

Sound Perspectives

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Ask an Acoustician: Sarah A. Marley



Meet Sarah A. Marley

This “Ask an Acoustician” essay features Sarah Marley. Sarah is finishing her first year as a lecturer in marine vertebrate zoology at the University of Portsmouth (Portsmouth, UK). Sarah completed her BSc (Hons) at the University of Aberdeen (Aberdeen, UK), her master’s degree at the University of St Andrews (St Andrews, UK), and then her PhD in applied physics at Curtin University (Perth, WA, Australia). She continued her postdoctoral research at Curtin University and the University of Western Australia (Perth) and served as an environmental consultant for Environmental Resources Management (erm.com) before moving to the United Kingdom. Notably, Sarah is also an award-winning science communicator and has spoken at numerous science communication events around the globe. You can even see her in action on YouTube (youtube.com/watch?v=rPGauMnFjSk). For examples of Sarah’s research (including the work she describes in this essay), see the **Bibliography**. I will let Sarah tell you the rest of her story.

A Conversation with Sarah A. Marley, in Her Words

Tell us about your work.

My research primarily focuses on bioacoustics and marine soundscapes. I have been studying marine mammals for over a decade, and acoustics allows me to investigate aspects of how these animals interact with each other, their environment, and human activities. For example, I have spent several years studying coastal dolphins in Western Australia, in particular a small community of Indo-Pacific bottlenose dolphins (*Tursiops aduncus*) in the Swan River. This river system flows through the state capital of Perth and experiences a range of anthropogenic activities. Many of these influence the underwater soundscape of the Swan River. Over the years, I have recorded noise underwater from recreational vessels, transport ferries, shoreline construction, vehicles and trains crossing bridges, and even Spice Girl songs from party cruises! My research revealed that the Swan River is composed of multiple acoustic habitats, with some areas being dominated by biological sounds (like fishes or snapping shrimp) and other areas being noisier due to anthropogenic sounds. It might be reasonable to assume that the dolphins might avoid sites prone to man-made noise. But, in fact, we found that dolphins would spend long periods, sometimes over three hours at a time, foraging in one of the noisiest sites. Of course, just because an animal does not leave an area does not mean that there is no disturbance. And, indeed, closer examination revealed some subtle changes in dolphin behavior. During periods of high vessel traffic, dolphins traveled at faster speeds and spent less time resting or socializing. We also found that the characteristics of dolphin communication whistles changed during “noisy” periods, with whistles typically becoming longer in duration and covering a wider frequency range. Interestingly, although these

animals are thought to be most sensitive to higher frequencies, the strongest response was observed when the noise was centered around the 1 kHz octave-band level. Although I recently moved back to the United Kingdom, I am still collaborating with Australia-based colleagues to learn more about the Swan River dolphins. However, I am also in the middle of launching new research projects examining underwater soundscapes and marine megafauna in the United Kingdom.

Describe your career path.

I grew up watching dolphins and other marine life along the Scottish coast but never considered it a career option! A field trip while doing my undergraduate degree at the University of Aberdeen changed everything; not only did it give me my first experience on a boat and the chance to get close to dolphins, but it introduced me to staff working with these animals. This led to an Honors project and my first publication, followed by a MSc in marine mammal science at the University of St Andrews. I then traveled to Australia and spent a year volunteering on various cetacean research projects. This was when I became involved in underwater acoustics for the first time. I went on to do my PhD at the Centre for Marine Science and Technology (CMST), Curtin University, with Dr. Chandra Salgado Kent and Dr. Christine Erbe and was also fortunate enough to be involved with many other projects run by the CMST. After receiving my doctorate, I spent a year or so dividing my time between research projects and environmental consultancy. In August 2018, I moved back to the United Kingdom to begin a permanent faculty position with the University of Portsmouth as a lecturer in marine vertebrate zoology. I now have the pleasure of not only continuing my acoustics research but also sharing my knowledge and enthusiasm with young scientists.

What is a typical day for you?

As a new faculty member, my time is divided between developing teaching material, supervising students, continuing my own research, getting new research projects off the ground, and scientific service. Each week, I would say I typically spend about 1.5 days on research and the rest of the time on teaching and supervising research students. So far this year I have taught aspects of animal physiology, biodiversity and evolution, science outreach, statistics, and experimental biology. At the moment, I am developing some new lectures and practicals relating to bioacoustics for our undergraduate marine biology course, which is great fun!

I currently have four Honors, four master's, and two PhD students who are working on projects related to underwater soundscapes, harbor seal behavior, cetacean habitat use, and shorebird occurrence. These projects are particularly exciting for me because they are all brand new. After moving to Portsmouth last year, a lot of my time was spent exploring the local area, finding out what wildlife was present, and who was already working on it; I was very cautious about stepping on toes! Fortunately, everyone has been very welcoming and happy to collaborate. So, I look forward to seeing how these projects develop.

At the same time, I am continuing several collaborations back in Australia on various marine megafauna and acoustics projects. Slightly trickier now that we are several time zones apart but worth it to keep working with such amazing people! And around all these exciting things, I am still managing to squeeze in some scientific service. I am blog editor for the *Journal of Animal Ecology* (animalecologyinfocus.com) and associate editor for *Austral Ecology*, and I was on the media committee for the *Effects of Noise on Aquatic Life* conference that took place this past July in Den Haag (the Netherlands).

How do you feel when experiments or projects do not work out the way you expected them to?

Not great! I think it is inevitable that there will be some frustration when things do not go as expected. A lot of my research is field based, so you get used to the fact that many things are beyond your control during data collection. My master's project was good training for this because everything went wrong! I was supposed to be observing gray seals at a haul-out site in Scotland. I had not realized that the site was also an unofficial nudist beach, which was of great surprise to both myself and the volunteer assisting me! Besides dodging nudists, we had various other misadventures. But the good thing about fieldwork is that it is typically a group activity and that means that there is always someone else there to share your pain and (eventually) laugh about it!

Do you feel like you have solved the work-life balance problem? Was it always this way?

Work in progress! I think one of the contributing factors to work-life imbalance is that doing a PhD creates some very bad habits. You are working on a single project that consumes your life for a long period of time. After finishing, you are so used to being obsessed with work that it becomes difficult to break the routine of working evenings and weekends. In fact, competitive academic environments can often make it worse.

I wanted to use my move back to the United Kingdom as an opportunity to reset and rebalance. I am fortunate in that the United Kingdom does not operate on a tenure system: I have a permanent faculty position. And yet the work still creeps into nonoffice hours. A last-minute funding application, a lecture to finish writing, marking that needs to be done, urgent student emails... Now I am looking forward to the summer break as a chance to rebalance, especially as the long days will allow more opportunities for walking, cycling, and spending time in nature, my favorite activities!

What makes you a good acoustician?

The people I work with. I do not think it is possible to be a good solo acoustician. This is such an interdisciplinary field with so many different aspects. To fully encompass these, it is necessary to work together, combine knowledge, and share ideas. I was fortunate to undertake my acoustical training alongside people with different backgrounds. At the CMST, there was a mix of biologists, computational scientists, engineers, and physicists. But beyond having different skill sets, they were all good people to work with: happy to explain concepts, discuss ideas, suggest techniques, and give support. At Portsmouth, I am now working with an enthusiastic mix of marine biologists, computational scientists, and even cosmologists as well as industry collaborators. I think that this supportive team environment is extremely important, for both younger and more experienced academics! And that is the kind of environment I want to cultivate for my own students going forward.

How do you handle rejection?

Poorly! But once the mix of indignant anger and crushing despair has passed, I am generally able to look at the result objectively and think “how could I succeed next time?” An important part of that is to consider what went wrong and how could it be improved but also to acknowledge the good parts. So, whether it is a paper submission, grant application, or job opportunity, I always try to get feedback. An emergency chocolate stash also helps!

What are you proudest of in your career?

Persevering enough to have one. I come from a single-parent, low-income family and was the first in my family to attend university. I had never even dreamed it was in the cards but am thankful to have achieved undergraduate, master’s, and PhD degrees! I love to learn and always want to know more.

Now I have the chance to share this passion with students as well as stories of the various adventures I’ve had along the way. I also really enjoy doing science outreach and school-level engagement for this reason. How many kids out there have never considered science as a career, thought they were too poor or too stupid, or just not had the opportunities they needed? Maybe sharing our own individual stories can help encourage others to consider new things.

What is the biggest mistake you’ve ever made?

There are several things that I cringe to look back on. But with each, it is a case of learning and moving on. A particular example for me was participating in a research project where I experienced bullying. I spent several months volunteering as part of a small team in the field, dealing with daily belittling, nasty comments and a lot of negativity from another team member plus the lead investigator. Disappointingly, both were female. So much for the scientific sisterhood! I deeply regret not standing up for myself. Since then, I have found that many other people have had similar interactions with these particular people, which has made me feel a bit better. But unfortunately, there seems to be a recurrent idea that research volunteers are “just” volunteers and of lesser value than other team members and so less deserving of respect. As a result, instead of viewing my experience as a mistake or something to regret, I have tried to use it as a basis for my own research philosophy: ideas about how teams should function, how people should be treated, and what kind of leader I want to be. My research relies heavily on volunteers assisting with fieldwork and data review, and I often recruit undergraduates with no previous experience. I hope that by giving them that vital experience in a positive environment, where they can feel secure to learn, ask questions, and work as a team, that they will not only benefit now but also in the future. Hopefully, if they know how a good research environment operates, they will have the courage to speak up against negative ones.

What advice do you have for budding acousticians?

Find yourself a good group of people. These might be your peers, your supervisors, your mentors, your lab mates... It is easy to be swayed by an exciting project, but without a good team, even the sexiest project can quickly disintegrate. If you find people who will support you both professionally and personally, you will go a long way.

Have you ever experienced imposter syndrome? How did you deal with that if so?

Yes, frequently. It can be hard to ignore, especially when hearing about the accomplishments of others. But at the same time, I try to look beyond the surface of those accomplishments. I am sure that none of them came easy and are instead the result of a lot of hard work, dedication, and perseverance. Perhaps even at great personal sacrifice. Remember that success means different things to different people and that the important thing is to try your best to achieve what is important to you. I also find that supervising and mentoring younger scientists helps with imposter syndrome; it gives you great perspective on how far you have come and reminds you how exciting it is to be working in science!

What do you want to accomplish within the next 10 years *or* before retirement?

I hope that I am able to create the same research environment that my supervisors created for me. For my Honors, master's, and PhD degrees, I have been lucky to have great supervisors and mentors. I look forward to passing that on to their grandstudents!

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