



# Growing our roots: Climate science in secondary schools

Troy White ([pwhite@uidaho.edu](mailto:pwhite@uidaho.edu)) UI, Kattlyn Wolf UI, and Jodi Johnson-Maynard UI

Finding ways to get climate science into secondary classrooms has presented a challenge to researchers, due to teachers' limited knowledge of the subject. Research across the region has suggested the need for curriculum and focused teacher in-service training directed at climate science literacy. To meet this need,

## IMPACT

A curriculum that allows teachers to increase both climate science literacy and agricultural literacy will make students in the region more globally aware and productive members of society.

we have developed an interdisciplinary curriculum that focuses on the use of agriculture as a context for teaching students about both agriculture and climate science. To help teachers better understand the new curriculum

and the climate science embedded in it, we have offered professional development in-service courses each summer starting in 2012. A handful of REACCH teachers attended the first in-service

training, which was grouped with ICE-NET, a University of Idaho climate literacy project in its final year.

In 2013, 18 teachers attended the first solo in-service training, and 8 high school teachers applied their experience to their own classrooms by piloting the first three REACCH curriculum units. Students and teachers alike took attitudinal questionnaires based on the Global Warming's Six Americas survey, which Harvard has been conducting for more than eight years. Students at each of the eight pilot high schools took this survey both before and after instruction. The surveys were supplemented by exit interviews with teachers to determine how the teachers felt about the quality of the curriculum and the receptiveness of the students to an agriculturally based climate literacy curriculum.

Teacher comments reflected two key findings. First, the curriculum was received positively in every school, and second, the students both gained knowledge and enjoyed the units of instruction. Teachers reported that their students related well to the



**Figure 1.** Agricultural and natural science teachers learned how to collect weeds and pests in wheat fields in Pendleton, OR, July 2014. Despite the high temperatures, they collected more than 30 species for identification and preservation. Photo by Leigh Bernacchi.



locally relevant curriculum, and could often provide correct examples from their own observations of how agriculturalists were adapting to the changing climate and modifying their production practices.

One component of the curriculum appreciated by teachers was the scientific readings provided for each unit. Teachers are trying to create new curriculum that ties their content area to the Common Core state standards. These standards were adopted in the Pacific Northwest (PNW) over the past two years, with increasing levels of accountability over three years and full accountability beginning in the 2014-15 school year. The English and Language Arts standards require teachers of all disciplines to have their students read technical and scientific publications of varying levels of complexity throughout their courses. The REACCH units all included at least three technical documents tied to the content of the units for teachers to use with their classes. Teachers reported that these readings were grade appropriate, and several were technical enough to really challenge their students. One teacher reported that she had successfully partnered with the Language Arts teacher at her school to use the readings in both classes to enhance the relevance of the agriculture curriculum for her students.

Student evaluations of the content showed gains in agricultural knowledge; however, attitudinal statements relating to climate science showed mixed results. The climate science covered in the soils, water, and erosion lessons was indirect in its application. The overall curriculum has units specifically on the changing climate, ecological processes, and economic impacts of climate change on agricultural production across the region. These units were not piloted as a complete curriculum, and so it was expected that students receiving only 3 of the 10 units would not demonstrate a full understanding of climate science. Because of this limitation, teacher interviews have provided the data relat-



**Figure 2.** Teachers Lynique Oveson and Brian Wolf collected weed species for preservation. They marked each weed with their GPS units. Incorporating live specimens with technology brings together multiple scientific techniques and gives the students a lot to do. Photo by Nicole Ward.

ing to the impact of the curriculum on student attitudes related to climate change. All of the teachers in the pilot group reported that their students were more receptive to climate science because of their interaction with the REACCH units. Student attitudes in one school were actually more positive toward the reality of climate change than those of their teacher.

Teachers in the region have not taught units on climate science in the past. Providing teachers with both a curriculum and in-service opportunities to become familiar with the science have proven beneficial for both REACCH and the pilot teachers. REACCH is currently piloting the next three units of the curriculum with 21 teachers spread across ID, OR, and WA. The pilot will continue in the summer of 2015 with the final units of the curriculum. The modified complete curriculum will be released in the spring of 2016 to help teachers meet the needs of high school students across the region.



**Figure 3.** To understand the end of the wheat production process, the teacher workshop attendees were able to visit the Pendleton Flour Mill. This mill produces many types of flour for well-known brands and local restaurants, using regional wheat. Photo by Leigh Bernacchi.