference and Workshop
- ***Nov. 15:*** SEAL Virtual Training: Getting Started with SEAL
- ***Dec. 4-8:*** AGU Conference Booth
- ***Dec. 14:*** SEAL Virtual Training: Getting Started with SEAL

2024

- ***Jan. 11:*** Wonders of the Universe Series Talk at Fromm Institute USF.
- ***Jan. 12:*** KQED Interview https://www.kqed.org/science/1991228/where-to-see-the-2024-total-solar-eclipse-in-april
- ***Jan. 22:*** NSTA Webinar
- ***Jan. 24:*** Getting Started With SEAL Webinar
- ***Jan. 29:*** Science Education Council of Ohio (SECO) Workshop
- ***Jan. 30:*** Washington, DC Library Workshop
- ***Feb. 2:*** Eclipse Outreach Programs: Role Model Strategies for Engaging Youth in STEM Webinar
- ***Feb. 6:*** KCBS Interview
- ***Feb. 7:*** Raleigh, NC Library Workshop
- ***Feb. 8:*** NSTA Webinar https://my.nsta.org/resource/129034/archive-science-update-get-ready-for-the-april-8-total-solar-eclipse-february
- ***Feb. 9:*** Columbia, SC Library Workshop
- ***Feb. 9:*** Space Exploration Education Conference (SEEC) Panel Presentation
- ***Feb. 12:*** NSTA Webinar https://zoom.us/rec/play/2hLzA-kzcRNMvjRiSMgytmrIjwlGGxLjpqCaGXBpawEv5hyV41jM-QqKTHPFk9IbSD3rurk2uFF3VJW5.KBvInHh20vCxzNVD
- ***Feb 13:*** K12 Dive Interview https://www.k12dive.com/news/3-curricular-approaches-solar-eclipse/711416/
- ***Feb. 16:*** San Francisco State Retired Faculty Association Presentation
- ***Feb. 20:*** Hoosier Association of Science Teachers, Inc. (HASTI) Conference Workshop
- ***Feb. 21:*** Columbus, OH Library Workshop
- ***Feb. 21:*** NPR Interview
- ***Feb. 21:*** Getting Started With SEAL Webinar
- ***Feb. 26:*** The Final Push to Be Ready for the April 8 Solar Eclipse: Ways to Be a Resource to Your Community - https://www.nsta.org/blog/final-push-be-ready-april-8-solar-eclipse-ways-be-resource-your-community
- ***Feb. 27:*** Ohio Department of Education Teachers Webinar
- ***Feb. 28:*** America Changed Forever, CBS/Sirius XM Interview
- ***March 5:*** Dekalb, IL Library Workshop
- ***March 5:*** Zoom webinar for National Osher Lifelong Learning Institutes Coalition
- ***March 6:*** Springfield, IL Library Workshop
- ***March 7:*** Carbondale, IL Library Workshop
- ***March 8:*** Editorial in Education Week: https://www.edweek.org/teaching-learning/opinion-the-solar-eclipse-is-coming-how-to-make-it-a-learning-opportunity/2024/03
- ***March 11:*** Talk for Osher Lifelong Learning Institute, San Francisco State
- ***March 11:*** NSTA Webinar https://zoom.us/rec/play/uaihQXGU2QsR7Nr_peaVLKV7J1W8sLtdCYhiwa1wC0_3STniqeYes5uUbMc4-4m1Iih9KEFlYjoHVib3.ZepJ_N4ivDqi9I-9
- ***March 12:*** Viewing Eclipses through Cultural Lenses with Dr. Isabel Hawkins Webinar
- ***March 12:*** NASA Community College Network Webinar https://www.dropbox.com/scl/fi/24pbcc9971nv7djloqf7m/Eclipse-Panel-March2024.mp4?rlkey=bsthebibvtilaq08eefnks01x&dl=0

- ***March 14:*** Southern Regional Education Board (SREB) Teachers Webinar
- ***March 15:*** Grey Matters Podcast Interview https://www.greymatter.show/episodes/s1e75-andrew-fraknoi-science-a-total-view-of-the-total-eclipse
- ***March 17:*** San Francisco Public Library Zoom Webinar https://sfpl-org.zoom.us/rec/share/MOFlp_b8V0YITY-2WV22EKOXyM_MWX4BjE1GLdMjxO6r-PLfK4Wyoh79K2UNjnPNcV.7P9OHj1z-VgnSRsXg (Passcode = 8Fhu7$DT)
- ***March 22:*** NSTA Conference Session
- ***March 25:*** How Schools Can Turn the Solar Eclipse Into an Unforgettable Science Lesson –Education Week Interview https://www.edweek.org/teaching-learning/how-schools-can-turn-the-solar-eclipse-into-an-unforgettable-science-lesson/2024/03
- ***March 25:*** SF Chronicle Interview https://www.sfchronicle.com/weather/article/total-solar-eclipse-sun-19369969.php
- ***March 26:*** Richmond, VI Library Workshop
- ***March 26:*** Fromm Institute Talk
- ***March 27:*** Family Radio Network Interview
- ***March 27:*** San Jose Mercury News Interview https://www.mercurynews.com/2024/04/01/solar-eclipse-how-much-will-you-be-able-to-see-in-california/
- ***March 27:*** New York Post Interview https://nypost.com/2024/03/28/shopping/solar-eclipse-glasses-where-to-get-them-and-how-to-avoid-fakes/
- ***March 28:*** ABC News Interview
- ***March 30:*** KCBS Interview
- ***March 31:*** KCBS Interview
- ***April 2:*** KGO Interview
- ***April 2:*** Rainy Day Ideas for the April 8th Solar Eclipse STAR Net Blog
- ***April 3:*** Capital News Service, University of Maryland Interview
- ***April 3:*** Nightside, WBZ NewsRadio https://www.iheart.com/podcast/1002-nightside-with-dan-rea-28654279/episode/going-dark-part-1-164628069/
- ***April 4:*** Channel 2 News Interview https://www.ktvu.com/video/1436416
- ***April 4:*** When Zeus Turned Day Into Night STAR Net Blog
- ***April 6:*** Your Weekly Dose Podcast Interview
- ***April 6:*** KCBS Interview
- ***April 8:*** KQED Forum Show Appearance: https://www.kqed.org/forum/2010101905279/total-eclipse-of-the-sun-promises-to-be-solar-sensation
- ***April 8:*** Channel 2 Interview: https://www.ktvu.com/video/1438099
- ***April 11:*** What to do with extra and gently used eclipse glasses?? STAR Net Blog
- ***Aug. 1:*** Hawaii AstroDay Event
- ***Aug. 3:*** Kamuela, HI Library Workshop
- ***Aug. 4:*** Kihei, HI Library Workshop
- ***Aug. 6:*** Kilauea, HI Library Workshop
- ***Aug. 7:*** Honolulu, HI Library Workshop
- ***Aug. 12:*** Pago Pago, AS Library Workshop
- ***Aug. 13-19:*** Programs at 11 sites across American Samoa
- ***Oct. 30:*** Boulder Philharmonic Table
- ***Nov. 10:*** Boulder Philharmonic Table
- ***Dec. 9-13:*** AGU Conference Booth and 9 Workshops

SEAL MATERIAL WITHOUT SPECIFIC DATE

- SEAL Library Booklet: http://bit.ly/eclipsesforlibraries
- Eclipse Observing Guide for teachers, including handout for each eclipse to distribute to families, friends and other members of the community: http://bit.ly/eclipsesforteachers
- Eclipse Observing Guide for school administrators: http://bit.ly/eclipsesforadministrators

Getting Started With SEAL STAR Net Resources Blog

- Bilingual (English/Spanish) Solar Eclipse Resources STAR Net Blog
- How-To Video: Build Your Own Sun Clock Youtube
- How-To Video: Parker Solar Probe Papercraft Youtube
- SEAL Virtual Training: Sunspotter Telescope Youtube
- SEAL Virtual Training: Corodado Solar Telescope Youtube

Clearing House Activities:

- Big Sun, Small Moon (https://clearinghouse.starnetlibraries.org/astronomy-and-space/71-big-sun-small-moon.html)
- Eclipse Chalk Art (https://community.starnetlibraries.org/wp-content/uploads/2025/01/Eclipse-Chalk-Art.pdf)
- Guide to Building Solar Eclipse Viewers (https://clearinghouse.starnetlibraries.org/home/737-guide-to-building-solar-eclipse-viewers.html)
- Pocket Solar System (https://clearinghouse.starnetlibraries.org/home/736-pocket-solar-system.html)
- Solar Energy Quick Facilitation Guide (https://clearinghouse.starnetlibraries.org/home/734-solar-energy-quick-facilitation-guide.html)
- Make Your Own Sun Clock (https://clearinghouse.starnetlibraries.org/home/733-make-your-own-sun-clock.html)
- Make a Protective Case for Your Solar Viewing Glasses (https://clearinghouse.starnetlibraries.org/astronomy-and-space/731-make-a-protective-case-for-your-solar-viewing-glasses.html)
- Build a Sizzling Solar Oven (https://clearinghouse.starnetlibraries.org/solar-eclipse-activities-for-libraries/727-build-a-sizzling-solar-oven.html)
- Shadow Tracing (https://clearinghouse.starnetlibraries.org/astronomy-and-space/149-shadow-tracing.html)
- Shadow Tracing Take & Make Kit (https://community.starnetlibraries.org/wp-content/uploads/2023/02/Shadow-tracing-take-make.pdf)

- "Get Ready for the Solar Eclipse Double Header" in Homeschooler Parent Magazine, June 2023: https://online.fliphtml5.com/iffvh/hrap/#p=20
- "Making the Most of the Upcoming Eclipse Double-Header" in Science Scope, Jul/Aug. 2023: https://www.nsta.org/science-scope/science-scope-julyaugust-2023/making-most-upcoming-solar-eclipse-double-header
- "The 2023 and 2024 Eclipse Double-Header: The Perfect Opportunity to Highlight Three-Dimensional Science Learning" in Science Scope, Jul/Aug. 2023: https://www.nsta.org/science-scope/science-scope-julyaugust-2023/2023-and-2024-solar-eclipse-double-header

- "Making the Most of the Upcoming Eclipse Double-Header in Science Teacher, Fall 2023: https://www.nsta.org/science-teacher/science-teacher-fall-2023/making-most-upcoming-solar-eclipse-double-header

- "The 2023 and 2024 Eclipse Double-Header: The Perfect Opportunity to Highlight Three-Dimensional Science Learning" in Science Teacher, Fall 2023: https://www.nsta.org/science-teacher/science-teacher-fall-2023/2023-and-2024-solar-eclipse-double-header

- Guide to Eclipses in Fiction, Films, Music, Art, and More: http://bit.ly/eclipsesand

- Annotated Guide to Free Online Classroom Activities on the Moon, the Sun, and Eclipses: http://bit.ly/teacheclipse

- Blog Post on the Eclipse at Fraknoi.com: https://www.fraknoi.com/astronomy/an-eclipse-of-the-sun-coming-to-north-america-april-8th/ was recommended in the 3-24-2024 issue of the Bay Area Science Calendar.

- Short article in The Connector a P-R Magazine: https://www.prforpeople.com/tech-science/science/rare-eclipse-sun-monday-april-8-2024

- September/October 2023 – Editorial in Connected Science Learning - https://www.nsta.org/connected-science-learning/connected-science-learning-september-october-2023/making-connections

- June 2023 – Article for the Washington Science Teachers Association Newsletter

- June 2023 – Article in NSELA (National Science Education Leadership Association) Newsletter

- Summer 2023 – Commentary for Science Scope – Hurrah for Teachable Moments - https://www.nsta.org/science-scope/science-scope-julyaugust-2023/hurrah-teachable-moments

- Fall 2023 – Article in NSTA's Science & Children – The Astronomical Event of the Decade: A Solar Eclipse Double Header in 2023 and 2024 offers the perfect experience to excite early learners (with Anna Hurst, Julia Plummer and Suzanne Gurton) -https://www.nsta.org/science-and-children/science-and-children-fall-2023/astronomical-event-decade