

Washington NASA Space Grant Consortium
University of Washington
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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 2011.

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 After WSGC's annual meeting in 2010, physics professors Tom Fleming of Edmonds Community College and Michael Jackson of Central Washington University discussed ways to increase research opportunities for students on their home campuses, especially community college students. The result is a unique collaboration in which students from both schools receive WSGC stipends while conducting research through CWU's far-infrared laser laboratory. This project now serves as a model for cross-consortium collaboration. In the past two years, seven student researchers have participated in experiments on both campuses. Thus far, three articles co-authored by CWU and EdCC students, including one on the discovery of a new laser medium, have been accepted for publication in the IEEE Journal of Quantum Electronics.

OUTCOME #2: EDUCATE AND ENGAGE. In 2011, an experiment designed by the astronomy and biotechnology students at Seattle's Ballard High School was selected as one of only 16 student projects to fly aboard the Space Shuttle Endeavor. This rare educational opportunity was offered through the Student Spaceflight Experiments Program, a national project to place student work on the last Space Shuttle flights. The students wanted to compare how E. coli cultivated in space varied from bacteria cultivated on Earth. WSGC provided critical funding and researchers from the world-renowned Institute for Systems Biology advised students and teachers on their experiment's design. Ballard classes will analyze the frozen bacteria for mutations and other flight impacts for years to come.

OUTCOME #3: ENGAGE AND INSPIRE Roving Mars was developed last summer by WSGC as an engaging, hands-on informal education activity for all ages that would promote STEM literacy and awareness of the discoveries made by the NASA MER missions and the Phoenix Mars Lander. Participants acting as ground control are given limited time to drive a model rover through an obstacle course of simulated Martian rocks and reach one of the discovery flags, guided only by what they can view on computer through a camera mounted on the rover. Each flag represents a mission discovery, such as the evidence of liquid water found in Eagle crater. The activity also spurs discussion of the engineering challenges of the missions. Roving Mars was successfully beta-tested at a Pacific Science Center (PSC) Scientist Spotlight in early August. Space Grant volunteers then staged the activity at the 2011 Space Elevator Conference on the Microsoft campus and at PSC's Polar Science Weekend, reaching approximately 1,150 participants.

PROGRAM ACCOMPLISHMENTS

Outcome 1 Objectives: Higher Education contributions to the Development of STEM Workforce – Educate and Employ

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: Partially met. Of the 170 significant awards for scholarships and research internships in FY2011, 16.5% went to underrepresented minority students, based on the number of the students who chose to indicate race. While this is fractionally less than our goal of 17% enrollment, it exceeds the enrollment percentage for underrepresented minorities in our state (14% according to the most recent enrollment data from the National Center of Education Statistics Digest). Of the 1,083 students who were enrolled in our higher education courses, 9.2% identified as underrepresented minority students, a decrease from last year but well above our target of matching UW College of Engineering's 8.3% underrepresented minority enrollment for 2011.

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 48.1% of our 154 significant awards to undergraduates for scholarships and research internships. Enrollment of women in our higher education courses was 26%, a slight decrease from 2010 but still significantly higher than the 22.8% enrollment of women in the UW College of Engineering in 2011.

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 FY2011, WSGC awarded 84 significant undergraduate scholarships at six affiliate institutions: 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 FY2011, WSGC awarded 14 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 FY2011, WSGC awarded six scholarships to Seattle Central Community College students and four to UW transfer students, representing alumni from four other community colleges (South Seattle, Green River, Tacoma and Everett CC). Our transfer scholarship program is one of only three UW scholarship programs targeted at 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: Not met. Of the students who received significant support, were successfully tracked, and took their next steps in FY2011, 92% remained in STEM fields. This is a 5% decrease from the retention percentage reported for FY2010. However, the number of students who reported taking a next step in FY2011 increased nearly fivefold, from 35 to 167, with the number of students reported entering a non-STEM field increasing from 1 to 14. 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. In FY2011, WSGC continued its partnership with the National Space Grant Foundation to locate and track alumni from all of our higher education institutions. NASA requires tracking of all significant award recipients after 2005 and we have achieved 95% compliance in this group. In an effort to ascertain more accurately the next step taken by our awardees after graduation, we have also attempted to track alumni from previous years as well. By 2011, 60.5% of our alumni (1997-2011) had updated their tracking record to their next step at least once; 40% actively participate in the tracking system. We also continue to foster ongoing contact with our alumni through NASAAlumni, a listserv used for distributing alumni news and career opportunities, and through Facebook. We plan to establish a LinkedIn presence by the end of 2012.

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 60 significant research awards (95 total awards) to undergraduate students at nine academic affiliates (UW, CWU, NWIC, SCCC, SU, UPS, WWU, Whitman, and Whitworth).

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 FY2011, we awarded three new WSGC summer internships at Eagle Harbor Technologies and one at Tethers Unlimited Inc. We also worked with Aerojet-Redmond, a traditional partner in our summer internship program, to secure outside funding through NASA ESMD for four summer interns recruited through the WSGC Private Industry program.

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

Progress to date: Met. All industry partners sent representatives to the WSGC annual reception and poster session. Tim Ziembra, president of Eagle Harbor Technologies, presented the awards for participants in summer internships in private industry and at NASA centers. WSGC leadership continues to collaborate with Eagle Harbor Technologies 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.

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: Met. In FY2011, six students from three WSGC higher education affiliates received partial funding to participate in research internships at NASA Centers. Awardees included one underrepresented minority student and an alumna of NASA's National Community College Aerospace Scholars program.

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 FY2011, UW ESS 102 (Space & Space Travel) was offered in Spring, Fall and Winter Quarters; ESS 495 (NASA Science and Engineering Research Seminar) was offered in Spring Quarter. Enrollments were 661 and 335 respectively. ESS 472/575 (Rockets and Instrumentation) was offered Fall and Winter Quarter, with an enrollment of 46.

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 PART Measures: Minority-Serving Institutions, WSGC supported six NWIC students conducting environmental science and global climate research. We facilitated the partnership between CWU and EdCC, as described earlier, and supported the placement of six students in the SCCC Undergraduate Research Experiences (SURE), which aims 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 Objectives: Elementary and Secondary Schools attract and retain students in STEM Disciplines – Engage and Educate.

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, 22 professional development workshops have taken place, reaching 281 in-service teachers. The North Central Educational Service District conducted 20 professional development 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 FY2011 Space Grant funding to strengthen pedagogical and science content knowledge (including unit-specific strategies for English language learners) among teachers in kindergarten and grades 1, 4 and 5, with 11 of their 19 short-duration workshops aimed at this group. Additional professional development workshops were offered through Pacific Science Center and Museum of Flight.

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

Progress to date: Met. Nine 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 FY2011, we 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 2011 summer residency at the Museum of Flight. Last

summer, 159 students attended the residency; in November 2011, 297 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 continues to support professional development and entries into NASA team competitions at Key Peninsula Middle School, the state's first NASA Explorer School. In FY2011, we co-funded the attendance of five KPMS teachers at a summer workshop on space-related topics and the hiring of substitute teachers so two KPMS educators could conduct in-flight research with NASA's Reduced Gravity Flight Opportunities Program.

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 FY2011, the WSGC e-letter reached 935 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 archived and available to the public at two online locations.

Outcome 3 Objectives: Informal Education – Build Strategic Partnerships and Linkages.

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 FY2011, the WSGC website was updated at least once a month and logged an average of 1,470 unique visitors a month, with the number of visitors peaking at 2,599 in February 2012 when the largest number of internship opportunities were open to applications. In the past, this metric also included publication of an annual print newsletter. In January 2012, we reviewed our publication strategy in light of evolving technology, applicant feedback and current budget constraints. We concluded that the print newsletter should be replaced by a news blog, to be launched no later than July 30, 2012. We will continue to relay NASA-related opportunities 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 FY2011, WSGC participated in Roboquest, a free family-focused, informal education event offered the last afternoon of the 2011 Space Elevator Conference. Utilizing the new Mars Rover activity described earlier, we reached approximately 150 members of the general public. We continued to collaborate with UW's Applied Physics Laboratory on its three-year E/PO proposal to NASA's Science Mission Directorate for support for Polar Science Weekend at the Pacific Science Center (PSC). Over two days, the WSGC exhibit highlighted STEM careers, Mars missions, and information regarding NASA and Space Grant-sponsored opportunities for Washington state students. Approximately 1,000 significant contacts were made. Outside Seattle, the PSC's Science on Wheels program provided 11 elementary schools and two middle schools in underserved areas with "science center" experiences, complete with exhibits, classroom lessons and hands-on activities, reaching 4,873 students and 122 teachers. We also became a sponsor and judge of the Washington State Science & Engineering Fair, which draws approximately 500 student competitors in grades 1-12, primarily from rural school districts. Our support of Heritage University's informal education efforts on the Yakama Indian Reservation is detailed in Minority-Serving Institutions, under Program Contributions to PART Measures. Additional informal education collaborations are listed below under Metric 3.3.

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 newsletter, educator e-letter and mailing lists to students. Provide materials for at least one new informal education event.

Progress to date: Met. In FY2011, WSGC provided materials to two new events: Roboquest and the Washington State Science & Engineering Fair, both described above. Materials were also distributed at the Museum of Flight's Educator Open Houses, Astronomy Night, NASA Climate Day, NASA Future Forum, Women Fly! and Space Day; PSC's Polar Science Weekend; Expanding Horizons and IGNITE (events that encourage middle school students and girls to pursue STEM careers). Materials were also provided to the Louis Stokes Alliance for Minority Participation (LSAMP) regional conference at Oregon State University. Materials include posters, lithographs and STEM career information, as well as CDs and DVDs such as Journey to the Stars, and NASA curriculum packets (for homeschool families and teachers).

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 FY2011, 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 more than half of WSGC's higher education affiliates, with a display of 75 posters by WSGC student researchers, graduate fellows and interns. A statewide planning meeting for WSGC partners and members was held October 16 on the University of Washington's Seattle campus. In

December, representatives from seven member and partner institutions also participated in the NASA Future Forum at the Museum of Flight.

PROGRAM CONTRIBUTIONS TO PART MEASURES

- Student Data and Longitudinal Tracking: Current data for FY2011 show that WSGC made 205 total awards. Of those, 170 were significant awards, including 98 significant awards in the Fellowship/Scholarship category and 72 in the Higher Education/Research Infrastructure category. Of the students who chose to indicate race, 28 are from underrepresented groups. During the FY2011 program year, 167 students took their next step. Of those, 69 are pursuing advanced degrees in STEM disciplines, 3 accepted STEM positions at NASA contractors, 59 accepted STEM positions in industry, 10 accepted STEM positions in K-12 academia, 12 accepted STEM positions in academia, and 14 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.
- Diversity: WSGC is composed of 14 members and 8 partners. These include 4 community colleges, 1 tribal college and 1 four-year Hispanic-serving institution (HSI). WSGC benefits from the diversity of its leadership and staff. The director is of Asian descent, while the 3 associate directors are Caucasian women. Of the affiliate representatives (excluding the WSGC director and associate directors), 15 are men (1 African American and three other persons of color) and 6 are women (5 Caucasian and 1 person of color). Of the faculty, 19 were women, 3 men were from underrepresented groups, and 1 man reported a disability. Of the student awardees, 93 were women (78 significant awards) and 30 were members of underrepresented minority groups (28 significant awards).
- Minority-Serving Institutions: WSGC's tribal college affiliate, Northwest Indian College, received \$20,000 NASA funding and provided matching funds of \$5,000 for scholarships and research projects. NWIC reported that 12 student awards were made with FY2011 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 and oceanography and mentoring high school students in ecosystems and general science through tribal summer academies. Students from the NWIC Rocket Team presented the results of their experiments at the 2011 Space Grant Awards Reception and Poster Session; the students also displayed their work at the NASA Future Forum in December. WSGC continues to concentrate on developing 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) hosts a Mathematics Engineering Science Achievement (MESA) chapter called MESA-First Nations, which partners with two local high schools and a middle school to provide afterschool tutoring in math and science and out-of-school informal education programs in STEM disciplines. The school also hosts the Environmentors

program, an NSF-sponsored program that provides high school students with intensive original research experiences in environmental science. In FY2011, WSGC provided \$5,000 funding for an HU undergraduate student to conduct STEM research and participate in these outreach efforts. In September 2011, WSGC staff traveled to Eastern Washington to meet with HU faculty and faculty from Columbia Basin College (CBC), an HSI community college. HU and CBC are collaborating on the development of Bachelor of Science degree programs in astronomy, nuclear technology and sustainable energy, to be offered jointly on the CBC campus, beginning in autumn 2012. Since the meeting, we have worked with the HU-CBC team to leverage opportunities at NASA and the National Space Grant Foundation toward meeting their goals in this area. For example, we recently advised them on a proposal to host live interactive conversations between HU/CBC students and astronauts aboard the International Space Station.

- NASA Education Priorities: In FY2011, 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 = 72; development and support of 1 undergraduate course = 46 students; and 1 student competition = 12 students (Objectives 1.9, 1.10, 1.11, 1.12, 1.13 and 1.14). These were also supported through teacher professional development = 281 in-service teachers and the WAS program = 159 students (Objectives 2.3 and 2.4).
 - WSGC engaged middle school teachers in hands-on curriculum enhancement capabilities through short- and long-duration workshops provided by NCESD, Pacific Science Center and the Museum of Flight = 22 workshops/71 in-service teachers; research experiences for pre-service teachers = 8 pre-service teachers; and through participation in national STEM conferences and NASA-sponsored competitions = 7 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 = 17 students (Objectives 1.4, 1.6, 1.9, 1.12 and 1.14). As noted in Program Benefit to Outcome 1, WSGC supported a student research program linking CWU and EdCC. Through Heritage University, WSGC initiated a new relationship with Columbia Basin College (see Minority Serving Institutions above).
 - Aeronautics research was supported through scholarships and fellowships = 4 students; internships on campus, in private industry and at NASA Centers = 22 students; 1 course = 46 students; and 1 student competition = 12 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 = 49 students (Objectives 1.4, 1.5 1.6, 1.9, 1.12, 1.13, and 1.14).
- WSGC supports diversity of institutions through the membership of 2 minority serving institutions (HU and NWIC) and through faculty and WSGC representatives = 25 female, 4 underrepresented minorities and 1 with disabilities. WSGC also supported diversity by meeting specific metrics for participation by women and underrepresented minorities in scholarships and fellowships, research and higher education programs = 93 total female participants (78 significant awards) and 30 underrepresented minority participants (28 significant awards). (Objectives 1.1, 1.2, 1.3 and 1.14).

IMPROVEMENTS MADE IN THE PAST YEAR

For several years, WSGC has sought out new ways to create additional opportunities for students at community colleges and minority-serving institutions to participate in meaningful, hands-on research in NASA-related fields. This has been especially challenging outside of Seattle. The collaborative model created by the affiliate representatives from CWU and EdCC offers a solid template that can be adopted by other WSGC members and partners. At our last statewide meeting, representatives from HU and Whitman College, which are located less than 120 miles apart in central Washington, discussed how they could collaborate on similar programs to broaden participant diversity and summer research opportunities for their students. In FY2011, HU appointed a new affiliate representative who has also proposed collaborations to strengthen the K-12 pipeline for underserved, underrepresented students in their community, as noted above.

WSGC's decision to discontinue printing an annual newsletter in favor of increased use of electronic media is anticipated to save approximately \$4,000 a year. Applications for programs such as scholarships will continue to be printed and mailed to a targeted audience of educators and students. WSGC has a strong online presence through its redesigned website and Facebook page. We are currently updating our YouTube channel and will be adding a LinkedIn page this summer. Many students are now blogging as part of their research experiences. The change from print newsletter to blog will allow for more student visibility, either through links or guest bloggers, making it a stronger recruiting tool.

PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

WSGC is comprised of 14 member institutions and eight 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 a main campus in Ellensburg and seven off-site centers at community colleges.
- *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 Edmonds Community College (EdCC), Everett Community College (EvCC), North Seattle Community College (NSCC), all two-year colleges serving north Seattle and the neighboring suburbs; and Eastern Washington University, a regional public university serving Eastern Washington.