

Washington NASA Space Grant Consortium
University of Washington
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Telephone Number: 206-543-1943
Consortium URL: <http://www.waspacegrant.org>
Grant Number: NNX10AK64H

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 NASA Space Grant Consortium is a Designated Consortium funded at a base level of \$575,000 for fiscal year 2012.

PROGRAM GOALS

The overall objective of Washington NASA Space Grant Consortium is to provide high quality programs that align with the NASA Office of Education Outcomes and serve the needs of our state. WSGC seeks to enhance higher education opportunities for students seeking to pursue careers in the fields of science, technology, engineering and math (STEM); to enrich and improve STEM education at Washington's diverse pre-college, college, university and community learning centers; and to provide public outreach for NASA missions, and thereby strengthen the future workforce for NASA and our nation. To that end, our goals are as follows:

- To attract and retain high-achieving students, especially those underrepresented in the sciences, technology, engineering and mathematics, to space-related degree programs and career tracks supporting NASA's missions.
- To support the integration of research and education in NASA-related fields at the undergraduate and graduate levels.
- To support faculty interested in deepening ties to NASA research and the development of research infrastructure at consortium member institutions.
- To increase collaborative efforts of university scientists and students with industry leaders in aerospace-related programs.
- To enhance the teaching of science, technology, engineering and mathematics and to attract students to these fields of study through engaging informal and formal education programs based on NASA's missions on Earth and in space.

- To share the excitement and knowledge gained from NASA’s missions with the general public.
- To strengthen collaborative efforts within the Consortium as well as with industry, community, and governmental organizations to support NASA and WSGC goals and activities.

We provide here a narrative report on our progress toward last year’s specific goals and metrics.

PROGRAM/PROJECT BENEFIT TO OUTCOME (1,2, & 3)

OUTCOME #1: EMPLOY AND EDUCATE. WSGC’s successful collaboration with the Pacific Northwest Louis Stokes Alliance for Minority Participation (PNW LSAMP) has grown steadily over the past four years, culminating in plans for co-funding up to four four-year scholarships beginning in the 2013-14 academic year. Launched with NSF funding in 2009, LSAMP seeks to increase the recruitment, retention, and graduation rate of underrepresented students in the disciplines of Science, Technology, Engineering, and Mathematics (STEM) throughout Idaho, Oregon and Washington. At the University of Washington, WSGC staff provided poster design workshops for students participating in the College of Engineering Bridge Program, recruited on-campus volunteers for LSAMP outreach events geared to middle and high school students, and participated in LSAMP-sponsored recruiting events to involve undergraduates in research. In FY2012, LSAMP funded three students in the Space Grant Summer Undergraduate Research Program (SURP), where they worked for nine weeks in research laboratories under mentors in their fields (astronomy, bioengineering and Earth and space sciences). This spring LSAMP’s associate director also served on the scholarship selection committee for the UW Space Grant scholarships for the 2013-14 incoming freshmen.

OUTCOME #2: EDUCATE AND ENGAGE. Over the last two years, North Central Educational Service District (NCESD) — the largest educational service district in Washington state, serving a mostly rural, economically disadvantaged, Hispanic and Native American population — has been working with Chelan County Public Utility District (a PUD operating three hydroelectric projects, as well as local utility services and parks) to pilot a new hands-on STEM curriculum that could engage middle school students, meet state academic standards, and make students aware of STEM careers in their own communities. With funding from WSGC, activities were developed by participating teachers, PUD employees and NCESD staff, based on the energy, machines and motion curriculum already in use in the region. In 2012, four pilot projects were implemented. One school built model solar cars. A second built hovercrafts. A third worked with the PUD’s dive team, learning about gas laws and underwater engineering challenges. A fourth learned about the physics of hydrology by creating a working model of Rocky Reach Dam on the Columbia River. After evaluation, the solar car activity was selected for implementation across the region. Beginning next year, 11 school districts will receive kits for building model-sized solar cars. Chelan County PUD energy conservation engineer and solar power expert Jim White, who worked on the collaboration, received the 2013 Science Champion Award from the Washington State Leadership and Assistance for Science Education Reform (LASER). He has donated his \$5,000 prize to the NCESD Foundation to buy 150 solar car kits.

OUTCOME #3: ENGAGE AND INSPIRE In September 2012, WSGC coordinated the first Yakama Nation Blast-Off Festival, a daylong community science fest intended to expose Native American students and their families to the excitement of rocketry and other hands-on science activities. The event was a result of collaboration by WSGC, Yakama Nation Land Enterprise, Yakama Power, and University of Washington's Indigenous Wellness Research Institute (IWRI). In the past, high school students had reacted enthusiastically to the two-hour rocketry workshops WSGC offered as part of IWRI's summer enrichment program for Native American youth but those workshops only reached students visiting the UW's Seattle campus. For the September event, volunteers from UW, Central Washington University and Northwest Indian College traveled to the Yakama Nation reservation where they guided about 90 middle and high school students through launching foot-tall hobby rockets and building water rockets made of empty pop bottles. After the events in the field, students, families and volunteers gathered for a lunch of elk and salmon at Toppenish High School. The students then explored the Pacific Science Center's Science on Wheels program of hands-on activities and two inflatable planetariums. A second Yakama Nation Blast-Off Festival is planned for Fall 2013.

PROGRAM ACCOMPLISHMENTS

Outcome 1: *Contribute to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals (Employ and Educate).*

SMART Goal #1: *Diversity - To attract and retain high-achieving students underrepresented in the sciences and engineering into higher education institutions statewide, to space-related degree programs and career tracks supporting NASA's missions.*

Metric 1.1: Award WSGC scholarships and research internships to underrepresented minority students at or above 17%; enroll underrepresented minority students in higher education courses at or above the percentage of their undergraduate enrollment in the UW College of Engineering for the year.

Progress to date: Met. Of the 182 significant awards for scholarships and research internships in FY2012, 19.2% went to underrepresented minority students, based on the number of the students who chose to indicate race. This exceeds our goal of 17% enrollment and significantly exceeds the enrollment percentage for underrepresented minorities in our state (14.7% according to the most recent enrollment data from the National Center of Education Statistics Digest). Of the 813 students who were enrolled in our higher education courses, 11.6% identified as underrepresented minority students, a 2.4% increase over last year and significantly higher than our target of matching UW College of Engineering's 9.2% underrepresented minority enrollment for 2012.

Metric 1.2: Award WSGC scholarships and research internships to women undergraduates at or above 40%; enroll women in higher education courses at or above the percentage of their undergraduate enrollment in the UW College of Engineering for the year.

Progress to date: Met. Women undergraduates received 51.2% of our 164 significant awards to undergraduates for scholarships and research internships. Enrollment of

women in our higher education courses was 30.5%, a 4.5% increase over last year and significantly higher than the 23.1% enrollment of women in the UW College of Engineering in 2012.

Metric 1.3: Foster strong programs at our minority serving institutions including partnerships with other affiliates so they may tap into the state's research colleges while developing more opportunities for their students to participate in hands-on research.

Progress to date: Met. See below for Program Contributions to PART Measures: Minority-Serving Institutions.

SMART Goal #2: *Scholarships & Fellowships - To attract and retain high-achieving students statewide, especially those underrepresented in the sciences and engineering, to space-related degree programs and career tracks supporting NASA's missions.*

Metric 1.4: Continue WSGC's undergraduate scholarship program through its academic affiliates and partners to provide 60 scholarships to undergraduate students statewide.

Progress to date: Met. In FY2012, WSGC awarded 112 significant undergraduate scholarships at six affiliate institution (CWU, NWIC, SCCC, UW, WSU and WWU). Many of these awards included research participation.

Metric 1.5: Continue WSGC's graduate fellowship program at the state's two primary research universities (UW and WSU) with a minimum of 12 fellowships per year.

Progress to date: Met. In FY2012, WSGC awarded 18 graduate fellowships at UW and WSU.

Metric 1.6: Enhance support for students in community colleges and/or community college students with associate degrees transferring to four-year colleges, awarding 10 scholarships annually.

Progress to date: Met. In FY2012, WSGC awarded 13 scholarships to Seattle Central Community College students and six to UW transfer students, representing alumni from five other community colleges (Cascadia, Clark, Grays Harbor, Highline, and Spokane Falls). Our transfer scholarship program is one of only three UW scholarship programs focused on recruiting community college students and retaining them through graduation.

Metric 1.7: Achieve 95% retention in STEM disciplines of all scholarship awardees.

Progress to date: Almost met. Of our 2006-2011 students who received significant support and were successfully tracked, 92% remained in STEM fields. This is the same percentage as reported for FY2011. We will continue to employ retention tools such as formal and informal student meetings with our student advisor, content-specific peer tutoring and networking opportunities.

Metric 1.8: Establish regular communication with WSGC scholarship and fellowship alumni from all consortium institutions through our longitudinal tracking system and social networking sites. Target: 65% alumni tracked by the end of FY2014.

Progress to date: Met. NASA requires tracking of all significant award recipients after 2005; Education Programs Support Services (formerly operated through the National Space Grant Foundation) provides our tracking system. To better ascertain WSGC's long-term impact on our alumni, we have encouraged our pre-2005 alumni to also participate in the tracking system. By 2012, 69.6% of our alumni (1997-2012) had updated their tracking record to their next step at least once. We distribute news and career opportunities to our alumni through the NASAAlumni listserv and Facebook. We

plan to add a LinkedIn group, as this seems to be the social media most used by the engineering school alumni.

SMART Goal #3: *Research Infrastructure - To expand participation in existing WSGC-sponsored undergraduate research and NASA internships; to increase collaborative efforts of university scientists and students with industry leaders in aerospace-related programs by establishing summer industry intern programs among all members of the consortium; to support the expansion of research opportunities for graduate and undergraduate students to work with STEM-field faculty across the state of Washington, particularly women and underrepresented minority students and faculty, as well as early career faculty; and to support teams in NASA-sponsored and/or aerospace activities and competitions.*

Metric 1.9: Continue to support an active WSGC-sponsored undergraduate research program within our higher education affiliates, with 60 undergraduate researchers.

Progress to date: Met. WSGC made 95 total awards (64 significant awards) to undergraduate students at nine academic affiliates (UW, CWU, NWIC, SCCC, SU, UPS, WWU, Whitman, and Whitworth) and one unaffiliated institution. Of the 95 total research awards, 20 were made to students who also received scholarships (18 of these were significant awards).

Metric 1.10: 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.

Progress to date: Met. In FY2012, we awarded three WSGC summer internships at Eagle Harbor Technologies and two at Aerojet-Redmond.

Metric 1.11: Foster closer ties with our private sector partners through participation in at least one research symposium.

Progress to date: Met. Three of our four industry partners sent representatives to the WSGC annual reception and poster session. Tim Ziemba, president of Eagle Harbor Technologies (EHT), presented the awards for participants in summer internships in private industry and at NASA centers. WSGC leadership continues to collaborate with EHT on their two successful NASA Phase I SBIR proposals for the development of a micro-thruster for formation flying of multiple spacecraft and for space debris mitigation. Aerojet-Redmond and Blue Origin, an emerging WSGC collaborator, hosted optional tours for participants in the 2012 National Space Grant Directors Meeting in Seattle.

Metric 1.12: Continue support of a summer NASA internship program and ensure access to students by providing partial funding for six NASA interns.

Progress to date: Partially met. In FY2012, three students from three Washington schools (Whitworth, WSU and Gonzaga University) received full WSGC funding to participate in research internships at NASA Centers. A fourth student received partial funding for a NASA Interface Region Imaging Spectrograph (IRIS) internship at the Lockheed Martin Solar and Astrophysics Laboratory. We endorsed six additional students: two were not matched, one was funded directly by NASA, and three chose to accept REUs or internship offers from other agencies or institutions.

SMART Goal #4: *Higher Education - Provide NASA competency-building education and research opportunities for faculty, researchers, and post-doctoral fellows; develop and expand participation in NASA-related courses for integration into STEM disciplines; provide NASA competency-building education and research opportunities to individuals to develop qualified undergraduate and graduate students who are prepared for employment in STEM disciplines at NASA, industry, and higher education.*

Metric 1.13: Support the integration of NASA-related research and education at the undergraduate and graduate levels through three or more courses that focus on results from NASA missions or provide experiential learning opportunities in aerospace. [Target: Support a total of 3 courses, reaching 350 students.]

Progress to date: Met. In FY2012, UW ESS 102 (Space & Space Travel) was offered in Fall, Winter and Spring Quarters of the 2012-2013 academic year; ESS 495 (NASA Science and Engineering Research Seminar) was offered in Spring Quarter. Enrollments were 482 and 164 respectively. ESS 472/575 (Rockets and Instrumentation) was offered Fall and Winter Quarter, with a total enrollment of 51. WSGC also developed a distance-learning version of UW ESS 102, allowing high school juniors in the Washington Aerospace Scholars (WAS) program to earn five hours of university credit for WAS participation. That enrollment was 116 (representing 41% of current WAS participants).

Metric 1.14: Augment the opportunities for students at minority serving institutions and community colleges to participate in opportunities at state's larger colleges including hands-on courses/research internships and the NWIC rocket program. [Target: 4 MSI/CC students in hands-on research annually].

Progress to date: Met. As detailed in Program Contributions to NASA Education Performance Measures: Minority-Serving Institutions, WSGC supported 10 NWIC students conducting environmental science and global climate research, and seven students competing on the NWIC rocket team. We also supported placement of five students in SCCC Undergraduate Research Experiences (SURE), a program to increase transfer/graduation rates of STEM majors to baccalaureate institutions and strengthen the community college's ties to our state's four-year institutions.

Outcome 2: *Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty (Educate and Engage)*

SMART Goal #5: *To enhance teaching of STEM topics at a K-12 level and attract students to these fields through engaging informal and formal education programs based on NASA themes and materials; to provide courses and workshops to improve teachers' mastery of STEM disciplines and through those projects help Washington students (especially those from underserved communities) meet state and national standards; to provide hands-on research experiences for pre-service teachers in STEM fields.*

Metric 2.1: Support 21 technical or professional development workshops for in-service teachers, with at least one workshop in a rural area serving a traditionally underserved population.

Progress to date: Met. To date, 42 professional development workshops have taken place, reaching 526 in-service teachers. The North Central Educational Service District conducted 41 workshops in underserved rural communities with high Hispanic and Native American populations. In 2010, less than 45% of fifth graders in the district

demonstrated proficiency on the state science assessment. To address this challenge, NCESD utilized FY2012 Space Grant funding to strengthen the teachers' pedagogical and science content knowledge (including unit-specific strategies for English language learners). Pacific Science Center provided one workshop on its standards-based astronomy curriculum at the 2012 Washington Science Teachers Association conference.

Metric 2.2: Provide research experiences for a minimum of seven pre-service teachers in STEM fields each year.

Progress to date: Met. Seven future K-12 teachers in the Science, Mathematics, and Technology Education (SMATE) Program at Western Washington University were placed in research experiences. SMATE participants complete both a major in a STEM discipline and either the elementary or secondary education program. The WSGC scholars created a poster describing their research and participated in a seminar to discuss how their experiences will improve their inquiry-based educational methods and relate to their future teaching.

Metric 2.3: Collaborate with the Washington Aerospace Scholars (WAS) program to expand opportunities for high school juniors with STEM career interests and enhance program capacity by supporting the training of 16 in-service teachers/mentors to remain with WAS year-round.

Progress to date: Met. In FY2012, WSGC supported the recruitment of 16 state-certified STEM teachers to mentor high school juniors participating in the WAS program's online NASA curriculum and the 2012 summer residency at the Museum of Flight. We also collaborated with the Museum of Flight in development of a new UW distance learning course for WAS students (described in Metric 1.13). Last summer, 159 students attended the residency; in November 2012, 283 students applied to the online program. Of the WAS alumni now in college, 78% of those surveyed are pursuing a STEM degree, with more than half of those alumni studying engineering.

Metric 2.4: Support teacher participation in national conferences focused on NASA science mission results or participation in NASA-sponsored science competitions, with a target of two opportunities for in-service teachers and/or K-12 teacher-student teams.

Progress to date: Met. WSGC supported two professional development activities for staff at Key Peninsula Middle School, the state's first NASA Explorer School. In FY2012, we co-funded attendance for four teachers at a weeklong professional development training on astronomy and space-related topics. In addition, WSGC also provided travel for the team lead to present a research poster at the 63rd International Astronautical Congress, on inspiring underrepresented K-12 students in STEM through astronomy immersion. The paper was co-authored with a NASA Goddard Space Flight Center researcher; NASA also requested that the teacher—a Department of Education Teaching Ambassador Fellow—meet with 30 graduate student attendees sponsored by CSA, ESA, JAXA and NASA to discuss K-12 STEM education, as well as college and career readiness. She also conducted a professional development session for 25 teachers from the Department of Defense schools.

Metric 2.5: Produce an electronic newsletter twice monthly during the school year to connect educators, informal and formal, with relevant NASA-related materials, curriculum ideas, Internet links and other STEM resources.

Progress to date: Met. In FY2012, the WSGC e-letter reached 941 direct subscribers, including secondary distribution networks such as the Washington Science Teachers

Association listserv (1,600 subscribers) and the Edmonds Homeschool Resource (130 subscribers). The newsletter is publicized via social media and publically archived at two online locations.

Outcome 3: *Build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission. (Engage and Inspire)*

SMART Goal #6: *To share the excitement and knowledge gained from NASA's missions with the general public; to strengthen collaborative efforts within the consortium as well as with industry, community, and governmental organizations to support NASA and WSGC goals and activities; to provide informal education support resources that use NASA themes and content to enhance participant skills and proficiency in STEM disciplines and inform participants about STEM career opportunities; and to support Washington's museums and science centers in their efforts to engage the public in major NASA events.*

Metric 3.1: Utilize print and electronic publications to generate excitement about NASA's missions, publicize scholarships, fellowships and research opportunities, and foster collaboration among consortium institutions.

Progress to date: Met. In FY2012, the WSGC website was updated at least once a month and logged an average of 2,863 unique visitors a month, a 51% increase in web traffic, with the number of visitors peaking at 4,529 in October and 4,213 in November. The fall upsurge is due to the large number of scholarship and internship opportunities open, plus the popularity of our guide to creating academic posters. We redesigned our YouTube channel and launched the Expanding Frontiers blog, a replacement for our annual print newsletter. The blog allows for more timely dissemination of NASA-related opportunities and higher student and faculty visibility, with links and guest bloggers. NASA-related opportunities are also disseminated to our members and targeted groups (students, alumni, the general public, etc.) via e-mail lists, Facebook, a public calendar of events, and our regular e-letter for educators.

Metric 3.2: Work with informal organizations such as museums to provide at least one relevant science activity each year at a major event or exhibit.

Progress to date: Met. In FY2012, WSGC participated in the Yakama Blast-Off, described in Program/Project Benefit To Outcome 2, and the second annual Yakima Valley Science and Engineering Festival (YVSEF), sponsored by UW, Educational Service District 105, and Heritage University. Both events targeted the needs of underserved communities and were intended to increase interest in STEM careers. Approximately 36% of the Yakima County population is Latino or Hispanic and 5% is Native American; 20% of the population lives below the poverty line. During the YVSEF event, we interacted directly with 422 individuals, primarily students in grades 6-12 and community members; over 50% of the participants were underrepresented minorities. We continued to sponsor and help judge the Washington State Science & Engineering Fair, which draws 500 student competitors in grades 1-12, primarily from rural school districts. Four graduating seniors (three female and one underrepresented minority) received book scholarships for their winning WSSEF entries. Museum of Flight reached 399 in-service teachers through 24 professional development workshops, as well as open houses and

advisory meetings. PSC's Science on Wheels program provided 10 elementary schools, three middle schools and one K-12 school with "science center" experiences, complete with exhibits, classroom lessons and hands-on activities, reaching 4,357 students and 210 teachers in underserved communities. WSGC also funded PSC staff for an additional 75 public planetarium shows. WSGC is a sponsor of the 2013 Seattle Science Festival, organized by PSC, publicizing their events and helping recruit exhibitors. Last year SSF's free Science Expo Day drew 20,000 participants to hands-on exhibits offered by Microsoft, The Boeing Company, several WSGC education members and others.

Metric 3.3: Provide materials for museum and public events that showcase NASA missions at least once a year and regularly publicize NASA-related programs at WSGC museum affiliates via our newsblog, educator e-letter and mailing lists to students. Provide materials for at least one new informal education event.

Progress to date: Met. In FY2012, WSGC provided materials for two new events: the Yakima Valley Science and Engineering Festival and the Yakama Nation Blast-Off (see above). Materials were also distributed at the PSC Astronomy Day; Museum of Flight's Educator Open Houses, Astronomy Night, Curiosity Landing, and Space Day; Roboquest (a free family-focused education event at the 2012 Space Elevator Conference); Expanding Horizons and IGNITE (events that encourage middle school students and girls to pursue STEM careers).

Metric 3.4: Work more closely with consortium members to assure coherence in WSGC programs, to share expertise and resources, and to bring together students and faculty from all institutions to present their research. [Target: One face-to-face meeting annually.]

Progress to date: Met. In FY2012, members collaborated in selecting candidates for internships, advertising student opportunities and events, developing curriculum and other WSGC projects. Our annual fall awards reception and poster session drew participation and/or attendance by students and faculty from a third of WSGC's higher education affiliates, with a display of 54 posters by WSGC student researchers, graduate fellows and interns. Seven WSGC members (UW, WSU, CWU, SU, NWIC, MoF and PSC) also collaborated on two grant proposals in response to NASA's Space Grant Innovative Pilot in Stem Education solicitations. All WSGC affiliate members were offered the opportunity to attend the National Space Grant meeting in Seattle at reduced cost; three attended and of those attending, two presented (NWIC and MoF/WAS). The annual WSGC state planning meeting is scheduled for April 2013.

PROGRAM CONTRIBUTIONS TO NASA EDUCATION PERFORMANCE MEASURES

- **Student Data and Longitudinal Tracking:** Current data for FY2012 show that WSGC made 215 total awards. Of those, 182 were significant awards, including 130 significant awards in the Fellowship/Scholarship category and 52 in the Higher Education/Research Infrastructure category. Of the students who chose to indicate race, 35 are from underrepresented groups. During the FY2012 program year, 103 students took their next step. Of those, 43 are pursuing advanced degrees in STEM disciplines, 6 accepted STEM positions at NASA contractors, 31 accepted STEM

positions in industry, 1 accepted STEM positions in K-12 academia, 10 accepted STEM positions in academia, and 12 went on to positions in non-STEM disciplines. The remaining students have not yet received the degree that they were pursuing when they received their Space Grant awards.

- **Minority-Serving Institutions:** WSGC's tribal college affiliate, Northwest Indian College, received \$30,000 NASA funding and provided matching funds of \$15,000 for scholarships and research projects. NWIC reported that 10 student awards were made with FY2012 funds. Awards were based on a combination of need and merit. All awardees were pursuing Bachelor of Science degrees in Native Environmental Science. Student internships include research in water quality, oceanography, and natural resource management. Also included is travel funding for seven members of the NWIC rocket team to compete in the NASA University Student Launch Initiative (USLI) in April 2013. Students from the previous NWIC Rocket Team presented the results of their experiments at the 2012 Space Grant Awards Reception and Poster Session; their faculty advisor presented on the rocketry program at the National Space Grant meeting. Last summer, three NWIC team members received NASA internships in part due to their team experiences. WSGC continues to seek out ways for its minority-serving institutions to tap into NASA and the state's research colleges while accomplishing our SMART goals of providing opportunities for hands-on research and fostering affiliate partnerships. Heritage University (an HSI located on the Yakama Indian Reservation) has been collaborating with Columbia Basin College (CBC), an HSI community college, on the development of Bachelor of Science degree programs in astronomy, nuclear technology and sustainable energy technology to be offered jointly on the CBC campus, beginning Fall 2013. During the development process, WSGC staff worked with the HU-CBC team to leverage opportunities at NASA and the National Space Grant Foundation toward meeting their goals in this area. Most recently, a proposal submitted by our associate director in response to the Solar System Exploration Research Virtual Institute CAN NNH13ZDA006C includes HU and CBC as key partners and calls for the HU-CBC astronomy team to work in conjunction with the Alliance for the Advancement of Science Through Astronomy (AASTA) to upgrade the Pacific Northwest Research Observatory to allow for remote control observations; HU-CBC students and faculty would then conduct spectroscopic observations of near-Earth asteroids, thereby increasing student research opportunities.
- **NASA Education Priorities:** In FY2012, WSGC accomplishments relate to the following "Current Areas of Emphasis" stated in the 2010 Space Grant solicitation:
 - Authentic, hands-on student experiences in science and engineering disciplines — experiences rooted in NASA-related, STEM issues — were supported through student research programs on member campuses, at NASA centers and in private industry = 103 awards to 82 students; development and support of 1 undergraduate course = 51 students; and 2 student competition = 16 students (Objectives 1.9, 1.10, 1.11, 1.12, 1.13 and 1.14). These were also supported through teacher professional development = 554 in-service teachers and the WAS program = 159 students (Objectives 2.1, 2.3 and 2.4).

- WSGC supports diversity of institutions through the membership of 2 minority serving institutions (HU and NWIC) and 2 community colleges (SCCC and NSCC) and through faculty and WSGC representatives = 20 female and 2 underrepresented minorities. WSGC also supported diversity by meeting specific metrics for participation by women and underrepresented minorities in scholarships and fellowships, research and higher education programs = 104 total female participants (92 significant awards) and 38 underrepresented minority participants (35 significant awards). (Objectives 1.1, 1.2, 1.3 and 1.14).
- WSGC engaged middle school teachers in hands-on curriculum enhancement capabilities through short- and long-duration workshops provided by NCESD = 13 workshops/226 in-service teachers; research experiences for pre-service teachers = 7 pre-service teachers; and through participation in professional STEM/NASA-related conferences = 5 in-service teachers. (Objectives 2.1, 2.2 and 2.4).
- Providing summer opportunities for secondary students on college campuses was accomplished through our participation in the WAS program's summer residency, which targets high school juniors = 159 students. (Objective 2.3).
- WSGC sustained and strengthened its relationships with community colleges through scholarships and student research opportunities = 22 students (Objectives 1.4, 1.6, 1.9, 1.12 and 1.14).
- Aeronautics research was supported through scholarships and fellowships = 10 students; internships on campus, in private industry and at NASA Centers = 14 students; 1 courses = 51 students; and 2 student competition = 16 students (Objectives 1.4, 1.5, 1.6, 1.9, 1.10, 1.12, 1.13, and 1.14).
- Research in environmental science and global climate change is supported through fellowships, scholarships and internships = 47 students (Objectives 1.4, 1.5, 1.6, 1.9, 1.12, 1.13, and 1.14).

IMPROVEMENTS MADE IN THE PAST YEAR

WSGC has consistently awarded scholarships and research internships at the enrollment percentage for underrepresented minorities in our state (currently 14.7%). However, over the past two years, we have struggled to meet our enrollment goal of 17%, set in 2010. In FY2012, we focused on a multi-pronged approach to increase diversity across the Consortium, with a special focus on strengthening the STEM education pipeline on tribal lands within the state and in central Washington, an underserved area with a high Hispanic/Latino population. Most of these efforts have been outlined above: NCESD professional development and new curriculum; PSC's Science on Wheels visits to underserved communities; the Yakama Blast-Off, Yakima Valley Science and Engineering Festival and other public outreach; and increased LSAMP collaboration. In FY2012, each higher education affiliate either increased its number of underrepresented minority students receiving Space Grant awards or participated in recruiting/enrichment activities targeted at underserved communities. As a result, 19.2% of WSGC scholarships and research internships in FY2012 went to underrepresented minority students, based on the number of the students who chose to indicate race.

Additionally, four grant proposals were submitted that seek to further increase STEM participation by underrepresented minorities: one collaboration to improve STEM retention rates in the first two years of college and one to increase participation in K-12 STEM teaching (NASA's Space Grant Innovative Pilot in Stem Education, see Metric 3.4); one to increase student research opportunities and research infrastructure at Washington HSIs (Solar System Exploration Research Virtual Institute CAN NNH13ZDA006C, see Minority Serving Institutions above); and one collaboration between WSGC and the Mathematics, Engineering, Science Achievement (MESA) program to support STEM students at the University of Washington (NSF 12-529).

In FY2012, WSGC also increased its level of contributions to the national network by hosting the Fall 2012 National Space Grant meeting in Seattle. At that meeting, WSGC Director Robert Winglee was elected to the National Space Grant Foundation Board of Directors for a term expiring December 31, 2015.

PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

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

Higher Education

- *University of Washington*, the lead institution, is a major research university and receives over \$1 billion annually in research grants and contracts.
- *Central Washington University*, a public university serving Central Washington, with 20% of its recent incoming classes being students of color (largely Hispanic/Latino).
- *Heritage University*, 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 Community College* (SCCC), an urban 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 largest ESD in the state, 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.

- *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, Eagle Harbor Technologies, and Tethers Unlimited, Inc; partner Woodruff Scientific, Inc. is focused on new energy technologies. Educational partners are North Seattle Community College (NSCC), a two-year college serving north Seattle and the neighboring suburbs and Eastern Washington University, a regional public university serving Eastern Washington.