Some GRFP advice from Rose Driscoll's brain

So you're applying for the NSF GRFP! That's awesome. Here's some advice I've put together, based on my own experience applying (twice as an undergrad, once as a grad student) and on the great advice that I got from other people when I was applying and that I've seen afterwards. Take everything with a grain of salt, and always do what makes sense to you; good luck! ~Rose

When to apply - advice for undergrads: Check the eligibility requirements, but I'm pretty sure that currently you can apply during your final year of undergrad, and then as many times as you want before starting grad school. Therefore, it's good to apply early and often! More applications means more chances to get the award.

Research experience is definitely your friend here. I won the GRFP during my second year of graduate school, so at that point I had been doing research for a quite a while – junior and senior year of undergrad, a one-year post-bac, and then graduate school. Research experience is helpful mostly because it's a demonstration that you know what you're getting into and are able to see a project through. All three of my reviewers mentioned my undergrad research experience in their comments.

That said, the expectations are typically lower for people applying to the GRFP as senior undergrads – you're being compared to people who are at a similar stage to you. I don't want anyone to feel like they shouldn't apply because they feel like they don't have enough research experience! It is absolutely worth applying no matter how much or how little experience you have.

When to apply - advice for grad students: You can only apply for the GRFP once after starting grad school, so there's some strategy about whether to apply in my first or second year. I discussed it with my advisor and we decided that applying in my second year would be better. Getting some preliminary data before applying can be a consideration, but in my case the decision to wait was more because in the fall of my first year I was still figuring out what I wanted to do, and we thought my application would be stronger with a more concrete research plan. It ended up working out really well for me! By the time I applied in the fall of my second year, I did have a bit of preliminary data, but honestly relied more on some data that had previously been collected by other folks in the lab to set the stage for what I wanted to do. I think my preliminary data got about a sentence.

Another thing that I thought about a lot in hindsight about when to apply for the GRFP is the amount of time to prepare the application. The first two times I applied for the GRFP, I started the application in September or so, but the third time I applied I started in June and had a whole five months to put together and polish my application. It was really good for my stress levels and I think the application came out a lot better in the end. And since I'd decided not to apply the previous year, it had sort of been in the back of my mind all year and was relatively easy to start writing. At the time, I didn't expect it to make that big of a difference in the quality of the application - I mostly was focusing on my stress levels - but in hindsight, I think it may have helped a lot.

Timeline: Obviously, the more time you give it, the better. If you can start it in June, awesome. But if you're starting in September, that's okay… don't discount yourself from applying just because you're worried about not having enough time to polish.

The most crucial part of the timeline is talking to letter writers. I gave my letter writers two weeks' notice but SHOULD have given them about a month. This is especially important if people haven't written a letter of rec for you before because they'll be starting from scratch, but just in general, asking for letters early helps to foster goodwill!
The other time-sensitive thing to think about is getting your transcripts. You'll need a current or final transcript from every undergrad and above institution you've been at, I'm pretty sure. Sometimes it can take a while to get these, so definitely try and order them early.

Letters of recommendation: Like I said above, ask for these early. When you email people, you can even suggest things that they could talk about, like "I was hoping you could discuss my work as a TA in your class last semester" or "It would be great if you could mention the outreach work I've done with the lab, in addition to my research." (For example.) This is generally super helpful for the letter-writers, since they then don't have to think of stuff on their own, and it also helps you to get a broad distribution of information in the letters if you're asking different people to bring up different things. The letters of rec are EXTREMELY important – honestly, they might even be equal to your statements in importance, in my experience – so having strong letters will really help. My reviewers consistently mentioned the letters of rec as a strong positive in their reviews.

Where to go for help: When I was getting ready to start my statements, I asked for advice from a lot of people around me who had applied for the GRFP (fellow students, postdocs, even young faculty) or reviewed GRFP applications (faculty) in the past, and looked at a lot of advice that various people had posted on the internet (for example, here's some advice from Lars Brudvig: https://twitter.com/lars_brudvig/status/1157312546841477120?lang=en). I read over statements written by other people – here's a big database of those, and you can also ask people you know who've applied: https://docs.google.com/spreadsheets/d/1xoezGhbtcpg3BvNdag2F5dTQM-Xl2EELUgAfG1eUg0s/edit#gid=0. For the writing, I worked with a group of my friends who were all applying to the GRFP at the same time as me. It was incredibly helpful to read over each other's statements and get tons of feedback, and we all helped each other stay on track and make consistent progress over the summer. I also got feedback on the writing from my advisor and from other mentors and labmates.

Software to do the actual writing in: Word, latex, and google docs are all fine; whatever you're comfortable with, allows you to control the formatting to fit the GRFP specifications, and can export to PDF at the end. You might also want to think about how you will be getting feedback. I used word and that worked pretty well for me; everybody that I was asking to look at my statements knew how to use track changes and comments, so I could just send my word doc over and they could send it back with their suggestions. Then I could decide what to integrate and what to ignore, but save the file with their suggestions in case I wanted to look at it again later. With latex, you could do a similar thing by just sending people a compiled pdf to look at and annotate, or you could use overleaf, share the tex files, and use track changes and comments. The one downside I see to overleaf and google docs is that if you have several people looking at your statement at the same time, they will see each others' comments and suggestions, which could be awkward for you or for them. Or it could be fine! It just depends on what works for you.

Writing the research proposal: The goal is to have three aims, all distinct from each other but related to a common theme. I've written a research proposal with four aims (unsuccessful) and have seen others with only two, but three tends to hit the sweet spot of enough different things without seeming like you're overshooting. It is very important that the aims not rely on each other; if your aim 1 doesn't work out, and your aim 2 relies on your aim 1 working, that's going to be an issue! And reviewers are very aware of this as a potential pitfall.
I like titling my aims using an "action word" - a verb that helps to foreground me as the doer of the proposed science. Here's a list of some good action words: determine, characterize, evaluate, discover, investigate, identify, assess, examine, explore. Depending on the context, words like understand, establish, uncover, inspect, consider, and survey can sometimes work too.
For the body of the aims, a tight structure was very helpful for me: each aim has some background info, methods, predicted results, and some kind of interpretation of what those results would mean. The amount of space you have for each aim is small enough that you can basically go sentence by sentence:

1. Sentence describing what the aim is (bolded; starting with an action word)
2. Background info
3. Hypothesis/question
4. Methods
5. Predicted results
6. Other possible results / alternate interpretations
7. Significance

String those seven sentences together into a paragraph, and voila, first draft of your aim. Of course, some things will need more space and others will need less for any given aim, but I found this to be a handy trick for getting started.

Writing the personal statement: This is a tough one for me to give advice on. I can tell that my personal statement for my third GRFP application was better than the first two, but I can't really pinpoint what makes it better. Lots of editing, really streamlining what I wanted to say, and going over and over the sentence structure and choice of words. Lots of people have written about how to put together a personal statement, so definitely look around. Here's some good advice from Elinne Becket: https://twitter.com/bielleogy/status/1359699694461480964?s=09
One thing that I did in my personal statement was start with a couple-sentence summary of what I was going to say in the statement, then wrap up at the end with a slightly longer summary that included my career goals and referred back to my planned research and broader impacts. I think this framing structure worked pretty well for me.

Writing about broader impacts: This will be different for every person, depending on what kind of experience you have and what your goals are, so here's a brief description of how I approached the broader impacts, to get you started thinking.
In my personal statement, I talked a lot about my past experiences with good mentors and teachers and how I want to pay it forward by being a good mentor and teacher myself. I also talked about my outreach and service work, which is what I'm doing to try and (a) encourage more people to go into science and (b) make scientific communities a supportive place for everyone. In my research proposal, I talked about how my proposed research would give me a chance to work with and mentor younger students, and I also referred back to all of the broader impacts stuff I talked about in my personal statement. I think it's a good idea to make the two

statements as redundant as possible – the reviewers are reading a TON of these applications very quickly, so repeating things can help to get your point across and make the information stick in their mind.

Writing in general: When it comes to the nuts and bolts of the writing, keeping your reader in mind and trying to make all of your points as clear as possible is a really good idea. I mentioned this a little bit above – the reviewers are reading a lot of these applications really fast, so you want to make sure that you're getting through to them. Even simple tools like underlining your main points, using bolded headings, and providing a summary at the end of your personal statement can be really helpful.

Submitting the application: Leave yourself an extra couple of days at the end, if you can, just in case their system goes down. You'll also need to spend some time before the submission typing things into their web form, because they want all the info that would be on a CV but they don't let you just submit a CV. Unfortunately, you have to enter everything separately.

What if you apply and don't succeed? I firmly believe that the GRFP selection process is at least 50% and possibly as much as 90% chance. How well your application does depends a lot on what reviewers you get and how competitive things are in your area in a given year. If you apply and aren't successful, don't get discouraged!

Honorable mentions: There's a chance you might get an honorable mention, which doesn't give you any money but is still a really big deal and makes you look really good for other things. I got honorable mention'd my first year applying and my advisor actually told me to put it down on my CV (I put it in an "honors/awards" section with some other stuff). It's special enough that people would sometimes comment on it when I had to send in my CV for something.

For undergrads: If you don't get awarded, you can probably apply again next year – the current rules allow you to apply as many times as you like before you start graduate school, and then once in either your first year or your second year of grad school. (Check the program solicitation, though, because the rules can change and this might become outdated.) You'll get reviews back that go over the strengths and weaknesses of your application, which you can try and use to make your next application better… though definitely take the reviews with a grain of salt. Reviewers can be biased or just plain old confusing. The first time I applied, one of my reviewers said that I had done an impressive amount of research for an undergrad and then also told me that they really expected me to have a paper. ???

For grad students: You might not be able to apply again next year, but I'd be willing to bet your application will be useful in other ways. I reused a lot of the ideas from my GRFP when I applied for the Ford (https://sites.nationalacademies.org/PGA/FordFellowships/PGA_171962), and eventually my GRFP research statement ended up forming the bones of my thesis proposal!

For everybody: Writing an NSF GRFP application is also just a really good thought exercise. It helped me practice designing and thinking through a project, and gave me the chance to sit down and think about why I want to be a scientist and what my career goals are. I'd recommend it to anybody.