Ask an Acoustician: Kathleen J. Vigness-Raposa

Kathleen J. Vigness-Raposa and Micheal L. Dent

Meet Kathleen J. Vigness-Raposa

This "Ask an Acoustician" essay features Kathleen J. (Kathy) Vigness-Raposa, a principal scientist at INSPIRE Environmental. Kathy received her BS from Miami University, Oxford, Ohio, and her MS in biological oceanography and PhD in environmental sciences from the University of Rhode Island (URI), Kingston. In addition to her position at INSPIRE, she has served on and off as a faculty member at the URI since 2014. Kathy's work on the educational website "Discovery of Sound in the Sea" (see dosits.org) won the Acoustical Society of America Science Writing Award for Media other than Articles in 2007. This website still serves as an important educational tool for many. Kathy served on the technical committee for the Providence meeting and is an associate editor for *The Journal of the Acoustical Society of America*. I will let Kathy tell you the rest.

Tell us about your work.

My work has focused on assessing the impacts of underwater sound on marine mammals, sea turtles, and fishes and translating complex acoustic concepts for broader audiences. I have been part of a number of different projects, from environmental compliance studies and permitting documentation to passive acoustic monitoring for marine mammals during active acoustics projects to predicting marine mammal distributions and abundances based on environmental covariates. Most recently, I have been part of a team that is focused on the sounds from the construction and operation of offshore wind farms and on the potential exposure to underwater sound and electromagnetic fields from those developments.

Twenty years ago this fall, URI Principal Investigator Gail Scowcroft, other URI colleagues, and I launched the DOSITS project. The DOSITS project synthesizes peer-reviewed science related to underwater sound, including content on sound sources, potential impacts on marine life, and how animals and people use sound underwater. DOSITS has been a great collaboration among acousticians and experts at digesting science content for a variety of audiences, but also is ground-breaking in that all DOSITS content is peer-reviewed by a panel of scientific experts that currently includes Arthur N. Popper, Darlene R. Ketten, James H. Miller, and Aaron M. Thode. It has been so awesome to be part of this project that is increasing the understanding and awareness of the science related to underwater sound.

Describe your career path.

I became interested in acoustics as a high school student participating in a National Science Foundation (NSF) summer program at St. Olaf College in Northfield, Minnesota, and I have always loved the ocean. However, I wasn't sure how someone from Wisconsin would get a job doing marine biology, so I got an undergraduate degree in secondary science education. This was fortuitous because it provided me with an incredibly diverse background in biology, chemistry, geology, and physics.

I then went to the Graduate School of Oceanography at the URI to work with Howard Winn on the vocalizations of minke whales. Unfortunately, Dr. Winn passed away

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unexpectedly after my first year of graduate work, but at the same time James H. Miller came to the URI Ocean Engineering Department. I took Miller's signal-processing course that fall and was looking for guidance on how to continue moving forward with my MS research. I ended up convincing H. Thomas Rossby that tracking his SOund Fixing And Ranging (RAFOS) floats (RAFOS is SOFAR spelled backward; they are floats that listen for signals and are used to map ocean currents well below the surface) was just like tracking vocalizing whales, and I completed a modeling sensitivity study of the critical parameters for passive acoustics tracking of marine mammals for my thesis.

In the meantime, I needed funding and Miller connected me with William T. Ellison at Marine Acoustics, Inc. (MAI). MAI is a scientific and engineering company that provides environmental consulting, research and development, and naval technology and training services to a diverse set of government, corporate, and international clients. I started working part-time for MAI as part of a research team studying the potential effects of the US Navy's Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) acoustics system. This work transitioned into a full-time job, first in the Washington, DC, area, then in Newport, Rhode Island, where I helped to develop research methods and modeling tools to determine the sensitivity of marine animals to anthropogenic activities and to estimate their exposure in specific scenarios. MAI has developed the Acoustic Integration Model (AIM) that models the four-dimensional acoustic field (three-dimensional space + time) into which simulated animals ("animats") are distributed and through which they move, acting as dosimeters to estimate their acoustic exposure.

To better inform the animal distribution and abundance inputs to AIM, I went back to school to complete my PhD, focusing on using environmental covariates in geospatial models to predict distribution and abundance. While at MAI, I worked my way up from staff scientist to senior scientist to Vice President of Environmental Projects, focusing more on project management and proposal writing in later years. In 2020, I shifted to INSPIRE Environmental, where I am a principal scientist, focusing on offshore wind activities and using more of my geospatial skills as part of an integrated team studying seafloor health, benthic habitats, and fisheries interactions.

What is a typical day for you?

I get up around 4:45 a.m. and go for a run; this is my meditation time when I get my best ideas and get myself organized for the day. When I get home, I walk our two dogs and get my 12-year-old daughter, Brierley, off to school at 7:00 a.m., then turn to work. The vast majority of my job is computer analyses, writing reports and proposals, and coordinating with colleagues. I don't really have a "typical" day; I need to address which priority is most urgent at the time while also keeping others moving forward and being productive on our projects. I don't often take a lunch break because I tend to graze throughout the day. I have been working at home since March 13, 2020, because of COVID-19, so now I try to take a break around 2:00 p.m. when my daughter gets home from school. We will play a little basketball or ping pong or take the dogs for a walk, then she sits down to homework and I continue with my tasks. I wrap up around 5:00 p.m. (or would be home by then if working in the office) and shift to evening activities and dinner preparation. I am the president of our town's land trust and the president of a local Montessori school's board of directors, so the juggling act continues!

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

I am disappointed, obviously, but then I try to tease out the individual steps within the project to identify factors that I may not have considered properly or points at which errors may have occurred. I do a lot of modeling so having empirical data and/or a general sense of what the outcome should be is very helpful at retracing steps and ferreting out mistakes.

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

Some days are better than others, but I definitely struggle with the work-life balance. My husband, Kenneth B. Raposa, is the research coordinator for the Narragansett Bay Research Reserve, so it is tough to juggle both of our jobs and all of our and our daughter's activities. Working from home during COVID has been both a blessing and

a curse in that I am able to support our daughter and dogs, but I find it hard to turn off the demands when my office is just steps away, whereas my commute used to provide a degree of separation and decompression that I haven't been able to achieve at home.

What makes you a good acoustician?

I am a good acoustician because I have a solid foundation in physics and mathematics that allows me to dissect complex problems into fundamental principles. I worry that various coding applications make it too easy to implement a function without truly understanding its assumptions and structure. This also makes it more difficult to detect errant outputs and develop an intuitive sense of accuracy. I think it is particularly important for bioacousticians to develop their math and physics foundation to understand the acoustics.

How do you handle rejection?

I am definitely a glass is half-full kind of person so I try to take rejection as constructive criticism and spin out the positive from the negative. What was good? What was bad? How could I improve? What might be the underlying drivers that resulted in this decision? I also like to talk through the process with others, be they colleagues that were part of the original project or outside mentors that might be able to provide a second opinion. Then I work to develop an alternate strategy that gets me to the same end game.

What are you proudest of in your career?

I am most proud of the work I have done with the DOSITS project. It is a passion of mine to explain complex scientific topics and make them digestible by the general public. I think this is a critical skill that all scientists need to learn: what are you doing and why is it important. And I am incredibly proud that DOSITS has been funded for over 20 years at this point. It is a reminder that you can break projects into incremental pieces to meet funding allotments and those increments may become extensive pieces of work over time. Don't feel that you need to tackle everything all at once but prioritize for greatest impact with what you can do.

What is the biggest mistake you've ever made?

Not sticking up for myself soon enough. I am very good at facilitating conversations from an outside perspective and I am usually more forthright once I know the individuals with whom I am working, but I tend to struggle when I am in a group of individuals that I don't know well. I want to keep the group moving forward and find a conciliatory position that will please the greatest number of people. I am a big picture person and can identify the needs to keep the group moving forward, so I tend to volunteer to fill those voids at my own expense, often with a greater time commitment than I would like.

What advice do you have for budding acousticians?

Don't give up and be flexible. A work ethic is 90% of the fight, and the path is never straight and narrow. If you continue to improve your skills and keep up with the literature, you will find a niche for yourself.

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

I'm not sure it is imposter syndrome so much as time warp syndrome. I feel like just yesterday I was working on my Master's thesis, but then when I think about all that I have done and accomplished over the years, I feel like I am 250 years old! I think it is important to continue to be true to yourself, know your strengths and weaknesses, and define goals that keep you moving forward.

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

At INSPIRE, I am most proud of our work to mentor younger scientists and conduct science outreach to diverse communities. As the offshore wind industry takes off on the US East Coast, I am excited to continue the work that I am doing and continue to focus on opportunities to facilitate the general public's understanding of and interest in science.

Bibliography

Amaral, J. L., Miller, J. H., Potty, G. R., Vigness-Raposa, K. J., Frankel, A. S., Lin, Y.-T., Newhall, A. E., Wilkes, D. R., and Gavrilov, A. N. (2020). Characterization of impact pile driving signals during installation of offshore wind turbine foundations. *The Journal of the Acoustical Society of America* 147, 2323-2333. https://doi.org/10.1121/10.0001035.

Ellison, W. T., Southall, B. L., Frankel, A. S., Vigness-Raposa, K. J., and Clark, C. W. (2018). An acoustic scene perspective on spatial, temporal, and spectral aspects of marine mammal behavioral responses to noise. *Aquatic Mammals* 44, 239-243. https://doi.org/10.1578/AM.44.3.2018.239.

Vigness-Raposa, K. J., Scowcroft, G., Morin, H., and Knowlton, C. (2014). Underwater acoustics for everyone. *Acoustics Today* 10(2), 50-59.

Vigness-Raposa, K. J., Scowcroft, G., Morin, H., Knowlton, C., Miller, J. H., Ketten, D. R., and Popper, A. N. (2020). Discovery of sound in the sea: Communicating underwater acoustics research to decision makers. *Proceedings of Meetings on Acoustics* 37(1), 025001. https://doi.org/10.1121/2.0001204.

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