



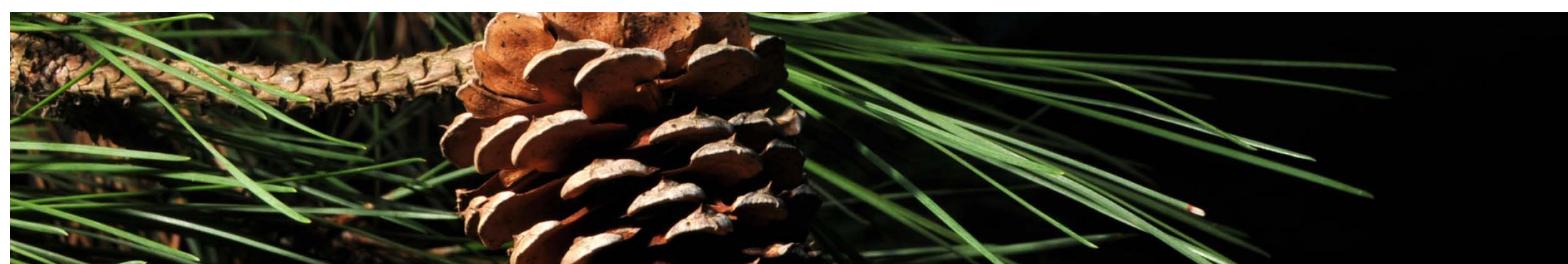
# Undergraduates using climate and forest ecosystem issues to engage secondary school students

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**ABSTRACT:** Preparing and enhancing communication skills of natural resource professionals is one means of addressing the need to promote awareness of and interest in forest resources and social issues involving forest ecosystems. The Pine Integrated Network: Education, Mitigation, and Adaptation Project (PINEMAP) Undergraduate Fellowship Program is a novel undergraduate research experience that addresses this need by combining a summer research internship with a fall course in education and communication. This fellowship not only prepares undergraduates for graduate studies in forest resource disciplines, but it also allows public secondary school students the opportunity to learn about forest resources and climate issues from an undergraduate researcher. The first half of the distance course covers principles of interpersonal communication and preparation of lessons later delivered to targeted secondary school classes. The second half involves preparation of scientific communications of students' summer research. In 2012, the first cohort of five fellows reached 1,060 secondary school students. Students that completed the end of course survey reported an improvement in oral and written communication skills as well as a greater ability to think creatively. The 2013 cohort of 12 fellows began the distance course in August.



## INTRODUCTION

Promoting awareness of forest resources and climate change impacts to the general public depends on professionals well-versed in communicating with a variety of audiences. The PINEMAP Undergraduate Fellowship Program is a unique, distributed research experience for undergraduates (REU) that is part of a coordinated agriculture project researching climate change effects on southeastern pine forests. This REU places undergraduates with graduate student mentors at a PINEMAP institution for a summer internship followed by a distance education course (Figure 1).

## PROGRAM OBJECTIVES

1. Engage fellows in research and teaching
2. Develop and deliver inquiry-based science lessons
3. Convey value and relevance of southern forests and climate change

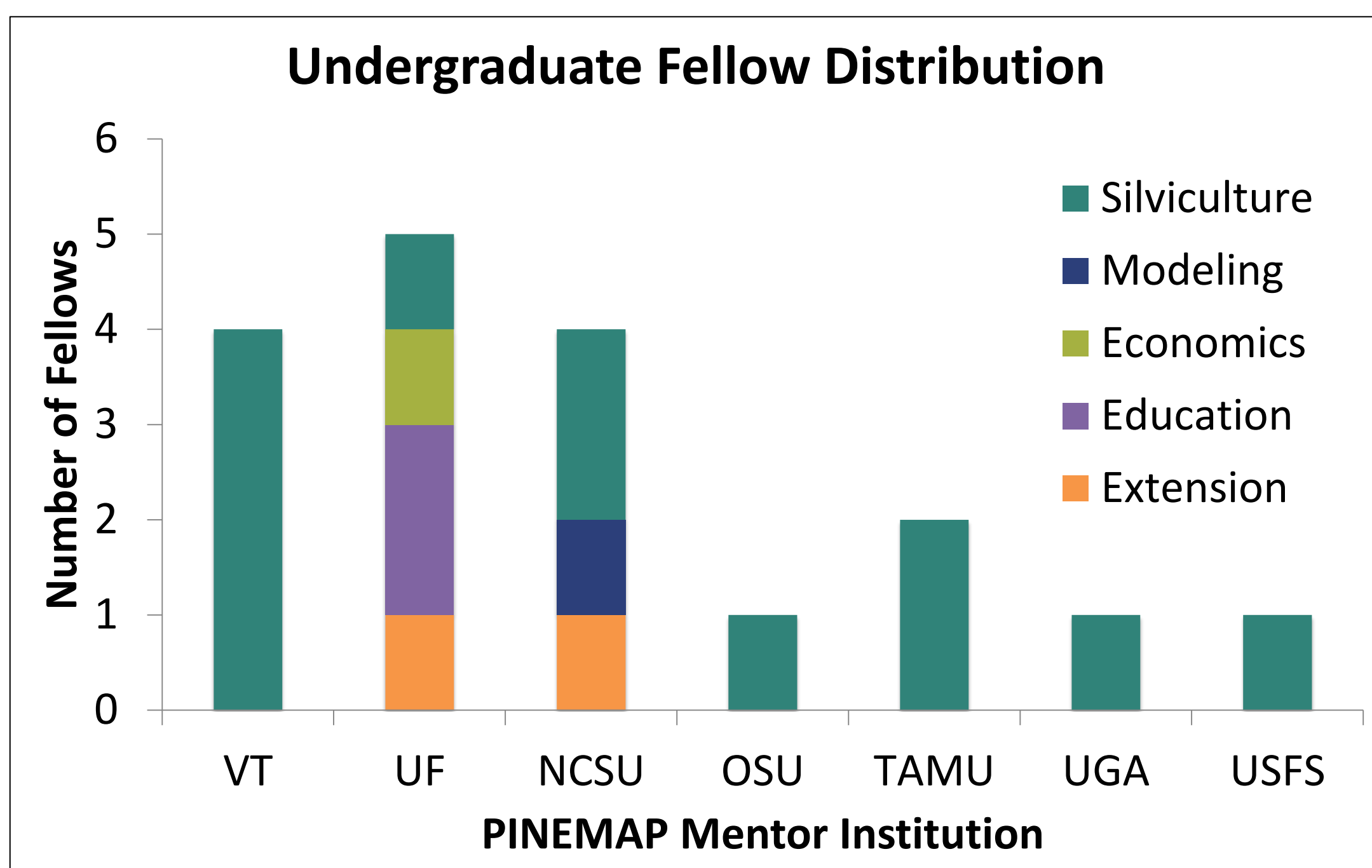


Figure 1. Total distribution of 18 undergraduate fellows across PINEMAP research disciplines and partner institutions for summers of 2012-2013.

## COURSE DESCRIPTION

Undergraduates return to their home university and participate in a mostly synchronous, **distance-based course** for three, letter-graded semester credits. The course is conducted by staff at Virginia Tech, but students register for independent study hours that may be substituted for public speaking or other similar course dependent on home university policy. Course content includes presenting educational lessons and developing scientific communications (Figure 2). Host secondary school teachers evaluate students' presentations for constructive feedback and as part of final grades.

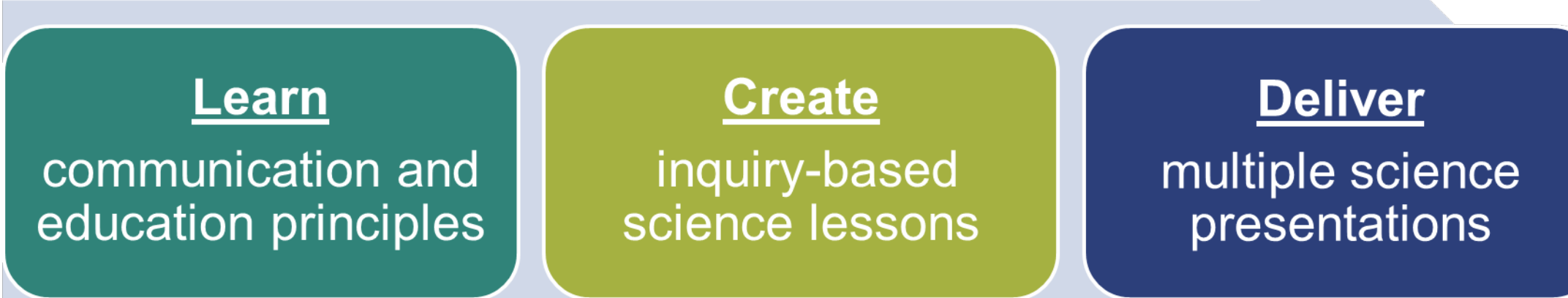


Figure 2. Diagram showing the process students go through to develop and deliver presentations that function as PINEAMP education and outreach.



Figure 3. Will Kennerley (far right), a 2012 PINEMAP fellow, demonstrates how forests can impact atmospheric CO<sub>2</sub> levels to a high school biology class in Southwest Virginia. Will used a small scale terrarium "forest" and CO<sub>2</sub> gas analyzer to track changing CO<sub>2</sub> levels. Photo by April Addington.

## STUDENT PRESENTATIONS

The perhaps most important course component occurs when **students provide outreach for PINEMAP** by presenting to 10 public secondary school classes. After many practice sessions students coordinate visits with nearby school teachers. Students give lessons including **activities that reinforce the message** related to forest resources, climate change, and PINEMAP research. For example, one presentation utilized a terrarium and an infrared gas analyzer to show the process of photosynthesis decreasing atmospheric CO<sub>2</sub> and respiration increasing atmospheric CO<sub>2</sub> (Figure 3).

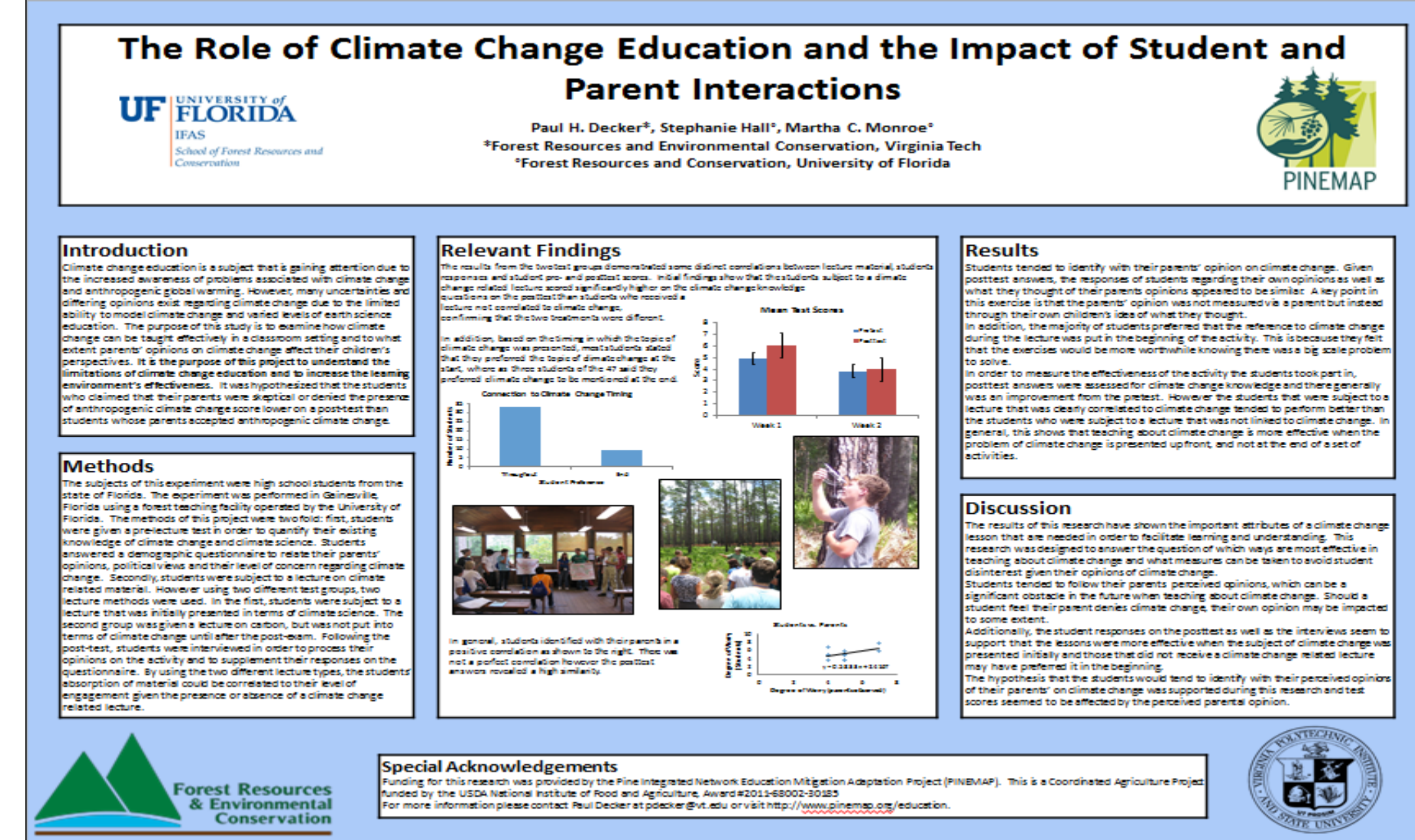


Figure 4. Research poster created by a student researcher in the PINEMAP Undergraduate Fellowship Program during the 2012 pilot year.

## RESEARCH COMMUNICATIONS

The second half of the distance class ties students' summer research together with presentation skills as students develop scientific abstracts, posters, and slide presentations (Figure 4). These are **skills useful in communicating research** in future undergraduate and graduate studies. Posters can be displayed at the PINEMAP annual meeting the following spring.

Table 1. Individuals reached through the 2012 fellowship program.

Outreach metric	Number
Fellowships completed	5
Presentations delivered	54
Schools visited	14
Teachers visited	29
Students reached	1,060

## PROGRAM OUTCOMES

- Five of the six students in the pilot program successfully completed the fall course.
- All 12 students in the 2013 cohort are on track to finish.
- Last fall, **1,060 secondary students were reached** through this program (Table 1).
- We expect this number to double for fall 2013.

School teachers that provided written feedback were appreciative of this unique opportunity. Students that participated in a post-course survey **identified increases in oral and written communication skills**, and they also indicated the usefulness of the research-oriented communication assignments.

Future program evaluation research will examine in greater depth how this program is meeting its objectives.

"These assignments were great, because they are a good practice for graduate school. Both the internship and these assignments in the fall helped me to gain an insight as to what graduate school is all about." – 2012 fellow



Find us on the web at <http://www.pinemap.org/education/undergraduate>



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