Kyle Hardage

Engineering Geologist at California Department of Water Resources

Educational Background

I have a BA in chemistry and a BA in geology, both from Vanderbilt University (Nashville, Tennessee) in 2012. I did summer field camp in Montana through Indiana University in 2012 and completed a PhD in earth science from UC Santa Cruz in 2020. In 2019 I got my Geologist-in-training (GIT) certificate by passing the geology fundamentals exam of ASBOG (Associated State Boards of Geologists). I also completed an internship with the US Forest Service in 2019 which resulted in two additional stints of seasonal work as a hydrologic technician.

Job Search

I set up job alerts on CalCareers (https://www.calcareers.ca.gov/) and USA Jobs (https://www.usajobs.gov/) for hydrologist and geologist key words. I knew I wanted to work in the public sector, and all competitive California state jobs go through CalCareers while federal jobs (Forest Service, Geological Survey, NOAA) go through USA Jobs. I also signed up for emails of societies I was part of like Geological Society of America, Geochemical Society, American Geophysical Union, and the California State Water Board listservs. All of these would have section for job listings. Pay special attention to certain job requirements and do them early! For example, the state of California requires a civil service exam to even apply for jobs. It is not a traditional “exam” answering questions about knowledge but rather consists of listing all relevant experience. It does take time to complete, however, and higher scores get referred to job applicant lists. Other government or private sector jobs may require a GIT, and that exam is only

offered twice a year and must be applied to 6 months in advance, so keep in mind it may take nearly a year to fulfill requirements to even apply for some types of jobs.

Current Position

I work in the Modeling and Tools Support section of the Sustainable Groundwater Management Office. In short, my job is data-analyst-meets-earth-science with two big focus areas: groundwater modeling and technical review. We use a state-developed groundwater model to look at supply and demand of surface and groundwaters across the Central Valley, and we improve it as more data becomes available through research publications, well completion reports, or technical studies from consulting and non-profit firms. Much of my day is spent using R coding language to wrangle huge state data sets on water quality and perform statistics and visualization to better understand the Central Valley Aquifer. We then use that information to tweak parameters in the groundwater model to better predict changes in water supply. Technical review consists of reviewing groundwater sustainability plans submitted by local agencies to the state. I read some of these plans, compare them to regulatory requirements set by the department, and offer recommendations to assist local agencies in achieving their sustainability goals. I also help write best management practices for how to use our modeling data sets so end-users have the best science available to make management plans and mitigate risk to water supply. My day-to-day is a mix of reading and writing these documents, writing code, and attending meetings with my team or other department teams to ensure consistent support for California's groundwater resources.

Key Skills for My Job

My job relies more on synthesis and analysis of multiple geologic data sets rather than any specific geoscience skill (like field work or lab work). Over the last few months I have had to read geologic maps, interpret remote sensing data, interpret geophysical borehole logs, interpret water quality geochemistry, create geologic cross sections, perform geospatial analysis in ArcGIS, and learn modeling software like MODFLOW. Strong background in hydrogeology is particularly important, such as understanding aquifer characteristics, hydraulic conductivity of different continental or marine lithologies, hydrologic properties of soils, and even evapotranspiration calculations of crops and forests. Ultimately this knowledge translates into how geologic characteristics affect water availability and management.

Best Part of My Job

Creative problem solving. My work is complex and challenging which is what I liked about research at UC Santa Cruz. It is gratifying to support a clean water supply for Californians, and I enjoy broad support from my team and office. I also love the departmental support for learning new skills. If there are relevant GIS classes or coding classes that will advance our public mission and produce better, reproducible work at a faster pace, there is generally opportunity to include these in a personal training program. I love coding and data analysis and how I get to use these tools to explore and solve geologic puzzles. I learn more about California geology and data science tools every day. It's really my dream job.

Advice for Geoscience Students

If you are going to work with geoscience data in any way, learn to code! What does that actually mean, and why? Really you need to be able to write scripts that automate work and minimize error. I use R, but python is very popular with my team and integrates with ArcGIS Pro. Being able to read in, combine, and quality-check millions of data points quickly is crucial for the large-scale work we do across the state. I mentioned in my background that I interned with the US Forest Service – that position was extended twice because of my coding ability in R, and I was able to advance monitoring projects for the Hat Creek Ranger District and really improve the quality and efficiency of data analysis. Think of it this way: in the past, job applicants might list Microsoft Office Word or Excel on their resume, and now it is just expected you know these. Currently, it is common to list ArcGIS on resumes, but increasingly this is also just an expected geoscience skill to be able to open and edit maps just as you would a word document, even (especially) if there are dedicated geospatial analysts at your workplace. I really believe coding is the next expected skill for technical work, be it python, R, or visual basic (which is used in Excel), even if your workplace has dedicated programmers. You may be expected to open, understand, or troubleshoot scripts that automate your workflow or generate recurring reports. Even if you go in the non-profit or policy direction, I saw plenty of job posts that desired candidates with coding ability because this allows you to quickly merge data sets and generate reports of statistics that reflect current and proposed policy actions. There are tons of free online resources to learn, you don't need to pay for data boot camps (you could if desired, in which case Coursera and Udemy have been recommended to me). The best way to learn code is to do it, to dive in and get frustrated with constant errors and lots of googling. Lastly, I have been asked if a PhD is required for my work. My observation is that a PhD is not strictly necessary; most people I work with have a bachelors or a master, and generally, professional licensing is important for promotions and ability to take senior management positions. My view is that a masters + professional license + coding skills is the winning combination to open diverse careers in geoscience, but any two of those is a great start.

Please note that my answers here are from my own experience and observation and do not reflect views of the California Department of Water Resources. The CalCareers website will have the most up-to-date information regarding application requirements for state employment.

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