



underrepresented students in topology and algebra research symposium

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**Contact:** Underrepresented Students in Topology and Algebra Research Symposium  
www.ustars.org

**Email:** info@ustars.org

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## USTARS 5 Year Report

*A review of the last 5 years of the Underrepresented Students in Topology and Algebra Research Symposium.*

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### Description of USTARS.

Underrepresented Students in Topology and Algebra Research Symposium (USTARS) is an event that was created by a group of underrepresented graduate students that, at the time, were mathematics graduate students at the University of Iowa. For the past five years USTARS has met every April and created a venue where Algebra and Topology graduate students from underrepresented groups present their work and form research and social support networks with other mathematicians with related research and professional interests. The organizing committee consists of early-career mathematicians who are diverse in gender, ethnicity, background, and research focus; and thus, is well-positioned to achieve participation from a diverse group of students and scientists, including women and minorities.

Graduate students at all stages of their research careers are invited to attend USTARS. These students will discuss techniques and concepts that they are exploring as part of the process of producing their graduate theses and, in turn, will gain new insight into their research from students and professors at other institutions who may view the problem from a different perspective. This symposium also provides an invaluable opportunity for students who have not yet chosen a research topic or have switched areas of study to learn about potential research topics. We expect

the faculty who attend to provide mentorship and collaboration by helping undergraduate students and transitional graduate students find research areas and encouraging students to meet and work with people interested in their areas of research. To facilitate this, we include a networking and mentoring luncheon on Sunday afternoon. The luncheon includes a panel discussion focusing on professional development, networking, professional/personal balance, and career advancement. The panel consists of faculty, postdoctoral researchers and graduate students. We also allow for unstructured group meeting time throughout the meeting.

As reported by past participants, the broader impact of USTARS is that graduate students who attend USTARS are better equipped to seek academic positions and continue the cycle of mathematical research and collaboration. Undergraduate students invited to attend are exposed to a greater variety of current research, ideas, and results than at their home institutions, which promotes continued growth and development in mathematics. All participants network with underrepresented faculty and students who may become future collaborators, colleagues, and/or mentors.

In 2012, 29% of the mathematics doctorates were awarded to women while only 13.2% were awarded to minority students<sup>1</sup>. USTARS is working to promote diversity in the mathematical sciences by encouraging women and minorities to attend and present their research. Indeed in its first five meetings, roughly 70% of the participants have come from underrepresented groups, and the mathematicians who are participants of USTARS continue to influence the next generation of students in positive ways by serving as much needed mentors and encouraging students in the mathematical sciences to advance themselves and participate in research and conference events. A 2013 USTARS participant reported that “I was inspired by your (USTARS organizing) team. I made my own team here at San Francisco State University, and last summer we initiated a first-ever three-day summer math camp for low-income students in the Bay Area.”

The primary mission of the Underrepresented Students in Topology and Algebra Research Symposium (USTARS) is to showcase the excellent research conducted by underrepresented<sup>2</sup> students studying topology and algebra. Dedicated to furthering the success of underrepresented students, USTARS seeks to broaden the participation in the mathematical sciences by cultivating research

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<sup>1</sup>Doctorate Recipients from U.S. Universities: 2012, Arlington, VA (NSF 14-305), December 2013

<sup>2</sup>Our definition of underrepresented includes the definition provided the National Science Foundation: minorities (African American, Hispanic, and Native American), women, and individuals with physical disabilities.

and mentoring networks. USTARS is open to all people interested in the topological and algebraic fields.

Although USTARS is designed to bring together underrepresented student researchers in Algebra and Topology, the goal is to focus on and showcase the research produced by underrepresented students and provide mentorship for these researchers. USTARS exposes all participants to the research and activities of underrepresented mathematicians, encouraging a more collaborative mathematics community.

The USTARS Organizing Committee consists of early career mathematicians who share a commitment to mentoring and professional advancement of underrepresented students in mathematics. The organizing committee is not only committed to diversity, it *is* diverse. Each member brings not only their own experiences but also the experiences of their mentors and advisors to address the issues that underrepresented students encounter during critical transitions in their career.

Dr. Jeannine Abiva, a female of Filipino descent, is a received her PhD from the University of Iowa and is currently a research scientist for the United States Navy. Dr. Syvillia Averett is an African-American female assistant professor at Central State University, a historical black university. Dr. Erik Insko, a Caucasian male, was a first generation college graduate and is currently an assistant professor at Florida Gulf Coast University. Dr Garrett Jones, an African American male, is a visiting assistant professor at University of Wisconsin, Stevens Point. Dr. Candice Price, an African-American female, is an assistant professor at Sam Houston State University, in Huntsville, Texas; and, Dr. Shannon Talbott, a female of Native American descent, is an assistant professor at Moravian College in Bethlehem, Pennsylvania.

The USTARS Advisory Board is comprised of senior mathematicians who have demonstrated impacts in addressing issues of underrepresentation in mathematics. The job of this board will be to assess and provide feedback on the organization, structure, and success of the events comprising USTARS. In addition, USTARS advisors help guide the organizing committee in finding further options for funding for the symposium and help disseminate research opportunities for participants. Through their mentorship, USTARS will develop further reaching programs to help equip underrepresented students with the needed skills to find academic positions and continue the cycle of research and collaboration, therefore reaching new stages in their professional career. The advisory

board includes Dr. Erika Camacho, an Associate Professor at Arizona State University (ASU) and a recent Martin Luther King Professor at Massachusetts Institute of Technology (MIT). Also included on the board is Dr. Edray Goins, an Associate Professor at Purdue University and the director of ADVANCE Purdue Research in Mathematics Experience (PRiME). Prof. Phillip Kutzko, a professor at the University of Iowa and recipient of the American Mathematical Society Distinguished Service Award; LTC (retired) Donald Outing, an Academy Professor and Chief Diversity Officer at the United States Military Academy and founder of the Center for Leadership and Diversity in STEM; and Dr. Cindy Wyels, an Associate Professor at the California State University and an advocate of undergraduate research and believes it is particularly meaningful for students from non-traditional backgrounds are also members of the advisory board.

New additions to the USTARS Advisory Board include Dr. Dagan Karp, an Associate Professor at Harvey Mudd College in Claremont, CA and active supporter of programs for underrepresented students including SACNAS and Math Alliance; Dr. Federico Ardila, an Associate Professor at San Francisco State University and a co-Director of the Math Science Research Institute Undergraduate Program; and, Dr. Rebecca Garcia, an Associate Professor at Sam Houston State University and a co-Director of the Pacific Undergraduate Research Experience in Mathematics.

## **Demographics and Impact**

Each year the USTARS applicants represent on average 37 distinct institutions. Tables 1-5 and Figure 1 depict participant demographic data for each of the past symposiums.

This level of support provided to USTARS has a large impact on the mathematical community as it provides a valuable experience to the participants which, in turn, positively addresses the objectives of broadening participation in STEM and diversifying the STEM workforce. The size of the event provides an open and supportive environment where participants feel comfortable asking questions and seeking mentorship. The focus on underrepresented graduate students provides much needed mentorship, professional development, and networking opportunities for this population. Changing the venue each year allows for USTARS to impact several local environments and maximize the number of potential colleagues and mentors that the participants are exposed to. This makes USTARS a unique event that is perfectly equipped to create multiple and far reaching mentoring networks each year. In total, USTARS has directly influenced at least 188 people from 83 distinct

university in 4 different communities.

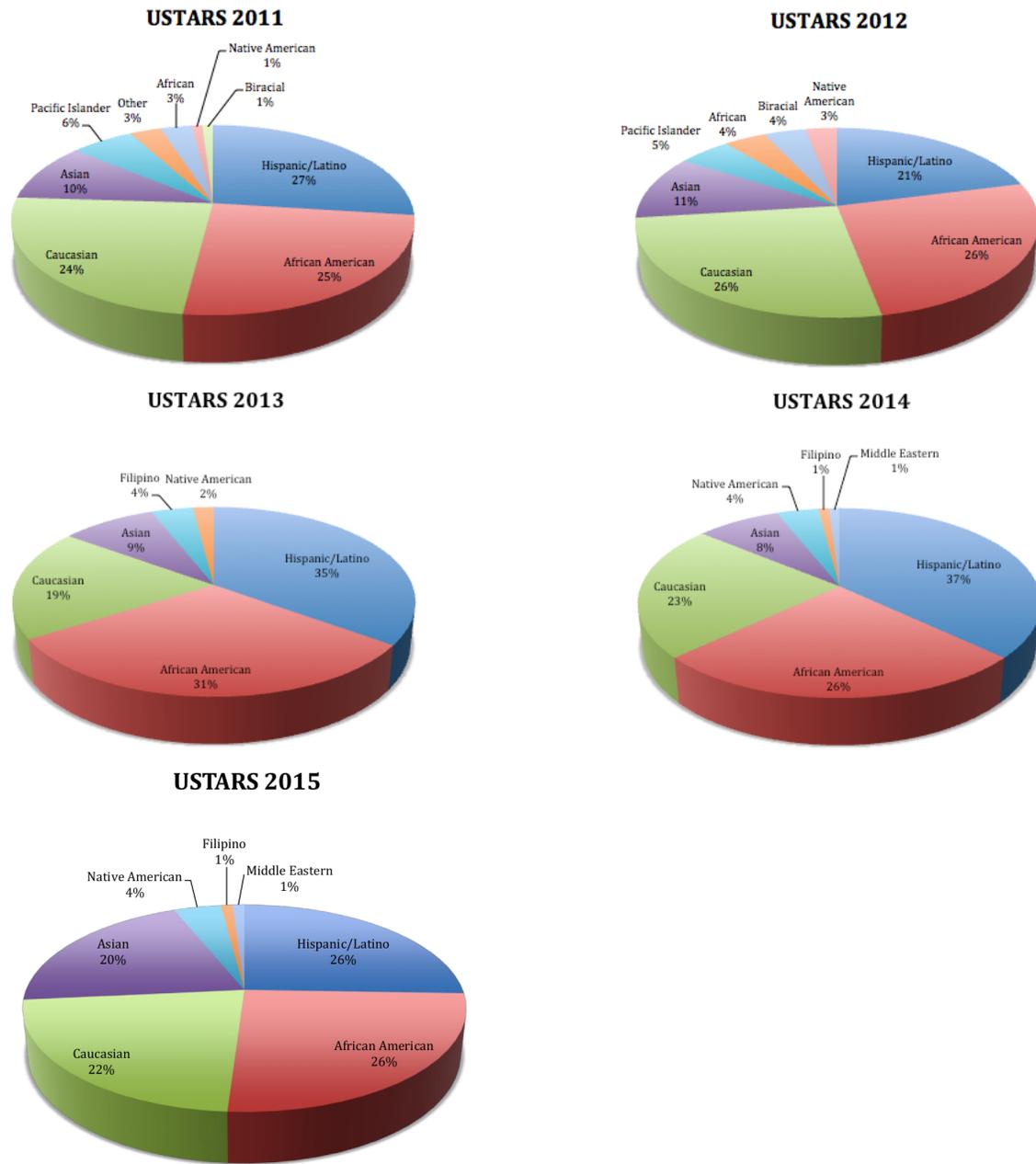


Figure 1: Demographic data of USTARS applicants

### Summary of 5 Year Survey Data.

The goal of USTARS is to supply its participants with an environment that creates a mentoring network as well as a research network in the pure mathematical fields. We feel that by doing so, we can create positive changes in mathematical communities around the country. To assess USTARS effectiveness at achieving these outcomes each year we ask participants to fill out post-

Table 1: 2011

Undergraduate	3
Graduate	49
Postdocs	6
Faculty	10
Community member	0
Total	68

Table 2: 2012

Undergraduate	6
Graduate	51
Postdocs	5
Faculty	8
Community member	3
Total	73

Table 3: 2013

Undergraduate	3
Graduate	46
Postdocs	7
Faculty	10
Community member	1
Total	67

Table 4: 2014

Undergraduate	20
Graduate	42
Postdocs	5
Faculty	18
Community member	2
Total	87

Table 5: 2015

Undergraduate	8
Graduate	38
Postdocs	4
Faculty	13
Community member	2
Total	65

Table 6: Gender Demographics

Year	Female	Male
2011	50%	50%
2012	54%	46%
2013	46%	54%
2014	53%	47%
2015	52%	48%

conference surveys and share stories of how USTARS has changed their mathematical community. To gain a better understanding of the effectiveness of the Underrepresented Students in Topology and Algebra Symposium overall, the organizers sent out a survey based on consultation from an external evaluator to the participants of USTARS 2011-2015. As a result, we received responses from 37% of the participants, whose careers ranged from undergraduate students to professor. The following is a summary of the results of that survey.

Of those who responded, outside of USTARS, 43% attended 1-2 conferences per year and 38% attended 3-5 conferences per year. Further, 22% mentioned that USTARS was their first conference, indicating that most of our participants were actively attending conferences outside of USTARS (Fig.2). In addition, over 40% of those who responded have attended USTARS multiple times, with a few participants having attended all 5 years.

While not every participant presented their work at USTARS, 72% of our attendees have presented either a poster or oral presentation. Of that 72%, 15% presented a poster, 52% gave an oral presentation, and the remaining 5% presented both an oral and poster presentation (Fig.3). Following

### Conferences Attended Annually

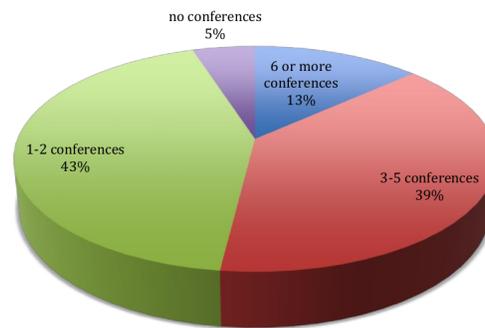


Figure 2:

their experience in delivering a presentation at USTARS, several participants not only mentioned that they had been invited to give other talks but as one participant said, “USTARS 2011-2015 ha[s] greatly increased my mathematical network. I met three of my current collaborators at USTARS meetings. USTARS has also benefited my research students, as several of them have attended to present their research and build their networks.” Therefore, USTARS can be seen to influence the professional career of some of its participants by helping them to identify other opportunities, to feel more comfortable presenting, as well as even inspiring them to work harder and present their research. As one graduate student put it, “As an African American PhD student in mathematics, USTARS made me believe in myself to go and finish my PhD.”

### Presenting at USTARS

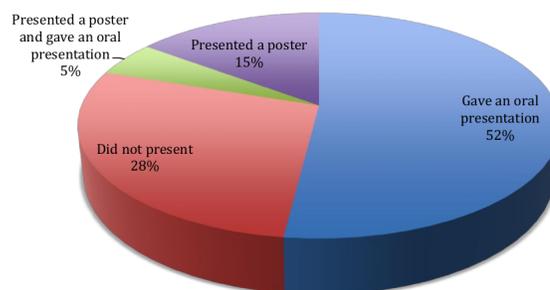


Figure 3:

One of the goals of USTARS is to create a venue where Algebra and Topology graduate students from underrepresented groups present their work and form research and social support networks.

When asked the reason for attending USTARS, 71% said they attended to present their research, 59% for research networking opportunities, 57% for mentoring networking opportunities, and 29% to gain new insight into their current research. Further, 88% of the survey participants indicated that USTARS absolutely fulfilled their reason for attending, indicating that USTARS continues to meet its goal of providing a worthwhile conference for its participants. One participant related their experience by saying that, “USTARS brings together a diverse group of mathematicians in a supportive and intellectually stimulating environment. We need this in our world. It provides inspiration, support, networking, and mathematical training.” Another graduate student says that, “In my personal experience, it is one of the few conferences in which I have been able to establish meaningful, important connections with other graduate students.” Further, another graduate student stressed how USTARS was the “biggest asset for overcoming barriers to success for minority mathematicians: supportive community, networking, access to resources. USTARS provides all of these.”

The setup of USTARS consists of concurrent research presentation sessions, a networking lunch panel, an invited faculty speaker session, and a poster session, all of which were rated as above 4.25 out of 5 in their importance to the USTARS conference. In addition, the distinguished graduate student award, which allows a graduate student to provide an hour long talk regarding their research. This was rated at 3.94 out of 5 for importance to the USTARS event. This further suggests the satisfaction of USTARS amongst its participants.

### **USTARS Annual Budget.**

USTARS has traditionally been funded by the hosting institution and grants from two government agencies: the NSF and NSA.

- In 2011, Syvillia Averett, Carlos De la Mora, Erik Insko, Julianna Tymoczko and Candice Price (PI) are Co-PIs for the NSF grant DMS-1053428 in the amount of \$24,960.
- In 2012: Syvillia Averett, Erik Insko (PI), Garrett Jones, Maggy Tomova and Shannon Talbott were Co-PIs for the NSF grant DMS-1207604 in the amount of \$25,000.
- In 2013 USTARS also provided participant support via an NSF grant DMS-1317928 who's Co-PIs include Alejandra Alvarado, Edray Goins (PI), Pamela Harris, Shannon Talbott and Candice Price. The amount for this grant was \$25,000.

- In 2014, David Eisenbud received NSF grant DMS-1434323 for \$34,706. Also in 2014, Candice Price and Pamela Harris received an NSA grant in the amount of \$15,000.
- In 2015, Erik Insko (PI), Syvillia Averett, Garrett Jones, Candice Price and Shannon Talbott were Co-PIs for the NSF DMS-1458396 in the amount of \$30,000.

Appendix A contains the annual budget information for USTARS 2011-2015.

## **Future Directions and Sustainability of USTARS.**

Due to the overall satisfaction of the current events at USTARS, the organizing committee plans to sustain these portions of USTARS. Two new additions to the symposium are opening with a Faculty development workshop and a professional development session for the undergraduate and graduate participants to close USTARS, respectively. Through a series of panels and discussions, we seek to develop early career faculty into mentors. The theme for the faculty development workshop will be “Finding, Developing, and Implementing Research Opportunities.” Participants in the workshop will be provided with information and advice on how to find appropriate research opportunities for their students, develop new research programs at their institutions, and implement a good research experience for students, both undergraduate and graduate. We will invite faculty from colleges and universities across the country that have experience addressing critical transition points for underrepresented graduate students to act as mentors for these early career faculty. We will also invite officers from funding agencies to provide information on how to find and apply for funding to create and develop opportunities for underrepresented students. During the professional development session, USTARS undergraduate and graduate participants will have the opportunity to be involved a roundtable discussion with faculty mentors to discuss questions including applying for graduate schools or jobs, advice on giving great presentations and becoming active in research opportunities.

Many factors may affect the sustainability of USTARS, such as financial and political climates, organizational characteristics, and elements of evaluation and communication. The USTARS organizers utilized *The Program Sustainability Assessment Tool* created by the Washington University in St. Louis. This tool allowed the organizers to rate USTARS on the extent to which they have processes and structures in place that will increase the likelihood of sustainability. Assessment results were then used to identify next steps in building program capacity for sustainability in order to position efforts for long term success. Appendix B provides the responses provided by the organizers.

The table in Figure. 4 presents the average rating for each sustainability domain based on those responses provided.

<b>Overall Capacity for Sustainability</b>	<b>4.35</b>
Environmental Support	5.0
Funding Stability	2.2
Partnerships	5.2
Organizational Capacity	6.0
Program Evaluation	4.25
Communications	4.2
Strategic Planning	3.6

Figure 4: **Sustainability Results:** 1 = to little or no extent / 7 = to a great extent. Results based on responses to the Program Sustainability Assessment Tool v2, 2013, Washington University in St Louis.

There is no minimum rating that guarantees the sustainability of the program. However, lower ratings indicated opportunities for improvement that we may want to focus on when developing our plan for sustainability. Because our main objective is to create a sustainability plan, we saw from our evaluation of the program that we are weak in one domain: funding stability. Thus, this is the main portion of our Sustainability Plan. The objectives for this important domain are the following:

1. **Establish relationships with corporate sponsors.** In order to do this we must first identify potential sponsors with aligned interests. We plan to have this be a focus of the USTARS Advisory Board and an aspect of our relationship with BDIS. The objective is to have 5 potential sponsors identified by October 1, 2015. We are currently drafting a sponsor letter that will be sent by January 1, 2016.
2. **Formalize partnership with Building Diversity in Science (BDIS).** Partnering with BDIS will allow USTARS to utilize sponsorships and to include a small registration fee for the symposium to cover underfunded expenses. The objective is to formally establish this partnership by December 31, 2015.
3. **Diversify funding source and establish flexible, long-term financing.** By establishing items 1 and 2, USTARS is able to diversify its funding sources to include sponsorship, but it is also a goal to strengthen its current funding sources and guarantee funding support for long-term

stability. The objective is to submit a long-term grant to government funding agencies that will last 3 to 5 years. The timeline for this proposal is for it to be submitted by June 1, 2016.

## **Closing.**

USTARS participants continue to influence the next generation of students in positive ways by serving as mentors and encouraging students in the pure mathematical sciences to advance themselves well after they have attended USTARS. By exposing participants to mentoring and collaborative circles, USTARS is a catalyst for this action. By creating more mentors and collaborations for under-represented students in pure mathematics, USTARS is changing the demographics for the academic workforce and improving the quality of this career path.

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	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
<b>Travel</b>	\$ 16,900.00	\$ 10,416.09	\$ 16,069.40	\$ 15,000.00	\$ 15,436.54
<b>Lodging</b>	\$ 4,210.00	\$ 5,202.00	\$ 6,268.00	\$ 10,523.20	\$ 7,630.00
<b>Honoraria</b>	\$ 500.00	\$ 500.00	\$ 700.00	\$ 700.00	\$ 500.00
<b>Misc</b>	\$ 700.00	\$ 500.00	\$ 506.48	\$ -	\$ 164.54
<b>Food</b>	\$ 2,650.00	\$ 5,306.18	\$ 4,871.25	\$ 4,056.50	\$ 2,972.75
<b>Total</b>	\$ 24,960.00	\$ 21,924.27	\$ 28,415.13	\$ 30,279.70	\$ 26,703.83

Sustainability Survey: 1 = to little or no extent / 7 = to a great extent

<b>Environmental Support</b>	<b>Rating</b>
1. Champions exist who strongly support the program.	7.0
2. The program has strong champions with the ability to garner resources.	5.0
3. The program has leadership support from within the larger organization.	N/A
4. The program has leadership support from outside of the organization.	5.0
5. The program has strong public support.	3.0

<b>Funding Stability</b>	<b>Rating</b>
1. The program exists in a supportive state economic climate.	6.0
2. The program implements policies to help ensure sustained funding.	1.0
3. The program is funded through a variety of sources.	1.0
4. The program has a combination of stable and flexible funding.	2.0
5. The program has sustained funding.	1.0

<b>Partnerships</b>	<b>Rating</b>
1. Diverse community organizations are invested in the success of the program.	5.0
2. The program communicates with community leaders.	6.0
3. Community leaders are involved with the program.	5.0
4. Community members are passionately committed to the program.	6.0
5. The community is engaged in the development of program goals.	4.0

<b>Organizational Capacity</b>	<b>Rating</b>
1. The program is well integrated into the operations of the organization.	7.0
2. Organizational systems are in place to support the various program needs.	7.0
3. Leadership effectively articulates the vision of the program to external partners.	6.0
4. Leadership efficiently manages staff and other resources.	5.0
5. The program has adequate staff to complete the program's goals.	5.0

<b>Program Evaluation</b>	<b>Rating</b>
1. The program has the capacity for quality program evaluation.	4.0
2. The program reports short term and intermediate outcomes.	N/A
3. Evaluation results inform program planning and implementation.	6.0
4. Program evaluation results are used to demonstrate successes to funders and other key stakeholders.	6.0
5. The program provides strong evidence to the public that the program works.	1.0

<b>Communications</b>	<b>Rating</b>
1. The program has communication strategies to secure and maintain public support.	6.0
2. Program staff communicate the need for the program to the public.	3.0
3. The program is marketed in a way that generates interest.	6.0
4. Program evaluation results are used to demonstrate successes to funders and other key stakeholders.	5.0

5. The program demonstrates its value to the public.

1.0

<b>Strategic Planning</b>	<b>Rating</b>
1. The program plans for future resource needs.	6.0
2. The program has a long-term financial plan.	2.0
3. The program has a sustainability plan.	1.0
4. The program's goals are understood by all stakeholders.	4.0
5. The program clearly outlines roles and responsibilities for all stakeholders.	5.0