Idaho Space Grant Consortium Lead Institution: University of Idaho Director: Dr. Joseph D. Law Telephone Number: 208-885-7230 Consortium URL: www.idahospacegrant.org Grant Number: NNX15AI04H Lines of Business (LOBs): NASA Internships, Fellowships, and Scholarships; Stem Engagement; Institutional Engagement; Educator Professional Development

A. PROGRAM DESCRIPTION

The National Space Grant College and Fellowship Program consists of 52 state-based, universityled Space Grant Consortia in each of the 50 states plus the District of Columbia and the Commonwealth of Puerto Rico. Annually, each consortium receives funds to develop and implement student fellowships and scholarships programs; interdisciplinary space-related research infrastructure, education, and public service programs; and cooperative initiatives with industry, research laboratories, and state, local, and other governments. Space Grant operates at the intersection of NASA's interest as implemented by alignment with the Mission Directorates and the state's interests. Although it is primarily a higher education program, Space Grant programs encompass the entire length of the education pipeline, including elementary/secondary and informal education. The Idaho Space Grant Consortium is a Designated Consortium funded at a level of \$760,000 for fiscal year 2016.

B. PROGRAM GOALS

The Idaho Space Grant Consortium (ISGC) has four Strategic Goals, which align with NASA's Lines of Business. Each goal contains multi-year objectives with ISGC intends to achieve over the life of the current three-year grant. Underscoring ISGC's Strategic Goals are four crosscutting strategies, which infuse important initiatives (e.g., diversity) into all activities across all goals. Under each objective and strategy, ISGC identified annual performance indicators (APIs) to support progress toward the multi-year objectives. The following are ISGC's Strategic Goals and multi-year objectives. Section D describes ISGC's FY16 progress toward each multi-year objective and API, as of the date of submission of this report.

Goal 1: To contribute to the development and diversity of NASA's future workforce in disciplines needed to achieve NASA's strategic goals through scholarship, fellowship, and internship opportunities.

Objective 1.1: (Internships): Increase the number of ISGC students applying for and receiving NASA and STEM industry internships.

Objective 1.2: (Scholarships): Increase the percentage of ISGC scholarship recipients graduated with STEM degrees and/or retained in the STEM pipeline.

Objective 1.3: (Fellowships): Increase percentage of fellowship students obtaining NASA or STEM industry employment and/or retained in the STEM pipeline.

Goal 2: To attract, educate, and retain students and educators of diverse backgrounds in STEM disciplines through hands-on and other experiential research opportunities.

Objective 2.1: (Undergraduate research - students): Involve more students in hands-on undergraduate research at ISGC academic affiliates.

Objective 2.2: (Undergraduate research – faculty) Increase the number of researchers in Idaho conducting ISGC-funded undergraduate research.

Goal 3: To develop partnerships with NASA, other STEM-related organizations, and companies to provide opportunities for Idaho's researchers to contribute to NASA's missions through innovative research opportunities.

Objective 3.1 (Research Infrastructure- faculty): Increase the number of proposals and participating institutions applying for ISGC Research Seed Grants.

Objective 3.2: (Partnerships): Increase the number of industry research partners/collaborators on ISGC Research Seed Grants.

Objective 3.3 (Research Infrastructure- students): Increase the number of undergraduate and graduate students participating ISGC Research Seed Grants.

Goal 4: To engage K-12 students and the public in the excitement of NASA's missions to encourage the pursuit of higher education in Idaho.

Objective 4.1: (K-12 Student Engagement): Increase number of Idaho K-12 students participating in hands-on STEM activities.

Objective 4.2: (Educator Professional Development in STEM): Provide STEM educator professional development opportunities and NASA-related classroom content to more Idaho educators.

Objective 4.3: (K-12 Informal STEM engagement): Increase the number of ISGC-supported K-12 student experiences at STEM-focused museums, science centers, and other informal education providers, and STEM events.

Objective 4.4: (Public STEM engagement): Increase awareness and support of STEM activities for the public.

Crosscutting Strategy 1 (Participant Diversity): Increase participation of underrepresented groups in all ISGC activities.

Crosscutting Strategy 2 (Portfolio Diversity): Increase diversity of STEM fields and projects supported through student and research awards.

Crosscutting Strategy 3 (Evaluation and Assessment): Identify key performance metrics for all ISGC activities. Outline and implement processes to collect additional necessary data.

Crosscutting Strategy 4 (New Partnerships): Identify and pursue new partnerships that help the ISGC achieve its strategic goals.

Crosscutting Strategy 5 (Outreach): Integrate more K-12 and public outreach into all ISGC programs and projects.

C. PROGRAM/PROJECT BENEFITS TO PROGRAM AREAS

This year the ISGC supported an Eclipse-related project that spans **Pre-college** and **Higher Education**. The project, organized by Moscow, Idaho high school physics teacher Pat Blount, created an opportunity for a team of high schoolers to participate in the National Space Grant High Altitude Balloon Eclipse project. The high school students have learned skills related to high altitude ballooning and data collection alongside undergraduate students. One undergraduate

student from the University of Idaho is serving as a mentor to the team throughout the year, which provides two benefits. First, the contact with an undergraduate student may increase interest in in higher education among the high school student. Second, the undergraduate student benefits by gaining valuable mentoring experience.

The ISGC also continued to support NASA Internships, Fellowships, and Scholarships (NIFS). In addition to the critically important financial support that they provide for students, the awards often affect the trajectory of students' careers. For example, Megan Fisher received an ISGC Fellowship to support her doctoral research, which led to her having the opportunity to present at an international conference where she made a connection with her future employer, the Irish National Supercomputing Center.

Other students are similarly impacted by their involvement on **Higher Education** or **Research Infrastructure** research projects. One previous undergraduate research participant, Jennifer Hasenoehrl, connected with NASA internship opportunities through her ISGC-supported research group. After participating in multiple NASA internships, Jennifer says that those opportunities helped her "find her career." Jennifer is now an employee of NASA Jet Propulsion Laboratory.

D. PROGRAM ACCOMPLISHMENTS

NASA Internships, Fellowships, and Scholarships (NIFS):

Objective 1.1 (Internships): Target (2015-2018) Average of 9 internships awarded per year (NASA and/or STEM industry internships). *Year two progress: Internships will be awarded in April 2017.*

- API 1.1.3 Survey past internship applicants and current ISGC students to determine what additional support (e.g., resume workshops, etc.) would improve student chances of attaining and successfully completing an internship. *Year two progress: In Year 2, ISGC staff conducted informal discussions with students to identify barriers to applying to NASA internships. Based on those discussions, ISGC has increased communications with students about internships including more advertising of the NASA OSSI internship application deadline, 1-on-1 discussions with students on how to apply through the NASA OSSI system, and participating in a NASA OSSI webinar hosted by California Space Grant and NASA Ames Research Center. To date, there appears to be increased interest in NASA internships (based on the increase in internship-related meeting requests), but ISGC will not know the outcome of the increased internship interactions until April/May 2017 when Summer 2017 internships are awarded.*
- API 1.1.4 Survey NASA Centers and STEM Industry partners to gain insight into successful internship applicants. *Year two progress: In Year 2, ISGC staff increased informal communications with staff at NASA Centers to identify barriers to Idaho students being selected as interns. One of the biggest barriers identified was Centers not being aware of available funds for Idaho students. NASA ISGC staff have been in contact with staff at several NASA Centers to ensure they know that Idaho has funds available for interns and that Idaho students are given full consideration. The outcome of these interactions will not be known until April/May 2017 when Summer 2017 internships are awarded.*

Objective 1.2 (Scholarships): Target (2015-2018) Average 85% of ISGC scholars retained in the STEM pipeline (or transitioning to STEM workforce) at the end of each academic year. *Year two progress:* Most (34 out of 36, 94%) ISGC scholars remain enrolled in a STEM undergraduate degree program (27) or have taken a STEM-related next step (7). No data is available yet regarding the breakdown of how many students took each type of next step.

• API 1.2.2 Pilot an ISGC scholar mentor program by identifying ISGC researchers or graduate students to act as scholar mentors. *Year two progress: Recruiting researchers and graduate students to serve as mentors has presented challenges. ISGC is evaluating options for moving forward with this objective.*

Objective 1.3 (Fellowships): Target (2015-2018) Average of 51% of fellows retained in the STEM pipeline or transitioning to STEM workforce at the end of each academic year. *Year two progress:* Data regarding the year-end plans of ISGC fellows will be available in May 2017.

• API 1.3.2 Pilot a next-step program where fellows discuss post-graduation plans with an ISGC affiliate representative or staff member annually. *Year two progress:* 5 out of 7 (71%) current year fellows have discussed their plans for the next year with an ISGC staff member or an appropriate faculty member. ISGC has plans to discuss plans with the remaining 2 fellows before May 2017.

Higher Education projects:

Objective 2.1 (Undergraduate Research- Students): Target (2015-2018) Average of 20 students with significant participation in undergraduate research projects at ISGC academic affiliates each year. *Year two progress: 14 undergraduate participants in research at ISGC academic affiliates met our criteria for significant involvement. (Note some data is not yet available for this metric.)*

- API 2.1.2 Create a list of past undergraduate research projects on the ISGC website to act as inspiration for future projects. *Year two progress: Year one and year two project briefs are available on the ISGC website. ISGC will add brief descriptions of future projects as they are awarded.*
- API 2.1.3 Feature an ISGC student research poster session at the annual ISGC affiliate meeting or other relevant venue such as the Idaho Academy of Science and Engineering (IASE) annual symposium. *Year two progress: ISGC is in the process of making arrangements with IASE not only to facilitate an ISGC poster session, but also to fund student presenters' travel to the symposium.*

Objective 2.2 (Undergraduate Research-Faculty): Target (2015-2018) Average of 5 undergraduate research projects funded at 4 academic affiliates each year. *Year two progress: In year two, ISGC awarded 5 undergraduate research grants to 3 university affiliates.*

• API 2.2.2 Survey past applicants and awardees of undergraduate research grants to identify possible improvements to the solicitation process. *Year two progress: ISGC has gathered informal input from undergraduate researchers and applicants on the solicitation process and used this information to schedule an earlier release date for undergraduate research solicitations. The ISGC will*

conduct a formal survey in Spring of 2017, once the current solicitation and award process is complete.

Research Infrastructure projects:

Objective 3.1 (Research Infrastructure - faculty): Target (2015-2018) Average of 8 research seed grant proposals from 3 or more academic affiliates. *Year two progress: ISGC received 9 seed grant proposals from 3 academic affiliates in year two, which raised our average number of seed grant proposals to 6.5.*

• API 3.1.2 Survey past applicants and awardees of research seed grants to identify possible improvements to the solicitation process. *Year two progress: ISGC has gathered informal input from researchers and applicants on the solicitation process and used this information to schedule an earlier release date for research seed grant solicitations. The ISGC will conduct a formal survey in Spring of 2017, once the current solicitation and award process is complete.*

Objective 3.2 (Partnerships): Target (2015-2018) Average of 2 research seed grant proposals with industry collaborators. *Year two progress:* Three of the seed grant proposals submitted had industry collaborators.

• API 3.2.2 Begin a curated list of possible industry collaborators by subject area. *Year two progress: ISGC staff are working on this list in conjunction with an Idaho economic development group. Once finalized, it will be posted to the ISGC website.*

Objective 3.3 (Research Infrastructure - students): Target (2015-2018) Average of 2 student participants on each research seed grant. *Year two progress:* The year two seed grants averaged 1 student per project. The overall average for student involvement in seed grants is 1.75 students per project.

• API 3.3.2 Facilitate connections between students and researchers by posting research projects to the ISGC website. *Year two progress: ISGC staff have worked on facilitating connections between students and researchers, but mostly on a 1-1 basis rather than posting opportunities on the ISGC website.*

Precollege projects:

Objective 4.1 (K-12 Student Engagement): Target (2015-2018) Average of 300 K-12 students participating in hands-on STEM engagement activities. *Year two progress: final numbers for year two will be available in June 2017, however ISGC anticipates more than 1000 K-12 participants during year two. The overall average participation in year one and year two will be in excess of 650 K-12 students per year.*

• API 4.1.2 Create and publish resources on the ISGC website for STEM education grant applicants. *Year two progress: ISGC published resources (e.g., a guide to cost share) to a public Google Drive folder. The link is accessible from our website and directly from our K-12 grant applications.*

Objective 4.2 (Educator Professional Development in STEM): Target (2015-2018) At least 15 ISGC-supported educators participating in professional development activities over the 3-year grant period. *Year two progress:* Final data will be available in May 2017. So far, ISGC supported 8 educators pursuing STEM professional development in year two. Combined with the 6 educators supported in year one, ISGC has supported 14 educators in the first two years of this grant.

• API 4.2.3 Work with ISGC affiliates to compile and publish professional development opportunities and curriculum resources for educators. *Year two*

progress: ISGC has posted some curriculum resources and professional development opportunities on our website. A robust list will be available by April 2017.

• API 4.2.4 Offer a grant application workshop at the Idaho Science Teachers Annual Conference or similar venue in Idaho. *Year two progress: ISGC presented at the Idaho Science Teachers Conference in October 2016. Additionally, ISGC met about the application process with individuals and small groups at school districts throughout southeastern Idaho, a region that has traditionally been underserved.*

Informal Education projects:

Objective 4.3 (K-12 Informal STEM Engagement): Target (2015-2018) Annual average of 200 K-12 students participating in hands-on activities at STEM-focused museums, science centers, informal education providers, and STEM events. *Year two progress:* Due to the nature of the ISGC informal education and pre-college grants, there is significant overlap in progress on this objective and progress on Objective 4.1. The progress reported under Objective 4.1 far exceeds the target set by ISGC, partially because some of the approximately 1000 students served could be reported here instead. However, given that there is no clear delineation between K-12 students impacted by Informal Education funding versus Pre-college funding for projects in an informal education setting, ISGC is choosing to report all 1000 students under Objective 4.1 with the acknowledgement that satisfactory progress has been made on Objective 4.3 as well.

• API 4.3.4 Survey teachers on the impact of the transportation grant. *Year two progress: ISGC communicates frequently with teachers throughout the course of their award period. Thus far, all teachers have provided unsolicited feedback on the effects of ISGC support on their classes. Given that teachers are providing high quality feedback without the intervention of a survey, ISGC will not collect survey data on this topic this year.*

Objective 4.4 (Public STEM Engagement): Target (2015-2018) Average of 3 ISGCsupported activities per year. *Year two progress: ISGC has supported two public outreach activity thus far and anticipates supporting at least one other activity before the end of April 2017.*

- API 4.4.3 Compile and publish a list of possible outreach events and venues (based on input at the annual affiliate meeting) to inspire proposal ideas. *Year two progress:* With the Eclipse rapidly approaching, ISGC's focus has been creating a space to communicate public outreach related to the Eclipse. To that end, ISGC created a Facebook page where anyone from around the state can communicate their Eclipse outreach plans. ISGC anticipates this page transitioning to a more general Idaho STEM outreach resource after the Eclipse has passed.
- Crosscutting Strategies projects (applies to all activities above—but unique to ISGC): Crosscutting Strategy 1 (Participant Diversity): Target (2015-2018) Average of 10% minority, 35% female participation within each student program. Year two progress: ISGC has made some progress on this crosscutting strategy overall (12% minority, 32% female). Among NIFS awards, ISGC is on track (17% minority, 37% female), but among student participants in research ISGC has more work to do (0% minority, 27% female). In the coming year, ISGC will focus on improving the diversity of students significantly involved in research projects.

- API CS.1.2 Engage external evaluators to assist ISGC with evaluating student programs and identify practices to improve underrepresented group participation. *Year two progress: ISGC will be meeting with representatives from minority and female affairs offices on two or more Idaho campuses in April 2017. Additionally, ISGC will use available resources (education research, data published by each campus, student feedback, researcher feedback) to explore why underrepresented/underserved students participate at a lower rate in significant research activities.*
- API CS.1.3 Create a focus group of underrepresented students from affiliate institutions to identify barriers to student participation in ISGC programs. *Year two progress: ISGC staff attended a Cultural Literacy and Competence Symposium in spring 2016 where students from University of Idaho shared barriers to their participation on campus. ISGC plans to attend again in April 2017 in addition to pursuing other sources of student feedback (see API CS.1.3).*

Crosscutting Strategy 2 (Portfolio Diversity): Target (2015-2018) 40% of awards go to non-engineering students and/or researchers applying for grants. *Year two progress:* With respect to undergraduate research grants and research seed grants – a total of 15 proposals were received. Four proposals were from researchers in non-engineering disciplines (27%). However, only two out of the 15 were awarded to PIs in non-engineering disciplines (13%). With respect to student participation, students who were significantly involved/supported (NIFS and/or Research participants), 26% were non-engineering students. Among all students (regardless of significance), the rate was 22% non-engineering. Among only NIFS awards, 31% went to non-engineering students.

• API CS.2.3 Evaluate Year 1 applications and awards to assess progress and take corrective action, if necessary. *Year two progress: The ISGC has reviewed the proposals, applications, and awards and is implementing a few new pilot processes to ensure greater diversity of scientific disciplines in ISGC's portfolio. For example, ISGC is piloting a new review committee process to broaden the types of reviewers that sit on each committee.*

Crosscutting Strategy 3 (Evaluation and Assessment): Target (2015-2018) Students with significant participation on ISGC research grants will be longitudinally tracked. *Year two progress: ISGC is now collecting the required data from students who participate in ISGC-funded research. ISGC includes those students in longitudinal tracking efforts.*

- API CS.3.3 Review progress on all annual performance indicators and identify any additional data or assessment needs. *Year two progress: ISGC staff facilitated a review of progress on performance indicators at the ISGC Annual Affiliate Meeting in June 2016. ISGC staff also met in November 2016 to evaluate progress on all annual performance indicators and to identify additional data needs. In Spring 2017, ISGC will survey and/or conduct interviews with various stakeholders to identify additional strategies for improving ISGC's programs.*
- API CS.3.4 Evaluate student research participation to establish additional parameters for "significant" participation. *Year two progress: ISGC has identified that in addition to students who participate for more than 160 hours or receive in excess of \$5000, students who participate over a long period of time (e.g., excess)*

multiple semesters) or hold a leadership role on the project are participating in a significant way.

Crosscutting Strategy 4 (New Partnerships): Target (2015-2018) Four community college/technical school ISGC affiliates. *Year two progress: In Year 2, ISGC still had only 2 community college/technical school affiliates.*

• API CS.4.3 Engage and assist two Idaho community colleges with the application process for becoming an ISGC affiliate. *Year two progress:* In Spring 2017, ISGC staff will ensure both the College of Western Idaho and Eastern Idaho Technical College have received information on how to become an ISGC affiliate. However, in Year 2, ISGC staff did have discussions with two other organizations interested in becoming an ISGC affiliate. Both organizations have received information on the affiliate application process and ISGC is waiting for their formal applications.

Crosscutting Strategy 5 (Outreach): Target (2015-2018) 25% of ISGC research projects include, and report on, K-12 or public outreach. *Year two progress: Most K-12 and public outreach associated with ISGC research grants occurred through undergraduate research grants. In Year 2, three out of seven research grants (seed grants and undergraduate research) conducted outreach activities for K-12 and/or the publics.*

• API CS.5.2 Capture data on outreach participants in grant final reporting. *Year two progress:* These outreach associated with these grants is still on-going. ISGC is collecting data on research grant outreach for the grant final report.

E. PROGRAM CONTRIBUTIONS TO NASA EDUCATION PERFORMANCE GOALS

- Diversity:
 - Institutional categories and types:
 - 3 private universities/colleges (8 student awards), 6 public universities/colleges (40 student awards)
 - 2 two-year colleges (3 student awards), 7 four-year universities/colleges (45 student awards)
 - 1 minority serving institution (4 student awards)
 - Underrepresented students (significantly supported only)
 - 3 racially underrepresented students (6%)
 - 4 ethnically underrepresented students (8%)
 - Underserved students (significantly supported only)
 - 16 female students (32%)
 - 0 students with disabilities
 - 0 students who are veterans of the U.S. military

• Minority Serving Institution Collaborations:

o ISGC collaborates with 1 minority serving institution (Idaho State University)

• Office of Education Annual Performance Indicators:

- API 2.4.1: ED-16-1 _____see the diversity section above______
- API 2.4.2: ED-16-2 <u>8</u>

- API 2.4.4: ED-16-4 (4) Museum Alliance organizations are affiliates of the ISGC. Those organizations are eligible to participate in ISGC organizational decision-making and to receive grants.
- o API 2.4.5: ED-16-5 <u>524</u>

F. IMPROVEMENTS MADE IN THE PAST YEAR

- **Revising the application/review process for small K-12 grants**: Previously, these small grants followed the same application/review process as ISGC research grants (solicited one time per year, reviewed by a full committee via telecon). Now small K-12 grants are accepted all year and are reviewed monthly by a specially developed committee. Instead of the committee arranging a time to meet every month, the committee members review the applications individually and submit their decisions and feedback via an online form. This new process allows ISGC to be more responsive to the needs of K-12 educators while still maintaining a competitive awarding process.
- Travelling around the state to visit with the researchers, educators, and students at each of the ISGC affiliates, as well as many K-12 Schools: This year, ISGC was able to arrange in-person visits with the majority of our affiliate institutions and over 10 public school districts. Subsequently, ISGC has seen increased participation from both affiliates and regions of Idaho that were previously participating at lower rates. ISGC also gained valuable insight into barriers to participation that are now in the process of being resolved.

G. CURRENT AND PROJECTED CHALLENGES

• The primary challenge ISGC is currently facing is low rates of intern placement at NASA centers. ISGC is responding to this challenge by developing alternative strategies for intern placement including pursuing connections with companies that take STEM interns from Idaho. ISGC would appreciate any feedback that the National Program Staff can offer regarding improving Idaho students' chances of receiving a placement offer at a NASA center.

H. PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

The ISGC partners with academic, informal education, and industry affiliates throughout Idaho to deliver outstanding programs for students, researchers, and the public. Affiliate representatives participate in review committees, goal setting and monitoring, and maintaining an effective STEM-focused network in Idaho.

Academic affiliates and their role: ISGC Academic Affiliates encourage students and faculty to pursue scholarship, fellowship, internship, and research opportunities available through ISGC.

- Boise State University: Public 4-year university with over 22,250 students.
- Brigham Young University Idaho: Private 4-year university with over 17,550 students.
- College of Idaho: Private 4-year college with over 1,100 students.
- College of Southern Idaho: Public 2-year community college with over 9,000 students.
- Idaho State University: Public 4-year university with over 14.400 students. (AIANSI)
- Lewis-Clark State College: Public 4-year college with over 4,300 students.

- North Idaho College: Public 2-year community college with over 7,800 students.
- Northwest Nazarene University: Private 4-year university with over 2,050 students.
- University of Idaho: (Lead institution) Public 4-year university with over 11,500 students.

Informal Education affiliates and their role: ISGC Informal Education Affiliates create and support opportunities for learners of all ages to participate in STEM-focused activities in Idaho.

- **Discovery Center of Idaho:** Non-profit science center offering interactive, hands-on STEM exhibits and educational programs for people of all ages and walks of life.
- Eastern Idaho Engineering Council/Idaho Academy of Science: Non-profit organization performing educational and charitable activities in the areas of engineering, science, technology, and science education in Idaho. (These affiliates will merge in 2016.)
- Idaho Science Teachers Association: Idaho State Chapter of the National Science Teachers Association. Focuses on enhancing science education in Idaho.
- **Palouse Discovery Science Center:** Non-profit science center featuring hands-on science and learning experiences for people of all ages.

Government and Industry affiliates and their role: ISGC Government and Industry Affiliates create and support opportunities for researchers and learners of all ages to participate in STEM-focused activities in Idaho.

- **Bruneau Dunes State Park and Observatory:** Home to the largest single-structured sand dune in North America. The observatory offers tours and solar viewing for the public.
- Craters of the Moon National Monument and Preserve: One of the best places in the world to see the effects of volcanism and frequently visited by researchers.
- Idaho Museum of Natural History: State museum of natural history featuring the Idaho Virtualization Laboratory and offering classes in anthropology, Earth science, and life sciences for all ages.
- Idaho State Department of Education: Provides expertise and technical assistance to promote educational excellence throughout Idaho.
- Idaho National Laboratory: The U.S. Department of Energy's lead nuclear energy research laboratory offers cutting-edge facilities and expertise to Idaho researchers. The lab works with higher education institutions, researchers, industry, and with students of all levels in a variety of capacities.
- Idaho Transportation Department Division of Aeronautics: Facilitates programs and services to foster an exemplary system of airports to meet Idaho aviation community needs.