# Sword Fern Research Project

Progress Report

September 16, 2020

Haven
Ecology & Research

## Accomplishments

### Project Management

Project management over the past month has included general logistics for field work and lab work, as well as grant writing in support of an application for the Sustainable Path Foundation grant.

After reviewing the budget, we decided to omit the Mercer Island sites from the current study.

### Research

We have completed all field work and approximately 85% of all lab work. In the process of conducting lab work, we made several pertinent observations. Although symptomatic ferns had abundant scales clustered at the center of their crowns, they generally did not have well-developed crozier buds underneath. After dissecting several buds in the lab, I found that healthy ferns consistently had healthy-looking and well-developed croziers underneath a layer of scales (Figure 1). In contrast, the crozier buds of symptomatic ferns had wide range of development. In some ferns, there were short undeveloped stubs underneath the scales. In other ferns, it appeared that the bud had previously developed a typical spiral-shaped crozier which had then partially withered back (Figure 2). Symptomatic ferns also showed discoloration and signs of decay at the apical meristem of their rhizomes (Figure 3).

After completing the final lab work today, I will ship the samples to Ylva Lekberg tomorrow on September 17. The samples will arrive at MPG Ranch by 3:00pm on Friday, September 18.

### Consultation

I provided comments on a research report from the Doty lab at the University of Washington which claimed that the die-off phenomenon was likely caused by abiotic stress and successional changes in the composition and structure of Seward Park. The conclusions of their study are speculative and likely incorrect due to several flaws such as:

- Pseudoreplication (n = 1) prevented the use of inferential statistics and other analyses;
- Aggregating their inoculum samples, which can change the sign and strength of plant-microbe interactions in greenhouse experiments;
- Short duration of their experiments (< 2 months);
- Lack of discussion on the conflicts between their results and previous studies;

## Next Steps

After receiving our samples, MPG Ranch will extract DNA, amplify barcode regions and sequence the amplicons in their next MiSeq run.

*Figure 1: Crozier bud from a healthy fern. Bar represents 2 cm.*

*Figure 2: Crozier bud from a symptomatic fern. Bar represents 2 cm.*

*Figure 3: Partially dissected rhizome from a symptomatic fern. Arrow indicates an area at apical meristem of the rhizome that was darker in tint and had a softer consistency. Bar represents 2 cm.*