1. Name, Rank, Department/School/Unit, College/Unit.
Rebecca Ostertag, Biology and TCBES/Natural Sciences Division/College of Arts and Sciences

2. Date range of your sabbatical leave.
Aug 1, 2014-July 31, 2015

3. What were your sabbatical objectives and planned activities?
I wrote in my sabbatical application that my main objective was to focus on my research program, and I listed three projects (see Projects 1-3 below). My plans were to concentrate on writing up publications and to receive training in more advanced statistics.

OBJECTIVE 1: WRITE PUBLICATIONS.

Project 1: EPSCoR: A climate-ecosystem observatory network in windward and leeward Hawaiian forests (ENDER Climate)

The goal of this project is to investigate climate and vegetation in Hawaiian forest ecosystems to assess the interrelationships between climate, plant species composition, ecosystem structure, and function. Under EPSCoR we established the Hawai‘i Climate-Ecosystem Observatory, consisting of a network of sites each with a climate station and a permanent ecosystem monitoring plot. The observatory consists of eight sites that span elevation gradients on windward and leeward slopes of Hawai‘i Island. These two transects cross gradients of temperature and precipitation, allowing monitoring of a wide range of climatic zones and ecosystem types. Variables monitored at each climate station include air temperature, relative humidity, net radiation, photosynthetically-active radiation, wind speed and direction, soil volumetric water content, soil temperature, soil heat flux, and precipitation. The EPSCoR climate network will provide a valuable glimpse of patterns and changes in weather conditions over time, both locally and island wide, to researchers, academics, and the general public.

Project 2: Influence of invasive species on water and nitrogen cycling

Prior to European contact, coastal zones and near-shore upland zones in Hawaii were likely comprised of a diverse mix of native plants and plants introduced by the Polynesians. Today, dense stands of the non-native tree, kiawe (Prosopis pallida), dominate much of the coastal wetland and upland ecosystems of the Kona coast, including anchialine pond ecosystems. Kiawe is a nitrogen-fixing tree that is able to use sources of nitrogen unavailable to most other
plant species, but as a consequence a tremendous amount of excess nitrogen may also be added to both land and sea. Kiawe is also a tree that may use large amounts of water, essentially precluding its use by other plants. The presence of this tree in our coastal ecosystems may therefore have harmful effects on vegetation, groundwater, and coral, algal, and fish communities of the marine environment.

Project 3: Liko Nā Pilina: building hybrid ecosystems in Hawaiian lowland wet forest

This project develops and evaluates a set of hybrid ecosystems, in which native and non-native species mixtures provide valuable forest structure and ecosystem services. We have used community assembly rules and species-level information to design combinations of species, and the Hawaiian name, Liko Nā Pilina, reflects the growing relationships developing out of these new mixtures. We developed this approach because in some areas, such as Hawaii, invasion by exotic species is so pervasive that often we cannot go back to all-native ecosystems on anything but the smallest scale, either economically or practically. Furthermore, some non-native species may be playing important roles in the community in terms of providing ecosystem goods and services. Our long-term project goals are to test whether hybrid ecosystems can: 1) maintain themselves with relatively little input; 2) are capable of sequestering substantial amounts of carbon; 3) sustain a broad range of native biological diversity; and 4) remain open enough at ground level to allow human movement through them.

**Objective 2. Travel (using grant funds) to take several intensive courses in statistics, to learn these new statistical techniques for data analysis in these research projects.**

4. *To what degree did you meet each of your sabbatical objectives and complete each of your sabbatical planned activities? Please explain.*

**Objective 1: Write publications.**

I had a very successful writing periods during my sabbatical, although it was not working on all of the publications that I had initially planned.

Project 1: I had three planned publications. Unfortunately, the publications did not get written, because we ran into many snags with the quality control process in checking the data. Two years later, and I am still working on getting that data in its final form. However, during this time I wrote a pre-proposal to NSF Ecosystem Studies. Ultimately, it was not chosen for a full proposal, the reviews led to another attempt in January 2016 (also not chosen for a full proposal).

Project 2: I had listed four papers on which to work. Two papers were spent time on during my sabbatical year that were recently published. One other paper is still in the works, requiring more analysis. In addition, the fourth paper is meant to be a synthesis of all our work on this
topic, and incorporating other work. I had a conversation with an outside collaborator about a synthesis paper and we developed a work plan.


Project 3: This project has become my largest one in terms of scope and time. Two papers resulted from work during my sabbatical time.


Two additional papers were submitted during this period that were rejected and need revisions and to be resubmitted to another journal. I have been unable to find the time to finish these two papers since my sabbatical ended.

Other Projects: Other things came up during my sabbatical, and I was thankful for the freedom to pursue them. I arranged to spend three months at Universidad de Alcalá de Henares, in Madrid. I was based in the lab of a well-known restoration ecologist, Dr. José M. Rey Benayas. During this time, I had office space and focused on writing manuscripts. I gave two seminars at universities in Madrid. I went on a number of field trips and saw restoration experiments that expanded my repertoire and showed me new techniques. I had lunch with the science faculty most days and that interaction developed into a later collaboration with Dr. Pilar Castro Díez, on an analysis of global ecosystem services called Cost—NNEXT, with collaborators across the globe. We have a manuscript draft to be submitted in late January 2018.

Also during this time, I was asked to help write a review paper about tropical montane forests, as part of an NSF research coordination network in which I am involved. I worked extensively on this paper during the sabbatical time and it was published.

During my time in Spain, I also worked on two papers that were related to the Master's thesis of one of my students, Nicole DiManno. One paper was directly from her thesis, and the other was a side project on which she did a major amount of work. These two papers were also published. My colleagues in Spain were very helpful in providing comments on these manuscripts.


I was asked to participate in a book chapter for a major restoration ecology textbook. I spent a considerable portion of my time in Spain working on this book chapter, and consulting with my host who was writing another chapter for the same book. This book was published.


Finally, during my sabbatical year I was invited to participate in writing a Natural Resources Condition Assessment for three west Hawai'i parks (Pu’ukoholā Heiau National Historic Site, Kaloko-Honokōhau National Historical Park, and Pu‘u‘ohonua o Hōnaunau National Historical Park). I was given a small contract. Work began in earnest in 2015 and through 2017. I have completed the three reports, pending final revisions.

Objective 2: Take intensive courses in statistics.

During my time abroad, I spent two weeks in Portugal, taking two courses through Highland Statistics. Alain Zuur and Elena Ieno, who have written key books on statistics in ecology, taught the courses. The two courses were extremely difficult, especially the second one. I became proficient in the R statistical language and learned about general linearized mixed models—those were my two primary goals. In addition, I have a wealth of new statistical resources from that course—gained both from the instructors and from interacting with the other participants.

5. Summarize the contributions you believe the sabbatical leave has provided for your own professional development, as well as perceived benefits for your department, school, college, university, and/or profession.

Having large blocks of uninterrupted time is an academic necessity for me in order to write. In addition, I needed the large blocks of time for the statistics courses as well, as I would have never had the discipline to learn the material on my own, and I would have been far more distracted if I had taken a weekly class while on campus. Out of my sabbatical came the eight publications listed above, plus additional ones that need revision or are still being formulated. Of
course, I did not do all that writing from scratch during the one year, as many of these projects are ongoing, but during the sabbatical period I had the freedom to finish old manuscripts and begin new ones like the book chapter and review paper. Both of those I would never have taken on if I had been teaching in Hilo. The opportunity to travel to another university and meet new colleagues, and see new field sites (vital for an ecologist) was extremely beneficial to me and lead to a new collaboration.

During this time I wrote a grant proposal, and two additional ones written the following year were spawned during the sabbatical. In addition, I gained a university contract and made connections to gain another contract to continue funding Project 3 after that funding ended in 2016.

Two of my graduate students defended in Spring 2015, and although I was away, I was able to devote large chunks of time towards making suggestions for revisions in their thesis.

6. **Optional: What was your greatest accomplishment and what was your greatest challenge during your sabbatical leave? Please explain.**

I feel like my greatest accomplishment was during my time in Spain. I was able to see restoration with new eyes and I made a number of excellent professional contacts. My greatest challenge was in Project 1. Although I spent most of Fall 2014 working on that data set, there were many hurdles that are still not completely solved.

7. **Optional: For other colleagues who are considering applying for sabbatical, what two or three pieces of advice would you like to provide for them?**

I wish I had worked out my international travel portion earlier. I put it off because I felt so busy during teaching. Unfortunately, I did not give myself time to get a visa, so I could only stay for three months. I wish I had spent more time abroad, as it is the biggest gift of a sabbatical.

By taking on new things, I did not get to some things on my list. I feel torn about that decision, and one should weigh very carefully the benefits of starting new things vs. finishing old things.

Work on this report while you are on your sabbatical—I am embarrassed by how late I am turning this report in.

8. **Optional: Please feel free to provide any other information that you would like to share about your sabbatical leave.**

Make sure that your department has a good plan to cover your absence so that there are no misunderstandings.

Stay away from campus—you will get sucked into things if people see you around.