

19. The PINEMAP Undergraduate Fellowship Program: Integration Across Boundaries

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The PINEMAP Undergraduate Fellowship Program engages the public through fellow presentations to local, public secondary school teachers and students as they learn about forest resource science and climate issues. The program also builds capacity for greater integration across geographical and disciplinary boundaries as undergraduate fellows work with graduate students, staff, and principal investigators who may share similar and/or diverse interests within climate and forest science.

Outreach programs are critical to making research available and relevant to society. The PINEMAP Undergraduate Fellowship Program is a highly integrative education and outreach component of the PINEMAP project that brings together principal investigators, graduate students, and undergraduate students (Figure 19.1). This vertical integration offers the potential for each participant to be exposed to a variety of research interests, skillsets, and learning experiences. Undergraduates from across the southeastern United States are hired as wage employees of Virginia Tech, earning up to \$7,000. These undergraduate fellows are paired with graduate student researchers at PINEMAP's collaborating universities. The program includes an intensive, distributed (i.e., students go to different sites) summer research internship followed by a distance-delivered education course undergraduate fellows take to learn science communication skills and develop and teach lessons on natural resources and climate change issues directed toward public secondary school students.

The structure of the program allows it to bridge some of the gaps between disciplinary research groups and geographic regions. In the program's first year, most applicants came from PINEMAP institutions and departments, but the second year of the program saw greater diversity among the undergraduate fellows' home universities (e.g., Kansas State University, Virginia State University, and University of West Florida) and degree programs (e.g., geography and microbiology). The fellows in the second year were also distributed across a larger diversity of disciplines and collaborating institutions than the pilot year (Figure 19.2). This fellowship provides undergraduate students the opportunity to experience working in a setting outside of their home universities and, frequently, outside of their majors. Fellows carry these new research interests and learned education and communication skills back to their home universities where, as part of the distance course, they develop interactive STEM (science, technology, engineering, and math) or social studies lessons directed toward secondary school students. In the first two years of the program, 17 undergraduate fellows reached more than 3,600 secondary school students (Table 19.1).

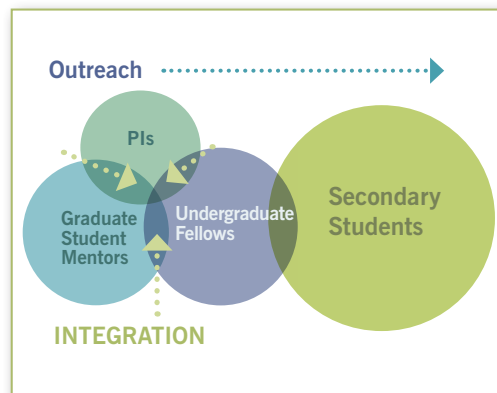


Figure 19.1. Basic conceptual model of the PINEMAP Undergraduate Fellowship Program's integration of principle investigators, graduate student and staff mentors, and undergraduate fellows, the last of which provide outreach about PINEMAP research to local public secondary school students.

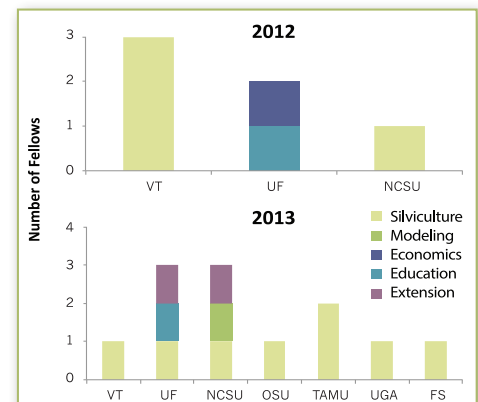


Figure 19.2. Distribution of 2012 and 2013 undergraduate fellows among PINEMAP's collaborating institutions and disciplines.



Graduate student mentor Elizabeth Wilson (left) and undergraduate fellow Madison Wigley (right) record pine needle fascicle lengths in a greenhouse experiment at Texas A&M University. Photo by Ayumi Hyodo.

“The mentor experience builds my ability to direct and motivate people... my communication skills... [my] ability to manage time and arrange tasks effectively... and [my] confidence and competence of being a good mentor”

—CHRISTINE LI, 2013 GRADUATE STUDENT MENTOR

Outreach metric	2012	2013	TOTAL
Fellowships completed	5	12	17
Presentations delivered	54	107	161
Schools visited	14	25	39
Teachers visited	29	40	69
Students reached	1,060	2,629	3,689

Table 19.1. Individuals reached through the PINEMAP Undergraduate Fellowship Program.

The fellowship program is committed to providing opportunities to a diverse set of undergraduates. PINEMAP has integrated historically black colleges and universities into the project by partnering with three 1890 land grant institutions. Five of 18 undergraduates came from Virginia State University, Alcorn State University, or North Carolina Agricultural and Technical State University. The opportunities and education this program offers are significant not only for minority students but for all undergraduate fellows. Fellows visit other universities for the summer to experience life as an undergraduate researcher in an alternative setting that provides new experiences and lasting memories. Leaving their home campuses for the summer, often to travel to other states, is a big step for many undergraduate students. Interactions with other students during program meetings and the fall distance course provide fellows with exposure to different ideas and research. The impact of this fellowship is evident from the statement of a graduate student mentor, Shelby Krantz, who reflected on her minority mentee, “She gushed about how much she had learned and wanted to change in her life now because of what she knew about climate change and forestry.”

Similar to the interns (fellows), graduate student mentors have varied backgrounds and levels of experience with guiding students through work and research activities. Approximately half of the graduate student mentors had never before been in a position to work with an apprentice, and they recognized this as an opportunity to gain and practice skills in mentorship, organization, and communication. Graduate student mentor Christine Li noted, “The mentor experience builds my ability to direct and motivate people... my communication skills... [my] ability to manage time and arrange tasks effectively... and [my] confidence and competence of being a good mentor”

Another mentor, Adam Maggard, similarly reflected: “It was my first time mentoring a student and [I] gained a lot [from] the experience. As a Ph.D. student, communication and management are going to likely play significant roles in my future, and the experience gained from teaching, communicating, and leading throughout the process was priceless.”

Additionally, during the summer, fellows begin planning public school lessons with help from their mentors. As mentors in this process, graduate students learn to consider how their research can be used to reach audiences not trained in their disciplines. Integrating graduate students in this fellowship program may allow them to improve their transition into mentoring undergraduates and others as they begin careers as postdocs, faculty, or research professionals.

As the program enters its third year, we are striving for additional representation from institutions outside of PINEMAP. We are offering funding for up to 18 undergraduate fellows, providing a greater number of opportunities for integrating PINEMAP’s interdisciplinary research with educational experiences and a greater number of educational experiences for secondary public school students near all of the colleges and universities represented in this program.