Homework 7.

I have not tried to respond to every comment that was made but have picked representative comments and any in which a key point was misunderstood. For each I have given a response/explanation. I've compiled them all here in one document (without names) so that the information is (hopefully) useful to all. Student comments are in black, my responses follow in blue. In a few cases I've edited/shortened the homework answer.

Q1. Identify the one or two topics that you have had the most trouble understanding. If you feel you understand everything, then identify the topic that you felt was most difficult to understand. If you can, describe what it is about the topic that makes it challenging.

1. I understand all of the concepts, but I still think that graphs are hard to understand. I guess this is because it's hard to tell when there's no actual data represented in a graph or when the graph is irrelevant. Sometimes it's obvious, but other times it's really hard to tell.

There were many variations on this answer (i.e., you are not alone in having trouble interpreting graphs – and it can be much harder than people often think).

It's also important to know that just because a graph has no data does not mean it is irrelevant. Often they show predictions or hypotheses, both of which can be just as important as data graphs. The key thing is that graphs are used for different purposes, and you need to know what the purpose is before you can start to interpret one.

Q1. I have not really had any issues understanding the material itself, but have really struggled mostly with interpreting data, especially when it comes to graphs. Some of them are fairly simple, but when there are a lot of data points on one graph, it just becomes statistical noise to me. Do you have any recommendations for sites I can check out that might help me to decipher this material more readily?

Sadly, I don't have the kind of recommendations you seek. Getting familiar with graphs is hard for everyone. I think the only solution is practice. If you do it enough, suddenly they start to click. This is why I spend so much time on them (especially as it is a skill that transcends conservation biology and applies to many disciplines).

Q1. I was challenged the most with understanding some of the math in conservation biology, like estimating populations and anything that requires logarithms. This confused me primarily because I'm not very good at comprehending math to begin with.

Lots of variants on this comment too. Unfortunately, most science involves math and a basic level of understanding is necessary (and, though it may not seem it, the level in this class is very basic). Anyone who is struggling with these concepts should bring them to office hours, which are a perfect setting for working through these issues more slowly.

Q1. I struggled to remember all of the risks to endangered species and their given percentages within the vertebrate, invertebrate, and plant categories. When it came to exam and homework questions, if I saw the exact number I would recognize general trends, but beginning to combine invertebrate and

vertebrate categories for example, and ask proportions of the combined data I found difficult.

Exact numbers are not actually very important; understanding broad patterns and differences among groups is the kind of information someone would actually use (e.g., in a job no one would ever ask you whether the percentage of endangered vertebrates affected was 87% or 73%, but they might expect you to know that is it the vast majority of them). This is why I ask questions in the way that I do.

1. I had the most difficulty in understanding …. why biodiversity hotspots generally occur more in edge habitats than interior habitats.

There is a misunderstanding here – hotspots do not generally occur in edge habitats more than interior habitats; hotspots are defined at a much larger (regional) scale. It is true that species richness is often high at edges – this is at least partly because you get a mix of species from both adjacent habitats.

1. Another topic that I found confusing was the extinction rates of species on the edge of islands, and on the interior. For some reason the fact that extinction rates are lower on the edges didn't make sense to me

Another misunderstanding. Extinction rates are not lower on the edges of islands (which is why it didn't make sense to you!). When habitat is fragmented (creating a lot of edge habitat), there is an increase in the risk of extinction to the species that require interior habitat.

1. The most challenging material was knowing how much habitat loss, exploitation, etc.. affect different groups. They all kind of blend in to each other.

This is true, but that they "blend" together is an important take home message. Understanding threats in specific cases can be terribly complicated – which is part of why it is so hard to do anything about them.

1. beta-diversity

Check out the mid-term key.

1. The part of this class so far that I have found challenging is the part about richness, evenness and diversity together. The concept is "easy" to understand but trying to use and relate it to works, at least for me, is a bit hard to get through because we are trying to make a number set based out of so many variables that can be used.

This is a fair point, but it largely reflects the reality of what biodiversity is. The bottom line is that people care about a lot of different types of things about the natural world. Finding a simple way to condense all that variation is not easy and it is something that ecologists are constantly grappling with. In the grand scheme of things, ecology (and especially conservation biology) is still a young science. A really important take home is that science is not all worked out and something that can just be learned from a textbook (at least not once you get past high school level material). Instead it is an evolving process where there is still much for even the experts to learn.

Q1. I was slightly confused about the difference between regulatory and supporting ecosystem services. For example, I wasn't sure if something like bee pollination would count as a supporting ecosystem service, or a regulatory one.

This is a good point too, and others have pointed out the same problem. Like many classifications the MEA is forcing a complex continuum of ideas into a simple set of boxes. I would probably consider pollination to be a regulatory service, but others might disagree. Maybe look at what the MEA says? Like many things in science things aren't as tidy as people might lead you to believe when you first start out (e.g., in high school science classes).

1. I definitely feel I struggled the most with the topics that included math, especially the problem on the exam where we had to identify parts of the graph that corresponded with the equation. I typically struggle with math in general, and **I think most of my problems stemmed from not seeking extra help** from the start. I did not understand the equation when it was explained in class, but I did not get help understanding it.

I really like the honesty of this response because I think the bit I highlighted in bold applies to lots of people. Every week, Manette is sitting all alone during office hours. We can't help you if we don't know you have a problem so don't be shy – ask for help if you think you need it.

Q1. I think that two topics that I had difficulty on were vulnerability to extinction and population decline. The reason I thought these two topics were difficult was because some of the material they talked about overlapped or were very similar. I understood what was being said, but when studying for the exam I realized that some of the material mentioned in one topic could also be mentioned in the other, or at least I thought that. An example of this was loss of species integrity in population decline. I felt that could also be in risk of extinction and that is what confused me.

These two things are closely related phenomena, and so you are correct that there is a lot of overlap.

1) I think the most difficult thing to understand is how scientist get estimates for species. I understand how known species can be followed and data is readily available, especially if they are common in many regions. However, it is hard to believe that they have an accurate estimate of how many unknown species there are, because we simply don't know and can't be sure, especially when most of the oceans aren't even explored and we can only go so deep.

First, it is true that no one has a very precise estimate of the number of unknown species, and we also don't know how accurate the estimates are. The key point though is that current estimates are still good enough for some purposes. To respond further, I'd need to know more about why you were not convinced that the methods described in class are useful. Yes, we can't be sure, but absolute certainty is often unnecessary - and we make plans based on (often very) incomplete knowledge all the time. For example, I don't know how much it is going to cost my son to go to college in a couple of years' time. But I can use available information to make some reasonable assumptions about how much money I'm going to (not) have for a few years. I'd be happy to talk about this issue more though, especially if you did not understand the methods used to estimate the number of undescribed species.

1 The functional traits portion gave me some trouble. I understand the basic premise of mapping functional roles of species and determining the evenness of them in a given ecosystem, but it took a while to get there and I don't know if I'm comfortable with anything more than what those traits are. Also, how functional traits differ from ecosystem services… I don't know if it's just a question of scale (ecosystem services vs. functional traits equals large scale vs. small scale) or if it's more in depth than that.

This is a tough concept – and a pretty new one in ecology, so exactly what traits matter, how they are defined, etc., is something researchers are still grappling with. Functional traits are different from ecosystem services, although there can be a link. The former refers to traits of specific organisms, things like leaf area or type of diet. The latter refers to specific things that ecosystems provide humans. The link is that a trait might influence a service. E.g., plants with a lot of leaf area (a functional trait) might be better at sequestering a lot of carbon (an ecosystem service).

Q1. I had to devote extra time to understanding and identifying sources of bias, especially in statistics. Despite the extra attention, it still does not come naturally and I spend a fair amount of time looking for bias in each weeks discussion paper. Thus far, my education has primarily been about accepting, understanding and regurgitating "facts". It is exciting, yet challenging, to learn to question truisms through critical thinking and analysis. Like any new skill, it takes time to learn--which overall is a good thing, but can be daunting when attempting to manage responsibilities in other courses/life/etc.

I don't have much response to this, but I include it here because it sums up what I am trying to do in this class – i.e., go beyond the memorize and regurgitate churn. Hopefully, even if it's a bit painful now, it will be helpful in the long term.

1. The idea that I have found myself having the most difficult time grappling with is the current rate of extinction. This does not come down to the concept being difficult to understand. Instead, the difficulty lies in the fact that it is difficult to conceptualize the idea of that many species going extinct at that rate. The idea that many of the species that we were familiar with when we were children could just disappear in the next ten years is a rather surreal feeling, and one which is somewhat difficult to imagine.

Two points to remember here are (a) most of these extinctions will take time to happen (relatively few will probably happen in the next 10 years, but maybe many more in the next 100), and (b) the majority of the predicted extinctions will not be of familiar species (though plenty probably will), but will be of species we've not even described yet (mostly insects).

1. The topic I had the hardest time grasping was the estimate numbers of extinction. I understand that everything is uncertain, but I feel that there were too many different statistics being thrown at me that were hard to decipher which one was correct. This lecture, alone is challenging because there is so much uncertainty.

I agree that these are the things that make this topic hard. Unfortunately, this is an accurate representation of the state of knowledge. It's tempting to just pick one number and tell you that that's the way it is, but that would misrepresent the science. Sorry.

Q1) One topic I had a bit of trouble understanding was on species area conservation. I understand that it's important to protect certain areas from a conservation biologist's point of view, but I wasn't sure which would be the highest priority regarding endemic species, species richness, species evenness, etc..

The main point here is that there is no single answer to this question. Science cannot say which of these (or what combination) is most important – that is something that society has to decide. Then science can help determine how best to act on that decision. Not very satisfying, I know.

Q1. I believe the topic that I had the most difficulty with is understanding the graphs. It is just very hard to look at it from different views and completely understand what they mean. Sometimes there goal is to mislead you and if you don't always look for that

Here I would disagree. A graph is rarely <u>designed</u> to be misleading (in advertising/advocacy, that might make sense, but what would be the point in science?). But, you are right that graphs can sometimes be misleading (or at least confusing), either because they are not well explained, or simply because they convey complex ideas that take time to understand. Only with practice can one solve this problem.

1. One topic that I had the most difficulty in understanding was the topic on ecosystem services. With this topic it feels as though there is not enough information or examples for this topic, seeing that there is no chapter on this in the textbook.

Yes this is something people have only been studying for a short period of time and we are only just beginning to understand it. I'm hoping it will be covered better in the next edition of the text book.

Another topic that I had trouble with was habitat loss and how urban development wasn't one of the main causes of habitat loss.

Yes, this surprises a lot of people. But if you think about it, cities don't cover very much land. Farmland is far more widespread. On the other hand suburbia is spreading….

1.) One of the most difficult things to understand so far was the island biogeography theory. It was simple to understand what the purpose of it was, but difficult to apply it. We didn't have an example in class or on the homework where we had to plug numbers into the equation to see how it works--I don't know if that would have made it easier to understand or would have further complicated it.

This is something that you can easily do for yourself (studying doesn't just have to be about doing what the professor asks you to do). Pick values for z (say, 0.15, as this is realistic) and c (any positive number will do). Then, pick an island area size. Plug the area into the equation and it will give you a number of species. Then make A smaller (= habitat loss) and see how S changes. You can then try this again for a different value of z to see how the slope of the line affects the amount of habitat loss.

Q2. Provide one or two suggestions for things that I could do in this class to make the material easier to understand. Suggestions can either be general (e.g., relating to lecturing style) or may relate to specific information covered.

Quite a few people suggested I should slow down (though others said the pace was good). I will try to do this. But, as I said at the start of class, if people don't ask me to slow down (or to repeat things when I ask if there are any questions), I have no way of knowing if the pace is OK. Don't be shy – based on the homework responses, if you ask me to slow down, or repeat something (or whatever), there will likely be others in the class who are grateful.

Q2. Some things that can make the material easier to understand is to post the lecture notes after lecture so more attention can be payed in the lecture and not rely solely on the notes.

All lecture notes are posted on the eebedia site before lecture (usually a few days before), so that you can read the notes before you come. I also try to leave quite a lot of white space in the pdfs for people who like to print my notes and then add their own notes on the same page. All of the powerpoints are posted on huskyct a day or two after each lecture.

2. One of my suggestions is pertaining to the discussion articles and the methodology incorporated into accessing our established knowledge by the surprise based questions. Though something surprises someone obviously it will not surprise everyone else and surprises can be somewhat person dependent. If factual questions were given each week based upon the article I do believe that our reading patterns would be altered to read for content versus a mindboggling connection or idea.

This is true, and I understand the point made. But, my goal with the "surprise" statements is to get you really thinking for yourself about the material and how it relates to other knowledge you've learned. Developing "critical thinking" skills takes more than just being led through material by someone else (which is what I do in the rest of the class). Although it can be hard to work out what is really required here because it is open-ended, my experience is that nearly everyone "gets it" by the end of the course and that they are much better equipped to explore the scientific literature as a result.

2. I think some more examples of species that are affected by each topic we talk about. When I was studying for the last exam, I realized that there were some topics we discussed in class that did not have clear examples.

I try to give examples for as many things as I can, but time is always limited. I also assume that you will start to recognize examples of your own – either from the textbook or by making connections with other classes or things you hear/read about elsewhere. One of the main reasons I use twitter is to post links (usually to non-technical, but well researched, news article) to specific examples that are relevant to the class. Even if you're not on twitter you can check out #eeb2208 for those examples. Or just follow me at @ssts.

2. I think that if the discussion of the peer-reviewed paper, were done either at the very beginning of class, along with the written responses, it wouldn't break up the class so much, and it probably encourage students to stay for the entire class period.

This comment is interesting as I tend to put the discussions in the middle of the class precisely because it does break things up! 75 minutes just seems like a long time for straight lecture (especially as research shows that a person's ability to retain information rapidly wanes after about 10 minutes of lecture.) I do try to find a good break point in the material though. I'd be interested to know if other people think a break mid-lecture is a good idea or a bad one.

2. The one suggestion I could make for the class is to perhaps annotate the Powerpoints to a greater extent. I understand why you wouldn't want to do this, but if they were, they could be a much more useful study tool.

I understand your reason for asking this, but I purposefully don't annotate the slides very much. There are two reason. First I do not want people to study from the slides – no matter how much annotation I put on them it will not be as good as my notes, your own notes, or the text book, all of which will give you a much better understanding of the material. Second, if I put a lot of words on the slides people will read them in class and then not listen to what I am saying. Slides make a good supplemental source of information, but anyone who treats them as their main source will end up with a superficial understanding of the material. (Sorry!)

2. I think that putting more of the lecture notes into the power points would be helpful because I either spend a ton of time out of class copying those notes, or I copy them in class but then it's hard to pay attention to the power point.

All of this info is in the written notes on the eebedia page (click on the topic name). I set the notes up with plenty of white space so that people can annotate with additional information without having to write everything down. Also, be aware that re-writing notes is a very effective way of studying – far better than just reading over PowerPoint slides.

Q2.) The material needs to be more straight foward on the lecture slides for instance on one slide it said something along the lines of "Ecological hotspot = Ecosystem Services" we found out that they did not equal each other, the slide made it seem otherwise.

The closest I found was "Does high biodiversity = lots of services". Framed as a question, this seems appropriate for what I was discussing. But, I'm not sure if this is the example you are referring to. If not, please let me know as I'd like to make changes to clarify any confusing wording.

2. One thing that you could do to make information clearer would be to explicitly define the bolded terms in your lecture notes.

These terms are nearly always discussed in the text book and defined there. If my definitions are not clear, you can always look them up online (Wikipedia, although not perfect as a source for many things, is a good place to look for definitions of scientific terms).

2. I would suggest being more specific about which parts of the book chapters to read for each topic, not everything in each chapter is relevant to what we discuss in class.

This comment is true – but I do not base my lectures on the text book. Nonetheless, all of the material in the book is relevant to the field, so I think it is important for you to have some familiarity with it. And, as I said at the start of the class, occasionally I will ask test questions that are based on material that is only in the book.

2. I think giving a quiz or two prior to the exam would help, although the homework already helps.

Feel free to use the homeworks as quizzes. If I gave a quiz, that is what they would look like. So, try giving yourself a 40 minute time limit to do a homework and it will be no different from if I ran them in class. As I mentioned previously, studying doesn't have to just be about doing what the instructor tells you to do.

2. Sometimes I don't know when to memorize certain numbers for exams so if you could clarify or generalize which ones are the most important to know, that would be helpful.

It is very rare that I expect you to memorize specific numbers. I do expect you to have a ballpark (order-of-magnitude) level of understanding of anything I talk about at any length, but not exact numbers. E.g., in the Wilcove table, I expect you to know the general patterns (e.g., those I asked about on the midterm), but I wouldn't expect you to know exact numbers. Usually if I spend a lot of time talking about something (e.g., background extinction rate, the Wilcove table) then you should know it. If I just gloss over something quickly, then it is less important.

Q2 - I would suggest making it clearer when it comes to numbers that you want us to know and memorize. Sometimes you state that we don't need to remember specific percentages, just the overall trend. However, on the exam I found that there were specific percentages and I wasn't prepared for those.

There was nowhere on the exam where I expected you to reproduce a specific percentage (I just re-read it to check – if you feel differently, please give me a specific example). I do, however, expect you to know the magnitude of things in general terms. E.g., I would expect you to know that during mass extinctions at least ¾ of all species are thought to have gone extinct (a general pattern). I would not expect you to know exactly how many were thought to have gone extinct in each mass extinction event (specific results). Similarly, I would not expect you to know exactly how much the Earth has warmed in the last few decades, but I would expect you to know that it is far less than 5° C.

I do not simply give you a list of numbers that you are expected to know, because that encourages rote memorization rather than understanding. I also believe that the ability to judge the relative importance of information is a critically important skill that students should be learning to do for themselves. Making distinctions like those described in the previous paragraph is something I am trying to teach.

Q2. One thing that I feel could be improved for the lecture is that you can provide us with more examples on some of the topics. I know that with some of the lectures you give us good examples, but

there are others I feel could have more specific examples or need examples as a whole. One example could have been if during our lecture about world change when we were discussing nitrogen creating "dead zones" in the oceans, you could have provided us with a more in depth example of animals that were being affected by this.

In this specific case, when oxygen depletion occurs pretty much ALL animals that live in the dead zone are affected (everything from small zooplankton to big fish and marine mammals). Those that can swim well can often escape, but are still displaced; anything else that needs to get oxygen from the water will simply die.

Q2. I think that more short videos may help demonstrate things and also help people stay focused in a long lecture period.

I used to think that this was a good idea and mostly didn't use videos because it was hard to find good ones. Recently though I read some of the educational literature and was surprised to discover that, in general, videos are one of the worst ways of conveying information if you want students to actually remember it! I have thought about putting self-made videos on huskyct or YouTube to go over some of the hardest lecture material, so that students can review it before/after lecture. I'd be interested in feedback on whether anyone would actually use that resource if I made it available (it would be a big time investment so is only worth my time to do it if students will use it).

Q2. I think the issue I have is with the true/false questions that are given in the homework and on the tests. I know you say to not look into them too much, and that all you're asking for is what the questions is asking, nothing more. However, personally I've found some of the questions to be a little open-ended and could be answered different ways depending on what perspective you use to look at them.

It is true that sometimes there are not black and white answers without any ambiguity (though these questions are rare). In these cases I will usually ask what you think is most "likely" (or something similar). E.g., it is possible that a richness hotspot for some group of organisms could occur in Greenland, but it is not at all likely given what we know about global species distribution patterns. In these cases I am testing whether you can make informed judgments even in light of uncertainty. I do this because that is what people actually have to do to implement this knowledge in the real world. If you are still unsure, come and talk to me about specific examples. My past experience suggests that often there is less ambiguity than students sometimes think, and that the real problem is that the student's understanding of the material is incomplete. This might not always be the case, but without specific examples, I cannot tell. (Note, I would never ask a question like this and them make the right answer inconsistent with the broad general patterns that I have taught in class – that would be totally counterproductive.)

Q2: Lecture could be improved upon by giving more concrete examples of biodiversity that is not species richness. It is hard to visualize a specific case or area where Beta diversity or complex ecological interaction occurs, while I find it is much more obvious to a student to think of a rainforest or coral reef to exemplify biodiversity as species diversity.

A rainforest is actually a really good example of why beta diversity matters. In rainforests the mix of species varies hugely as you move even short distances across a landscape (i.e., there is a lot of beta-diversity). This is one reason why the tropics are able to support so many species. More generally, though, it is true that some aspects of biodiversity are abstract and hard to think about (not just for students). This is partly why they get ignored. That said, wouldn't you agree that a trophic cascade, or the migration of monarch butterflies is something more than just what you would have if you just based everything on species counts?

Q2. It might be helpful to incorporate some multiple choice type/homework questions into the lecture to test our understanding of what is being presented, instead of waiting to be "tested" when we go to attempt the homework.

I've not done this in the past because I worry about the added cost to students of having to buy clickers (the last couple of times I polled students, the majority seemed opposed). Maybe things have changed and most people have them anyway these days. I'd be interested to know what others think of this idea.

2. Perhaps highlight particular examples, and elevating those above others to emphasize their importance could help. For example, both the discussions on the passenger pigeon and the heath hen were very long, and yet they covered the same ideas. Shortening the discussion of one of these ideas, or even eliminating one (though I would not see this as a great solution) could help to streamline the lectures a bit more.

The eternal struggle for a college professor! One of the commonest comments I've received is that people want more examples … but some (like here) want less. I don't have a good solution here, but I try to use multiple examples for points that are really important (even if they seem to overlap) and longer examples for points that are really important.

2. I found the homework to be very helpful in understanding what types of questions and thinking is required for the exam, as well as it being an enjoyable way to study. I just find it a bit of a hassle to do this all via email, and going back and forth between pages to find the question

Good point. Next year I plan to move the homework assignments into huskyct so that it can all be done online without any email submissions – and so that students get answers/feedback immediately. I just didn't know the system well enough to try that this year and wanted to make sure the homework questions were helpful to students first (it's the first year I've assigned them as required work; previously they were just optional study questions).

Q2: Instead of exam style questions each week I think it would be beneficial to sometimes have online discussions instead. I have done this for a few other courses and it usually helps to hear other people's views on topics in class. It exposes you to examples you wouldn't have thought of on your own and it tests if you can explain what you're learning. I find that if I can explain a concept to someone else, it is the best indication if I really understand it.

This is a great point. There is a discussion board on the huskyct site, designed for this purpose. Unfortunately no one uses it. I would strongly encourage you to use it is to set up study groups for exactly the reasons you give.

Q2. I think I personally needed the specific subtopics more precise and clear, mostly for knowing how to study the material.

If you are not using my lecture notes, then I'd suggest you do so. The hierarchy and organization of the lectures is laid out in detail there. My suggestion is to look over the notes quickly before lecture, then you will be better prepared to understand what I am talking about. Some people like to make their own notes on top of my notes – for this reason I try to leave a lot of white space on the page.

Q3. Identify the thing that you find most difficult about reading and understanding peer-reviewed papers such as those used for the discussions or that you plan to use for the poster project?

3. The discussion papers are difficult to understand because most include ideas and jargon we are just yet starting to cover in class or have heard in a class before, but mostly new ideas. They also seem to just be talking. I have a hard time understanding exactly what they are saying idea-wise, but when they don't clearly show what the main ideas are or important information (like the research question, in one or two discussion papers) I have an even harder time trying to understand what they are intending to say.

Yes, this is hard. I purposefully give you papers that are right at the edge of what we're learning, because that is what it is like when you do science – the stuff that is important is generally at the cutting edge, and so it is often unfamiliar. It is hard, but it helps to get used to experiencing information that really pushes your knowledge in a "low stakes" situation. With practice one gets much more comfortable with being constantly stretched by new ideas; without practice, it never happens.

3. What I find most difficult about reading peer-reviewed scholarly articles is the language used by the authors in describing their studies.

Some version of this answer was very common. Partly the problem is that there is a lot of technical language in science. Partly the problem is that many scientists are not very good writers and/or bury their writing in jargon. Unfortunately the only real solution is practice – the more you read the scientific literature the easier it is to navigate.

3. In reading peer reviewed papers the degree of jargon is often tolerable; but the organization tends to be chaotic and rather cumbersome. This dilutes and makes for an unfavorable experience while reading some but not all peer-reviewed sources.

I agree. Unfortunately, the scientific literature is what it is, and until you're writing papers of your own there is little to be done, other than to learn to manage what is out there. It may be hard to believe, but I do try to pick shorter, relatively simple papers.

3. For the articles the difficulty for me is just finding the time/way to actually be able to sit down and read through it. I always have to re-read them multiple times or simply take a break, especially for longer ones, simply because in many they throw many stats or just very described instances that can make your head spin, even if you know what they are talking about.

This is a common response. The trick is really just to learn to differentiate the information that is crucial for a particular purpose, and what you can skip over. Generally for this class you can skip over most of the analysis and quite a lot of the methods (though probably not the study design part).

Q3. The thing that I find most difficult about reading the peer-reviewed papers is deciphering the language, because I haven't read a lot of scientific literature before. The papers are directed at people who are experts in those fields, so they written in a very dense manner. They assume that the reader will be familiar with the subject and the terminology that goes along with it.

This comment is a good take on why the papers are hard to read. The problem is that there really isn't an intermediate step between textbook-level descriptions of science and the peer-reviewed literature. This means that, sooner or later, everyone who wants to be a scientist just has to take the plunge.

3) Sometimes I feel like the language is too scientific and could be simplified for people to understand easier. Some papers could also use better descriptions on their graphs and charts.

It is important to remember that peer-reviewed papers are not written for a lay audience – they are written for scientists. That does not excuse all the poor writing, but there are limits on how much they can be simplified. The bottom-line is that science has to be pretty scientific.

Q3: The most difficult aspect of understanding peer reviewed papers would be how to differentiate between figures and graphs giving data versus those that don't. What makes this difficult to understand is that many graphs of both types seem to neglect to label their axes, or more commonly neglect to label the units used, which makes interpretation more difficult.

If the axes are not labelled (and this should be rare in peer-reviewed articles), you might find the information in the legend.

3. I find the most difficult part of the discussion paper is finding something that is surprising!!! I can't tell you how hard it is to come up with something that fits your standards as to what is considered an appropriate response. I find that small things surprise me, but I have a hard time getting the full 1 point. Personally I don't think this benefits me at all to understand what the journal is talking about. It just points out how "vague" or "unintelligent" my surprise responses are....

As noted above, I agree that the surprise statements can be hard, but that with time nearly everyone gets much better at them. I should point out that the point of this exercise is NOT primarily to help you understand what the papers are about. Instead, the goal is to help you better develop critical thinking skills by making you really work at thinking deeply about the material and how it connects to other knowledge that you might have. It's learning the skills (i.e., critical thinking) rather than the material (i.e., learning facts) that I'm focused on. This is definitely one of the hardest things I have you do, so

don't feel bad if you find it to be work. And, if you are still having trouble with this at this point in the semester, it would be well worth meeting with Manette during office hours – she has exercises to help people get better at the assignment.

Q4. What topics, within the field of conservation biology, are you interested in that I have not discussed yet?

For the most part I have not responded to answers people gave to this question. Most responses addressed things that are either going to be covered in the second half of the class, or so specific and diverse that I can't really address them all in a broad introductory class. I have taken note, though, and will try to touch on people's suggestions where they are easy to fit in. In a couple of cases, I did feel that a response from me might be useful:

4. One topic that has not yet been covered that interests me is how species interactions (disregarding humans) affects conservation biology.

In general, conservation biology is focused on the effects of humans, rather than the natural interactions among species. The main area of overlap is when humans do something to change the nature of interactions. Invasive species are probably the most obvious example of this.

4. Maybe talk about genetically modified foods, energy (efficient energy), nuclear issues, Great Pacific Garbage Patch, or exporting hazardous waste.

For the most part these issues do not really fall within the realm of conservation biology and would fit better in a more general environmental science class. There is some overlap – e.g., GM foods can affect patterns of herbicide use, which can affect biodiversity (I used to talk about this, but had to drop it due to time constraints). Similarly, last year one group did a poster on the conservation effects of the Chernobyl nuclear explosion. But much of the research on these topics focuses on the human health aspects of the problems, which is not part of conservation biology.

4. We have talked much about why conservation biology is important, and what type of work it entails, but I feel like we have discussed very little about how much funding gets put into this type of work and the likelihood of being able to find a job in this type of field. That is one thing I feel like would be great to discuss.

This is a great question. We'll talk a little about the economics of conservation later in the class. Jobs is not something I cover, though there are links to job boards where you can search for conservation jobs on both the class web site and on my lab web site (under "Info for Students"). The bottom line, though, is that there are not a huge number of jobs, pay is usually not great (though it is adequate), and a willingness to move to where the jobs are is important. On the other hand, if you're prepared to stick with it, jobs in this field can be very rewarding, a lot of fun, and can allow you to go amazing places and see amazing things. FWIW, I have no regrets about working in conservation for a living.