Osenberg Lab Handbook

Odum School of Ecology

University of Georgia

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Welcome

Welcome to our lab! I'm glad that you have decided to be part of our community. In the time I've been engaged in research (from an undergraduate at UCSB, to a graduate student at MSU and KBS, to a post-doc at UCSB, and to faculty at UC Berkeley, UF and UGA) "the lab" has always been a very special place of colleagues, family, and friends. You will always be a valued member of *our* lab, even though you will move on to other places and in some cases to develop your own lab culture and community. Because I am "in the lab" year after year, I've written this handbook from my perspective, but based on the lessons I've learned from all current and past members of the lab. I'm also very thankful to all of the helpful discussion, writing, and invaluable input from everyone in the "covid lab" when we launched the handbook. Thank you.

In 2020, in the midst of the covid pandemic and the social unrest caused by a confluence of many events (police killings of unarmed persons of color, calls to overthrow democratic elections, increasing awareness of severe economic inequities etc.), our lab decided it was important to put together some information that helped explain the culture of our lab, how we succeed in our lab activities, what the expectations are for members of our lab, and how we create and sustain our community. Most of you who will read this handbook will be graduate students who are just joining the lab. My hope is that this handbook will jumpstart your sense of inclusion in the lab, making explicit many things that were historically implicit or passed on by tradition, word of mouth, or osmosis.

This lab handbook is only one of several resources that will help you as you progress through your graduate program. In addition to the lab handbook, other helpful resources include: 1) the Graduate Handbook (written, and continuously updated by, the Graduate Coordinator and Graduate Program Committee), and 2) your mentor-mentee compact that you and I will write together. This lab handbook complements those other two documents by providing more general info about the lab (rather than specifics about our one-on-one dynamic and your specific professional development plan; and in addition to the general policies of the

Odum School of Ecology and UGA Graduate School). This handbook not only provides insights about how we sustain our community, but it also will help you understand how to do certain things in the lab (e.g., data storage, truck use) as well as our policies about some important issues (e.g., authorship, finances).

I expect to update this handbook when needed, so please offer helpful suggestions on how it can be improved.

Our Community

Core values – the 8 seas

Our lab has a set of core values that I expect all of us to share:

- *Curiosity*. We share a curiosity about the natural world and an enthusiasm for science and the environment.
- *Clarity*. We relish the challenge to think more clearly and to communicate more effectively.
- *Courage*. We speak truth to power and we challenge ideas that we think are wrong even when they arise from people in powerful positions. And when we hold power, we respect the voices who challenge our beliefs and interpretations.
- *Creativity*. We respect new ways of seeing the world and novel ways to penetrate important concepts.
- *Collaboration*. We work together because we know that multiple and diverse perspectives generate novel ways to view the world. We value the input of others. We value helping others, even when it results it no tangible reward.
- *Constructive criticism*. We value and invite open evaluation of our ideas as a way to improve our science and our thinking; we provide critical and constructive feedback to our colleagues in a way that helps them advance their science and become better scientists.
- *Compassion*. We care about others and are sensitive to their needs and desires, but we also hold them accountable, just as we do ourselves.
- *Community*. We value the beauty of each voice that comprises our community.

At this point, it might be helpful to remind you of one of my favorite quotes (see others at: http://osenberglab.ecology.uga.edu/favorite-quotes/):

> *Politeness is the poison of all good collaboration in science. The soul of collaboration is perfect candor, rudeness if need be. Its prerequisite is parity of standing in science, for if one figure is too much senior to the other, that's when the serpent politeness creeps in. A good scientist values criticism almost higher than friendship: no, in science criticism is the height and measure of friendship.*
>
> –Francis Crick in a BBC interview

This seems a bit intense after writing the "8 Cs", but this quote lies at the core of my philosophy, especially if you read "polite" as "avoiding confrontation" and "criticism" as "constructive criticism", and "parity of standing" being a reference to the idea that we are all equals in science (it's not about "rank") – we are all capable of good ideas, hard work, and making contributions to our discipline.

Our lab culture

Several things contribute to our lab culture.

- We have fun – that fun involves science but it also just involves socializing. Socializing might involve potlucks, hikes, bocce ball contests, whiskey tastings, or just hanging out at the pub. The lab has worked well because folks in the lab generally like each other and enjoy doing things together. They also support one another and respect one another. That said, some personalities don't mesh well. But in those cases, I still expect everyone in the lab to get along and to be professional.
- The lunch table and blackboard are sacred to me. They were central to my life as a graduate student, and they have continued to be a focal point over the decades. I think it's great when we can have lunch together because it gives us a time to catch up, to share ideas we've been thinking about, get feedback on experimental design, or just chat. I eat lunch in the lab most days and I love it when others in the lab also are around. That said, "life" gets in the way sometimes (e.g., faculty meetings are on Mondays at noon; pizza lunches for graduate students with visiting speakers are on Tuesdays; faculty often go out for lunch together on Fridays).
- Informal interactions in the workplace are important (hence the lunchtable!). Thus, I expect folks to be in the lab/offices regularly. I don't expect anyone to have a fixed schedule (e.g., 8-5) – this profession is great in part because it is so flexible – but I do expect to see you regularly. The best interactions typically arise during unplanned discussions – from spur-of-the-moment questions and insights. That can't happen if everyone works at home. However, I also appreciate that everyone works differently and there are certainly times when you need the quiet of working at home (or at a coffee shop).
- Seminars are the life blood of a department. I expect everyone to attend Ecology seminars, including thesis and dissertation defenses, when your schedule permits. Of course, there are other seminars on campus also that you might also find interesting. I also am hopeful that folks will chat about the seminars (e.g., at the lunch table the next day) to expand on the insights or concerns raised during the talk.
- We share ideas and we help each other improve our ideas. Sometimes this involves critiquing or challenging another person's ideas about experimental design or interpretation of data. We strive to do this constructively. Intent matters. Challenges should not be intended to bring others down, but rather to clarify ideas and to make each of us better thinkers and more knowledgeable scientists. So, when we offer critiques, we do so with the goal of helping the other person; and when we receive critiques, we strive to embrace that feedback and to avoid defensiveness. To succeed, we each have to participate – it's important to be willing to provide constructive feedback to others and also to welcome feedback on our own work. Both require courage. We also love "stupid questions" because they are usually the questions from which come the most novel insights and new perspectives on a problem.
- We all help out. Our lab is communal space and the supplies and equipment get used by all of us. Thus, we are all responsible for keeping the lab clean and picked up. When you use equipment, leave it in good working shape. If you notice that some equipment is damaged, please report it and help get it repaired so that it's not broken when the next person needs to use it. If some supplies get used or are in short-supply, please let us know and then help order replacements. It's important that we all share in these responsibilities.
- We are students, teachers, peers, advisors, advisees, mentors, mentees. We each play a variety of roles. We might be both an instructor and a student. We might supervise someone but also be

supervised by someone else. For example, a graduate student is often supervised by faculty, but they also mentor undergraduates. Our responsibilities vary with these roles and our behavior in each role also carries different weight and consequences. We strive to be aware of these responsibilities and the effect we have on others in these situations.

Safety

Harassment and bullying

Harassment is inappropriate behavior that makes other people uncomfortable. Harassment based on particular traits (e.g., another person's gender, race, religion, sexual orientation) is particularly reprehensible and is prohibited by federal law and university policies. The graduate handbook provides some guidance on these legal issues and your responsibilities, for example as required because you are a mandatory reporter of sexual misconduct. We hope these egregious forms of harassment will never occur in our lab, but if they do, they will be reported to the UGA offices for Human Resources and/or the Equal Opportunity Office (as detailed in the Graduate Handbook).

It is more likely in our community that more subtle forms of harassment, bullying, or unwanted physical contact might occur. Whenever possible, I encourage you to express your discomfort to the person who offended you. In some cases, you may not be the recipient of harassment, but instead you might witness an interaction between two other people. In this case, you also have a responsibility to speak up and express your observation and concern to both parties (either together or separately). If you are not comfortable approaching the offending person, then you should come to me. If I was the offending person, and you are not comfortable discussing it with me, then you should go to another person in authority (e.g., a dean) and discuss the situation with them. In many situations, a discussion with the person will probably resolve the situation by allowing you to express your discomfort and making the other person aware of their offense. From both perspectives, an open, non-defensive, dialogue is essential to a successful outcome. Unfortunately, some of us will occasionally step over a line and in some cases, we may have no idea that we crossed a line. Our intent may not have been malicious, but the effect of our actions and words can still be harmful. My hope is that thoughtful dialogue will help prevent problems from escalating and make us each more compassionate and less ignorant. That said, in some cases, the harassment might continue or in some cases there can be retaliatory behavior. In that case, we need to escalate the urgency of the response by speaking with supervisors and, if warranted, HR or EOO.

Health and well being

Do not come to the lab if you aren't feeling well and might be contagious. If you have physical challenges that limit your ability to perform your job duties or conduct your research, please speak with me.

Work/life balance is a major challenge for many of us. Graduate school can be all-consuming. We all need balance – it's okay to spend lots of time doing your work, but you still need outlets to ensure that your mental outlook remains healthy. Know yourself and your limits and how to best take care of yourself. Sometimes that involves down-time, or extra exercise, or socializing, or meditation. Sometimes it requires the help of a counselor or psychiatrist. If you are struggling and it's impairing your work, I would like you to speak with me. I don't need to know the details (you have a right to privacy about these matters), but it helps me to be aware that you need time away or a break so that I can adjust my expectations. If you want

to share more, that's also fine, especially if you think I can help you. Other members of the lab are likely also available to help when its needed.

Lab and Field Safety

Don't put yourself or others at risk! If you feel pressured to do something you don't feel is safe, you have the right to refuse. Speak up! And also be sensitive about how you might put others in situations in which they might not feel safe – give others a chance to speak up and express their concerns.

Point of contact

Have a point of contact (some who is not in the field with you) who knows your location and approximate return time when you go out in the field each day. If you do not return by that designated time, they should initiate attempts to contact you, and request assistance if warranted.

SCUBA and snorkeling: AAUS and DAN

To scuba dive you must meet all UGA requirements (e.g., be an active AAUS diver, with current 1st aid/CPR/AED training, have DAN insurance, have dive equipment checked every year, etc.). It is your responsibility to ensure that you are approved for diving before initiating fieldwork using SCUBA. And of course, you must have a buddy. Snorkeling is potentially dangerous, so please do not underestimate the challenges.

Lab safety and chemicals

Lab safety (e.g. chemicals and whatnot) – please reference the lab safety guide that we maintain with the Byers lab. Our lab is not designed for wet-lab or chemical work, so Jeb has kindly agreed to share his lab space for many of our lab needs.

Truck safety

If you will be driving the lab truck, you must be an approved driver by UGA (see info in the Graduate Handbook). Prior to departing, check the truck (e.g., fluid levels, tire pressure, etc.) to ensure that it's safe to operate. If the truck is in need of service or repair, help get it taken care of.

Links to safety documents or protocols

- Moorea (TBD)
- Sapelo Island / GCE LTER Orientation Packet

Communication

Good communication is essential. I expect each of us to be in communication regularly. I don't expect anyone to "fall off the map" without letting me (and probably the lab in general) know ahead of time – or else we'll suspect there's an emergency. If you need some time away, that's fine, but please let me know. And if I or another lab member reach out to you, please respond.

For better or worse there are a growing number of ways to communicate, so let's review some of them (and lay out some suggestions).

Email

I primarily use email for work related emails. Even when I'm traveling, I will typically monitor my email and will respond within 24 hrs if I receive a note that requires a response. If it's the weekend, I may not respond until Monday. If I don't respond after one business day, then please send me another email. I don't mind. I get a lot of emails and sometimes important ones get buried.

Oh, and I like salutations.

Please do not include a "ps" beneath your name. If I get an email, I'll stop reading (and scrolling) after I get to your signature. Why would I keep reading? Ps. at the end of a letter is a holdover from when we wrote by hand (and ink) and couldn't insert another thought once we'd signed our letter. We don't have that constraint anymore. [Pet peeve]

I expect everyone in the lab to check their email regularly (once a work day, at least). It's the way in which I will communicate with you, and the university also sends out important announcements and inquiries that way.

I will send emails at very odd times (weekends, 3am, holidays). I don't expect you to respond then. I simply write when I'm working and something is on my mind. But I do expect a response during the next business day (if my email asks for a response).

Slack

Slack can be an effective alternative to email, but it's not something I use much (except when a colleague forces me to!). I'm open to the lab having slack channel, but I'm very happy with email.

Text

In general, texts should be reserved for situations that require immediate responses (e.g., I'm late to a meeting with you and you're hoping I didn't forget; or you're en route to my house but are running late). For most work matters, email is the best option, in part, because it's less "demanding NOW" and because I can more easily search and organize my email to find particular items. Unless it's an emergency or otherwise urgent, texts shouldn't be sent at odd hours.

Phone calls

Phone calls can be very useful if we aren't in the same place and there is an issue that required dialogue (email is awful when we need to have a more complex discussion or need to go back-and-forth a lot). But like texts, they can be invasive, so should be used during normal hours, unless it's an emergency. BTW, if you have an emergency and need to reach me and I don't respond to a text, then you should call. In an emergency, a phone call is probably the best option.

Zoom

During covid, we all came to appreciate the ability to meet via zoom (despite our collective zoom burn-out). When we are not in the same place, zoom is a really good option. We've used it for lab meetings for many years, and it's great when we need to meet remotely but share images, go through a talk, draw on a white

board, discuss data, etc. I maintain a zoom room for my use that we use for meetings and lab meetings when folks aren't all in Athens:

https://zoom.us/my/osenberg OR https://zoom.us/j/5320998679 (they are the same room)

As UGA personnel, I think we all have access to zoom, so you can set up your own room – mine should just be used for meetings that I'm in (so that we don't have conflicts for the room).

Social Media

I am not very engaged in social media, although it can be an effective communication tool to reach scientific audiences and the public (and to expand your professional network). I encourage you to consider whether social media can help you professionally and if so, go for it. It can, however, be a distraction and can affect mental health, so use it wisely.

I maintain a webpage (http://osenberglab.ecology.uga.edu/) and we also have a lab twitter account (@OsenbergLab, which is linked to osenberglabcomputer@gmail.com). I currently maintain (that's clearly not the right word) the twitter account, but I'm also happy to provide access to anyone else in the lab who would like access to it so that they can post to it. In particular, if someone is particularly keen to manage the account each year, that would be great. If you do post from it, then I only ask (of course) that you do it professionally and realize that anything that is posted reflects on the entire lab (not just you).

Lab meeting

We aim to hold a lab meeting once per week during the academic year (usually not in the summer due to fieldwork and travel).

Lab meetings are meant to be informal discussions in which lab members can share ideas, check in with each other, get feedback on their work, discuss interesting ideas and concepts, brainstorm new projects, troubleshoot analytic issues, etc. These are meant to be fun and helpful. Folks outside of the lab are welcome to attend, and undergraduates working in the lab also are encouraged to participate.

Lab meetings usually last 1.5 hrs. However, when we use lab meetings to practice job talks or MS/PhD seminars, they can go on for several hours!

At the start of each semester, I usually ask one student to coordinate the lab meeting. That include polling folks about a format for the semester, finding a day/time that works for everyone, and creating a sign-up sheet.

The person who has signed up for a particular week, is in charge of articulating the goals of that meeting, so that all participants understand the objectives. Everyone should lead at least 1 or 2 meetings each semester. We use lab meetings for a diversity of purposes:

- Discussion of project design, data analysis, framing ideas for a paper or proposal
- Feedback on a draft manuscript, job application material or research presentation
- Discussion of an interesting paper, book chapter, idea related to a scientific topic or the process of doing science
- Group project - e.g., a collaborative meta-analysis
- Discussion of a job search or recent seminar

- Meeting with a job candidate or seminar speaker

Leading a lab meeting can sometimes feel intimidating – laying out your initial ideas about a project (or asking for help when you've hit a wall) can lead to feelings of insecurity. These are normal situations to be in. We've all struggled with the clarity of our thinking, the motivation for the project, or the best way to analyze some data. We get past those challenges by talking to others and working through various options. Although challenging, this is also what can be the most fun about a project. Especially, when there is a break through and you see the issue in a new light.

Lab Logistics – Day-to-day Stuff

Getting along & conflicts

We work closely, share space, and often socialize together. I place great value on us getting along, having fun and encouraging good science. However, I expect conflicts to arise. Some will involve me and some will be between other personnel in the lab. Assuming these are the usual day-to-day issues (and not something more egregious: see *Safety: Harassment and Bullying*), my hope is that the folks having a conflict can agree to meet, discuss the situation privately, and find an equitable solution that respects both parties. If the problem lingers and you can't find a good solution, I'm happy to mediate, or we can find a mediator at the university who might be able to help. If the problem involves me, I'm hopeful that you will feel comfortable scheduling a private meeting with me to discuss your concern. We can do this during our weekly meeting or schedule a separate meeting. The sooner we discuss these conflicts the better, as they can fester and become larger if not addressed promptly.

Work hours

As noted above, we don't have fixed work hours, but I do expect to see you regularly in the lab when you are in town.

If you have a planned absence from campus (e.g., conference, field work, holiday), please put it on the whiteboard in the lab (name, departure, return dates).

Office and lab space

The lab has the lunch table/blackboard space (room 25) that also has a sink, microwave, frig, coffee/tea and videoconferencing system and workspace for two iMacs. Craig's office (room 32) and 2 other student offices (rooms 30 & 31) are accessed off the main lab, with one other office (room 24) next door. All of the rooms are keyed identically, so any key you are issued for the lab can open any of those doors.

Coffee

Coffee is essential! Flavored coffee is forbidden! Peet's Major Dickason's Blend is preferred. I often supply coffee for general lab use, but you also are welcome to bring in coffee for general use. There is also a hot water heater and a microwave in the lab.

Food and refrigerator

We maintain a refrigerator (with a freezer) that you can put your lunches and drinks in. Do NOT put any chemicals or biological samples in the lab refrigerator/freezer.

Lab cleanliness

Our lab and offices are communal space. Everyone is responsible for keeping it clean, especially the lunch table area, which needs to be kept clean to avoid infestations of ants, roaches, and rodents. If some dirty dishes or coffee mugs (always coffee mugs!) are hanging about, wash them. Someone else has certainly washed yours before. Other stuff should also be put away so that folks can easily work at tables and counters when they need to. This also obviously applies (even more so) if you use space in another lab.

Freezer

We have a freezer for samples down in the loading dock area. Do not put food in this freezer. Keep the freezer locked so that it doesn't open – the generic keys are kept in the key box (see "keys"). Also, try not to overfill the freezer, as this could cause the door to not seal properly and could ruin samples (since the temperature won't be maintained) – send out an email to the lab if you require additional space. Make sure that any samples put in the freezer are clearly labeled. And before you leave the lab, please throw out any of your samples that you aren't taking with you. At some point, the freezer will need to be defrosted, and everyone in the lab should pitch in to help with that.

Meetings in the lab space

We expect the lunch table to get used for impromptu meetings and workspace on a daily basis. That's great. Sometimes, Craig also will use it for a meeting (e.g., of an Ecology committee) or a student will use it for a working session. Ideally, we'd let the lab know about any scheduled meeting that will be using the lab space, so that there aren't conflicts, but thus far it hasn't been a problem and I'd rather not create too much burden on folks. I think we can manage this on a daily basis. However, sometimes, a student will need to use it for a committee meeting or oral exam or defense. In those cases, it's more important to check with the lab since exams need to be private/confidential. Also put a note on the door during such a meeting so folks remember not to interrupt.

Sometimes students in other labs also will ask to use the space for a committee meeting, especially since it has a good video conferencing system. That's great so long as it doesn't pose a conflict with a lab need.

Videoconferencing

The lab has a TV, camera and speaker/mic to facilitate remote meetings and it also is effective in lab meetings to project presentations. This works well with zoom. We also have other software that came with the system that allows wireless connections called sharelink (128.192.18.100; code=1111), but we haven't been using this [I'm not sure if it still works].

Wet lab activities

Our lab is designed for computer work and meetings (and lunch / coffee). It's not set up for wet lab work or chemicals. In fact, chemicals canNOT be stored in our lab space. Fortunately, Jeb Byers has graciously made his lab available. If you need wet lab space or need to do any work that involves chemicals, please talk with Craig and then check with Jeb or his lab manager. Other faculty have also been very generous about sharing their lab facilities, so I anticipate there are always solutions that can resolve your situation.

Keys

We maintain keys to the lab truck, the freezer, other labs in a black keybox located on the wall to the left of the two iMacs.

Supplies

We have a variety of tools, supplies, and lab equipment in the lab. There are not always well organized, so if you can't find something ask. If you use something return it (clean and in good shape). If you use disposable items and they become in short supply, please help replace them.

We also have some items in Room B15 in the basement of Barrow Hall. This includes larger clunkier items that aren't easily kept in the lab. We have several shelving units over there labelled "Osenberg". If you put items there, please make sure they are labelled. Items should go on the two metal shelves that belong to the lab (they are labelled "Osenberg Lab"). This is a general use space, so other people have access to that room and it helps to keep lab supplies for each lab distinct.

Access to B15 is controlled by UGA ID cards (not keys). If you try your card and it does not work, please see the Dean's assistant in the front office.

Chemicals

Chemical are not allowed in our main lab. Most of our chemicals are kept in Jeb Byers' lab. All chemicals have to be inventoried in the Chematrix system (https://chematix.uga.edu/Chematix/). Each year, one student in the lab (the one who uses the most chemicals) will be responsible for maintaining the Chemical inventory and overseeing the inspections by EH&S.

Lab Truck

We have an F-150 to support our local research operations.

Parking

The truck should be parked in designated state vehicle parking spots (e.g., by the loading dock or RBC). During the Fall, many of these state spots are reserved for football games. The only space we can park near the building on football weekends is in the parking spots "behind" the building between the loading dock and the sidewalk that runs between the S07 parking lot and the Ecology building. UGA policy prohibits parking the truck overnight at your residence.

Maintenance

Regular maintenance is coordinated through the UGA Automotive Center, who will typically email service reminders and any recall notices. They also should be notified if the truck needs any unscheduled servicing.

Recalls are typically handled through the local Athens Ford dealership.

Upkeep

In addition to regular maintenance, please keep the truck clean. Remove trash. The UGA Automotive Center has two carports equipped with a high-pressure hose, some cleaning brushes, and a vacuum. When leaving the truck on the coast for a while, it's good practice to wash the truck and to give the undercarriages and

wheels a good rinse when you return to campus. The truck should be driven at least monthly to ensure longevity of the battery.

Log

It's very useful to track truck usage and maintenance in our Truck Log. The truck log is kept in a google doc: https://docs.google.com/spreadsheets/d/17Ek8O3j1Mwn7WiRyYUvKIZ3N_CATNQd4gwxjTvne2LI/edit?usp=sharing. The Google Drive containing this spreadsheet is associated with osenberglabcomputer@gmail.com / PW=Ecology!

We haven't been good about keep this log, but it would be nice to change that tradition!

Files that deal with the truck are kept on the Eugenius drive (see below): Osenberg_lab/lab data and protocols/logistics/lab truck

Travel Authorization

If you take the truck out of state, you need to fill out a Travel Authorization.

Gas

You can get gas (and air for tires) at the UGA Automotive Center or a gas station, but at all locations, you need to use the **WEX-card located in the glove compartment** of the truck. To use the card, you'll enter the mileage, truck number (95621, which is painted on the driver's door and imprinted on the key), and your WEX fuel card PIN number (which is the last 6 number of your 810/811 number).

Online training

Visit the DOAZ webisite (https://service.doas.ga.gov/) and navigate to Fleet Services and Fuel Card. You may need to create an account before you complete the online fuel card training video.

1. Complete the fuel card training (16 minute video) and acknowledgment;
2. Email your certificate of completion to Paul Fields (Rental Fleet coordinator; pfields@uga.edu) and Felicia Hubbard (Administrative Assistant; ffleming@uga.edu) along with your pin number (the last 6 digits of your 810/811#).
3. Use your pin within a year or it will be terminated.

To drive a state vehicle (including the lab truck)

1. Each year, travelers using state vehicles should submit a Driver Acknowledgment Form and complete the "UGA Motor Vehicle Use Policy Training" in the Professional Education Portal (PEP).
    a. Email your Driver Acknowledgment Form and training certificate to the OSE Administrative Assistant (ecologyfrontdesk@uga.edu).
2. Those who use state vehicles at least 3 times per week should also complete an updated Motor Vehicle Record Request form each year.

Moorea

Some of us in the lab conduct research in Moorea at the UC Berkeley Gump Lab (https://www.moorea.berkeley.edu/). We have a lot of equipment and supplies stored at the Gump Lab, where we share a blue container with Jeff Shima's group. Much of that stuff also is used by Adrian Stier's lab as part of our collaborative research. In addition to having several inflatables and engines (although we're lucky to have one of these running at any time), we have some balances, microscopes, cameras, dive gear, etc. There is a diversity of field supplies (tie-wraps, zip-locks, transect tapes, z-spar, eugenol) and lab supplies (vials, vials, vials). These are available for everyone in the lab to use when they are in Moorea, but items need to be replaced as they are used, lost, or destroyed. Ideally, we'd have a full and complete inventory, but that's a bit spotty at times.

Housing reservations must be made at the UCNRS site: https://rams.ucnrs.org/ A permit (Protocole d'accueil) is also required to travel to Moorea and conduct research at Gump. If you want to return coral samples to the states, that requires a CITES permit. The personnel at Gump can help facilitate these permits.

Computer / IT

Your research as a graduate student will generally require extensive use of a computer (at the lab/office, in the field, and from home). I therefore expect all of my graduate students to have access to their own computers, ideally laptops, which are your personal responsibility. If this is a particular challenge financially, you should talk with me. We maintain two general use iMacs in the main lab, but do not have any general use laptops. The iMacs are for use by all folks associated with lab. They will often be used by undergraduates.

If your computer dies or is out for repair, the Ecology IT folks have loaners that you can use (I think the Graduate School might also have a loaner program).

Eugenius

We use the Ecology server (Eugenius) to maintain lab files. Please note that Eugenius is a name derived by combining Eugene Odum and Genius. Despite knowing that, I find it very disturbing that my spellchecker wants to correct it to eugenics. Unintended consequences (like naming your car model Nova and trying to sell it in Mexico)…

To access Eugenius, you need to be on campus or on the UGA VPN. To connect using a Mac:

1. Click on the "Go" menu when in the Finder (click anywhere on your desktop and you'll see the Go menu up top)
2. Click on "Connect to Server..." at the very bottom of the menu
3. Type in "smb://128.192.18.7/Osenberg_Lab" in the URL bar
4. Click the "+" in the bottom left to make a Favorite
5. Click on Connect
6. When it prompts for your username and password, type in your username as "MYID\yourusername" if yourusename (e.g., bp53820) doesn't work, make sure you haven't included the quotes.
7. Then just type your MYID password.
8. This should mount the server on the desktop or the Finder window as if you just plugged in a USB stick.

9. You can also create a short-cut to the Osenberg_Lab folder once you've connected, so that you can easily reconnect in the future (Just highlight the osenberg_lab folder in the finder window, then hold down option and command and drag the osenberg_lab folder to your desktop. That will create a short-cut/alias on your desktop.)

To connect using a PC:

1. Open up File Explorer or Computer (instructions and screenshots https://simplyfixit.co.uk/open-file-explorer-windows-10/)
2. In the URL bar up top, type \\128.192.18.7\Osenberg_Lab
3. You may or may not be prompted for your username and password depending on whether your computer is joined to the domain (On campus).
4. If it does prompt you, type in your username as "MYID\yourusername" without the quotes.

Eugenius files

Within the Osenberg_lab folder we keep files that include:

- Data files from completed projects – this serves as an archive for all projects done in the lab.
- Protocols (e.g., R code and lab methods)
- Logistics (e.g., engine maintenance for Moorea)
- Etc.

This directory is always in work and is constantly changing. We need to get this resolved and finalized.

Backups

It's essential that data and metadata be backed up. The Eugenius site is backed up regularly, so you won't have to worry about that. You can create your own folder under the Osenberg_Lab and keep your data there. That said, Eugenius can be slow and clunky. I keep my entire set of working files in DropBox. Others in the lab use Google Drive. I don't care where you keep your personal research files, but it's imperative that you do it in a way that is backed up on a daily basis. The Ecology IT team can also install software on you computer to back-up (my laptop and the two iMacs are on that system), but it's possible it's not available for personal computers.

Responsible Conduct of Research

Permits

Everyone in the lab is expected to conduct research with all required approvals and permits. This can be especially challenging in international settings where the process may not always be transparent to us. Permits can often take many months to be approved, so you have to plan ahead. You cannot conduct your research until you have all required approvals in hand.

IACUC/IRB

If you work with vertebrates, you will need to obtain IACUC (for non-human vertebrates) or IRB (for human) approval. All IACUC and IRB applications go through Craig.

IRB is rare in our lab (possibly in the case of student assessments for training grants, or opinion surveys, or use of epidemiological data). If needed, you should access the IRB portal.

IACUC is handled through the Artemis portal. IACUC is a common requirement in the lab and is needed for anyone working with fish, amphibians, reptiles, etc. This is true even if you aren't handling any organisms and only observing them in the field. You need IACUC approval even if you are collaborating with someone at another institution who has IACUC approval through their own institution. You cannot conduct your research with vertebrates until you have IACUC approval.

Authorship

Most of our science is collaborative. We rely on the input of many people to complete our projects. What contributions warrant a verbal "thanks", which ones warrant an acknowledgement in the paper, and which contributions warrant co-authorship? And if you have a set of co-authors, what order should the order of author be? These are challenging questions and there is no one-size-fits-all approach. In fact, arriving at your own philosophy about authorship is a really important part of your professional development. I suspect that your approach to authorship will likely change as you progress through your career.

Who deserves to be an author?

Deciding who should be an author on one of your papers (or if you warrant inclusion on another's paper) is challenging. Because authorship is one of the main currencies of our discipline these decisions carry a lot of weight in our careers (and the careers of our colleagues). If you apply too stringent a set of criteria, you deprive people of a reward that they have justly earned. If you provide authorship to anyone who made even a minor contribution, you devalue the substantive contributions made by other co-authors. My personal view is that during my career we have devalued authorship, especially as our discipline has become more collaborative. I know of extreme cases in which a person became a coauthor by providing published data (which the author already got credit for, and should be available anyway) or by attending one or two meetings and editing a handful of words in a completed drafted manuscript. Neither of those cases are sufficient for authorship (in my view). I've invested far more as an external reviewer for a journal.

Criteria for authorship vary greatly among disciplines and among individuals within disciplines. Some guidelines have been put out by professional societies. Many sources state that paying for the research (e.g., being the PI of a grant that funded the research) is insufficient to warrant authorship. I agree. However, it's important to keep in mind that paying for the work often also means that the PI contributed key ideas to that research – it's not just about the money. ESA's 2021 policy on publication states that authors should have "conceived the ideas or experimental design; participated actively in execution of the study; analyzed and interpreted the data; OR [not and] wrote the manuscript." I personally feel this is too broad. A technician, for example, often actively participates in the execution, but they may not be intellectually engaged in the work. Furthermore, they are paid for their engagement. Undergraduates often fulfil the same role, receiving training or course credit for their engagement. I greatly value the input that our lab community provides during lab meetings and informal discussions. In all cases, this greatly improves the caliber of the research, but I don't expect the entire lab to be offered authorship on a student's paper. Reviewer's also make substantial contributions, but they don't become co-authors. Thus, it's really a matter of scale – some editing vs. "writing"; helpful vs. substantial; incremental vs. fundamental.

I've seen other versions of authorship policy that give a list of, say, 8 modes of contribution, saying that at least 3 must be achieved to warrant authorship. As you can see, there is no hard and fast rule. One helpful

approach that some journals have taken is to ask the authors to provide a contributions statement, indicating the role that each person played in creating the research paper. This is also a common practice in tenure and promotion packets – to help delineate your role in multi-authored papers. I think this is helpful, but I also wonder how differently such statements would be written if they were crafted independently by each of the authors!

Here are some suggestions to help navigate these challenging situations:

- List out the various contributions that led to the paper (idea development; framing of the problem; study design; data collection; data analysis; writing; editing). List the people who contributed to each facet of the work. Be cautious in doing this because it's very easy to give greater weight to more recent activities (e.g., writing) and forgetting contributions earlier in the process (development of the question). Furthermore, it's sometimes easy to overlook how much we've benefitted from the input of others. It's too easy to often think that "I came up with that idea", when really it emerged from a key insight from another student, or had been previously written into your advisor's grant proposal. While this approach won't answer the question of who should be a co-author (where to "draw the line" between author and acknowledgement), it may help you clarify the relative contributions of various folks.
- It's best to be explicit about co-authorship EARLY in the process (as you are developing the project). This isn't always possible or even feasible however, especially because many important parts of the project haven't even been done yet. One advantage is that by discussing co-authorship early, you may get greater buy-in from your colleague(s) and help make them a much more engaged participant.
- It's okay to revisit any preliminary decision about authorship. Someone might have helped with the initial ideas, but then failed to follow-through on other parts of the project, and the ideas might have evolved considerably since the early stages. Another person not engaged in the early discussion may have become in invaluable collaborator to the project. Thus, these early decisions are not written in stone, but you do need to be communicative about this. The biggest problems arise when people have not had these discussions in a direct and clear manner.
- If you have moved ahead with one set of authors, and you are contemplating adding another author (or another co-author suggests someone), you should convey the rationale to the other authors and get their input prior to deciding whether to offer authorship to the other person.
- Bear in mind that someone you offer co-authorship can decline your offer. In such a case, I suggest you clearly convey why you want to include them, but ultimately this is their decision.
- Revisit authorship prior to submission.
- Get confirmation from all authors that they approve of submission of the paper to the journal BEFORE you hit "submit". This is really important. You should never submit a paper without approval from all authors (this includes submission of abstracts for conferences). This requires that you plan ahead – sometimes co-authors are not available due to fieldwork or personal emergencies.
- You should be as consistent as possible in your decision-making, and the criteria you use for inclusion on a paper (for which you are the first author) should be similar to the criteria you use in deciding to accept (or decline) authorship on another person's paper (as a co-author).
- To reiterate, communication among potential authors is essential. This is especially important since philosophies about authorship are quite variable, and it's such a personal matter. Long-lingering resentment can occur over these issues.

- When in doubt, it's probably best to be inclusive (especially early in your career), although I say that with some trepidation because I do believe that one should truly earn authorship. It is often given out too lightly.

Authorship order?

Deciding who should be an author on one of your papers (or if you warrant inclusion on another's paper) is just one part of the challenge. You also have to decide upon the order. Again, there are odd precedents in various disciplines. Historically, mathematicians often went alphabetically! Many lab scientists use the "PI is last" policy, and there are a variety of terms for this (senior author, anchor author), which frankly, I find confusing. In ecology, it's not uncommon for the authors to be in the order of greatest to least contribution (I find this the most straightforward, but it doesn't identify the PI – which is perhaps more equitable than having a senior author).

Corresponding and contact author?

Again, policies vary among labs. In the ESA journals, the contact author handles all correspondence during the submission and review process. The corresponding author handles all issues after acceptance: approval of licensing agreements, proofs, and billing, and is listed on the published paper (i.e., the person that readers should contact with questions about methods, data, etc.). Other journals combine these role. My policy is below (i.e., the first author is the contact and corresponding author).

My perspective

For papers that I lead (not very often any more), I use the policy "in order of decreasing contribution". For papers that come out of my lab (on which I'm a co-author but not first), I used to use that same policy, but now have adopted the "I'm last" approach, with other authors in decreasing order of contribution (although other senior folks might choose to be "near the end", letting students be in earlier slots). Typically, in those situations, I expect the first author to be the one who led the project and the writing effort (they typically go hand-in-hand). That person will ultimately also decide (in consultation with the rest of the team) on the authorship order. FYI – I only adopted the "I'm last" policy because that is the typical model used in the Odum School. Early in my career it was in order of contribution, although during the latter years at UF this became confusing, because I was increasingly on papers with students and would defer to a later slot – it just didn't matter to me and I was happy to be last.

My default philosophy is that the first author is the corresponding and contact author. If you are leading a project, then you should be the one that the journal reaches out to and the one that readers should contact if they have questions or comments about your paper. It's your project and you should own it. The only exceptions to this would arise if: you were going to be out of email contact for an extended period, or if you were leaving science and did not want to be responsible for handling revisions or follow-up questions after publication.

I do not expect to be on all of the papers that come out of my lab. I have had students with whom I've co-authored all of their papers from their PhD (most often if the work is closely tied to one of my research grants) and I've had other students with whom I never co-authored a paper (most often when the student's research is very distinct from my own). I would prefer to co-author at least one of your chapters with you, but it's not required. As your advisor, part of my job is to give you advice and guidance about your project and provide editorial input as you craft your paper – that guidance is free and it's part of the job that I love. If I'm a co-author, I will probably invest even more energy and time into the paper than I would give normally. FYI - Because my policy is different than some of my colleagues and because I typically invest in all papers that come out of my lab, I have a section in my CV that lists papers from my lab that I did not co-author.

Reproducible science

Since my PhD, the field has focused increasingly on reproducibility and open science. These have been welcome changes, but these policies will increase the burden on you (whole simultaneously helping you and the community).

Science should be reproducible

Other scientists should be able to reproduce you study. That means being clear, concise and complete about your field, lab and analytical methods. Of course, there's a line here – a reader doesn't need to know the brand of dissecting scissors that you used to extract stomach contents from your fish. Finding the balance is challenging – use other published papers as a guide. It's imperative that you record your field and lab methods in gory detail as you are conducting your work. Videos of your methods can also be helpful. Trust me, you will quickly forget exactly what you did if you wait until you write your paper!

Students have previously used a variety of methods for documenting their lab and field methos (e.g., physical notebooks, which can be photographed and uploaded; OneNote notebooks available via your UGA Office 365 account; or other commercial 'lab notebook' programs). There's not "right" approach, but keeping detailed notes (and having backups) is crucial. The same goes for your raw data sheets.

Your analytic methods are a far easier thing to document – they are in your code. Many journals now require you to make the code available that you used to generate all of your tables and figures (either as supplementary on-line files associated with the publication or as files in Dryad or Github, or other data/code repositories. That means that you need to write your code so others can understand it (or so that you can understand it 6 months from now – we've all been in the situation where we can't figure out what did when we set down a project and then come back it later). This requires not only documentation within the code, but also clean logic and convention. Some helpful resources to write good code (in R) and to facilitate reproducible results are:

- R is the software that almost everyone in my lab uses (except me, so my advice here comes from others).
- Tidyverse is a collection of R packages that many folks find really useful. The style guide is particularly helpful for getting you started and learning good coding habits.
- Rstudio is preferred by many over R to help you visualize your code. It also provides access to other tools.
- Rstudio Projects help you organize your work.
- R Markdown is very useful in creating reproducible science.
- Here's are a few useful resources for getting started with R, RStudio and R Markdown, R for Data Science, and Reproducible Research (pdf).

Science should be open

Of course, reproducibility implies that you have effectively communicated lots of information about your study (your methods and your code). This is required if science is to be open. Open science also requires access to the data that underlies your study, and most journals and funding agencies now require that you make your data available publicly. Exceptions exist: e.g., if the data involve human subjects or the location of collection sites of endangered species.

Ideally, the data you provide will be as "raw" as possible – rather than means and variances, the replicated observations that generated the summary stats. If you are publishing a meta-analysis, provide the data used to obtain the effect size, not just the effect size (and variance).

The data have to be accompanied with useful meta-data, so that someone can interpret and use the data appropriately.

Data archiving

When you archive your data, there are some strategies that can be helpful.

- Store data in csv files. It's okay to also store your data in an excel format, but the primary storage file should be csv – in 20 years, Excel will either not exist or the version from today won't be readable. That said, many of us find Excel a useful tool for data entry. That's fine, but also realize that a csv file corresponds to a single tab in an Excel worksheet.
- Your data file should have simple structure – rows and columns. Do not make little subsets of tables or summaries, so that your data can be easily read into a statistical package, like R.
- Avoid special characters in the column headers (the column headings should appear in the first row of the datafile).
- Provide enough metadata so that an intelligent, but ignorant person can figure out what the data are (include units, include descriptions of each variable) and how they were obtained (methods). If there's a paper in which these data were summarized, include that reference.
- Avoid doing calculations to generate your data files. Ideally, your data will be in a "raw" form. You can then have other files that provide the code that use to read in that data and manipulate it and analyze it.
- Have a clear naming convention for your files and your variables.
- Ideally, the filename should include a datestamp, so that you can go back to older versions (don't delete the older files; unless you are certain that you don't need them).

Lab policy

- Open Science requires that data be accessible for others to use (ideally after you've already published it. In addition, the public supported your science, through our grants, your tuition waivers, etc., so many would argue that it's unethical to hold on to your data as "yours" – it should be available for others to use – after you've been given adequate time to publish those data and thus benefit professionally from the time and energy that you invested in your research project.
- For the papers that you published prior to graduating, your data and code should be in Dryad or another data repository. I'd also like a copy of that data/code kept on the Osenberg_lab drive on Eugenius, so that it's centrally located and readily accessible for others in the lab.
- If you have not yet published your study, then the data that you have collected as part of your graduate research should still be archived on Eugenius (with appropriate metadata and code). No one will publish that data (from our Eugenius drive) without your permission for at least three years (unless previously agreed upon), but it's important that we have a lab-accessible copy of the data available. This can help other student develop ideas or construct historical comparisons with more contemporary data. Archiving your data on Eugenius applies even if none of my grants supported your research. If one of my grants did help fund your research, then I am obligated to make the data available as required by the funding agency (e.g., via BCO-DMO as required by the Biological Oceanography program of NSF, although we can put a moratorium on the use of that data for a while).
- If you do not publish your study within three years of graduation, then I reserve the right to subsequently publish your study, most likely with you as lead author (and me as communicating author). Odds are I won't have time to do this (I've got my own backlog of unpublished work), but it is an option. My sincere hope is that everything you've done (that is publishable) will be published

within a couple of years of graduating. Not only will this benefit you professionally, but it's also part of being a responsible scientist.

Undergraduates in the lab

Undergraduates are a welcome and important part of our lab community. Most undergraduates in the lab will work under the guidance of a graduate student or post-doc (although Craig should be aware of what those teams are up to and should be consulted for a range of issues).

Undergraduates are welcome and encouraged to participate in lab meetings, lunches, and lab discussions. Lab meetings can be a bit intimidating, but even just observing lab meetings is very helpful. Of course, undergraduate are also welcome to lead a lab meeting to get input on their project or presentations.

Like all lab members, undergraduates are expected to respect our lab's core values (the 8 seas) and should expect to be safe in their work environment.

In most cases, undergraduates first join the lab by helping to collect data or process samples. However, their mentors/supervisors should ensure that the student has opportunities to learn during their experiences and should not just be used a source of free labor. Graduate students may organize joint workshops to facilitate their mentees writing or analytical skills. We encourage undergraduates to develop their own research projects, to present at lab meetings, the Graduate Student Symposium (undergraduate present posters) and other venues. We encourage students to work with their mentor to apply for funding (e.g., from UGA's CURO program).

Expectations for time commitments and the final product for undergraduates will vary depending on the project, the student's goals, and any requirements of their funding source or research course requirements.

Most undergraduates who work in the lab do so as volunteers, for course credit, or with CURO stipend support. In some cases, we also have grant funding available to hire them as lab assistants. The ability to work in a lab as a volunteer is not possible for many students due to financial constraints, and we will strive to work with students to ensure that they have opportunities to gain research experience and succeed no matter their financial situation.

Graduate student funding

Completing a graduate program requires funds to support your living expenses, funds for tuition and associated fees, and funds necessary to support your research (this includes execution of the research, analysis of the research, conferences and publication). The source and amount of funding will vary from student-to-student, and from year-to-year.

Stipend

The Odum School will not admit you without a "guarantee" of a 9-month salary (see the Graduate Handbook). [FYI – faculty are also paid for 9 months, with no state-provided salary during summer.] At a minimum this stipend will take the form of a Fall and Spring teaching assistantship (usually at 4/9 time, which equates to a roughly 17.8 hours of work per week). RAs (paid from one of my grants) are typically paid at 4/9 (44.44%) or 50% time. A graduate student can't be appointed at >50% time. In 2021-2022, that means that you would earn at least $21,248, and at most 31,872, over the year.

The Odum School does not guarantee summer support – there are only a few TAs available. Thus, summer salary during falls entirely on you (to procure a fellowship or to obtain another paid position) or me (via my research grants). Thus, I encourage you to budget based upon your 9-month salary includes a salary (modest, but enough to live on for a single person). That will be very lean, but it's helpful if you don't have summer support – then, if you secure summer funding, the summer becomes a source of savings.

I have only limited support through grants. At any given time, I usually have 1-2 grants, but they each typically can support only 1 student (at most). Thus, I can only provide summer support to 1 or 2 students.

I encourage you to apply for fellowships, such as the NSF Graduate Research Fellowship. I will help you procure this support but you need to take the initiative and write the application. The NSF GRFP takes a great amount of effort, so plan to spend several months writing (and editing, and rewriting and editing). Get feedback from others in the lab (and outside) and from me, early enough in the process so that you can made significant improvements to your application. At UGA, the GRFP not only comes with a higher salary than a TA, but it also provides research funds. The Ecology Graduate Student Organization has a website that provides a list of various fellowships (and grants) that are available to graduate students.

Tuition and fees

If you have an RA or TA at ≥33% (or Fellowship), all but $25 of your tuition is covered by the university. However you will have to pay fees, and they are very expensive (up to ~$1500 per semester). This takes a big bite out of your paycheck so be prepared. Various folks are trying to get fees reduced, but so far this hasn't been successful, although in 2021, the university mandated a 4% pay raise to offset some of these fees (the Odum School increased grad salaries by 6%).

Research supplies

Research expenses are ultimately your responsibility (either by procuring research funds or by using personal funds) -- but I can often help. You should strive to define a research project that is feasible financially. I expect my students to develop their grant-writing ability, so I expect that you will be writing and submitting grants. Options include sources like the American Museum and Sigma Xi, as well as UGA and the Odum School. Most of the grants that you can write as a graduate student will be "small" (a few hundred dollars up to $10,000). I'm also open to working with you to develop a larger grant (like an NSF research grant), but bear in mind that these generally require preliminary data and take a while to get funded. If we're lucky enough to get funded on the first submission, we'll have money available ~8 months after submission; but most grants aren't funded on their first try, so it's more likely to be a time lag of, say, 20 months.

I may be able to use some of my research grants to support your research. I also have a bit of discretionary money that I also can use. If you need something and it's related to my grant, then talk with me. If you need something and it's not related to one of my grants, then: 1) attempt to get funding for it; 2) if you fail, then ask me for help.

To pay for items off my grant, you need to know the 'speedtype' – a shorthand that refers to the funding source. If you don't know the speedtype to use, ask me. Please also check with me prior to purchasing things from any of my accounts (my grants or my start-up/IDC account).

Office supplies

The Ecology front office has supplies that you can use to support your teaching and basic office needs (markers, pens, pads of paper, post-its, printer paper, scantrons). If our lab printer runs out of toner, then

please get it replaced using UGAMart [HP 305A (Black/Yellow/Cyan/Magenta) Original Laser Jet Toner Cartridge, CE410A] – either charge my overhead/start-up account or Ecology will pay for it. You are responsible for your personal office supplies and equipment (e.g., a laptop, a home printer, etc.).

In general, my grants cannot pay for general use items (e.g., pens and paper, books, computer software). They can only pay for items that are specifically for that grant. It's a frustrating policy, but that's why Ecology provides basic office supplies.

Conferences

In general, you are responsible for paying your way to conferences. If you are presenting work related to one of my grants (and that grant still has funds in it), then I can probably help defray these costs. UGA and the Odum School also have travel funds that you can apply for. Some conferences will also waive or reduce registration fees for students who help out during the conference (e.g., work the registration desk or assist with audio-visual equipment). Some societies have travel grants to attend their annual meetings.

Graduate Program Guidance

The Graduate Handbook lays out much of the information you'll need to navigate your graduate program. Here, I've focused on specifics that reflect my mentoring perspective and associated philosophy. I start with some general issues that apply to both MS and PhD students and then I provide info specific one or the other.

All graduate students

- At the start of each semester, I like to schedule a weekly (or biweekly) one-on-one 1 hr meetings with each of my students. This time is "yours". You set the agenda and are in control. If you don't have anything to discuss one week, then just drop me a note to cancel. If you cancel two weeks in a row, I might wonder what's up. If you cancel four weeks in row, I'm going to be concerned and will schedule a meeting. During the summer, we usually don't schedule meetings; instead we meet as needed (just let me know if/when you'd like to meet).
- You need to form a committee. Think of it as a team that will guide you through your graduate program. I'm happy to offer suggestions, and I encourage to you ask other graduate students about possible members; but ultimately this decision is yours. As you form your committee, think about what each member brings to the team and how they complement one another. I will not provide you with everything you need in your program; your committee should help fill in the gaps in my expertise. But keep in mind that your committee won't either. You should be interacting widely (not just within our lab or just with your committee members).
- One of the most challenging parts of doing a thesis or dissertation is coming up with the research question. There's no single approach that works well for everyone. Start with a question, some say. Start with the system, others will say. I lean towards to the questions, but I also appreciate that we each (often for esthetic reasons) gravitate towards particular systems (e.g., ponds or coral reefs or kelp forests or marshes). In reality I think we use a mix of the two approaches. We often "look around" in a system, while simultaneously reading the literature and finding holes or nuanced omissions in current research. Those gaps, or new insights, often get adapted to the system that we've gravitated to. Of course, there's nothing wrong with defining the problem and then finding the most suitable system to address that question with. There's also nothing wrong with letting your

knowledge of natural history guide you in a system to empirical gaps – so long as you have an eye on the broader context for this work.

- Part of your professional success will lie in effectively communicating your science. This holds whether you are presenting a talk at a national conference, teaching undergraduates, working through ideas with colleagues, or chatting with a family member. One great way to hone your skills is in practicing research presentations for a conference. I expect my students to practice their talks before attending a conference. The sooner you so this, the better. You will get lots of advice and you'll quickly learn that a talk that seemed "almost done" has to be completely redone. That's normal, and it get easier each time.
    - Given the likely amount of revision that your talks will require (in terms of organization, analyses, and presentation), it's important that you give a practice talk well before you have to leave for the conference. Don't wait until the last minute. In fact, this applies more generally: plan ahead.
- I expect to see your research proposal (e.g., prospectus for a PhD student), grant applications, and chapters several times before they go to your committee or funding agency (and to have discussed it with you during many weekly meetings and lab meetings). I will generally I will offer you lots of comments – both editorial (to improve the writing, and logic, and presentation) and conceptual. I might ask you "why is this important?". That is not intended to be read as "it's not important", but rather to challenge you to more effectively communicate why this is an important problem that warrants your time, external funding, and/or an investment of time by a reader. How will your research contribute to the discipline, and how will it change how we think about ecology? I know you care about the work, but why should I (assuming I'm a curious and well-read ecologist)?
- I ask all of my students to provide each manuscript to their committee and solicit feedback prior to submitting it to a journal. Not only will this facilitate the external review process, but it will avoid a situation in which a student publishes a paper and falsely assumes that means that the committee will be fine with it during the defense.
- I encourage you to write and submit papers as you progress through your program. Do not wait until the end of your program to submit your papers for publication (obviously this is more challenging for a MS student). Ideally (especially for a PhD student), by the time you defend, most of your graduate research will already be published or in review. This also will make your next transition (e.g., to a PhD program, a post-doc or a job) much easier and more enjoyable (because the publication of your prior research isn't hanging over your head).
- I greatly prefer that you finish and defend your degree in fall or spring (not summer). That's not always possible, but summers can be challenging. First, faculty aren't paid by the university in the summer, so it's awkward to ask for their time. Second, many faculty are away in the summer (e.g., doing fieldwork). Finally, lots of students also are in the field, which means that fewer of your friends will be around to help you prepare for your defense and to celebrate in your success.

MS students

- Ideally, a MS student should file their thesis by the end of their second year. That's quick, so there's relatively little time to waste. In some ways, PhD students have it much easier.
- One option (this is also true for PhD students) is to start your research the summer prior to the August during which you matriculated. This gives you a head start. Of course, that's not always feasible.

- This short time frame puts a premium on coming up with the question and in getting the data you need during the summer after your first Fall and Spring semester. Although I typically expect a PhD student to come up with their own question, I'm much more inclined to directly help a MS student define their research question (or even hand it to them to develop further). You and I need to have early discussions to figure out what will work best for you and your professional goals.

PhD students

- Ideally, a PhD student should file their dissertation by the end of their fifth year; however that is probably not going to happen in most cases – 6 years is a more standard timeframe (although the funding guarantee from Ecology is only 5 years, in most situations, a 6th year is probable).
- I'd like your committee to be shaping up by the end of your first year and to hold a committee meeting by the end of your second semester. Even if you don't have your full committee picked out, you should meet with the folks whom you have tentatively chosen (and who have agreed to serve). Your committee's job is to help you through your program, so you need to be soliciting their input early in the process. Your first committee meeting will likely focus on coursework and your general research plan for the coming summer. You committee should be finalized by your third semester so that you can adequately plan for your qualifying exams.
- Meet with your committee members individually to solicit guidance about the qualifying exams. Some faculty will have specific readings that they expect you to do. I'll probably say "just keep doing what you're doing" – when I say that I mean that if you are reading widely (and lots), taking the required courses and mastering that material, interacting with other students and faculty, attending seminars, writing, and thinking, then you don't need to do anything more! My main goal in the qualifying exams is to evaluate if you have a breadth of knowledge in ecology and evolution (including theory and math/stats as applied in ecology), and if you can think through ecological problems soundly.
- Your qualifying exam has 3 components: 1) a written exam (1 day is devoted to questions from each committee member); 2) a written prospectus; and 2) an oral exam (which includes a prospectus defense).
- I'd love for you to pass your qualifying exam by the end of your second spring semester, but that's probably not feasible for most students, although it should be your target. I also think it's important to have a prospectus in hand to guide you during your second field season (i.e., the second summer after the fall you matriculated). As a result, I think a more practical goal is: 1) draft your prospectus and review it during a committee meeting that you call for the spring semester of your second year (i.e., prior to heading into the field). Then, I suggest you do your writtens in at the end of summer or during the early-mid part of Fall semester (of your 3rd year), and then submit your final prospectus to your committee and have your orals in mid-late Fall.
- You should have advanced to candidacy no later than the end of your 3rd year.

At The End

As you prepare to move on, there are several things that I would like you to do before you depart.

- Sign the blackboard.
- Write a story (if you want) in the lab journal (the journal was started by a previous student, Mike Gil) and if you escaped without writing in it, there's still time.

- Please make sure that either your samples are cleaned out of Ecology labs and the freezers or that you've discussed leaving them with Craig (or another student is going to process them in the future). An alternative to disposing of samples (like dead organisms or tissues) is to donate them to the Georgia Museum of Natural History.
- Archive your data and code on Eugenius (see Data Archival).

The Next Phase

Helping you successfully navigate your degree program and successfully defend your these or dissertation is not our only goal. You also need to plan on the next phase in your professional development: e.g., a job or a PhD program for a MS student, and a post-doc or a job for a PhD student. During your entire program you should have an eye on this next step so that you plan your program accordingly, but I suspect that we'll focus more on this about 1 year from your graduation date. Finding a job, or getting into a PhD program, or procuring a post-doc often involves a bit of a time lag (up to a year in many cases), so you need to plan ahead. I'll pass along any options that I encounter, and you should check other online sources (e.g., NSF, Eco-log, etc.). While I'll help you all I can, this is ultimately your responsibility. I'll chat with you, I'll help you strategize, and I'll help you craft your application materials, but the motivation and direction will come from you.

When a student graduates, it's a very exciting time. It's great to celebrate your achievements and to cheer you on as you tackle your next professional goal. But it's also sad. You have become an integral part of the lab – we'll miss you. Your departure leaves a hole and lab dynamics will change. I often struggle to see how the lab will work with that gaping hole, but it always does. The team adjusts; new members come on board; it's always different, but it's also fun to see how folks assume new roles, or how different styles work differently in a new context. It's a really cool part of the cycle. And it's always exciting to follow your accomplishments (personal and professional) as you move through life. So, stay in touch!

[End of Handbook]