

## **FY15 Year 1 APD**

**The National Space Grant Office requires two annual reports, the Annual Performance Data Report (APD – this document) and the Office of Education Performance Measurement System (OEPM) report. The former is primarily narrative and the latter data intensive. Because the reporting timeline cycles are different, data in the two reports may not necessarily agree at the time of report submission. OEPM data are used for official reporting.**

Washington NASA Space Grant Consortium

Lead Institution: University of Washington

Director: Robert Winglee

Telephone Number: 206-543-1943

Consortium URL: <http://www.waspacegrant.org>

Grant Number: NNX15AJ98H

LOB: 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, university-led 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 Washington Space Grant Consortium (WSGC) is a Designated Consortium funded at a level of \$575,000 for fiscal year 2015.

### **B. PROGRAM GOALS**

**SMART Objective IA1:** *Award WSGC NASA Internship Fellowships & Scholarships (NIFS) direct student awards to underrepresented minority students at or above 17% and to women undergraduates at or above 40%. (The National Center for Education Statistics reports the current percentage of enrollment of underrepresented minority (URM) students in higher education in the state of Washington as 16.1%.)*

**SMART Objective IA2:** *Continue WSGC's undergraduate scholarship program through its academic Affiliates and partners to provide 60 scholarships to undergraduate students across the state of Washington in year 1 and 40 in years 2 and 3. About 20% of WSGC scholarships contain a research component, which aids in recruitment and retention at the upper levels.*

**SMART Objective I.A3:** Sustain a strong WSGC graduate fellowship program at the state's land grant university (Washington State University) with a minimum of 14 fellowships annually.

**SMART Objective I.A4:** Maintain support for students in community colleges and/or community college students with associate degrees transferring to four-year colleges, awarding 11 scholarships in year 1 and 8 in years 2 and 3.

**SMART Objective I.A5:** Continue support of a summer NASA internship program and ensure access to students by providing funding for five undergraduate NASA internships in year 1 and two in years 2 and 3.

**SMART Objective I.A6:** Achieve 95% retention in Science, Technology, Engineering, and Mathematics (STEM) disciplines of all scholarship awardees by 2018.

**SMART Objective I.B1:** Support the integration of research and education in NASA-related fields at the undergraduate level through two survey courses at higher educational institutions around Washington and continue support of a distance learning college credit course for rising high school seniors through Washington Aerospace Scholars. [Target= 950 students per year]

**SMART Objective I.B2:** Work with Affiliate members to initiate or expand the capabilities of their rocket classes and/or teams to gain hands-on experience in STEM-focused interdisciplinary environment. [Target = three participating higher education institutions (including at least one minority-serving institute (MSI) in years 1 and 2; four in year 3 (including at least one MSI and one community colleges.)]

**SMART Objective I.B3:** Support the development of a CubeSat program (the first for Washington state) in conjunction with NASA's Orion flyby of the moon and the Centennial Challenge for a CubeSat to orbit the moon.

**SMART Objective I.B4:** Since University of Washington College of Engineering (UW CoE) enrollment demographics largely define the pool of interested students for the specialty courses under development at the lead institution, we have pegged our target for course enrollment (indirect participation) by women and URM students to those percentages. [For FY2013, the UW CoE enrollment percentage of women was 25.1%; the percentage of URM students enrolled was 10.1%.]

**SMART Objective I.B5:** Support at least one undergraduate team activity in year 1 and one team activity in either year 2 or 3.

**SMART Objective I.C1:** Continue to support an active WSGC-sponsored undergraduate research program within our higher education Affiliates, with 50 undergraduates in year 1 and 34 in years 2 and 3.

**SMART Objective I.C2:** Award WSGC direct student awards to underrepresented minority students at or above 17% and to women undergraduates at or above 40%.

**SMART Objective I.C3:** Augment the opportunities for students at minority-serving institutions and community colleges (CC) to participate in mentor-centric research experiences including hands-on courses/research internships. [Target: 4 MSI/CC students in

*hands-on research in year 1 and 3 in years 2 and 3]*

**SMART Objective I.C4:** *Provide research experiences for a minimum of six pre-service teachers in STEM fields each year.*

**SMART Objective I.C5:** *Continue support of our summer industry internship program with local companies involved in STEM research and expand the program when opportunities arise, with a target of four internships in year 1, one-partially funded internship in year 2, and one full internship in year 3.*

**SMART Objective I.C6:** *Work closely with consortium members to assure coherence in the program to share expertise and resources, and to bring together students and faculty from all institutions to present their research. [Target: 1 public event per year]*

**SMART Objective II.A1:** *Support technical or professional development workshops for in-service teachers with at least one sustained training project in a rural area serving a traditionally underserved population. [Target: 15 workshops in year 1 and 10 in years 2 and 3.]*

**SMART Objective II.A2:** *Collaborate with four in-service teachers employed by K-12 schools on Native American lands each year to create and sustain an out-of-school rocketry program and provide training in related NASA-STEM curriculum.*

**SMART Objective II.A3:** *Collaborate with Washington Aerospace Scholar Program (WAS) to expand opportunities for high school juniors with STEM career interests and enhance program capacity by supporting the training and retention of 12 in-service teachers/mentors a year.*

**SMART Objective II.A4:** *Produce an electronic newsletter twice monthly during the school year to connect educators, informal and formal, with relevant NASA-related materials and curriculum, events and competitions, and other STEM resources.*

**SMART Objective II.B1:** *Work with informal organizations such as museums to provide at least one relevant science activity each year at a major event or exhibit, with an emphasis on showcasing NASA missions, materials and fields of interest, and on reaching traditionally underrepresented and underserved communities.*

**SMART Objective II.B2:** *Support at least one space science/rocketry showcase at a school serving a tribal community in year 1, with a goal of having 100 attendees participate.*

**SMART Objective II.B3:** *Support opportunities for secondary students to participate in extended research opportunities on college campuses through established NASA or National Science Foundation (NSF) programs, with the objective of increased enrollment in STEM disciplines or interest in STEM careers. [Target = 3 students per year]*

**SMART Objective II.B4:** *Utilize print and electronic publications to generate excitement about NASA's missions, publicize educational opportunities for teachers and students, as well as NASA-related programs at WSGC museum Affiliates, and foster collaboration among consortium institutions. [Target = 4 social media posts a week, 1 website update a month, and a 5% increase in Facebook followers per year.]*

### C. PROGRAM/PROJECT BENEFITS TO PROGRAM AREAS

WSGC's FY2015 projects are chosen to create an educational pipeline to engage, educate and ultimately employ Washington residents in STEM fields. In Research Infrastructure, WSGC not only supports authentic, hands-on opportunities for Seattle University (SU) undergraduates to participate in research on campus, but also to present their work in a professional environment. Junior Evelyn Bordeaux, for example, spent her summer studying the biochemical processes that allow diatoms to thrive. She then received travel funding to present a research poster at the American Society for Biochemistry and Molecular Biology in April. Bordeaux is one of four SU student researchers awarded funding to attend the conference; five more received travel support to attend other STEM meetings.

In Precollege, WSGC continues to strengthen our professional development program in rocketry for middle and high school teachers on tribal lands. In FY2015, two teachers from Lake Roosevelt High School, which serves the Confederated Tribes of the Colville Reservation, received their Level 2 certification from the National Association of Rocketry. This, in turn, has helped to expand the school's American Indian Science and Engineering Society (AISES) chapter. A video of the rocket club's activities was also instrumental in helping the school secure a \$25,000 Career and Technical Education grant from the state's Office of Superintendent of Public Instruction to support a new aerospace fabrication program.

In Informal Education, WSGC support allowed high school student Hussain Miyaziwala, a Discovery Corps intern at the Pacific Science Center (PSC), to spend his summer working at UW's Center for Industrial and Medical Ultrasound on a research project funded through the National Space Biomedical Research Institute. The research looked at ways to improve kidney stone detection. "Astronauts are at an increased risk for developing kidney stones because of dehydration and bone loss in microgravity," Hussain explained. "If an astronaut developed a kidney stone, the pain alone could compromise the mission and worse, cause an infection or even death. NASA's goal is to ultimately prevent stones from forming, but in the case of an incident, early detection and planned treatment is critical." The PSC Discovery Corps is a youth development program aimed at underrepresented teenagers and supported in part through two NASA grants (NNX10AK17G and NNX14AD03G).

### D. PROGRAM ACCOMPLISHMENTS

- NASA Internships, Fellowships, and Scholarships: WSGC exceeded our undergraduate scholarship target and will meet our community college metric by May 2016 (I.A2, I.A4). We supported five NASA internships, four to undergraduates and one to a graduate student (I.A5). In FY2015, we awarded only 10 fellowships, offering eight undergraduate scholarships instead of an additional four graduate awards (I.A3). Of our NIFS awards, 50% went to women and 17% to URM students (I.A1). Of the 1,127 WSGC alumni who have taken a next step since 2006, 90% have remained in STEM; this is less than our target of 95% retention (I.A6). We believe stronger outreach and a redesigned survey may increase alumni response so we have fewer students that default into the non-STEM category.

- Higher Education projects: In FY2015, WSGC supported four courses focused on the results from NASA missions or hands-on learning in rocketry or high-altitude ballooning, reaching 421 students to date. A CubeSat project that began as a credit course evolved into a WSGC-supported team effort. Three other teams have applied for spring funding. Thus, WSGC met SMART Objectives I.B1, I.B2, I.B3, and I.B5I. Enrollment figures to date show student diversity in the courses on target, with 24% women and 7% underrepresented minorities (I.B4).
- Research Infrastructure projects: WSGC supports a robust undergraduate research program at our higher education Affiliates, with 52 students at three schools supported to date; four more institutions (including the home of our pre-service teachers program) will announce their selections in April (I.C1, I.C4). We exceeded our goal for private industry internships (I.C5), placing five students in FY2015, and placed four students at MSI schools in research (I.C3). Students from eight colleges and universities presented their work last fall during our annual poster session and reception (I.C6). Of our awards in this category to date, 54% went to women and 18% to underrepresented minority students (I.C2).
- Precollege projects: Thus far, we have met three of our metrics in this area and the fourth will be completed in April. WSGC supported 16 professional development workshops for K-12 teachers, with three long and nine short-duration workshops being offered in underserved rural communities with high poverty and large Hispanic and/or Native American populations, reaching a combined total of 474 teachers. (II.A1) We continued our successful collaboration with Washington Aerospace Scholars (II.A3) and met our production schedule for our electronic newsletter for teachers (II.A4). Two teachers employed by schools on Native American lands received training to establish out-of-school rocketry programs and held a two-day event in October; two more will complete training in April (II.A2).
- Informal Education projects: In FY2015, WSGC met all four metrics for informal education (II.B1, II.B2, II.B4). To date, 17 events were publicized through WSGC outlets and conducted, reaching 2,045 participants. On April 16, three Affiliates will participate in First Nations Mathematics Engineering Science Achievement (MESA) Day, a showcase of rocketry, portable planetarium shows, and hands-on activities. MESA Day generally reaches 250 students in grades 6-12 and approximately 50 adults.

E. PROGRAM CONTRIBUTIONS TO NASA EDUCATION PERFORMANCE GOALS

- **Diversity:** WSGC supports diversity of institutions through the membership and partnership of 5 MSI (UW Seattle, Heritage University (HU), Northwest Indian College (NWIC), Seattle Central College (SCC) and North Seattle College (NSC) and 3 community colleges (Everett Community College, SCC and NSC). The diversity of WSGC representatives and other participating faculty is demonstrated as follows: 19 women and 3 underrepresented minorities. During FY2015, WSGC supported student diversity by meeting its specific metrics for participation by women and underrepresented minorities in scholarships with 53 awards to female participants and

18 to underrepresented minority participants, and in research infrastructure with 31 awards to women and 10 to underrepresented minority participants.

- **Minority-Serving Institution Collaborations:** During FY2015, WSGC’s tribal college Affiliate, Northwest Indian College, received \$20,000 in NASA funding and provided \$5,000 in matching funds for scholarships. In FY 2015, NASA funds were utilized to provide two scholarships and housing for a student who received an internship at NASA Ames Research Center, and in support of the NWIC student rocket team. The team will participate in NASA Swarmathon this month and compete in the First Nations Launch competition in Wisconsin on April 21 – 23, 2016. To date, NWIC reported four direct participants, all underrepresented minority students. Seattle Central College, an Asian American and Native American Pacific Islander-Serving Institution (AANAPISI) and community college, received \$10,000 in NASA funding for five scholarships to be awarded this spring. Heritage University, a Hispanic-Serving Institution (HSI), received \$5,000 in NASA funding to support two informal education programs aimed at strengthening the STEM pipeline for underrepresented students. These programs are First Nations MESA and the local NSF-sponsored EnvironMentors Program, both of which provide STEM-focused, out-of-school learning programs for middle and high school students from the Yakama Nation lands and surrounding area. This award will be utilized this spring. UW Seattle, home campus for WSGC and an accredited American Indian and Alaska Native-Serving Institution (AIANSI), provided professional development for in-service teachers at schools serving the Confederated Tribes of the Colville Reservation (Colville) and/or Confederated Tribes and Bands of the Yakama Nation (Yakama) to establish an out-of-school rocketry program utilizing NASA curriculum materials and Estes and Level 1 rockets.
  
- **Office of Education Annual Performance Indicators:**
  - APIED-15-1     \_\_\_100\_\_\_                    (Number of NIFS to racially or ethnically underrepresented students, women, and persons with disabilities.)
  - APIED-15-2     \_\_\_476\_\_\_                    (Number of educators.)
  - APIED-15-4     \_\_\_17\_\_\_                         (Number of informal education events.)
  - APIED-15-5     \_\_\_486\_\_\_                    (Number of K-12 students.)

**F. IMPROVEMENTS MADE IN THE PAST YEAR**

In FY2015, WSGC focused on increasing the synergy of its members and partners. The WSGC lead institution and Affiliates collaborated to submit multiple NASA proposals that would support and expand the work developed through our statewide consortium. These efforts include two Undergraduate Student Instrument Project (USIP) proposals. WSGC also led a successful collaboration with Space Grant members in Oregon and Montana to pursue a cooperative agreement with the NASA Science Mission Directorate to establish a regional pipeline to improve in-service teacher training, and greater access to NASA materials in underserved communities. WSGC added two new industry partners, MSNW and M42

Technologies; both are space-oriented research and development start-ups. We are currently working to bring aboard two more academic partners, both from outside the Puget Sound area.

#### G. CURRENT AND PROJECTED CHALLENGES

As always, the sheer geographic size of the state and the difference in academic calendars remain a challenge. Over the last two years, we have depended heavily on telecoms for proposal development and statewide meetings. This fall, we are planning to hold a statewide meeting on the UW campus, most likely in conjunction with the annual WSGC Reception and Poster Session. The other challenge is the timing of our subcontracts and student projects.

Most institutions are now requiring that funds be fully available before issuing out a call for scholarships, fellowships or internships. Any gap or uncertainty on available funding puts a hold on the call, thus missing the current academic cycle. This leaves unused funds on subcontract due to delays in award selection. Invoicing is therefore delayed and the awards are made for the next academic year. We believe we were able to address this challenge during the FY2015 cycle and it should not recur during the rest of the grant cycle.

#### H. PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

WSGC is comprised of 14 member institutions and ten industry and educational partners, which are described below:

##### Higher Education

- *University of Washington (UW)*, the lead institution, includes one MSI campus and is a major research university, receiving \$1.30 billion in research grants and contracts in FY2015.
- *Central Washington University*, a centrally located, public four-year university, with 20% of its incoming classes identifying as students of color (largely Hispanic/Latino).
- *Heritage University (HU)*, a Hispanic-serving institution (HSI) located within the Yakama Nation reservation in central Washington.
- *Northwest Indian College (NWIC)*, a tribal college in northern Washington.
- *Seattle Central College (SCC)*, an urban AANAPISI community college with high minority enrollment.
- *Seattle University*, the largest independent university in the Pacific Northwest.
- *University of Puget Sound*, a four-year liberal arts college located in Tacoma.
- *Washington State University (WSU)*, a major research university and the state's land grant university.
- *Western Washington University*, home to the Science, Mathematics, and Technology Education (SMATE) program for pre-service teachers and education research.
- *Whitman College*, a private liberal arts school located in central Washington.
- *Whitworth University*, a private liberal arts school located in eastern Washington.

##### K-12

- *North Central Educational Service District (NCESD)*, the state's largest ESD, serving a mostly rural, economically disadvantaged, Hispanic and Native American population.

### Informal Education

- *Museum of Flight* (MoF), a provider of informal education and training for pre-college students and in-service teachers, as well as home to Washington Aerospace Scholars.
- *Pacific Science Center* (PSC), a provider of informal education and training for pre-college students and in-service teachers.

WSGC industry partners within the field of aeronautics and astronautics are Aerojet Rocketdyne, Eagle Harbor Technologies, MSNW, M42 Technologies, and Tethers Unlimited, Inc. Partner Woodruff Scientific, Inc. is focused on new energy technologies. Educational partners in higher education are North Seattle College (NSC), an AANAPISI two-year college serving north Seattle and the neighboring suburbs, and Everett Community College, a two-year college with strong ties to the state's aerospace and manufacturing companies. At the precollege level, our partners are the Olympic Educational Service District, which serves 15 school districts on the Kitsap and Olympic Peninsulas, and First Nations MESA, which serves eight middle and high schools within the Yakama Nation and its ceded lands.