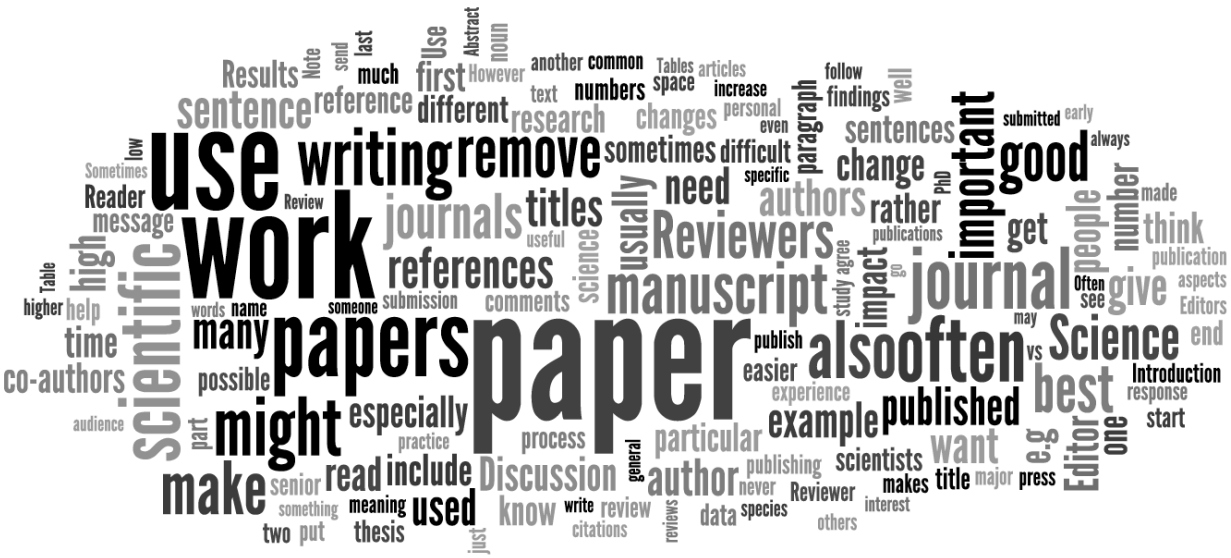
Publishing your Science

Associate Professor Anthony J. Richardson

anthony.richardson@csiro.au

University of Queensland

CSIRO Marine and Atmospheric Research



Please contact me if you would like to distribute this guide to someone else

TABLE OF CONTENTS

Purpose

I have written this guide to help my students understand the publication process, produce higher quality work, increase acceptance rates of their manuscripts, and become more productive and happier scientists – and it should also help you get a job!

Publishing is key to scientific success, now more than ever. Your publication record follows you throughout your career and is an impartial (but imperfect) measure of your productivity and impact. During a PhD, students are now expected to publish a couple of papers, and this is a key part of the training process. The style of writing theses has also moved away from having separate chapters on Methods, Results and Discussion, and toward having self-contained chapters that are in the form of scientific papers, bookended by an Introductory chapter and a final Discussion chapter at the end.

Something my Honours supervisor, Professor Craig Johnson now at the University of Tasmania, said to me about the importance of publishing science still resonates with me. It originates from the Bishop George Berkeley in the 18th century: 'If a tree falls in a forest and there is no one there to hear it, does it make a sound?' Similarly, if we do the best science in the world but never publish it, did it really happen? Only when an idea or data is published and subjected to peer-review (in whatever form the discipline demands), can others use and build on your work. Ecology is a public-funded enterprise, so the public deserves the best return on their investment.

Despite the importance of scientific publications, no one seems to teach you how to do it. There are two aspects of publishing that convince me that everyone can improve. The first is that there are common formats, approaches and practices that scientists can follow to maximize their chance that their science will be accepted. The second is that there are common mistakes that we all make as young (and often not so young) scientists. Knowing some of the lessons and pitfalls will increase your productivity and your enjoyment of publishing.

This guide is in five sections. The first describes the anatomy of a paper from the title to the supplement. The second section details the eight major types of scientific articles; there are many more publication options than just a standard article. The third section describes the strategy for getting a paper accepted and follows a logical sequence from manuscript submission to dealing with proofs. The fourth section describes your thesis and beyond, including some useful tips for your CV. The last section describes good writing practice. Clear and concise writing will make it more likely your work will be published and increase your citation rate.

This guide is full of my personal opinions and others might differ on particular aspects, but I am confident that the overall message – that there are strategies to improve scientific writing – is well accepted. I also anonymously include some illustrative examples from my students' work and I thank them for that and hope that these are useful. This guide is incomplete and is a work in progress. Any feedback about alternative views or additional themes would be much appreciated, as my aim is to publish this after a sufficient gestation. Improving your scientific writing is a continual and enjoyable process throughout one's career and I hope that the content here will help guide you on that journey.

Section 1: The anatomy of a paper

Scientific articles have a rigid structure. We are all familiar with the main sections of a scientific paper – Introduction, Methods, Results and Discussion. There are many aspects of these sections that you need to consider to communicate your message effectively, and there are also other sections of a paper that are not usually considered important but are. I will describe the anatomy of a paper from start to finish, highlighting important issues.

An important consideration that Peter Hairsine, CSIRO scientist who teaches scientists how to publish, is the diminishing number of readers that persevere from the start to the finish of a paper. For every 1,000 scientists who read the title (on ISI say), 100 will read the Abstract, 10 will read the paper, and 1 will cite it. Although this is oversimplified, the general principal is real and highlights the importance of engaging the Reader from the Title and Abstract.

It is often useful, but not imperative, to start with a target journal in mind and then follow the journal format. It is good practice to familiarise yourself with the journal style by obtaining a few recent articles in the target journal.

It is timely to give two overarching pieces of advice for writing scientific papers. The first is to read **and** read. It is only through having read hundreds of scientific papers that you can understand their general similarities and sometimes nuanced differences in format. The second piece of advice is that, in my experience, the biggest roadblock to publishing is **perfectionism**. As scientists, we need to have an attention to detail and produce work of a high standard. If it is poorly structured, sloppily written, or the analysis is weak then a paper will be difficult to understand, even if it was solid work, and is likely to be rejected. However, I have seen many scientists never publish because they never consider their work sufficiently complete. Remember that nothing is 100% perfect and it is better to get something out even if it is not perfect than for it never to be published.

Where to start – the storyboard

A powerful way to begin putting together a scientific paper is to **storyboard**. This technique originated in the film industry and is used extensively there, in the theatre, on TV and in business. For a movie, it entails cartoon depictions of scenes with dialogue and information about how to film each scene.

For a scientific paper, storyboarding entails putting Figures and Tables together, including any synthesis figures that encapsulate the main message, including pertinent points that describe them, and placing them in a logical sequence to tell a story. It is usually not worth starting to write a paper before you have your Figures, Tables and associated analyses nearly complete, although you can probably write most of the Introduction and Methods beforehand. I have seen many people waste a considerable amount of time starting to write a paper before they have their results. You do not need to have the final Figures and Tables, but you need to know what the results are. For example, you

could have some rough or hand drawn figures that you are pretty sure will encapsulate your results. It is often good to print out your Figures and Tables and put them on a large table and keep arranging them in a logical sequence until they tell a story.

Storyboards are an essential part of the creative process in writing a scientific paper and have several advantages. First, the storyboard will help you develop your story, allowing you to experiment easily with changes in the storyline to improve its clarity and impact. Second, it allows early input from your co-authors, rather than waiting until you have a first draft of the complete paper, only to find out that you are off track. Third, the process of visual thinking and planning allows a group to brainstorm, fostering more ideas and generating consensus. Fourth, storyboarding helps find gaps in your story that you need to fill with additional display items (Figures or Tables) or analysis. Last, it can help you and your co-authors develop a synthesis figure that can encapsulate your main message.

Storyboards are not used enough for writing scientific papers. They can be thought of as a traditional paper outline, but focusing more on the visual aspects and creative benefits. I think storyboards are even more important when writing a Review or Opinion piece, because they allow co-authors to generate the new perspectives from synergistic brainstorming that massively enhance these papers, and because of the greater level of opinion in them it allows consensus to be reached.

Title

What makes a good title? This is difficult to answer, as it depends on personal preference, the impact factor of a journal, the size of the research field, and the message you want to convey.

1. **There are three types of titles.** 1. *Descriptive titles* give the approach/method but not the answer (aka 'Methods'); 2. *Interrogative titles* give the subject as a question (aka 'Introduction'); 3. *Declarative titles* give the main conclusion (aka 'Results')
2. **Descriptive titles.** These are by far the most common, give the most amount of information, and are often the longest, although you can make them short. They can include what you do, where it is, and how you did it. Examples include:

   "Relating local abundance of South African pelagic fish species to environmental variables using generalized additive and linear models"

   "Abundance, distribution, morphometrics, reproductive aspects and diet of the catshark *Holohalaelurus regain*"
3. "Encounter success of free-ranging predator movements across a dynamic prey landscape"

   "Biology, ecology and conservation of mobulid rays, *Mobulidae* (Gill, 1893)"

   "The pace of shifting climate in marine and terrestrial systems"
4. **Interrogative titles.** Arouse curiosity. Examples include:

   "Are jellyfish increasing in response to ocean acidification?"

   "How long can fisheries managers afford to delay action on ecosystem and climate change?"

5. **Declarative titles.** I think there is a is a trend toward stating a conclusion or finding in a title. Often good for opinion pieces/reviews/letters to the Editor. Rather than: 'How long can fisheries management delay action in response to climate change?' could be stated as 'Delays in fishery management should be reduced in response to climate change'. Examples include:
   "Overstretching Attribution"
   "Adaptive strategy recommended for US ocean planning"
   "Ecosystem-based fisheries management requires a change to the selective fishing philosophy"
   Here is an example used in a more traditional paper:
   "Ocean surface warming: The North Atlantic remains within the envelope of previous recorded conditions"
6. **Composite titles.** Often composite titles start general and get specific
   Interrogative and Descriptive: "How big is the world's biggest fish? Measuring whale sharks with laser photogrammetry"
   Descriptive and Declarative: "From plankton to top predators: bottom-up control of a marine food web across four trophic levels"
   Two interrogatives: "What determines the likelihood of species discovery in marine holozooplankton: is size, range or depth important?"
   Two descriptive: "The jellyfish joyride: causes, consequences and management actions of a more gelatinous future"
7. **Reworking titles.** The same title can usually be reworded into the different forms. For example, a meta-analysis of quirky paper titles could be:
   Descriptive: "A meta-analysis of citations for quirky titles of scientific papers "
   Interrogative: "Do quirky titles receive more citations?"
   Declarative: "Quirky paper titles receive more citations"
   Composite: "To quirk or not to quirk? A meta-analysis of the impact on citations of scientific papers with quirky titles"
   Which do you prefer?
8. **Quirky titles and the use of colons.** Quirky titles can more interesting, memorable and could lead to more citations. They can also be silly, so use it sparingly and with some thought. They particularly work well for Review/Opinion pieces and also in press releases, but can be in standard papers too. A colon is sometimes used with quirky titles. For example: "In Hot Water: Zooplankton and Climate Change". My most talked about title is: 'The jellyfish joyride: causes, consequences and management actions of a more gelatinous future'. We coined the term 'jellyfish joyride' as an analogy to a rollercoaster, because once you are on it, it is difficult to get off. This title has stuck in peoples' minds
9. **Use of colons.** I like the use of colons, but not all journals allow them. There is an increase in the number of titles that use colons. It can also make titles longer though. We thought the title

'The jellyfish joyride: causes, consequences and management actions of a more gelatinous future' works well with a colon. The first part is memorable but not informative, whereas the second part is informative but not memorable. You can usually rewrite a title so that it does not include a colon, if required

10. **Broad titles.** Often the more specific the title, the smaller number of Readers that might be interested. For example, including in your title that you are working in the Logan Estuary might not interest global readership as much as saying your work is from a sub-tropical estuary. Similarly, rather than saying you are working on *Calanus agulhensis*, it might interest readers more if you said you focused on a dominant calanoid copepod, unless it is a discipline-specific journal. By contrast, including the manta ray *Manta alfredi* in the title might be fine because it is a well-known, charismatic animal. It might also be reasonable to be more specific in large research fields
11. **Short titles.** Generally, shorter titles are preferred and are easier to read. Higher impact journals, in particular, often require short titles, and often more interesting ones, especially for Reviews. This is partly because the topics in higher impact journals and reviews are often broader, but also because the readership is broader too. In an effort to make titles succinct, be careful not to stack too many modifiers (see 'Unstack Modifiers' in 'Good Writing Practice')
12. **Depersonalize?** Probably best to depersonalize a title. The preceding title was initially ''How long can fisheries managers delay action in response to climate change?''
13. **No fullstop.** There should be no full stop at the end of a title; it is a giveaway that the person has not published much

Authorship

Students often ask, 'how many authors should I have on my paper' or 'should I include a particular researcher?' There are no definitive answers to these questions and your views can change with experience. I explore the issues here, providing some guidance, but authorship remains a challenging issue that is often resolved on an individual basis. I have gone into some detail because I have found that there was little practical advice in one place.

1. **Authorship is an emotive issue – background you need to know.** I have seen authorship tensions compromise friendships and sour supervisory relationships. Keep in mind that authorship is important for all researchers, often in different ways. For students, publications are essential for learning how to do science, for postdoctoral and job opportunities, and is viewed extremely positively by thesis Examiners. As an academic, a strong publication record ensures tenure, grant funding, promotion and job security, especially for younger academics. For example, 100 staff at the University of Sydney were given notice in Feb 2012 because of a lack of publications (http://blogs.nature.com/news/2012/02/university-of-sydney-sackings-trigger-academic-backlash.html, 23 Feb 2012, Nature News Blog). For all researchers, publications are a sign of your hard work, commitment to excellence, provide feedback on your

research, and are good for your ego. Unsurprisingly, these tensions can be amplified in high-impact publications. Your view of authorship can also change through time. Nearing the end of your PhD, there can also be a tendency for students to want to publish with fewer co-authors, a sign of increasing independence. Highly-published academics can often have many papers coming out each year so can sometimes be less worried about authorship on individual papers. Finally, most people over estimate their contribution to a piece of work. Some journals now require all authors to put down the % contribution that they made to the paper; these invariably add up to many times more than 100%. *This does not mean that you must include everyone on all your publications, but it should highlight the need for discussing authorship in a respectful and transparent way*

2. **Authors should contribute to multiple aspects of a paper.** To help resolve issues, most institutions, including the University of Queensland and CSIRO, have guidelines for assessing authorship. These basically suggest that authors, as far as possible, should contribute to several of the many aspects there are of a paper: obtaining funding, developing research direction/questions, solving problems, collecting data/building the model, provision of extra data/information, devising appropriate analyses, analyzing the results, developing the story, writing the paper, and ensuring the paper is robust and readable. These author guidelines work well in theory but can fall down in practice, so I suggest using these as a guide
3. **Decide early on a senior author.** I am an advocate of assigning a senior author early because someone has to lead and progress the work. There are many decisions that need to be made during the evolution of a paper and the senior author should listen intently to co-authors, especially those with more experience in certain areas, and then make his/her decision based on all the available evidence. Ultimately it is the senior author that does most of the work
4. **Benefits and problems of deciding authorship early.** In terms of co-authors, once you invite someone onboard, it is difficult to then drop them. Unfortunately, the reality these days is that often you need to be upfront with external collaborators early on to get them to provide input – everyone is busy and you will often get more out of people if they know they will be an author early on. However, there can be a negative consequence of agreeing co-authorship too early. I have seen some researchers that once they know that they are a co-author, they will do very little, because they know it is rare to be removed from a manuscript once the offer of authorship has been made. One good strategy is to just put your name on it up front and put et al., so people know you are keen to collaborate and have their input into drafts and analysis, but the implication is you expect to have some input and you will wait to decide (and you can base it on actual contribution) who the authors will be and the author order
5. **One golden rule?** The closest to a hard-and-fast rule in my opinion is that it is up to the senior author to resolve issues with the paper, including authorship

6. **One silver rule?** Science is increasingly collaborative. One of the first things I was told about deciding authorship is that 'it is better to be inclusive rather than exclusive'. This is generally true; publishing with collaborators can stimulate future collaborations and be good for one's career. Papers with more authors have been shown to get more citations, as there are more people who (a) know the paper intimately, (b) to disseminate the work, and most dubiously, (c) want to promote their own work. There is usually (but not always) any limit to the number of authors and it does not diminish the input of the senior author (see 80:20 rule below). On the other hand, it does diminish to some extent the input of each of the co-authors, and I think single-authored (or two-author) papers stand out from the masses of papers published these days with >10 authors
7. **Should you include your supervisor/s on publications?** This depends on whether you think they have made a significant contribution, but in the real world other considerations sometimes come into it. As with other co-authors, consider the range of different aspects of a publication and where they might/might not have input. I have had PhD students who have not included me on their articles when their research interests have diverged from mine and I have not made substantial contributions to their papers, and that has been the right decision. I have also been in the situation where I have thought I have contributed and should have been included, and I respect that decision as well
8. **What do you do if you think you should be an author?** If you feel strongly about it, have a discussion about it with the senior author, before submission. Be open and frank, and ultimately respectful of the decision that the senior author makes. Keep in mind, a career in science is a marathon, not a sprint, so no one publication is worth compromising good will, friendships and being respectful of others
9. **Reward effort.** A not uncommon situation is when you have invited someone onboard early and they have contributed well to the paper, but in the end their contribution (say data and analysis), is not included in the final paper. This can happen as the final paper evolves. My response in these situations is to include the person. I am far less likely to if the same thing happens when the person has put in little effort
10. **Senior author decides authorship order.** There are different ways to assign authorship order. Common approaches include alphabetical after the senior author, assigning order based on level of input assessed by senior author or agreed beforehand, the major second contributor going second and the head of the lab or originator of the idea going last. I also think that usually the remaining order should be decided once the article is close to submission, rather than upfront. This is because it is good to be able to look back once the article is ready to submit and see the relative contributions over the entire process of putting the paper together, from funding to improving drafts. Agreeing to authorship order too early can result in people tailoring their inputs accordingly

11. **Engage co-authors.** Co-authors might not be able to contribute to every revision of a manuscript because of other commitments, but you should expect that they would contribute to most of the drafts. Giving co-authors multiple opportunities to have input is important. Give a defined time for people to get back to you, such as a week
12. **Author limits.** In some types of publications (e.g. particularly Perspective/Opinion/Policy Forum/Review pieces in some high impact journals) there can be a limit on the number of authors that can be included. This can be a problem, especially when a paper stems from a Working Group. One solution can be using a Group name. For example, I was involved in a paper 'Uniting marine and terrestrial modeling of biodiversity under climate change' and it was a Letter in *TREE* with a restriction of five authors. We thus used a pseudonym of 'The CSIRO CAF Biodiversity Working Group' and listed the other 12 authors and their affiliations. There is nothing stopping an author including such a publication on their CV. Sometimes the authors in a pseudonym are entered by electronic databases
13. **The '80% rule'.** When you are senior author, keep in mind the work required. My experience has been that the senior author does about 80% of the work – I am being overly precise here but it is illustrative. This also does not decline with more authors on a paper. Counter-intuitively, the proportion of the work that the senior author puts in increases with more authors. When you are working with one other colleague, often the contribution is more equitably split 50:50 or 60:40, but with more authors the senior author's contribution often increases to 80:20. As senior author, you should be aware that you will often have to do the lion's share of the work. However, feel free to push your co-authors to contribute more. Many co-authors over-estimate their contribution to a paper
14. **Students/Postdocs senior author their research.** It is expected that students/postdocs lead the papers from their research, as it is an excellent learning experience. Situations where this might not be the case could be where the student has not published the work in a reasonable time and after a thesis has been submitted (e.g. years), where a student leaves their PhD and leaves science, or where there has been an agreement between supervisor and student
15. **When do you remove your name from a paper?** It depends on how important you feel the disagreement is and what your personal values are. I think it is unrealistic to expect every author to agree with every aspect of a paper, especially when there are many authors involved. The situation often arises that there are significant differences of opinion amongst the authors when writing a Review. It happens less frequently in standard articles but it can arise there too. My rule of thumb is I have to agree with most (say 80% for me) of the interpretations/implication in a paper to include my name on it. When there is disagreement, you should put forward your views with polite vigour and enter into robust scientific debate. Ultimately, however, the senior author has to decide the content and interpretations that will be presented. Should you remove your name from the paper if your view does not win out? I

have only removed my name a few times, and this has not been over differing views but when I have felt I have contributed insufficiently to the paper. This is a personal thing and there are some authors I suspect who would never turn down any authorship

16. **Share the glory.** Sometimes, particularly in high impact publications, similar amounts of input by multiple authors can be indicated by a mark such as an asterisk. Further, equal input by the senior author and a co-author can even be specified
17. **Specifying contribution to papers.** Journals are increasingly requiring authors to specify their contribution to different parts of a paper. This has some benefits, but is usually not published. It is usually obvious that co-authors over-estimate their contribution to the paper, as the percentages inevitably add up to much more than 100%
18. **Include initials.** If you have a middle name, always specify the initial. This is more important than one might think. Citation metrics are increasingly used, so being able to identify your publications (for you and for others), especially for people with common names, is imperative. Many women who change their names when married keep their maiden name for scientific publications
19. **Thank co-authors once paper is published!**

Affiliations

This is more important than you think. Institutional funding of universities and Government research labs is partially contingent on publications, and the affiliations listed are the yardstick used for assessment. This means that it is extremely important that you check affiliations and get them right, especially when you are a co-author on someone else's paper.

Abstract

1. **Interesting to read.** As electronic databases such as ISI include Abstracts, many researchers decide whether they want to read a paper based on the Abstract. It thus needs to be interesting to read and summarize your paper succinctly
2. **Layout.** I think they work best when they have something from each section of your paper, and in their relative proportions. Thus, a couple of sentences from the Introduction (context), a couple of sentences of Methods, a few sentences from the Results, and a couple of sentences from the Discussion (implications). Often Abstracts miss out or over-represent one particular section of a paper, which makes it difficult to follow the story and seems unbalanced
3. **No references.** Only very few journals allow references in the Abstract
4. **No acronyms in Abstracts.** You want the Abstract to be as accessible as possible, and acronyms do not help. Also, you will have to redefine them in the remainder of the paper if you use them, as remember the Abstract is stand alone from the Introduction, Methods, Results and Discussion

Keywords

As database searches look only in the Title, Abstract and Keywords of a paper, it is usually best to include Keywords that are not in your Title or Abstract.

Introduction

1. **Start general, end specific.** The Introduction normally starts broadly, outlining a particular area of research, and homes in on a particular research question. This is embodied in the school of thought that suggests that you should never mention your organism in the first paragraph, so you first describe concepts and how it might apply across different groups, before focusing on your organism of choice. Although the application of this in all cases is over prescriptive, it is valuable to keep in mind. Review pieces and papers in higher impact journals usually start broader than focused, discipline-specific studies
2. **The final paragraph in the Introduction is the most important.** This should start something like 'Here we do X'. After the Abstract, this is the first paragraph I read in a paper
3. **Scatter references throughout the Introduction.** Ideas in an Introduction (or Discussion) should flow and references be used throughout wherever needed. A telltale sign of a lack of development of original argument and integration of different literature sources is when a single paragraph describes a single reference, which is typically placed at the start of the paragraph. It is rare that there is virtually no work in a research area
4. **The four paragraph Introduction.** This works well and different parts can be expanded into an extra paragraph if needed. Suggested paragraphs are: 1st = Context; 2nd = The Problem/The Gap; 3rd = Previous work/knowledge; 4th = What we did
5. **State the major finding.** Historically, scientists have outlined what they did in the last paragraph and kept the Reader guessing as to what their findings were. Now there is a tendency by some toward stating your major findings in the last sentence. However, do not cite Figure or Table results from your paper in the Introduction. Stating the major finding at the end of the Introduction makes it more likely for a Reader to see it (when they scan the paper) and remember it

Methods

1. This can make or break a publication
2. Methods can sound much more rigorous after they are written
3. For statistical analyses, state the particular package you used after you have described the statistical approach. It is not necessary to state the package if the statistical test is simple (e.g. a t-test) or the package is simple (e.g. Excel)

Results

1. **No references.** When there are references in the Results, it suggests that the authors are interpreting their results and that it should be in the Discussion
2. **Write in past tense**. Because it is what you have done
3. **Use subheadings.** This can help the Reader follow the logic. Headings should be short, should not use acronyms. For Reviews/Perspectives, it can be good to be more interesting
4. **Accurately describe salient points from Figures/Tables.** The amount of description to include for a Figure/Table can be a bit tricky. The Reader needs to be told the salient points from the Figure/Table that you want them to know. To save time, often the Reader might not even look at the Figures/Tables and accept blindly the authors' description. The onus is thus on the Authors to describe accurately the Figures/Tables
5. **Interpret the Figure/Table.** The level of interpretation to include for a Figure/Table can be problematic. Most Authors err on the side of giving little interpretation in the Results and leaving this to the Discussion. However, often having a Results sections with a myriad of facts that are hard to grasp their meaning can confuse Readers. My suggestion is to give the level of interpretation that is needed so that the Reader can understand the meaning of the Figure, while leaving the larger contextualization to the Discussion. A guide can be that if you are tempted to use a reference to explain the meaning of a Figure in the Results, then that aspect of the explanation should be in the Discussion
6. **Refer to Figures/Tables sequentially in the text.** You cannot skip figures. However, if they are multi-panel Figures (e.g. a, b, c,…) where you might refer to (a) and (b) first, and then later on refer back to (c)
7. **Refer to Figures/Tables in brackets at the end of a sentence.** When the Figure/Table is the subject of the sentence, it does not convey a message and wastes words. By making the message conveyed the subject of the sentence, it places the emphasis on the message and saves space

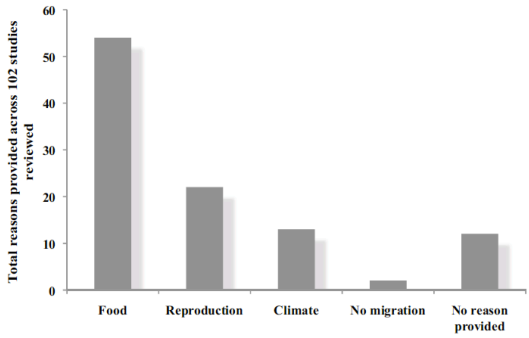
   Rather than: 'Figure 2e highlights the fact that most sightings for *M. pelagios* are concentrated around the northwestern and northeastern Pacific.'

   Better: 'Most sightings of *M. pelagios* are around the northwestern and northeastern Pacific (Fig. 2e).'
8. **State Figure/Table message in the legend.** It can be good to word a figure legend at the start to briefly say what it shows. For example, 'Meta-analysis of copepod publications showing an increase in recent years'. This helps the Reader and gives you an extra chance to get the message out. In particular, *Marine Ecology Progress Series* does this
9. **Do not embed Figures/Tables in the text.** They should be separate – either at the end of the document or in a separate file (depending on the journal). This is a legacy from the past when it was more difficult to embed figures in text, but it remains the standard

10. **A summary Figure/Table.** This might be your last Figure/Table in the paper. It is good to think of a figure that could be shown in a 1st year university class to describe your findings. Conceptual figures can be powerful and well cited. Summary Tables and Figures are especially important in Reviews
11. **When to use a Figure or Table.** If there are only a few numbers to show in a Table or Figure then it is best to just include them in the text. If you do have sufficient data for a Figure or Table, then Figures are preferred for seeing trends and are more easily interpreted by Readers. Tables are useful when specific values are important or needed by other researchers

Figures

1. **State the message in Figure legends.** To be most effective, state up-front the main message that you want the Reader to take.
2. **Use x and y-axis labels**
3. **Keep Figures simple.** Do not use shadows or fancy effects or use 3-D graphics if possible



4. **Same y-axes.** In multi-panel figures showing the same variable, it is best to have the same y-axis for all figures to aid comparison. If you use different y-axis scales, then be sure that you want to zoom in for particular panels and it might be best to mention that in the Figure description underneath
5. **Remove borders around figures and legends**

Tables

1. **State the message in Table legends.** To be most effective, state up-front the main message that you want the Reader to take.
2. **Tables have few borders.** In journals, horizontal borders bound the title (top and bottom) and are at the bottom of the last line. The rest of the rows do not have borders and columns do not have borders. Note that the default in Word puts a border around every cell
3. **Start column labels with a capital letter**
4. **Orient Tables so the longest dimension is by rows**. Journals want to save space and will not use a smaller font to fit the Table on a page. If you had a Table with 10 columns and 6 rows, it would be best to transpose this so it best fits on a page. When you have phrases/sentences in

Tables, it is important to heavily edit (to the point where it is still understandable) them to be as short as possible. Space is money for a journal

5. **Use superscripts for references in a Table.** It is good practice and useful for others to reference information in Tables, but rather than take up space in the Table itself with a column, it is more compact to use superscripted numbers or letters with the references under the Table. Do this numbering once the Table is finalized, as adding or deleting references or row orders during construction of the Table and feedback from co-authors changes the ordering of references. Also, whether you use numbers or letters, or even whether the sequence progresses by Table rows or columns can be journal specific, so find an example in the journal you are submitting to

Reporting statistical analyses

1. **Reporting p-values.** Traditionally,
2. You can choose to use marginally significant for $p<0.1$
3. **Only use the words 'significant' and 'not significant' for reporting statistical results.** This minimises confusion. If no statistical test was performed but you want to mention differences, you could instead say there were 'large', 'substantial' or 'important' differences or that there were 'no', 'little' or 'minimal' differences.

Discussion

I think this is the most difficult part of a manuscript, but can also be the most fun. There is considerable freedom to explore interesting implications of your work. With this freedom comes a challenge – there are fewer general principles or restrictions about how to structure a Discussion than other sections of a paper

1. **Recapitulate your main point in the first paragraph.** More important things come first. You also need to repeat your main message regularly, so it is not lost by most Readers who skim a paper. The most important part of a Discussions are the first and last paragraphs
2. **Summarize important implications or future work in the last paragraph**
3. **Use headings.** This can help the Reader follow the logic. They can be different from those that you might use in the Results, and often will be, otherwise a descriptive rather than a synthetic approach might result. Ensure that if you do use the same major headings in the Results and Discussion sections, that you have additional synthetic themes in your Discussion
4. **Write in present tense.** This is because you are trying to generalize your findings and provide a broader context
5. **Discuss caveats.** The Discussion (or Methods) can be a good place for discussing weaknesses of your study and will convince Reviewers/Readers that you are careful. It can often defuse negative Reviews by being upfront about caveats. You do not want to be too negative though, and it is best to couch caveats positively wherever possible by concluding why they are not

much of a problem or how they were considered. Considerable discussion of caveats is particularly important in theses so Examiners know the Candidate has been careful and is aware of limitations in their study. A section on caveats can be useful

6. **Discuss implications.** You can speculate quite a lot about the implications of your study. Developing a comprehensively referenced argument will convince Reviewers more than unbridled speculation
7. **Do not combine Results and Discussion.** It is generally uncommon to combine Results and Discussion and my experience is that it is usually easier to write them separately. The reason for combining them is sometimes when study results can best be interpreted straight away and requires references. Be very sure that you want to combine them before doing so, as some journals do not support it
8. **Emphasize your own work.** In paragraphs and sentences in the Discussion, mention your own findings first and then other work for context; this puts the emaphsis on your work. Also, you want to say that other findings support your work rather than saying your work supports other findings

   Rather than 'Our findings support what has been observed in seas elsewhere (Smith 2007)'

   Try 'Our findings agree with what has been observed in seas elsewhere (Smith 2007)'

   Or 'Findings from seas elsewhere (Mackenzie and Schiedek 2007) agree with our work'

Conclusion

This tends to be a recapitulation of the major points – similar to the Abstract, but with the focus on Results and Discussion, particularly implications.

References

1. **Follow the journal format.** When a colleague of mine submitted his first paper, it was returned to him immediately with a letter from the Editor saying that when he spent the time to format his references for the journal, the Editor would consider spending the time to send it to review. Reference formats are usually given in Instruction to Authors, although you might need to look at recent papers in the journal to find examples of less common formats (e.g. for books, reports, websites)
2. **Use appropriate references.** A large proportion of references in the ecological literature are inappropriate, as they do not say the points that they are purported to. Get it right
3. **Reference more robust studies.** There is insufficient scrutiny of the quality of papers. Do not use a reference if you think the study was poor, even if it supports your argument
4. **Placement of references.** Try to put references at end of sentence, which makes the message of the sentence its subject (and it is then where the emphasis is) and it easier to read. However, sometimes a reference needs to come in the middle of a sentence to reference a particularly statement. Reference at the start of a sentence sparingly. It can be useful when you are

highlighting a particular person who has been instrumental in a field or a debate in the literature with a few well-known protagonists. I thus think it is most effective in Reviews. Note that the form of referencing at the start of a sentence is Smith (1989) rather than Smith 1989

5. **References give the impression of the scope of the study.** Make sure that the references you use give the impression you want. Often local studies with local relevance use predominantly local references. To place your study into a broader context, it is good to use literature from other systems that support or contrast with your findings. Papers in high impact journals usually have a larger proportion of articles from such journals and reference papers with a broader context
6. **Use unpublished data sparingly.** There is no peer-reviewed scrutiny of unpublished material. Only use it when there is no other reference and it is needed. It might be reasonable to use unpublished data occasionally to make a point that is small and specific, but not for a point that is critical to the development of an argument or is a major theoretical issue. Note that pers obs can be synonymous with unpublished data but is probably weaker. Unpublished data and pers. Obs. are used for co-authors. Here is an instance where it could be OK:

   In addition, rare or seasonal sightings of *M. birostris* at locations, such as northern New Zealand (Duffy and Abbott 2003), southern Brazil (Luiz et al. 2008), the Azores Islands, the Similan Islands (A. Marshall pers. obs.) and the eastern coast of the United States (Bigelow and Schroeder 1953), suggest that this species undergoes important migrations.
7. **Use pers. comm. even more sparingly.** This is used for statements by researchers who are not co-authors. There is no peer-reviewed scrutiny of pers comm, so they should be used sparingly and only when there is no other reference
8. **No need to reference obvious statements.** For example, I suggest a reference is not needed here: 'The shelf broadens downstream of Praia do Tofo, in the lee of a major coastline indentation, to form an area of wide continental shelf known as the Delagoa Bight (Lutjeharms and Da Silva, 1988).'
9. **Number references immediately before submission.** In high impact journals, references are often numbered to save space. Change from word citations to numbers just prior to submission, as doing it too early will lead to major problems. Any addition or deletion of a reference will require renumbering. Numbering also makes it difficult for co-authors to assess the quality and validity of the references you cite for a particular statement
10. **Save space.** Do not need line spaces between references as a hanging indent suffices
11. **Use of reference software.** Using reference software such as EndNote can make it easier to change reference formats for specific journals, and especially change from written to numbered references. It also allows you to search for papers. It can make it a bit trickier to put words within references (e.g. Smith et al. 2010).
12. **Save space by not over-referencing.** Best to not give every single reference you have read to make a point, but limit it to two or three. Maybe an older seminal work and a couple of recent

papers. Also, save space by not mentioning references more than they need to be. For example, the first set of references can be removed in the following.

"A range of temperature response models have been used to predict the suitable habitat of pelagic fish species (e.g. Lehodey et al. 2008, Cheung et al. 2009). For example, a normally distributed response curve is assumed by Lehodey *et al*. (2008) and a triangular-shaped response curve is assumed in Cheung et al (2009)."

Acknowledgements

Include people who have read drafts and who have provided help with various aspects of the work. Ensure that you mention funding agencies; this is increasingly important. I am not a fan of thanking anonymous Reviewers (what does it mean?) but thanking named Reviewers seems reasonable. You do not need to thank authors of the manuscript

Supplementary Material

Supplementary material and Appendixes are increasingly used. This is good because it makes detailed methods and often raw data available to others. However, they are generally poorly refereed – have a read of some Supplements and you will see they can be quite error prone. They are used extensively in higher impact journals. I think they can also make a paper more likely to get accepted if the data that are provided are useful.

Writing block

1. Take a break for a while and come back
2. If a section you have written really loses readers then you should consider going back and potentially outlining the section again and build it up from the bottom-up rather than wordsmithing

Section 2: Types of scientific articles

Maximizing productivity by grasping opportunities

1. **Develop a publishing network.** Once you deliver to collaborators they remember you. One advantage of being inclusive with authorships is that it can facilitate future collaborations
2. **Collaborate with productive individuals.** You will learn to identify collaborators who work hard and contribute and those that cruise. Collaborating with productive individuals over your scientific career is rich and rewarding. I have 3 collaborators, in 3 different countries, from 3 different stages in my career, who I have published a total of 22 papers with, and each collaboration I have thoroughly enjoyed
3. **Look for controversies you can comment on.** There are always controversial articles being published in the top journals and if you disagree with them (or agree and have an interesting angle) then a short Correspondence might be appropriate or an Opinion piece in TREE
4. **Write to Editors.** If you have a great idea for a Review or Opinion piece, write to the Editor with the idea to gauge their interest

Types of articles

There are many more types of submissions than you probably thought.

1. **Standard article.** These are the papers we know well with Introduction, Methods, etc. By far the most common contribution
2. **Note.** Often if the piece of work is short with only a few figures, but is still important enough to publish, writing a shorter article such as a Note is the way forward. A manuscript longer than it needs to be risks rejection. Journals sometimes like shorter articles because they can squeeze them in within their page limits, although check that the journal you want to send to them accepts them. Another reason for choosing to write a Note is that putting in more effort with a particular piece of work will not find more relationships or make it more robust; you are better off focusing on lower hanging fruit.
3. **Review.** Require a good outline, especially when working with multiple authors. Using dotpoints for multiple drafts keeps the focus on content. If sentences are crafted too early then much of the focus can shift to wordsmithing rather than content
4. **Opinion/Perspectives/Commentaries.** Fewer authors than Reviews (often only one or two). They are sometimes more contoversial
5. **Response.** Usually they are responding to recently published articles in the same journal. There can be a time limit. Potential journals include *PNAS*, for *Science* and *Nature* see next below
6. **Correspondence.** In *Science*/*Nature*, these are 2-3 paragraphs about important issues, usually responses in responding to recent articles in the same journal but sometimes they can be

making general points. Must be of interest to a broad readership. Reading *Science*/*Nature* weekly will provide you with ideas and opportunities for Correspondence pieces

7. **Conference/Workshop article.** These are short, report some interesting findings from a topical Workshop, and need to be submitted quickly (sometimes within two weeks of the event). They are also published rapidly
8. **Book chapters.** These can be fun to write, you can have a bit more freedom compared with a standard article, and they can offer more of a perspective. They also can be quick to write as they can be based on several of your published papers. On the downside, Book Chapters are often recapitulations of previous work, are sometimes not peer-reviewed as robustly as standard articles, are often difficult to get citation metrics for, and are often not as highly cited as standard articles. It is good to do some but not too many

Writing a Note

1. **Make it flow.** Notes often do not have section headings. It is often best to combine Results & Discussion. If you are asked to convert a full length paper to a Note then if you just take headings out it can feel as if there is an abrupt transition between the Results and Discussion.
2. **Keep it short.** Notes are supposed to be short, so it is even more important to keep it short and follow page and figure limits

Writing a Review

1. **Why write a Review?** Reviews are more highly-cited than standard papers. Consider writing your Thesis Introduction or Final Discussion as a Review. This can be difficult to write as one of your first scientific articles, but a real bonus is that it ensures you know the literature well. For example, in the Journal of Plankton Research, "Horizons", Special Issues/Themed Clusters, Featured Articles and Short Communications all cite higher than the average. Reviews can also be more fun to write than standard papers. This is because they are often more creative
2. **Context.** The most important aspect of writing a Review is making it clear to the Reader "Why its being written?" "What is the message?"
3. **Take a position.** The most interesting reviews take a position, sometimes controversial
4. **Synthesis Tables and Figures are especially valuable**
5. **Use present rather than past tense.** Present tense has the feeling of being less specific to a study and more synthetic, a major aim of a Review. Past tense gives the impression of being specific, as can be seen in the Results section of a paper that is usually written in this tense
6. **Use active rather than passive voice.** This conveys that you are taking a position and stating it directly
7. **Use 'could' rather than 'should'.** This is less prescriptive
8. **Journals.** *TREE*, *Reviews in Fish Biology and Fisheries, Current Biology*

9. **Copyright.** For figures that are based on previously published work (even your own), usually you need permission from the Publisher of the journal. You go to the journal website, and it will have a section on copyright that you fill in and give the exact Figure and paper you want to use and where it will be published. The publisher will then send you permission. It is usually pretty quick. Many journals are published by the same publisher (e.g. Elsevier) and you can sometimes get one permission for multiple journals. It is also polite to write to the initial authors (lead author) and just say that you are going to modify their Figure X from paper Y of theirs and you have sought permission from the Publisher to do so, and you are publishing it in journal Z. This is usually flattering for the scientist and it is just polite and gives them some warning that they will see their own work published by someone else. You still need to acknowledge the original source in the Figure caption, and often use in brackets (with permission)

Writing a Opinion/Perspectives/Commentary Pieces

1. **Journals.** *PNAS* has Commentaries; *TREE* has Letters and Opinions. *GCB* has Editorial Commentaries and Letters to the Editor

Writing a Workshop Report

1. **Why Publish a Workshop Report?** To let people know what is happening in a research area. This is especially important if you are seeking collaboration with the broader community (e.g. in a broader research or field programme). It can also be useful for future funding of a new research area
2. **Short.** They are usually 2-4 pages long
3. **Rapid.** There is often a short timeline – sometimes within two weeks of the workshop, depending on the journal. They can also be accepted very quickly: my record is 1 day!
4. **Contact the Editor.** It can be helpful to contact the Editor quickly to make sure s/he thinks that your Workshop is sufficiently interesting to a broad audience
5. **Journals.** Few journals publish Workshop summaries but some that do are *TREE*, *Biology Letters*, *Reviews in Fish Biology and Fisheries*

Writing a Book Chapter/Book

1. **Usually commissioned.** These are usually commissioned by Editors/Publishing houses, but if you have a good idea for a Book or Book Chapter it is worthwhile looking for an outlet

Publishing in Special Issues

1. **Advantages.** Papers in Special Issues could have a higher citation rate than stand-alone papers (although I do not have hard data to base this opinion on). This is because researchers are often aware of a Special Issue on a topic relevant to them and it becomes a quick reference

guide for finding a reference of choice, and if the Special Issue is a product of a conference, people could remember your talk and look for your work. They possibly could be a bit easier to publish in sometimes, as often reviewers are chosen from others who submitted to the Special Issue and they might want the issue to go ahead (although if space is limited they might have reason to be harsh)

2. **Disadvantages.** Special Issues can have a long gestation period. This is because they often have a lot of papers, deadlines can be pushed back for late submissions, the issue can be held up while a particular paper goes through multiple reviews, and Guest Editors can be overwhelmed with the number of papers to process. Sometimes the Impact Factor of the journal hosting the Special Issue is not as high as you were aiming for, so sometimes people submit their very best work elsewhere
3. **Journals.** *MEPS*, *Progress in Oceanography*, *Deep Sea Research*

Publishing in *Science* and *Nature*

We all know that it is difficult to publish in Science and this is the way it should be. The journal takes the best work from around the world, from publishing the human genome to reporting newly found planets. Unfortunately many researchers do not consider sending their best work to *Science*, or they consider it dauntingly difficult. The risk is high (>90% rejection rate) but the reward is large.

Often putting your work in the right context will help. Is there a knack to publishing in *Science*? Here are some suggestions that may help get your very best work published in *Science*.

Hints

1. **Read Science and Nature.** Although this may seem obvious, its value can not be underestimated. Reading the journal is the best way to familiarise yourself with the different types of communications that *Science* publishes. Science offers six e-mail alerts, delivered weekly, tied to *Science* content. Some such as Editors' Choice and Current Awareness give an insight into novel science in general. These alerts help to broaden your research knowledge and broaden the context of your own research (see http://www.sciencemag.org/cgi/alerts/main).
2. **Send your best work.** Send only your best work that has a clear and important message
3. **Familiarize yourself with categories of papers.** *Science* not only publishes the more conventional types of scientific papers (Research Articles, Reports, Reviews and Brevia), but has other avenues for more opinionated discourse on a subject, such as Letters, Policy Forum, Perspectives, News and Commentary, Education Forum, Books et al. These often provide incisive comment and are invaluable for practitioners at the cutting edge of many research areas. For many of these submission types, *Science* welcomes inquiries regarding new

advances and fresh insights (see 2008 Information for Authors http://www.sciencemag.org/cgi/issue_pdf/admin_pdf/319/5863.pdf). All categories go in ISI.

4. **Know the cutting edge in your field.** *Science* publishes novel concepts of broad interest. Knowing the state-of-the-art in your research field and being able to see the broader implications of your research findings are critical to providing the context for a piece of work to be considered in *Science*. Reading *Science* and attending international conferences are some of the best ways to keep at the cutting edge of your research field. *Science* Editors regularly attend international conferences and are happy to discuss exciting science issues and give advice on publishing in *Science*.
5. **Know your audience.** You need to convey your ideas to the appropriate audience. Science is read by a well-informed general audience that includes researchers, science policy makers, academic administrators, and leaders from industry and scientific funding agencies. However, conventional types of scientific papers in *Science* (e.g. Research Articles and Reports) attract an audience closer to the particular discipline, whereas more opinionated discourse such as Letters, Policy Forums, and Perspectives are often read by a broader audience.
6. **Communicate clearly.** Your covering letter needs to convey the main message of your paper succinctly and clearly, and contextualize the implications of your findings. This will make it easier for the Editorial member who initially receives your submission to cast a primary assessment before passing it onto the most appropriate Editorial board members. Something to pay particular attention to is your clarity of ideas in your figures. Is there a simple-to-explain figure from your paper that a university lecturer might include in a lecture to summarise your work, or that might be included in a scientific review in your discipline? This will not only make it easier for Editors and Reviewers to follow the paper, but ensure that if accepted the work will be as highly quoted and visible as possible.
7. **Quirky can be good.** For some sections, especially Letters, News and Commentary, quirky is interesting. This is especially true for areas of research that may not commonly appear in the journal as they may not be perceived as not being of general interest (e.g. pure mathematics). Short and interesting titles are especially important for opinion pieces in *Science*.
8. **Show it to an experienced colleague.** If you have something that you think is worth publishing in *Science* or *Nature*, show it to colleague who has published in those journals. Make sure s/he feels that they can give you a forthright assessment, as it might just save you a lot of work
9. **Test ecological theory.**
10. **Think global.** Often studies over large time and space scales are popular. For example, global phytoplakton decline over the past 100 yrs (Boyce et al. 2010 *Nature*), comparison of velocity of climate change on land and in the sea over the past 50 yrs (Burrows et al. 2011 *Science*), earlier blooming of plankton in the North Sea and mapping global threats to marine systems

(Halpern et al. 2008 *Science*). Large-scale meta-analyses are also popular: global climate change impacts (Parmesan & Yohe 2003 *Nature*, Root et al. 2003 *Nature*) and top-down and bottom-up control in pelagic foodwebs (Micheli 1999 Science). Firsts are always topical: the first study of phenology in the oceans showing earlier timing with global warming as on land (Edwards & Richardson 2004 *Nature*). For studies in one location, they are often large integrative studies focusing on a hot topic such as the oxygen minimum zone in Benguela and the adaptations that have allowed the goby to take over (Utne-Palm et al. 2010 *Science*)

Myths

1. **Science communicates with other journals.** Science does not contact other journals, including *Nature*, to find out whether a piece of work has been rejected elsewhere. On very rare occasions, an author has submitted a manuscript to *Science* and *Nature* simultaneously, and he/she has been exposed by both journals serendipitously sending the manuscript to the same reviewer who has then notified the journals and there has been correspondence between the journals.
2. **You need a big name co-author.** The rigorous scientific scrutiny is the same whether the authors have published in *Science* before or not. However, interaction with people who have previously published in *Science* has the advantage that they have a track record of knowing how to present their best science in the most imaginative and accessible way for a broad audience.
3. **Membership in AAAS influences selection of manuscripts.** *Science* is not just an American journal. We view science as a global enterprise and want to publish the best papers in science, from all countries and regions. We welcome submissions from non-U.S. authors. Our commitment to a broad geographical base runs deeper than just an interest in non-U.S. manuscripts, however. A substantial share of both our Board of Reviewing Editors and our referees are from outside of the United States. We review most manuscripts electronically to facilitate the use of expert referees, regardless of location. We maintain a Europe office (in Cambridge, UK). Our editors frequently visit worldwide scientific labs and professional meetings.
4. **There is no appeal process for rejected papers.** Editors do entertain appeals (via email), but most papers are not reconsidered unless a significant error has been made during review that determined our final decision. However, most editorial decisions are based not only on the technical merit but also on the general interest or importance of the work, and on comparison with other papers that are currently being considered in the paper's field and in related ones.

Section 3: Getting a paper accepted

This can be a long and torturous process. I remember my first papers that I submitted. I had to send sometimes five hardcopies in an envelope (double-spaced, hundreds of pages,) to a journal, it would cost a fortune, and often you would not hear back from them for six months! The online submission these days considerably streamlines and speeds up this process.

There are many aspects to getting a paper published, from submission through to dealing with proofs. There are a number of key approaches that you can learn to help a paper on its way. I give some tips below.

Hints for proofreading

Before submission, your manuscript needs to be as free of errors as possible and easy to read.

1. **Read the text twice.** The first for punctuation/grammar and another time for content
2. **Give it a rest.** Set your manuscript aside for a couple of days after you have written it and then proofread it with fresh eyes. You will see what you have actually written
3. R**eview a hard copy.** Print out your text and review it line by line on paper. Rereading your work in a different format may help you catch errors you missed previously
4. **Get another student/postdoc/collaborator to read it**
5. **Read your text aloud.** Or read it to someone else. This often highlights mistakes or sentences that you can improve
6. **Use a spellchecker and grammar checker.** These can catch repeated words, reversed letters, and many other common errors, but it is not foolproof

The covering letter

1. **Summarise novelty and importance of your study.** This is especially needed for higher impact journals but it is worthwhile for all. Increases your likelihood of acceptance
2. **Give explanations that help the Editor.** For example, I recently had a case where we used a pseudonym after the first nine authors because we had dozens of extra co-authors we wanted to include on the paper. We thought this required an explanation and stated it in the covering letter. We explained that the program relies on the expertise and good will of all the participants, many of which are young scientists from developing countries. Without their collaboration the program would not exist. Many have limited opportunity to publish and we would like to acknowledge and reward their efforts – something that they can take back to their institutions and say that the process has been worthwhile.
3. **Suggest Reviewers.** This maximizes your chances of success. The idea is to have people who you think will assess your work fairly. The person should not be too close to you (e.g. a relative!). Different journals have their own guidelines, but often someone who has published with you recently (within the last three or five years) or sometimes works for the same institution is not eligible. Picking someone from the literature who you do not know can be hit

and miss; they could have their own agenda, be competing with you, or reject most papers they review

4. **Remove a potentially antagonistic Reviewer.** If you really do not feel that you would get a fair review from someone then you can ask the Editor not to send it to the person. It is not always necessary to give a reason. Do not give a long list of people you do not want to have as Reviewers. In your covering letter you should also list people who have seen the manuscript and provided feedback (and sometimes in the Acknowledgements).
5. **Sometimes suggest a discipline for Reviewers.** Sometimes you feel that you might not get a fair treatment by a group of people because their area of expertise makes them critical/dismissive of what you have done. You usually only realize this after getting a paper rejected. For example, I had a paper looking at the effect of the environment on sex ratios of copepods in field populations. It was rejected on the basis that it should be done in the lab. Some scientists are locked into their particular approach (e.g. field, experimental, modelling) and do not appreciate the important interplay among them. I requested that ecologists with active field experience would be most suitable for reviewing the manuscript

When do you write to the Editor before submission?

You do this to gauge interest and get feedback

1. Sometimes for *Nature*, *Science* or *PNAS*
2. For review articles or opinion pieces
3. If you thought your paper might be out of scope or unusual for the journal

Submission

1. **Read the journal scope.** One of the main reasons that a paper will not be sent to review is that it is not within the scope of the journal
2. **Elicit final agreement of co-authors.** Send the final version of the paper to all co-authors for final agreement that they are happy with the content. This is especially important for Reviews and Opinion pieces that can be controversial and with large working groups on a paper. Give a defined time for people to get back to you, such as a week
3. **Send the submitted version to co-authors.** Always send a copy a complete copy (text, tables, figures) as a pdf to all co-authors on submission so everyone has a record, and make it clear which journal it has been submitted to. A key It is standard protocol to probably send co-authors pdfs four times during the publication process: on submission, when you send in a revised version, then when proofs come out, and then when you have the final published version.
4. **Put page and line numbers on the manuscript.** I threaten to return manuscripts unreviewed when they do not have page numbers, as it is difficult and more time consuming to give comments. As a courtesy to Reviewers, number lines from 1 to infinity rather than per page

5. **Follow Instructions to Authors.** This is usually the reference format (in the text and in the reference list), the headings and subheadings format (e.g. bold/normal, centred/left, caps/lower case, italicized/normal), the format for Figures and Tables and how to refer to them, and sometimes it can even include grammar suggestions. Look at other papers published in the journal to ensure that you have it right
6. **Number references at the end.** Some (particularly high impact) journals require numbered referencing. Do this at the very end, before submission, because any change to the references by you or your co-authors requires renumbering everything and it is easy to make mistakes. This goes also for Tables that have superscripted footnoted references

Dealing with Reviewers' comments

The Reviewing process usually substantially improves a manuscript. It is not perfect though and the acceptance of a manuscript is determined by many factors including the quality of the study, how the article is written, and the Reviewers' knowledge, perspective, mood, and integrity, amongst other things.

There is more luck in the process than one might think or wish for, but it usually works surprisingly well, especially considering it is voluntary. As an illustration of the variability of Reviewers, I know a researcher who rejects 80% of what gets sent to him, and I know others who rarely reject papers outright and will spend considerable time to make constructive comments to help authors improve a manuscript. With an appreciation of the element of luck in this process, a major aim of your response is to minimize the need for the manuscript to go for re-review, either by the original Reviewers or new ones.

1. **Be courteous.** Remember Reviewers are people too, and are much more likely to respond favourably if you are polite. Thank the Editor and Reviewers for their constructive comments that have improved the manuscript. Editors like to hear that the Review process has worked (remember they have already invested in the process as they have chosen the Reviewers and have read or at least skimmed the manuscript). Reviewers have also invested time and effort in the process
2. **Say 'yes'.** It is a truism that your manuscript will be accepted if you basically say yes to all changes. So, pick your (few) battles. Do not argue about minor things such as grammar or minor scientific points (even if the Reviewer is incorrect). It is sometimes useful to think about whether a change that you do not agree with substantially changes the message of the manuscript – if it does not then consider making it
3. **'Agreed. Changed.'** In response to a query, my preference is to say 'Agreed. Changed. I have done x, y or z'. When I disagree, I then leave out the 'Agreed. Changed' and concisely explain why I disagree
4. **Reviewers are not always right, but they are right 80% of the time.** Often when Reviewers have got it wrong, it is because they have got an incorrect impression about something because

of the lack of clarity in the manuscript. Usually it is best to assume it is your fault and clarify things

5. **Point-by-point response.** In your reply, detail a response to individual points raised to make it as easy as possible for the Editor/Reviewers to assess what you have done. You want to minimize their need to re-read the manuscript because of how busy they are. Where your response to a particular point raised has resulted in a change or addition of only a few sentences in the manuscript, then copy the sentences into your response and put them in quotes. Where it is longer than a few sentences, outline what you have done and then refer to the (new) line numbers so the Editor/Reviewer can look at it.
6. **Respond with integrity.** If you have made major changes beyond the points raised by the Editor and Reviewers you need to make this clear. All superficial changes such as tightening the grammar and increasing readability additional to the Reviewers' comments do not need to be mentioned. Minor changes in what you have included that do not change the findings also usually do not need to be detailed.
7. **State reasons for disagreement succinctly and politely.** Referencing your response will help convince the Editor that others agree with you
8. **Never respond immediately to a negative review.** Always wait after receiving a negative review, as spur-of-the-moment emails are often emotional and miss the sometimes useful comments that are made. Mull over the comments for a week or two and talk with co-authors, especially those with publishing experience
9. **Co-authors should have the opportunity to respond to Reviewers' comments**
10. **Say you addressed all grammatical comments.** When Reviewers give a list of many grammatical changes, you do not need to respond to each one individually, but say that you have addressed all of them or the vast majority
11. **Disagreeing with a comment and having maximum scope for acceptance.** Sometimes when you know a requested change is incorrect but the Reviewer is insistent you can say you are will do it but leave it up to the Editor to decide. I have done this with a title of a manuscript where a Reviewer had said 'incorrectly' that there was a grammatical problem
12. **Address the Editor's feedback.** Good Editors sometimes give their own feedback, particularly highlighting Reviewers' they think are particularly pertinent to address. You need to heed these carefully and it is generally wise to make them if at all possible
13. **Outside scope.** Sometimes Reviewers make suggestions that will require major extra work, such as the need for a new experiment, another phase of fieldwork, or another model. If you do not agree with the suggestion, then an Editor can sometimes be convinced that it is outside the scope of the present work
14. **Increased length.** Sometimes Reviewers suggest whole new sections in a manuscript. This can strengthen a manuscript. If you disagree, however, then an Editor can sometimes be convinced

that it will substantially increase the length of the manuscript with little benefit to the product. Journals are usually constrained by total length of each issue, and Editors know that longer papers mean fewer papers

15. **Do not denigrate your work.** In your response, you generally do not want to be saying you are wrong, even if you think you are. Say that you agree with the Reviewer, and you have made the changes and this has markedly improved the manuscript
16. **It is a manuscript not a paper.** Always call it a manuscript rather than a paper – it is only a paper once it is 'in press'
17. **Capitalise Reviewers and Editor.** This shows respect. Do not assume Reviewers or the Editor is male. Use gender-neutral terms (e.g. s/he, Reviewer A). Better to assume the Editor is a Professor than a Mr or Ms. You do not want to alienate people
18. **Separate comments to Editor and Reviewers' comments.** Always put a page break in between what you send to the Editor and how you respond to Reviewers' – this makes it easier for the Editor to just send the comments to the Review if s/he wants to – you might not always want the Reviewer to see what you said to the Editor
19. **How long before chasing up a journal?** Journals make much faster decisions on acceptance/rejection these days with electronic online submissions. If you have not heard from a journal within 8 weeks I would suggest a friendly email to the Editor asking for an update on the status. Be courteous

Second reviews

1. **Be more flexible.** The Editor will be keen to make a decision on the manuscript, so on the second round be even more flexible with making changes where possible. If you can avoid it, you do not want to resubmit to another journal with all the time and effort that takes
2. **Suggest another opinion.** If after a second round of reviews there is an impasse or it looks like the Editor is leaning toward a negative decision, suggest another Reviewer (but do not name them). This can give you another chance

Acceptance

1. **Acceptance will come.** Many journals, especially high impact ones, do not state straight away that your paper is 'in press', but will say that it will be considered for publication once a set of changes are made. Do not worry – the key thing is how substantial the changes are and whether you can easily address them. The acceptance will come
2. **In press date.** Note the date you receive the acceptance email
3. **Update your CV.** An 'in press' article is as good as published – and put the full reference including the journal name and 'in press, 12 Feb 2011'. This information is now needed for grants

4. **Send an in press manuscript to colleagues.** When sending an 'in press' manuscript to colleagues, it is best to make sure there are no track changes highlighted – all corrections should be accepted and any comments deleted. To be safe, it is also best to put an 'in press' water mark on it or put on the front page in press and the journal, and turn the manuscript into a pdf. For high impact papers, do not distribute your paper, because it will be under embargo

Proofs

This is the exciting part; the work looks like a real paper when you get the proofs!

1. **Senior author examines proofs.** Send the proofs to your co-authors, but examining proofs is almost always left to the senior author (by themselves)
2. **Detailed check.** Get back to the journal quickly with changes to the typeset galley proofs. You need to go through word-by-word against the latest version you sent them to make sure there are no mistakes. Pay particular attention to Figure/Table legends, superscripts/subscripts, and equations, as they often contain mistakes. Ensure Figures have reproduced accurately. Sometimes a paragraph can be missing. Scrutinize carefully the author affiliations and it is worth sending to the co-authors to do their own. Any mistakes that the journal has made they will correct
3. **Change incorrect/jarring writing.** The proof stage is the final chance of correcting things and once published it will remain in print in perpetuity. The journal will make all changes where they have made a mistake in typesetting and any that you have made that are still there (e.g. spelling mistakes). You can also make other small changes (e.g. update references that are now published rather than in press), and you can also change some numbers that might have changed slightly (but do not change the message). Finally, you can make some small changes to grammar to improve the readability – keep these to a minimum though by focusing on the main ones – otherwise the journal might charge you
4. **Clearly mark the changes.** Sometimes you can use Markup on a pdf to send changes. Usually, however, the journal wants you to print the pdf and mark any problems you see, scan it and send it back. It needs to be clear to them what to change. You can use common typesetting marks available on the web or ask me
5. **Pay for Open Access.** It is generally worth the money. An important aspect of assessing your science impact is the number of citations of each paper, and open access papers are more easily accessed and, on average, more highly cited. Convince your supervisor/s and collaborators that it is a small amount of money, compared to the total research cost of a paper (which is probably >$100K)

Rejection

1. **Do not take rejection personally.** This is part of the scientific process. If everything was accepted, we would have so much bollocks in the literature we would not move forward. Every experienced scientist has experienced rejection – you are in good company!
2. **Consider dispassionately reasons for rejection.** Put it aside for a week, talk to your co-authors, and then decide whether Reviewers' comments were justified. What can you learn? Do you agree with their reasons for rejection? Is there a fundamental flaw in the study? Can it be fixed? Was the message not conveyed clearly? Is the work publishable – is it sufficiently new and important?
3. **Submit to another journal immediately.** If after considering these questions you do not feel the Reviewers were justified, reformat and submit elsewhere immediately.
4. **Address criticisms and submit elsewhere.** If you agree with the Reviewers' comments, decide how best to fix it, and progress from there**.** You do not have to tell the new journal that it was rejected previously, but morally you should be able to justify how you addressed (or not) the negative comments previously
5. **Shelve (rarely).** If it is not feasible to fix the flaw or it could be too time consuming to do so, it might be best to shelve the work. This is rare
6. **Consider PLoSOne.** If the Editor considered the paper not sufficiently important, try another journal – maybe one with a lower impact factor. PLOSOne might be an option. They take papers in all areas of science. The scope of the journal states:

   'Too often a journal's decision to publish a paper is dominated by what the Editor/s think is interesting and will gain greater readership — both of which are subjective judgments and lead to decisions which are frustrating and delay the publication of your work. *PLoS ONE* will rigorously peer-review your submissions and publish all papers that are judged to be technically sound. Judgments about the importance of any particular paper are then made after publication by the readership (who are the most qualified to determine what is of interest to them).'

Asking the Editor to reconsider a decision

1. **Editors sometimes reconsider their decision.** Editors will reconsider their decisions more frequently than might be thought. You need to have a good reason (e.g. incorrect scientific viewpoint, a number of valid approaches, misunderstanding on the part of the Reviewer, bias)
2. **'Play the ball not the (wo)man'.** Remember when criticizing a Reviewer, focus on the arguments and never get personal. You are more likely to win the day if the argument is based on science rather than emotion, especially if the Reviewer has been rude or dismissive

3. **Enter into a personal relationship.** I think asking for the clarification or reconsideration of a decision can be better done by an individual rather than a long list of people copied into the eamil. It is less threatening. This also applies to much of the correspondence with an Editor

Reviewing

1. **Good learning experience.** For young researchers especially, reviewing others' work is a great learning experience. It often also gives you insight into the cutting edge in a research area and good ideas for the future
2. **Young Reviewers are notoriously tougher than more experienced ones.** This goes for thesis examiners as well
3. **Do not suggest many of your own citations.** Many Reviewers want their own references to be included, as this will increase their citation rates. It, however, can give away who the Reviewer is, and especially if you are being critical, you might not want the Authors to know. One Reviewer I had suggested eight additional references all by the same author!
4. **Anonymity or no anonymity**. It is a matter of personal preference. If you do put your name down for a negative review, then the authors might hold a grudge. Some people just put their name to good reviews they give, and this is a little inconsistent. There is a move toward total anonymity, which is my preference

A personal perspective on publishing

1. **Swings and roundabouts.** You need to have done enough on a paper to be able to justify to yourself (and others) that you should be included as an author. Some papers you will contribute a lot to as a co-author and some you might do relatively little on. Do not worry too much though, as it works out in the end. Remember that people repeatedly publish with people they want to so if you consistently do very little then you will end up being a sole author on your papers
2. **Accept the system.** The system of peer review is not perfect, but it is the best we have and we cannot easily change it. Learn ways to make it work for you and do not take it too seriously. Good papers can get rejected but should be published in a journal in the end
3. **Aim high but be realistic.** Increasingly jobs and promotions are based on our publication record, both quantity and quality. The impact factor of the journals you publish in is now a key measure of the impact of your science. When choosing a journal to submit your manuscript to, not only consider scope and audience, but the highest impact factor journal (or one that you esteem highly) that you can
4. **Publish in non-marine journals.** General ecological journals often have higher impact factors than those that are solely marine (e.g. *TREE*, *Ecology*, *American Naturalist*, *Ecology Letters*, *Current Biology*). General science journals have even higher impact factors (*Science*, *Nature*, *PNAS*). Publishing in these journals requires you to make your paper more accessible to a

general audience and often to include robust statistical treatments (especially in ecological journals)

Section 4: Your thesis and beyond

Thesis layout

1. **As papers.** The standard thesis layout now is to have each Chapter self-contained as a paper – either already published or ready to submit
2. **Bookended structure.** Introduction Chapter at the start and a Discussion at the end
3. **Be critical of your work.** The Discussion is a good place to discuss caveats. This will give the Examiners less ammunition and show that you are a rigorous scientist. When being critical do not lambast your work, but highlight limitations and especially show that many of the perceived limitations are not really so
4. **Publish before submission.** Examiners feel that they should not ask for major changes if a thesis chapter has been publish and gone through peer-review – what is the point? Examiners also know that publishing is a key skill to learn during your thesis so they want to see that you have been able to do that
5. **Authorship.** Discuss authorship of papers from each chapter with your supervisors

Choosing Examiners

1. **Know the Examiners.** As with reviews of papers, there can be an element of luck in the type of response from Examiners, partially independent of content. Hugh Possingham suggests that '1 in 20 Examiners are crazy', so choose carefully. It is best if your thesis Supervisors have met your thesis Examiners.
2. **Not too close.** Universities usually have guidelines on this and it is usually 3-5 years since your thesis supervisors have published a paper with them
3. **Positive thesis experience.** If someone had difficulties obtaining their PhD or MSc then this can make them think that everyone should have difficulty. Steer clear
4. **Experienced.** Young researchers straight out of their PhD can be the most critical. This goes for being a thesis Examiner and a paper Reviewer

Promoting your work

1. **Circulate your work.** If there is a group of collaborators, lab people, scientific acquaintances that might be interested in your work then it can be good to send it to them with a short dot pointed summary of its main findings (not to whole conference distribution list though!). Other scientists being aware of your work can increase citation rates. However, remember that self-promotion is never as good as promotion by others!
2. **Conferences.** Conferences are a good venue to promote your work. You can bask in the glory of a good talk for years and your peers will remember it. Conferences also give a deadline for you to meet, which can increase output. Present your best work. Posters are a lot of work for their return, but are important when because you cannot always get a talk and they can get

you to a conference. Choose an international conference toward the end of your PhD (or just after) to present your best work or an overview of your thesis

Tips for your CV

1. **Evolution of your CV.** Your CV needs to evolve as you gain more experience. What is appropriate when you are a PhD student is not appropriate when you are a Postdoc, early career academic. The further you go, the more you leave out other jobs and aspects not pertaining to science. For example, after you are have a PhD it is generally not relevant that you worked as a shop assistant or bar tender, or where you went to primary school
2. **Everyone can use Microsoft.** In terms of Special Skills that you have, do not include Microsoft Word, Excel, PowerPoint. It is assumed if you are doing a PhD you are proficient at these. It is best to include skills that set yourself apart from others such as statistical software, GIS software, analytical techniques, and experience at sea
3. **Include thesis/project titles.** For your Honours, PhD and Postdoctoral work, put in project titles and potentially a few sentences of explanation of what you did and found
4. **Education.** It is good to see where someone did their BSc and what their majors were
5. **Publications.** This is often the first section that someone looks at to give an impression of research area and output. I have my publications at the end so they are easy to find. It is good to have sections: 'Submitted papers', 'Published papers', 'Grey literature'. The submitted section shows you are active. The ones in review should be in 'Submitted papers' and those in press should be in 'Published papers'
6. **Have 1-2 papers submitted.** It is also a good check for you to make sure that you always have a couple of papers submitted.
7. **Numbering your papers.** It makes it easier – scientists will count them anyway. Ensure that only peer-reviewed papers go into your publication section – other articles such as a short (not peer-reviewed) conference abstract, a newsletter article or a report should go under Grey Literature. Newest publications should be first and numbered in reverse chronological order
8. **Service.** Lots of universities have a Service section in their annual assessments of staff, and it can be useful to have a section that brings together: paper reviews, thesis reviews, proposal reviews, committee work
9. **Have a picture.** Science is not a beauty contest, but it is useful for people to identify with you if you are going to have a phone interview, for example. It also allows people to remember you if they have seen you at a conference
10. **Layout is important.** A clear, simple and concise layout will be most effective. Now and again it is good to revamp your CV, as you can get bored with it
11. **Update it regularly.** Updating your CV whenever an event happens makes it easier to keep track of what is happening. Update your CV immediately when you: submit a paper, the paper

is 'in press', the paper is published, you learn a new skill, you attend a course or workshop, you give a presentation, you review a paper, you go to sea

12. **Scientists love metrics.** Some metrics to think about are: total number of citations; most number of citations for a paper; h-index = h papers cited more than h times; m-index = h-index divided by number of years since PhD. These can be a bit daunting for early-career scientists who are just beginning their publishing career, but as your career progresses these metrics can express your productivity and will be expected in a CV
13. **Tips for early-career scientists.** The m-index can be a bit fairer than other metrics because it considers the time since you received your PhD. When your publication career is just starting, then it is good to highlight particular aspects of your papers. For example, you could put the Impact Factor of the journal after each paper. You could also have a sentence or two after each paper (e.g. in italics) explaining the main findings/ramifications of the paper. You could also include number of citations for selected papers. Having a section on reviews that you have undertaken and the journals you have reviewed for is good; this shows that you are part of the scientific community
14. **Positive statements.** A good way to show the importance and quality of your work, especially for early-career scientists where a body of work is developing, it is useful to include a few of the very positive comments that you received from your thesis examiners or from referees of one of your papers.
15. **Use Wordles.** See http://www.wordle.net/. Wordles show the main words in text and scales their size relative to frequency. They add interest in your CV and can summarize a lot of information. I have used it to graphically depict research themes (based on titles of my published papers), co-authors, and journals I have published in since 2004

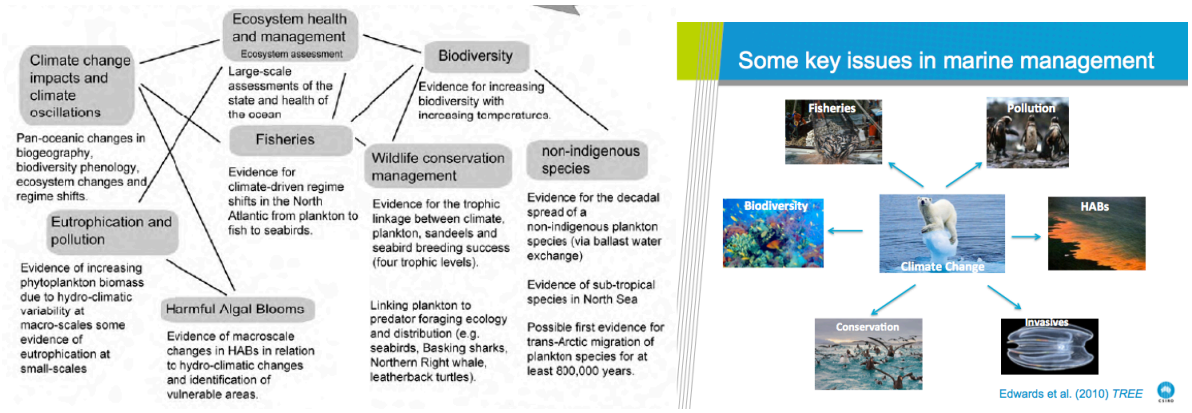
Coauthors

Journals

Research themes

Tips for presentations

1. **Time it.** Particularly for conferences, they will stop you. I have gone over time when I have not timed it
2. **Practice.** No matter how well you know the content, you need a few practice runs. Best not to over-practice it though as it can then sound rehearsed
3. **Minimize text/dotpoints and maximize visual appeal.** PowerPoint is both great and a scourge. Make it work for you. Think about using images rather than text. Here is an example of how I have replaced a figure from a summary paper with one that is more visually appealing and easier to follow. I then have individual slides of each key issue



4. **Keep it simple.** Do not use sounds, fly-ins or fancy slide transitions in PowerPoint, or if you do, use them sparingly for effect. Do not put too much text
5. **Lead your reader through.** Sometimes people have a part of a slide (top or left) that remains stationary throughout your talk and has the themes/heading on it and it steps through as you proceed. Others have transition slides to keep the audience on track. In the example above of key issues in management, I cycled through the issues by repeating this slide, circling the issue I was talking about, and then showing another more specific slide on the issue
6. **Can you 'involve' your audience.** This is difficult but worthwhile.
7. **Do not over-emphasize your own work.** Advertise your work where relevant, but also using other studies in the Introduction and Discussion will give greater context
8. **Never apologize. Ever.** Do not apologize for a graphic that has poor resolution. Either do not show it or improve it. Mentioning it brings it to people's attention
9. **PresentationZen.** This book is the bible of how to give crisp, visually-appealing presentations. I have the book – ask to borrow it
10. **Be prepared for questions.** This is an important part of your talk, as this is where you get some feedback and the audience feels more involved. Leave sufficient time. Think about potential questions and your answers.
11. **Extra slides.** It looks very polished when you have a slide after your last slide and talk to them to answer a question. This can allow you to show an extra slide that you might want to show, but cannot because of time restrictions
12. **Use Wordle!** This is a great resource for visualizing themes. Below is an example of authors I have published with
13. **Try Prezie.** See http://prezi.com/ This is an alternative to PowerPoint that is more dynamics It also forces you to storyboard your presentation. Be careful not to overdo the windows flying around though, as this will make your audience motion sick!

After your PhD

You should Leave 6-9 months contacting people for Postdocs.

1. **A postdoc.** You should start contacting collaborators and other researchers 6-9 months before you hand in your PhD to look for a Postdoc

Section 5: Good writing practice

This section describes some successful writing practices. The content here is based on my experience, is by no means exhaustive, is a work-in-progress, and other might differ in their opinion.

Be direct and general (in Discussion or Reviews use present tense)
Rather than: "Lanternfish were identified as the main driver of tropical tuna aggregations over some Coral Sea seamounts (McPherson 1991)."
Better: "Lanternfish are the main driver of tropical tuna aggregations over some Coral Sea seamounts (McPherson 1991)."

Acronyms

1. Always spell them out the first time you use them
2. Minimize their use as much as possible to make it easier for Readers. Certainly best to not use abbreviations if you use them <5 times
3. Best not to use them in headings
4. Use capital letters
5. The further apart the acronym needs to be used in the manuscript (e.g. Methods, Results, Discussion), the more times it needs to be used in the manuscript to warrant the use of the abbreviation

Active vs Passive voice

There are two voices in English – active and passive. Active voice is often more direct, clearer and vivid, and is preferred for scientific writing and giving instructions. However, the passive voice is preferred when the subject of the sentence is implied, indefinite, general, unimportant or if the writer is trying to increase vagueness or suspense. The passive voice often uses the word 'by' and is usually longer.

Which do you prefer?
Active: "Galileo discovered gravity". Here 'Galileo' is the subject of the sentence, 'gravity' is the object and 'constructed' is the verb.
Passive: "Gravity was discovered by Galileo". Here 'Gravity' is the subject, 'Galileo' is the object and 'was discovered by' is the verb. It is longer than the active voice.

Which do you prefer here?
Active: "We constructed an ecosystem model." Here 'We' is the subject, 'an ecosystem model' is the object, and 'constructed' is the verb. The emphasis is on the subject 'We'.

Passive 1: "An ecosystem model was constructed by us." Here 'an ecosystem model' is the subject, 'us' is the object, and 'was constructed by' is the verb. The emphasis is now on the subject 'An ecosystem model' and it is longer

Passive 2: "An ecosystem model was constructed." Note that in this instance a passive voice is OK because the object here is implied (i.e. the authors) and it is shorter.

Agreement of subject and verb

Singular subject need singular verbs and plural subjects need plural verbs. This can be tricky when the subject is not immediately next to the verb, as in the following.

'the *difference* between the distance shifted at the leading and trailing edges *is* less prominent'
Here the subject of the sentence is singular ('difference') and not plural ('edges') so a singular verb ('is') is used rather than a plural ('are')

'*information* on basic biological parameters *is* essential'
Here the subject of the sentence is singular ('information') and not plural ('parameters') so a singular verb ('is') is used rather than a plural ('are')

Apostrophes

Apostrophes are used to show the omission of letter in a contraction and to indicate possession. The possessive case causes the most problems an the following guidelines apply:

1. **To show possessive form of a singular noun, use apostrophe with 's', even if that singular noun already ends in 's'**
   "The manta's feeding area" (the feeding area belongs to the manta)
   "My boss's problem" (the problem belongs to my boss)
2. **For possessives of plural nouns that end in 's' (which is most plurals), use apostrophe without 's'**
   The mantas' feeding area (the feeding area belongs to multiple mantas)
   The fishes' tank (the tank belong to fishes)
   The students' projects (the projects belonging to the students)
3. **For possessives of plural nouns that do not end in 's', use apostrophe with 's'**
   The women's conference (the conference belonging to the women)
   The men's training camp (the training camp belonging to the men)
4. **When two or more nouns possess the same thing, add apostrophe 's' to last noun**
   Smith and Pauly's paper (Smith and Pauly worked together on the same paper)
5. **When two or more nouns separately possess something, add apostrophe 's' to each noun**
   Smith's and Pauly's thesis (Each person has his own thesis)

6. **Do Not Use an Apostrophe with Possessive Pronouns.** Possessive pronouns already show ownership (e.g. yours, his, hers, theirs). However, we do add an apostrophe 's' to form the possessive of some indefinite pronouns (e.g. anybody's guess, one's personal responsibility, somebody's breakthrough)

Recommendations

1. **Minimize contractions.** Apostrophes are used to indicate missing letters. Contractions are used in informal writing and should be minimized in scientific writing
   "Is not" rather than "isn't"; "There is" rather than "there's"
2. **Minimize apostrophes.** Usually best to minimize the apostrophe.
   "The manta's underside is blotched" can be replaced by "The underside of the manta has blotches"
3. **Do not use an Apostrophe to form a plural.** Generally, use only an 's' without an apostrophe to form plurals of nouns, including dates, acronyms, and family names
   "The regime shift occurred in the mid-*1980s*"
   "Ecosystem Based Models (*EBMs*)"
4. "**It's" vs "Its".** These are often confused. "It's" is colloquial and can always be replaced by "it is" in scientific writing. "Its" is a personal pronoun.
   "*It's* difficult to know *its* true meaning"

Be consistent

A good indication of sloppiness and lack of attention to detail is inconsistencies in scientific writing. In these situations, Readers can question the robustness of the science. For example, use capitals for proper nouns everywhere, if you choose to use *–ize* or *–ise* be consistent, and if you choose to not use a space between numbers and their units then do so all the time. In writing, consistently doing the wrong thing is better than randomly doing different things.

Commas

Commas make your writing more readable and sometimes are essential for correct meaning. Commas can often break up phrases and can go before words such as 'with'

The following sentence is more readable with a comma after 'reproduction'.

'While the movement of large pelagic fish is influenced by food availability and reproduction their distribution has been described by oceanographic variables.'

A comma is needed after 'live weight' in the following sentence.

'As data were expressed in terms of live weight conversion factors (FAO 2002) were used again to determine the weight of consumable seafood in tonnes for each species.'

Either

'Either' is only used with two things in a list, not more. The following is incorrect:
"To date, few reference levels have been defined for ecosystem indicators, either for characterizing unfished situations, limits to be avoided, or optimal management targets."

Footnotes

Best not to use footnotes in a thesis or paper. You will virtually never see them in a scientific article so best to follow that norm. The exception might be in some encyclopedia articles, some reviews, and in some writing for the general public.

Lists in a paragraph

The use of lists highlights a difference between writing in novels and scientific/technical writing. In a novel, there are never boring, repetitive lists that would lose Readers' interest. In scientific and technical writing, however, lists are often vital for helping the Reader follow a complex argument or know all the different causes. Only use lists when there are three or more items: two items can just be explained one after the other and the Reader can easily follow. Lists are normally introduced with a sentence that states there are few/several/many explanations/reasons/steps for something.

Rather than:
Firstly, … Secondly, … Thirdly
Better to use:
Firstly, … Secondly, … Lastly
Best to use:
First, … Second, … Last

Lists in a sentence

A standard way to have a list in a sentence is to start it with a colon, have semicolons between the items, and to use an 'and' after the last semicolon. It can be with or without numbers.

'Assuming these trends in ocean warming are continued in the future, we hypothesise that: (1) pelagic fish species leading edges would shift further than their trailing edges; (2) shifts would be greater in winter than summer; and (3) shallower species would shift further south than deeper species.'

Logical order

Often best to use a logical order where possible. For example, in time (Feb before Mar), space (mention sites from North to South), phylogenetically (from simple to complex), or importance (e.g. human stresses on ecosystems that are most to least harmful). When this is not possible, alphabetical order is a good fallback.

Example: Hourly data were used for the case studies, while weekly and daily means were calculated for time-series analyses.
Suggestion: Transposing 'weekly and daily' makes more sense from hourly, through daily, to weekly

Example: Given the increasing number of observed distribution shifts of marine fishes and their highly mobile nature, …
Suggestion: Given the increasing number of observed distribution shifts of marine fishes and their highly mobile nature, …

Repeating a sequence makes it easier for a Reader.

For example: "targeting the National Science Foundation in the US and the UK Natural Environment Research Council". Note that the US is at the end of its part of the sentence and the UK is at the start.
Better: "targeting the US National Science Foundation and the UK Natural Environment Research Council"

Numbers in sentences

Most people and journals use the rule that you spell out numbers less than 10 and write as a number those 10 or greater. There are a couple of extensions of this. When there are numbers smaller than and larger than 10 in a sentence, write them all as numbers. For example, 'The 3 lionesses had 10 cubs.' Generally spell out number at beginning of sentence. Also, never write numbers before units. For example, do not say 'five $m.s^{-1}$'.

Paragraphs

The 1st sentence of a paragraph should summarize the paragraph. Thus if you want to skim a paper, you should be able to read the 1st sentence of each paragraph and follow the logic of the paper. This means that when writing a paragraph, keep in mind that it should give the overall message of the paragraph.

Paragraphs should also not be too long. The longer the paragraph, the more difficult it is for the Reader to follow the message, and the more likely the Writer is to meander. Short, punchy paragraphs will best convey your messages.

Personal pronouns

Traditionally scientists have not used personal pronouns (e.g. I, we, his, her) in scientific writing. Over recent years, however, there has been a push toward using the active rather than the passive voice in scientific writing, and often this means using personal pronouns. An example is:

Passive voice: "The coral trout catch data were obtained from the Queensland fisheries database"
Active voice: "We obtained coral trout catch data from the Queensland fisheries database"

The active voice is often preferred because it is usually more direct and shorter. I think it is a (good) part of the Americanisation of scientific writing. Americans tend to be more direct, whereas traditionally British scientists have been more circumspect. However, we are often taught in our undergraduate studies that using personal pronouns in scientific writing is anathema and many traditional scientists still reject it. My advice is to write in the active voice and use personal pronouns wherever you need to. Occasionally you will get an Editor who will not like it, but this is increasingly rare. If you do strike an Editor who does not like it, change it.

Proper nouns

Names for particular objects should be capitalized. Earth,

Remove emotion

State the facts. Emotive terms include *alarming*, *concerning*, *lovely*, *useless*, *wonderful* and *worringly*. Especially in research focusing on conservation of habitats or iconic species, it is easy to use emotive language.

"Following those *alarming* catch reductions, bans for manta ray fisheries were applied to some areas."

If in doubt, think of the animal as a copepod and see whether you would use the same language!

Repetition is OK

Scientific writing is different from writing novels. In scientific writing, we are trying to convey information succinctly and clearly, whereas when writing novels the author is trying to capture and hold the reader's interest. That is not to say that scientific writing should be bland, but it requires special approaches. Think of using repetition of key terms throughout a paper to make it easier for the Reader. For example, use the term 'copepod' consistently throughout a paper, rather than referring to them as variedly as 'small crustaceans', 'maxillopodes', 'arthropods', and 'insects of the sea'. Repetition of structure can also make things easier to follow – meeting the expectations of a Reader.

Respectively – minimize its use

Using 'respectively' in sentences can be needed but often the sentence can be simplified to make it easier to read.
Rather than 'In the North Atlantic Ocean and north east Pacific albacore preferred respective temperatures between 10-17 ˚C and 11-23 ˚C (Goni and Arrizabalaga 2005), but individuals in the

South Pacific (off the coast of American Samoa) have shown higher temperature preferences of 20-25 ˚C (Domokos et al. 2007).

Try 'Pacific albacore prefer 10-17˚C water in the North Atlantic Ocean and 11-23˚C water in the north east Pacific (Goni and Arrizabalaga 2005), but warmer 20-25˚C waters in the South Pacific (Domokos et al. 2007).'

Sentences

1. **Short sentences.** There is a tendency in scientific writing to have long, complex sentences. The Reader will understand and cite you more if you use shorter sentences
2. **Simple sentences.** Prefer the simple to the complex
3. **Fog index.** One way of assessing how complex your sentences are is to use a Fog Index. There are several available. The most common is the Gunning's Fog Index (and this can be calculated at), but there are also the Flesch Reading Ease Score, and the Flesch Grade School Score. They are all based on the same logic. Gunnings's Fog Index is the best known and measures the level of reading difficulty of any document. It is an estimate of the education grade/year that a Reader would need to understand your work. It can be calculated at http://gunning-fog-index.com/index.html.

   Gunning's Fog Index =[(average number of words per sentence) + (number of words of 3 syllables or more)] × 0.4

   The Bible, Shakespeare and Mark Twain all have Fog Indexes of about 6. Time, Newsweek, and the Wall Street Journal average about 11. Scientific writing has higher Fog Indexes because of the nature of the content, but it is worth calculating yours for different pieces of work and try to reduce it. If your Fog Index soars then you might lose your readers in the fog!

   Microsoft Word calculates two other indexes for you. The Flesch Reading Ease Test is on a 100-point scale, with the higher the score the easier it is to read. The Flesch-Kincaid Grade Level Test rates text on a U.S. school grade level, with a score of 7 meaning that a seventh grader can understand it. You can calculate these directly in your Word documents. In Windows, under Word 'Options', click 'Proofing', select 'Check grammar with spelling', and under 'When correcting grammar in Word' select 'Show readability statistics check box'. For a Mac, go to Word 'Preferences', select 'Spelling and Grammar', and check 'Show readability statistics'. When you then go through and use Tools Spelling and Grammar, Word will give you scores for the Flesch Reading Ease Test and the Flesch-Kincaid Grade Level Test.

Uncertainties – one in a sentence is sufficient

Multiple uncertainties in a sentence weaken your message and waste words.

Rather than 'It is possible that this optimum temperature may be too high for albacore in our region'

Better 'It is possible that this optimum temperature is too high for albacore in our region'
Best 'This optimum temperature could be too warm for albacore in our region'

Unstack modifiers

Stacking is piling up modifiers before a noun, which is the written equivalent of a traffic jam. Long noun strings save a word or two, but are awkward and confusing. Here is a bad one:

"Space telescope wide-field planetary camera instrument definition team ground based charged-couple-device camera" (from *New Scientist*, cited by Matthew Lindsay Stevens in *Subtleties of Scientific Style*, 2007)

And another example

Original: "The availability of statistical correlative species distribution modelling algorithms has led to a rapid increase in their development."

Better: "The availability of algorithms for correlative species distribution modelling has led to a rapid increase in their development."

Best: "The availability of algorithms for correlative modelling of species' distribution has led to their rapid development."

Word choices

Here are some recommendations for word choices that often present challenges.

'A' vs 'an'

Which sounds better?

"An university degree" or "A university degree"?

Here 'university' make the sounds of the consonant 'y' (as in 'yellow') and thus sounds better with an *a*. Although generally *an* should precede words that start with a vowel, this is a generalization that does not cover all situations. An addendum to this rule is if the start of the word makes the sound of a consonant (even if it starts with a vowel), then it should be preceded by *a*. Conversely, if the start of the word makes the sound of a vowel (even if starting with a consonant), then it should be preceded by *an*.

Rather than	**Better**	**Why**
An eucalyptus	A eucalyptus	'eu' pronounced 'y' as in 'yellow'
An euphemism	A euphemism	'eu' pronounced 'y'
An euphoric	A euphoric	'eu' pronounced 'y'
An European	A European	'eu' pronounced 'y'
An eutrophic	A eutrophic	'eu' pronounced 'y'
An one-hundred fold	A one-hundred fold	'o' pronounced 'w'

An uniform	A uniform	'u' pronounced 'y'
An union	A union	'u' pronounced 'y'
An unilateral	A unilateral	'u' pronounced 'y'
An unique	A unique	'u' pronounced 'y'
An united	A united	'u' pronounced 'y'
An university	A university	'u' pronounced 'y'
An used	A used	'u' pronounced 'y'
An user-friendly	A user-friendly	'u' pronounced 'y'
A heirloom	An heirloom	'h' silent
A honest	An honest	'h' silent
A honour/honourable	An honour/honourable	'h' silent
A hour	An hour	'h' silent
A x-ray	An x-ray	'x' pronounced 'e'
A x-chromosome	An x-chromosome	'x' pronounced 'e'
A FDA-approved	An FDA-approved	'F' pronounced 'e'
A LCD	An LCD	'L' pronounced 'e'
A MSc	An MSc	'M' pronounced 'e'
A RGB	An RGB	'R' pronounced 'ah'
A STD call	An STD call	'S' pronounced 'e'
An SCUBA	A SCUBA	Because acronym is said rather than spelt
An US	A US	'U' sounds like 'y'
An UV	A UV	'U' sounds like 'y'

'Aims' vs 'objectives'

Aims are general statements, overall targets, and can be longer-term as are goals.
Objectives are more specific and concrete statements. Objectives can follow SMART framework (specific, measurable, accurate, reasonable and time is followed).

'All together' vs 'Altogether'

Altogether is an adverbial conjunction or an adverb. It means 'in general', 'on the whole', and 'for the most part', 'in total', 'overall', 'wholly', 'entirely' or 'completely'.

'All together' pertains to a group and means 'at the same time', 'everyone' or 'unanimously'. It can also be used as an adjective meaning 'in a group'. 'All together' fundamentally means everyone or everything-together.

One way of assessing which to use is to test the sentence without the word 'all'. If the sentence remains intact and comprehensible without 'all', it means the appropriate adverb is 'all together'. If it no longer makes sense after 'all' has been removed, however, 'altogether' should be used.

Examples of 'altogether'

1. Such barriers are generally weaker than those on land, subtly retarding movement in one direction or another rather than preventing it altogether (Gaines *et al*., 2007)
2. Altogether 181,262 samples have been analysed from 1946 to 2001 inclusive
3. The gemfish fishery, already under pressure from apparent over-fishing, collapsed altogether when the zonal winds declined to their low point in the 10-year cycle (1989)
4. However, in the interest of brevity and clarity, the PCI data have been removed from the paper altogether
5. Most of these estuaries have small river catchments and river flow is minimal or stops altogether for long periods at a time
6. For each of the three groups, two measures were analysed, giving six models altogether

Examples of 'all together'

1. Using the lattice package we can produce a histogram of gcsescore for each score, placing them all together on a single page
2. All together, the papers aim at documenting the complete development process

'Between' vs 'Among'

Between for two things (e.g. between the goal posts)

Among for three or more things (e.g. among the trees)

'Complement' vs 'Compliment'

Complement means "something that completes or brings to perfection." A *compliment* is an expression of praise. Almost all scientific uses are 'complement'.

Example

'Although he said that men and women have strengths that 'complement' each other, she did not take this as a 'compliment'.'

'Comprise'/'Consist of'/'Composed of' vs 'Constitute'

The nucleus comprises protons and neutrons.

The nucleus consists of protons and neutrons.

The nucleus is composed of protons and neutrons.

Protons and neutrons constitute the nucleus.

'Effect' vs 'Affect'

'Effect' and 'affect' are probably the two words I see most regularly confused in scientific writing.

'Affect' is a verb meaning 'to influence'.

'Effect' is usually a noun meaning result, but it can also (more rarely) be used as a verb meaning to cause. Effect as a noun is followed by the preposition 'on' and preceded by an article ('a', 'an', 'the')s

For example:

Temperature affects metabolic rates. (affect is a verb)

Temperature has an effect on metabolism. (common use of effect as a noun)

Temperature effects a change on metabolism. (rarer use of effect as a verb)

'*Estimated*' vs '*Measured*' vs '*Determined*'

These words are not interchangeable and are on a gradation from 'estimated' being the least precies to 'determined' being absolute. Measure is best used when an instrument is required.

"You estimate the density of copepods in the surface water" (because it is imprecise)

"You measure the temperature in the surface water" (more precise than estimated because a calibrated instrument is used

"We determined that copepods stop feeding at food concentrations <0.01 mg.m^3 of chl-a"

'Led' vs 'Lead'

Mixing these two is a very common mistake in scientific writing.

Led is the past tense and past participle of the verb *to lead* (rhymes with *bead*).

Lead (rhymes with *bead*) is a noun referring to an initiative or a position at the front.

Lead (rhymes with *red*) is also a noun referring to the metal.

*"*The Australian programme is led by the University of Queensland, which is also the lead institution in the International Consortium of Lead Research Institutions."

'Maybe' vs 'May be'

"Maybe" refers to a choice; "may be" refers to a possibility. "Maybe" is an adverb, a word that modifies verbs, adjectives, and other adverbs. Adverbs usually tell about the conditions under which something happened or happens. Words like "when, where, how, why". "Maybe" means "perhaps" when used as an adverb and denotes a choice. A simple trick of finding out if you have used "maybe" in the right place is by interchanging "maybe" with "perhaps." The sentence should refer to a choice and make sense.

"We need to remember that the CPR is towed in the upper water layers only, and therefore the jellyfish collected are primarily epipelagic but **maybe** not neustonic." (Gibbons & Richardson 2008)

"In the offshore parts of the western half of the Dutch Wadden Sea, a decline of mud content of the sediments took place recently over extensive areas, **maybe** mainly because of the removal of all mussel beds in and around 1990 and/or intensive dredging for cockles." (Beukema & Dekker 2005)

"May be" is used as a verb. A verb is a word that shows the occurrence of an action or performance of an action or indicates the existence of a condition or state, such as "run, eat, sleep, play". "May be" is used as "would be" or "could be." It denotes a possibility, the possibility of something happening or something being something. The simple trick to check if the use of "may be" is correct, one may use "could be" or "would be" in place of "may be." If it makes sense, the usage is correct.

Summary:

"Usually identified by bell, but may be difficult to separate from''Coelenterata tissue'' if bell not found."(I incorrectly used 'maybe' in Richardson et al. 2006)

"Generally all individuals are counted, but for particularly dense samples a sub-sample may be counted." (Richardson et al. 2006)

'May' vs 'Might' vs 'Could'

Some journals prefer 'might' rather than 'may' because 'may' can have a connotation of permission. 'Could' is often stronger than 'may' or 'might' and thus is preferable sometimes

'Past' vs 'Last'

There is not much difference, but careful writers prefer 'past'. This is because 'last' can have the connotation of finality; there can be nothing after the last. It is thus preferable to use 'past' when referring to the period of time leading up to the present.

'Practice' vs 'Practise'

'Practice' is a noun referring to the application of an idea ('the practice of science'), the exercise of a profession ('he left scientific practice'), customary procedure ('it was common practice'), or repeated exercise or performance ('knowing his times table required a lot of practice')

'Practise' is a verb meaning to perform an activity or skill repeatedly to improve one's proficiency ('He practised his dissection techniques', or to observe or work at something ('She practises science')

Example: You can practise your grammar at English Practice.

Note that in US English, 'practise' is not used at all, only 'practice' for both meanings. If unsure, do what the Americans do and use practice!

'Principle' vs 'Principal'

'Principle' is always a noun and is a 'basic truth' or 'rule'

'Principal' can be an adjective or a noun. As an adjective it means 'most important'. As a noun it means an "administrator" or "sum of money'. Note that when principal is used as a noun (e.g. *principal* of a school or the *principal* of a loan), it is the shortened form of a phrase ('*principal teacher*' or '*principal* sum').

Hint: A useful way to remember which one to use is: "If you can substitute 'main' (which contains an 'a'), use *principal* (which also contains an 'a'). If you can substitute 'rule' (which ends in 'le'), use *principle* (which also ends in 'le') (William and Mary Morris, *Harper Dictionary of Contemporary Usage*. Harper & Row, 1975)

"The principal reason that allometry is a scientific principle is principally that size governs the physiological, biological and ecological processes of plants and animals."

'Which' vs 'That'

Careful users of English distinguish the two. A 'that' should be used before a restrictive clause and 'which' before a non-restrictive clause. A restrictive clause is one that defines the situation and cannot be removed. A non-restrictive clause is separated by commas and is an additional piece of information that can be removed from the sentence without altering the meaning.
For example, which of the following is correct:

"Copepods that are well fed produce many eggs"
"Copepods, which are well fed, produce many eggs"
"Copepods which are well fed produce many eggs"

The 1st one is correct, because only copepods that are well fed will produce many eggs. In the 2nd sentence, removing the 'which are well fed' separated by commas, leaves us with a sentence 'Copepods produce many eggs' that has a different meaning to the first sentence and is untrue (copepods produce no eggs when they are starving). In the 3rd sentence, it is better to replace the 'which' with 'that', as a clause with 'which' should be separated by commas and it is not then the restrictive clause that is needed here. Here is another example:

"Copepods that are the world's most abundant metazoans are ubiquitous."
"Copepods, which are the world's most abundant metazoans, are ubiquitous."
"Copepods which are the world's most abundant metazoans are ubiquitous."
Here the 2nd one is correct. The 'which are the world's most abundant metazoans' is a non-restrictive clause, and removing this clause does not change the meaning of the sentence 'Copepods are ubiquitous'.

Although this might seem to be splitting hairs (or setae in the case of copepods!), it helps the Reader more easily follow your writing.

Concise, clear and consistent writing

Remember words cost money for a journal (in terms of space) so be concise. This also makes text easier and quicker to read.

Original: "There is very little difference on the impact of the different scenarios on evenness (Fig. 5)."

Better: "There is little difference in evenness of the different scenarios (Fig. 5)."

Best: "Different scenarios have similar evenness (Fig. 5)."

Using the appropriate word

You *answer* questions
You *address* objectives/aims
You *fill* gaps
You *solve* problems
For example, rather than 'answering problems', it is better to 'solve problems'.

Simple and short

Rather than	**Try**
ameliorate	improve
analogous	similar
anticipate	expect
approximately	remove where possible, or use about, ~ or ca.
contradicts with	contrasts with
employ	use
enumerate	count
facilitate	help
Furthermore	Further
magnitude	size, extent, importance
miniscule	tiny, small
numerous	many, several
obviate	avoid
orientate	orient
relatively equal	similar
semi-annually	twice a year
terminate	stop, end, finish
upon	on
utilise	use

Waste words weaken messages

Many scientists are reluctant to state facts explicitly, rather couching expressions in vague terms. In science it is important to be clear what we know and state those explicitly, and what we suspect/think and couch those more carefully. An additional point to make your writing more concise, note that plurals often do not need to be preceded by 'the'. So, 'the samples' can usually be 'samples'

Where	**Rather than**	**Try**
Start of sentences	A possible explanation here is that	remove
	As a part of this research, we	We
	Because of the fact that	Because, Since
	Current knowledge suggests that	remove
	Despite the fact that	remove
	Furthermore,	Further,
	In an aim to	To
	Indeed	remove
	In fact,	remove
	In order to	To
	In other words	remove
	In spite of the fact that	remove
	Interestingly	Usually remove
	In this regard	remove
	In this study	Here
	It appears that	remove
	It has been demonstrated that	remove
	It is apparent/clear/possible/estimated that	remove or Apparently/Clearly/Possibly
	It is generally accepted that	remove
	It is known that	remove
	It is important to note/understand that	remove or Note that
	It is well established/understood that	remove
	It must be understood that	remove
	There are also suggestions that	remove and use 'could'
	The evidence shows that	remove
	The results from this study	This study
	To date	remove
	To satisfy the outline/proposed objectives	remove

Within sentences	a considerable amount of	much
	a considerable/large number of	many
	a program named {software package}	remove
	adjacent to	adjacent, near
	aims to explore/investigate	aims to or explores/investigates
	any differences	differences
	appear (are known) to be	are
	are known to be	remove
	are recognised as	are
	are well known to occur	are
	as a result	thus
	as we know	remove
	becoming ever more	increasingly
	being recognised	recognised
	can have	have
	close proximity	proximity or close
	concentrated around	around
	conclude that	remove or conclude
	conducted to date	remove
	considered a	remove
	contributes to 64% of	remove to
	current knowledge	knowledge
	derived from	from
	each and every	each
	empty out	empty
	essentially models	models
	ever expanding	expanding
	evidence shows that	remove
	fairly	remove
	generally seemed to	seemed to
	has been shown to be	is
	have been found/reported/shown to	remove
	highlights the fact that	highlights
	included for perusal	included

	in the month of May	in May
	is as follows:	is:
	is known to	remove
	join together	join
	largely	remove
	located at	at
	located in	in
	may be revealed to be	may
	minor detail	detail
	much lower number of	fewer
	never at any time	never
	occurred	was
	overwhelmingly	remove
	predicted to occur	predicted
	presented here	here
	previously been used	been used
	primarily focused	focused
	quite	remove
	rather narrow/large	narrow/large
	reason is because	reason is
	results from such studies	results
	revealed that	revealed
	seek out	seek
	situated further	further
	step forward	step
	summer/autumn/winter/spring months	summer/autumn/winter/spring
	that are/were	remove
	that are known to exist	remove
	that indicate that	that
	the fact that	that or remove
	there are/is	remove
	this provides a clear signal that	remove
	to date	remove
	to have to	to
	use up	use
	used in this study	remove

	vary between different geographical areas	vary among geographical areas
	very	remove
	was found to be	was/were/is/are/remove
	were identified as	were
	which is at	at

Use formal scientific writing

Informal	**Formal**
My results were puzzling/not very good	Results obtained were unexpected/ inaccurate Results were difficult to explain

Common mistakes/Good practice

Reviewers and Editors are more favourable toward grammatically correct and shorter manuscripts.

Incorrect/Not ideal	**Correct/Better**	**Why?/Comments**
as discussed/mentioned above/previously	remove	Either assume the Reader remembers or reiterate the point briefly
both spp.	both species	
correlated to	correlated with	
data is	data are	Plural. Datum is singular (in latin)
etc	remove or precede list with "such as" or "including"	
excellent choice	ideal	You do not want to talk up your decisions
greater shifts in summer relative to winter	greater shifts in summer than winter	
Figure 2 D, E	Fig. 2d,e	Check journal format, but this is the most common
Fonts Arial, Calibri, Cambria, Courier	Times New Roman	More compact font for manuscripts. Better to use Calibri/Arial for presentations for ease of reading
Fonts Different font types/sizes	Use the same font and size throughout	Looks sloppy otherwise
has occurred	rewrite to be active rather than passive	'Occur' is used too frequently Coral bleaching has occurred in most regions

		There has been coral bleaching in most regions. Note that Microsoft Word will highlight passive sentences and help you fix them
like	such as, including	Slang
La Nina/El Nino	La Niña/El Niño	Shows attention to detail
marine pelagic animals	pelagic animals	Pelagic animals are marine
References in Tables	Use of superscripts numbers and letters	Saves space
Spaces Two spaces following fullstop	One space	Search and replace once ready to submit. Shorter and consistent
spp.	spp.	
Species names Cape anchovy (*Engraulis capensis*)	Cape anchovy *Engraulis capensis*	Unnecessary brackets make it difficult to read
strata is	strata are	Plural. Stratum is singular (in latin)
years 1989 and 2008	1989 and 2008	
50km	50 km	90% of journals use a space between numbers and units. Usually journals do not leave a space between the number and units of °C, %, °N, °S, °E, °W
m2	m^2	Looks sloppy when authors do not sort out superscripts and subscripts
1980's	1980s	This is plural, not in the genitive case
76.578%	76.6%	Do not use unrealistically high precision
Hyperlinks www.lternet.edu	www.lternet.edu	Enables the reader to use the hyperlink

Appropriate adjectives

High and low are over-used. Usually more-specific adjectives are more descriptive and interesting. High and low should really be confined to height.

Rather than	**Try**
low (high) abundance/biomass	small (large/big)

low (high) biodiversity	poor (rich)
low (high) cost	cheap (expensive) ~~cost~~
low (high) currents/forcing/stress/winds	weak (strong)
low (high) density/pitch/pressure/mountains/relief	low (high)
lower (higher) depths	shallower (deeper?). I do not like 'deeper depths' much though
lower/higher difference	smaller/greater
low (high) distance	short (far/long)
low (high) growth/photosynthetic/production/speed rates	slow (fast)
low (high) gradients	shallow/flat/weak (steep/strong)
low (high) number	few (many/several) ~~number~~
low (high) temperature	cold/cool (warm/hot) ~~temperature~~

British or US English

The Irish playwright Oscar Wilde described America and Britain as "two great nations divided by the same language." Many of the differences between US and British spelling were championed by the American teacher and lexicographer Noah Webster in the early 19th century. He saw the simplification of English spelling as a mark of American independence. In Australia we follow British English. Journals are usually flexible these days with whether you use British or US English. However, the most important rule of thumb is to be consistent in your usage, and the best way to do this is to choose the English version on your spell checker in your word processor.

The following is a table summarising differences between British and US English, focusing on scientific terms. Some rules are not hard-and-fast, as English is a dynamic language so spelling is in a state of flux.

Generalisations

British English	**US English**
-ae anaemia, archaeology, encyclopaedia (or encyclopedia), haemorrhage, leukaemia, paediatric, palaeontology	**-e** anemia, archeology (or archaeology), encyclopedia, hemorrhage, leukemia, paleontology, pediatric
-dgement acknowledgement, judgement, lodgement	**-dgment** acknowledgment, judgment, lodgment
-ence defence, licence, offence, pretence	**-ense** defense, license, offense, pretense
-ise* apologise, characterise, emphasise, globalise,	**-ize** apologize, characterize, emphasize, globalize, normalize,

normalise, organise, recognise, specialise, standardise	organize, recognize, specialize, standardize
-ll** cancelled, equalled, fuelled, abelled, modelled, signalled, travelled	**-l** canceled, equaled, fueled, labeled, modeled, signaled, traveled
-l enrol, enrolment, fulfil, fulfilment, skilfull	**-ll** enroll, enrollment, fulfill, fulfillment, skillful
-mme programme but computer program	**-m** program
-oe aeon (or eon), foetus (or fetus), manoeuvre, oesophagus, oestrogen	**-e** eon (or aeon), esophagus, estrogen, fetus, maneuver
-ogue analogue, catalogue, dialogue, prologue	**-og***** analog, dialog, catalog, prolog
-our behaviour, colour, endeavour, favour, harbour, honour, labour, neighbour, odour, rigour, rumour	**-or** behavior, color, endeavor, favor, harbor, honor, labor, neighbor, odor, rigor, rumor
-re centre, fibre, litre, meagre, metre, theatre	**-er** center, fiber, liter, meager, meter, theater
-yse analyse, breathalyse, catalyse, hydrolyse, paralyse	**-yze** analyze, breathalyze, catalyze, hydrolyze, paralyze

* In UK English, -ise spellings are more common but –ize can be used (e.g. the Oxford English Dictionary prefers them)

** Also with other word endings such as –lling/-ling and –ller/-ler

*** In US English, -ogue also used

Other words

British English	**US English**
aeroplane	airplane
aluminium	aluminum
grey	gray
maths	math
moult	molt
tyre	tire
sceptical	skeptical
sulphur	sulfur
Tonne	ton
(e.g. A)	(e.g., A)
(i.e. A)	(i.e., A)

Further Reading

Grammar

http://www.differencebetween.net/

http://gunning-fog-index.com/index.html

http://grammar.about.com/

Visualisation

http://www.wordle.net/