Modernization and Publication

ABSTRACT

Faculty at primarily undergraduate institutions (PUI's) are often stuck in a paradox where they would like to publish research, or are required to publish for tenure/promotion, yet have most of their job requirements related to teaching. Thus, they often feel disenfranchised with research as without constant active participation they can easily fall further behind as newer technologies become commonplace and require active training or consistent use to maintain proficiency. Furthermore, time necessary to publish results from scholarly activities is not available due to teaching loads and focus on teaching, advising, and service. While faculty can conduct research with undergraduates and collect data, the large amounts of time required to publish results are simply not available. I am proposing a sabbatical leave to 1. Learn to use the program (R) which has become standard for analysis, and 2. To submit manuscripts for publication from data collected by my students over the past several years.

PROJECT DESCRIPTION

Introduction

In the spring of 2018 I was approached by Erica Goff, a PhD student in Educational Leadership at Central Michigan University, to serve on her committee as the outside faculty member. I had been recommended to her by two faculty from NMU where she works. I read the prospectus of her project and was intrigued. She conducted a phenomenological study of Issues faced by faculty at Primarily Undergraduate Institutions (PUI's) in earning tenure. The review of issues faced at Bachelors and small Masters granting Institutions was all too familiar. Pressure from either faculty, the institution, or both, to publish scholarly works as is done at larger research institutions without the support provided by those larger institutions in the way of time (release from teaching or small teaching loads) and support (equipment, finances, personnel). Her results showed that many faculty were frustrated or disenfranchised with the idea of "professional activities" in the traditional sense of publication and that the stress of attempting to publish while maintaining a full teaching load were unbearable.

As a full-time teaching faculty member with several grant funded projects and undergraduate research mentees, it is easy to collect a lot of data, and difficult to find time to publish results in manuscript form. I believe that this is a common occurrence for many teaching faculty and causes large quantities of data to remain unpublished. While it seems that ample time exists in between semesters or over the summer to publish manuscripts, course preparation for the next semester and simply overseeing student workers in the field take more time than expected, and what time there is for writing is limited to required reporting on grant activities. Because publishing is secondary or tertiary to teaching and potentially service at primarily undergraduate institutions (PUI's) and it takes large blocks of time, manuscript preparation commonly takes a backseat in the priority list. Undergraduate students can write at least a rough draft of a manuscript, but are often gone after graduation and working in their field or on a graduate degree with little time to devote to finishing a manuscript. This, then requires the faculty member to expend the large blocks of time still needed to reform parts of the manuscript for submission, respond to editors and shepherd a manuscript through the publication process. This results in a lot of data and rough drafts of manuscripts that perpetually sit in the "in prep" category.

In addition to time constraints on actual publication of manuscripts, the training on specific software which has become common in a field after one has completed graduate school also becomes difficult. This puts the teaching faculty further behind and more disadvantaged in the publication process. A prime example of this is the use of the program R in statistical analysis of Biological data, and in fact in many fields as R is very broad and applicable to many fields, and is free. A quick review of manuscripts published in the late 1990's and early 2000's, when I was a graduate student and learning to use various statistical software packages, would show most researchers using SAS, SPSS, or other various statistical packages to conduct data analysis. The same review today would overwhelmingly turn up researchers using R, which has become the standard in statistical analysis.

Within this sabbatical leave, I propose to (1) become familiar with and be able to proficiently use the program R for statistical analysis and (2) submit at least 3 manuscripts for publication from data that I have collected with students over the past 5 years.

Background

While a graduate student at Northern Michigan University, and then at Texas A&M University, statistics classes I attended used the program SPSS to teach how to analyze data. SPSS is fairly user friendly, menu driven rather than command line based, but is rather costly and somewhat limited in types of analysis, especially specific analyses that may be used in biological sciences. For example, invertebrate data, in general, has a negative binomial distribution. During my dissertation I was forced to rank transform the data to force it into a normal distribution for analysis via ANOVA. This drove the statistician at the institute crazy as it violates several assumptions of the ANOVA, but there was no other way to do it with the software available. Today, one can run and ANOVA in R with assumed negative binomial distribution. The moral of the story is that while my analysis was accepted in 2005, it would be much less likely to be accepted today since more specific and appropriate analysis is available using R. I have tried to learn R on my own piece mill in the past and have run one analysis, I did it not on my own but from a general formula given to me from a colleague, who then had to double check my analysis.

There are several online beginner courses in R to introduce learners to the basics. For those that are familiar with the basics, there are endless freely available tutorials and groups devoted to sharing code in R. Within this sabbatical leave I will begin with an introductory course in R to familiarize myself with the platform and then will continue to learn enough to analyze data for manuscripts I plan to submit.

I have had grant funded projects working with the Piping Plover since 2010. Beginning in 2014 and then more formally 2015 and I had students begin to focus their senior thesis projects on various Piping Plover related projects. In 2014, an Algoma University student began to explore the idea of using trail cameras to monitor nesting activity. Working with an LSSU student, Michelle Kane, she deployed cameras near Piping Plover nests. In 2015, Michelle Kane took the study further by quantifying incubation time between male and female Piping Plovers using cameras. Another Algoma University student collected data in 2016 thus giving us 3 years of nesting data. However, each student was interested in a different facet and so we could not simply combine all three projects.

Since the 2015 summer, when I had 4 students complete senior research on Piping Plovers, several more have collected data. Most is preliminary and likely not publishable, but some may be with appropriate time commitment. Most noteworthy is Riley Waterman's project from spring 2020 that looked at nighttime behavior of plovers using night vision cameras.

In addition to Piping Plover related projects, my students have focused on everything from extracting lice from ducks to evaluation of deer counting methods, and in the process we may have two methods related publications. We developed a novel method for removing lice from ducks to estimate louse population and community dynamics. Since, a student used the technique to remove lice and evaluate their gut biomes for presence of pathogens, thus making our technique more relevant than we previously thought, and worthy of a manuscript. In working with the MDNR I have coordinated students in conducting shine counts of white-tailed deer. This is a common citizen science technique to estimate population fluctuations in deer. The standard technique is to begin shining one hour after sunset. Early on, a student noticed that he saw more deer in a field on his way back than he counted during the official count. We began an annual project to examine the difference in counts of the same route when beginning either 1 or 3 hours after sunset. Anecdotally, there appears to be something there, but it will take time to go back through several years of data.

Outcomes

I will complete an online course in R and receive a certificate of completion. My goal upon completion of the sabbatical leave is to be proficient enough in R to help students perform their data analysis using the program. In addition, I would like to give a CETAL lunch seminar on getting started with R.

I believe that learning R addresses all three specific outcomes of the sabbatical leave, as it involves a skill necessary for my continued professional development and scholarship, will improve my mentoring of undergraduate students and therefore improving education, and as it will be a learning experience for me.

The rest of activities listed below primarily address the first outcome of the sabbatical leave by continuing with professional development and publication of data.

The first manuscript to be submitted stems from skills learned from my last sabbatical where I learned how to use PCR in my research. I have worked with Dr. Stephen Kolomyjec and two undergraduate students on this project involving the population genetics of migratory Blue-winged Teal. We had one version of this manuscript that a friendly review suggested we add more data. The original used one loci as that was the technology we had at the time. With the acquisition of the fragment analyzer we now are working on 12 loci which will be a much stronger study. We were looking forward to having data ready to analyze in late spring of 2020, however closure of campus due to COVID 19 has caused a pause in work. I have bene tasked with completing PRC for the 12 loci on each of 200 samples, 12 reactions times 200 samples. Once this has been completed we will analyze and begin manuscript editing in light of new data.

The second manuscript to be submitted is on the nighttime activity budgets of Piping Plovers. Riley Waterman, graduated Spring 2020, used night vision to observe the behaviors of piping plovers at night compared to activities during the day. This manuscript has a high likelihood

of publication and it will be submitted to the Journal of Field Ornithology, or Wilson Journal of Ornithology – both international journals.

The third manuscript to be submitted is examining the time budgets of nesting piping plovers. This was a project in cooperation with colleagues and students at Algoma University. We have drafted several variations of the manuscript which were deemed sub-par and are currently waiting for new analysis of data prior to finalizing and submitting the manuscript. This project has been put aside by my co-authors and I as other commitments, including teaching, and grant reporting have been more pressing. In addition, we wanted to let the students take the lead, and while they made a pretty good first attempt we found some discrepancies and had to begin with re-evaluation of several thousand images of nesting plovers. Currently, we have the option of adding 3 more years of data to our manuscript and are deciding if it is really necessary. Needless to say, a bit of time devoted solely to this manuscript is needed to get it submitted to the Journal of Field Ornithology – an international journal.

A fourth manuscript sitting in the perpetual "in prep" phase is on using an apparatus developed by my senior thesis students to remove lice from waterfowl. This has tremendous potential, especially when combined with next generation sequencing, in identifying vectors of blood-born diseases in waterfowl. Currently lice are overlooked as potential vectors, or sentinels of disease presence, since they are very difficult to remove and count. I have allowed my BIOL 132 students to use our "duck blaster" in their open inquiry projects and have some good data on its effectiveness in removing lice. This will be a short communication and I anticipate submitting to the Journal of Wildlife Diseases – an international journal.

The final manuscript potential is the shine count data and evaluation of timing on count accuracy. This will take some time to go through data sheets and organize data to determine if it is worthy of a manuscript.

Timeline:

August - October 2021 – Complete online course in R. R Programming A-Z: R for Data Science with Exercises. Offered through Udemy.
After completion begin exploring other applications for use in my own research.
Finish any lab work needed on Blue-winged Teal Population Genetics

November – December 2021 – Manuscript Preparations beginning with the most complete. Blue-winged Teal Population Genetics, Night behavior of Piping Plovers

January-February 2022 – Manuscript on Piping Plover time budgets, and Louse removal from birds. Address comments from reviewers about first two manuscripts and re-submit or reformat for submission to different journal.

March-April 2022 – Evaluate data from deer shining (include 2021 fall data if available – no shining occurred in 2020) and submit manuscript. Work with edits to other manuscripts and revise or reformat for submission to other journals.

Summer 2022 – Continue to work with editors on manuscripts as necessary. Prepare CTEAL seminar on using R.