

Kelly Savoie ([00:00](#)):

Hello, Clear Skies Ahead listeners. This is Kelly Savoie and I'm hoping you can take a moment of your time to rate and review our show wherever you listen to podcasts. We have produced over 100 episodes and you can help us reach even more individuals that will benefit from the diverse experiences shared by our guests. Thanks so much for listening and I hope you enjoyed this new episode.

Welcome to the American Meteorological Society's podcast series, Clear Skies Ahead: Conversations About Careers in Meteorology and Beyond. I'm Kelly Savoie and I'm here with Emma Collins and we'll be your hosts. We're excited to give you the opportunity to step into the shoes of an expert working in weather, water and climate sciences.

Emma Collins ([00:53](#)):

We're happy to introduce today's guest, Nina Oakley, geohazards climatologist at the California Geological Survey in Santa Rosa, California. Welcome, Nina. Thanks so much for joining us today.

Nina Oakley ([01:03](#)):

Thanks for having me. So happy to be here.

Kelly Savoie ([01:06](#)):

Nina, could you tell us a little bit about what sparked your interest in meteorology and how it influenced your educational path?

Nina Oakley ([01:13](#)):

Yeah. So I'm going to lead off saying that I really hope that this conversation finds someone who's making a career change or coming into meteorology from another field since that was my experience. And my education path is a bit of a winding road, but I really hope it provides some insight and maybe resonates with someone else going through a similar change. And so to bring it all the way back to my K-12 experience, I did well in science and math, but it wasn't really my interest that I focused on. I really gravitated towards English, Spanish, art and history. And these came a lot more naturally to me than math and science. And so also in high school, I grew up in rural coastal Southern California and I started surfing in my junior year of high school. And weather was really important for determining the surf conditions and deciding where we were going to go surf and which days were the best to go surfing.

([02:13](#)):

And this year also happened to be the very strong 1997-98 El Nino event where we had major storm and flood impacts in California and was also a really anomalous and outstanding surf year that's still talked about in all over the media. So this is the year when the Chris Farley Saturday Night Live "El Nino, Spanish for the Nino" was all over the media. So when I started surfing, this started to make weather and science more relevant to me, trying to figure out what is El Nino and trying to... We would listen to the NOAA Weather Radio, listening to the Buoy reports and

wind and surf conditions. And so I became interested in trying to understand that information. So I graduated high school and I went to college at University of California, Santa Barbara, and I wasn't sure what to study. I think I entered as a communications and Spanish major.

(03:20):

And I wasn't aware of meteorology as a career or really careers in general. Being from this rural area, there wasn't a lot of guidance at our small high school. And my parents didn't have the opportunity to finish college, so they didn't have that experience to share with me about finding a major and a career. And so as part of my general education requirements, I took an intro to oceanography class and was like, "Wow, this is really cool." And we got to go out to the Channel Islands off the coast of Southern California. I had never been. It was really a cool experience related to earth science. And so this led me to change to a geography major. We didn't have meteorology at UC Santa Barbara. Anything weather related fell under geography. And this had a quantitative Bachelor of Science and also a non-quantitative Bachelor of Arts path.

(04:19):

And I wasn't feeling confident that I could do the calculus and physics needed for the Bachelor of Science path. So I took the Bachelor of Arts route and studied GIS, remote sensing, cartography, human geography. And I thought I would go into those fields. And then the last quarter of my junior year, then a PhD student, but now Dr. Chris Funk taught a tropical meteorology course. And it was a lot coming in from this non-quantitative background and not having the calculus and physics to understand it. But I was so excited about this class and I was like, "This is what I'm really interested in." And we spent a lot of time in office hours trying to understand this class. And then the following year, Dr. Funk taught global physical climatology class my last quarter of undergrad. And I was like, "Yes, I am going to go to grad..I want to be a climatologist.

(05:14):

I'm going to go to grad school. I'm going to do this." However, also realizing this last part of my senior year, I want to go into a highly quantitative field. I have no college level math, physics, chemistry. So upon graduation, I enrolled in Calc I and chemistry at the local community college and started into those after I finished undergrad. But as you can imagine, doing this double major in geography and Spanish, working through college, I was kind of a little burned out. And so I got those first couple classes done. And then I was like, "I need a break." I had some friends moving to Hawaii and to the big island and I was like, "Yeah, I'm going to go do that for a while." So started down the road of doing these pre-reqs and then moved to Hawaii. I worked as a hostess for a little bit and I would stand at my podium.

(06:14):

I had this book called *Prevailing Tradewinds: The Weather and Climate of Hawaii*, which was like a general interest book. And I just loved reading that book over and over and practicing my tropical meteorology. But I also had this background in Spanish, saw an offer for teaching Spanish at an independent school and took this part-time job teaching Spanish as well. And I really loved teaching. And they also needed a science teacher and knew I had this geography background. And so the school I was working at encouraged me to go get a teaching credential

through the University of Hawaii Outer Islands program. So I went and got my secondary science teaching credential while teaching science and Spanish at an independent school and really enjoyed teaching and spent a few years out there teaching in Hawaii. And then life circumstances brought me back to California. And I got another teaching job in Northern California in Santa Cruz teaching middle school earth science.

(07:14):

So now I had moved back to California. I was close to a school with a meteorology program at San Jose State and still had this dream of studying meteorology. So I was like, all right. I had my break. I'm going to get back to it. Climate change issues were in the news a lot. I was trying to teach this to my students without really understanding it. So I got really motivated to go do the master's program and reached out to San Jose State, got the info on the pre-reqs. And so now I was teaching during the day, taking Calculus II at night, physics over the summer. It was pretty brutal.

Kelly Savoie (07:52):

Wow.

Nina Oakley (07:54):

Yeah. It was rough, but got the pre-reqs done and was able to enroll in that MS program in meteorology at San Jose State. So started the program and the first class was a field campaign to observe the North American monsoon led by Dr. Craig Clements.

(08:10):

And I was older than most people in my master's program. I had no experience forecasting, which is what we were doing each day to decide where we were going to set up our instruments. And then I also had no instrument experience. And then also coming into my first dynamics class, now I had the calculus and physics, but it was still really, really different for me. But I absolutely loved it. And it didn't come naturally, but with hard work, I did well and was really thankful for my classmates, my study group and my professors that first year who helped me launch in the field. So I'm finding my way into meteorology. Things are going well. My research assistantship funding fell through at San Jose State and it's a high cost living place. So I looked into transferring to the closest school, nearby school, which was the University of Nevada at Reno and visited there.

(09:09):

They offered me a research assistantship, much lower cost of living. So I moved there, finished the MS in atmospheric science at UNR, and then ended up going on for a PhD and completing that. So all that to say, I think taking that break between undergrad and graduate school was really beneficial for me for getting into that mindset of going into grad school and then changing fields, going from education and this more of a non-quantitative background was really, really hard.

(09:50):

Coming into the grad school when you don't have any meteorology experience and everyone else does, sometimes you feel a little bit helpless and have to work extra hard to catch up, but it can be done and everything works out in the end.

Kelly Savoie ([10:05](#)):

That's amazing. You're brave. You really are. To pursue it knowing that you weren't going to be probably at the same level as some of the other students in there, but you had a passion for it and you kept going. So I applaud you. Congrats.

Nina Oakley ([10:22](#)):

Thanks.

Emma Collins ([10:23](#)):

What opportunities did you pursue that you knew would be beneficial to securing a job once you graduated?

Nina Oakley ([10:29](#)):

So I think the landscape changed a bit when I was in school, but programming skills, I recognized that that was really important and that was part of the curriculum at San Jose State, which I really appreciated. So now I think it's a given in most programs. And so the opportunity to build on my programming skills was really important for jobs in the future. But some of the other things that I found extremely helpful that I use all the time now, I took a graphic design short course while I was a PhD student and just learned to use Illustrator and InDesign. And you're doing things like cleaning up your figures and research. You need these for scientific communication, for making two-page handouts. I've done a lot of outreach and communication, producing two-page handout type things. Also, web design and development was... I also took courses in JavaScript and HTML and CSS, which now there's a lot of software that'll help you build websites, but at the time there was not.

([11:43](#)):

And this was really valuable in my work at the Western Regional Climate Center as we were building web tools for climate information. Also, web usability and human-centered design and understanding how people are looking for weather and climate information, how to make that easier for them to use a website and access that information is really important.

Interdisciplinary collaborations, being able to work with... I work with a lot of engineers and geologists, water resource folks. And so being able to work across disciplines and listen and understand also that relationship building and maintenance as well as what I recognized really early on going to University of Nevada Reno and the Desert Research Institute, which is a soft funding environment. So you have to bring in research funding and manage your projects is not only doing the science, but understanding the business of science and how to write research grants and receive funding and then manage your projects and manage that funding has been a really critical piece to being successful in sciences.

Kelly Savoie ([13:03](#)):

Nina, what was your first job in the field and how did you end up where you are today?

Nina Oakley ([13:07](#)):

So my first job was a continuation of the research assistantship I had during my master's. And I was working under the advisement of Dr. Kelly Redman and Dr. Tim Brown as a service climatologist at the Western Regional Climate Center based at the Desert Research Institute. And so when I graduated from my master's, I rolled into a staff position at the Western Regional Climate Center. And I just really love climate services work. Some of the things that I was doing was helping people determine what data and information are best suited for their application and helping them access data and then to apply that data in meaningful ways to inform their decision or activity. We built many web-based tools to provide climate data and information. And we wrote monthly and quarterly and annual climate reports about the Western US discussing what's happening, putting extreme events in context, describing the seasonal outlook.

([14:04](#)):

And we also worked with our partners at the National Centers for Environmental Information at the National Weather Service and our state climate office partners to help maintain weather station records. And so to catch and resolve errors in the data and to keep all metadata correct and up to date. And this work to me was really rewarding. It's really critical to have these high quality long record data sets. We also did a lot of outreach and communication related to climate topics and extreme events affecting the West. And so I did that for a couple of years after finishing my master's degree, but kept taking interesting classes in our atmospheric science department that luckily eventually counted towards my PhD. And so some funding became available to collaborate with Dr. Marty Ralph, who was spinning up the Center for Western Weather and Water Extremes at UC San Diego.

([14:54](#)):

And that funding was for a student to work on extreme rainfall landslides and post wildfire debris flows in California. So that ended up becoming my dissertation work. So I continued to work my climate services job halftime and then worked on this dissertation research the other half of the time. And so after I finished the PhD in atmospheric science, I continued to work at the Western Regional Climate Center now as the regional climatologist and continued this geohazards and extreme precipitation research. And I wanted to move, I was living in Nevada, wanted to move back to California where I grew up and took a job with the Center for Western Weather and Water Extremes at UC San Diego, continuing this geohazards research, but also working in Northern California on the advanced quantitative precipitation information system, a network of weather radars, observations and forecast tools and products to support water resource and flood management in the greater San Francisco Bay Area.

([15:59](#)):

So I did that work for about three years. And so at this point I had done a lot of work on post-fire flash floods and debris flows from the atmospheric perspective. And a lot of this work

had been in collaboration with the California Geological Survey. And so when the California Geological Survey established a program in 2022 to address post-fire flood and debris flow hazards, I was excited to apply and put my research experience to work in a more operational role. So I was the second hire to this new program, the Burn Watershed Geohazards Program as geohazards climatologist.

Kelly Savoie ([16:38](#)):

Yeah. It sounds like your experience, university experience, your master's and your PhD and the connections you made through that really helped you in your career journey and just the references in people that you worked with.

Nina Oakley ([16:56](#)):

Yes.

Emma Collins ([16:58](#)):

So could you walk us through a typical day on the job as a geohazards climatologist?

Nina Oakley ([17:02](#)):

Yeah. So I'll back up and explain since folks in atmospheric science may not be familiar with this. Each state has its own Geological Survey. So in California we're a state agency and we're not part of the US Geological Survey, but we do collaborate closely with them. And so in my work, I work primarily with geologists and engineers. So my day-to-day work is really interdisciplinary and it can be a little lonely as the only meteorologist and climatologist in the group, but I get by. And so one of our key functions in post wildfire hazard evaluations is called the Watershed Emergency Response Teams. And we work on non-federal lands in California and there's a similar function called burned area emergency response teams for federal lands. And so what we do is evaluate areas recently burned by wildfire to determine where floods, debris flows, rockfall and other hazards are likely to threaten life, property and infrastructure after the fire.

([18:07](#)):

And so we identify what we would call values at risk, which are things like homes, bridges, roads, culverts that are likely to be impacted by these hazards and provide guidance to communities to help mitigate impacts. And so for doing this work, knowing the climatology of an area is helpful. So how frequently high intensity rainfall occurs in the area, the drivers of that high intensity rainfall, the storm history of the area, knowing what available rain and stream gauges are in the area to be able to look at historic flood events and think about what might happen in the future on this recent burn area. And also being able to forecast upcoming storm event, high intensity rainfall that may occur in upcoming storm events and keep my team apprised of that. So sometimes I'm out in the field installing or servicing rain gauges on roofs and burn areas, we collect data to help constrain rainfall intensity triggering thresholds for debris flows.

([19:08](#)):

And then I also do a lot of processing of rainfall data and work with my team to recommend any changes to rainfall triggering thresholds to our partners. And I also still do applied research in my position and publishing research papers. And we also do a lot of outreach and communications work on post-fire flood and debris flow hazards. So lots of different things day to day that keep it fun.

Kelly Savoie ([19:35](#)):

Nina, your work focuses on extreme precipitation in its relation to landslides and post wildfire floods and debris flow. You've mentioned this a lot in your jobs and your positions and research. Could you explain to our listeners a little bit more how precipitation leads to landslides and debris flows?

Nina Oakley ([19:57](#)):

Yeah. So there are two different things here. It's important to make a distinction between the rainfall that drives post-fire debris flow hazards and the rainfall that drives landslides in unburned areas. And so for post-fire debris flows, so wildfire can remove vegetation cover and change soil characteristics. And so under these change conditions, when intense rainfall occurs on steep slopes, it runs off and scours ash, rocks, debris off the slopes and concentrates this material into steep channels. And so now you've got this fast moving, slurry, moving downstream as a potentially damaging debris flow if there's something in its path. And we've seen debris flows sweep away vehicles, wash away roads and knocks homes off their foundations. So for this to happen, rainfall doesn't need to be extreme, necessarily. Just a quarter inch and 15 minutes can be enough to trigger a debris flow in the most susceptible areas of Southern California.

([20:57](#)):

And so this is often a one to two year recurrence interval storm at that 15 minute duration. However, more intense rainfall events tend to produce larger and more damaging debris flows.

([21:12](#)):

An important note, especially when we're trying to contrast post-fire debris flows with landslides, post-fire debris flows are driven by short duration, so typically less than one hour bursts of high intensity rainfall rather than a long duration storm. And this short duration, high intensity rainfall may happen embedded within a long duration storm in some cases. And with those post-fire debris flow hazards, no antecedent rainfall is needed. These can and often do happen in the first storm following a wildfire. So when we talk about landslides in unburned areas, this is a different rainfall scenario that's going to trigger these. So landslides typically occur in association with persistent rainfall, infiltrating the soil and increasing soil moisture. And as rainfall continues without sufficient time between storms for the water to drain out of the soil, that soil moisture keeps increasing. And then under the right conditions, the slope reaches a point of destabilization and failure.

([22:17](#)):

So in California, we often see landslides during or following back-to-back atmospheric rivers or during long duration atmospheric rivers. And it can be a little confusing because in some scenarios, these landslides associated with this longer duration rainfall can mobilize into debris flows and have a similar outcome as the post-fire debris flows. So the important point here is that post-fire debris flows are triggered by short bursts of high intensity rainfall, while, landslides in unburned areas are typically associated with persistent longer duration rainfall and this elevated soil moisture, but both can have destructive outcomes.

Emma Collins ([23:00](#)):

You volunteer on prescribed fires in your community. Could you tell our listeners what steps you had to take to participate in this?

Nina Oakley ([23:07](#)):

Yeah. So I volunteer with the Good Fire Alliance, which is a prescribed burn association in Sonoma, Marin County, in Sonoma and Marin County in Northern California. But there are prescribed burn associations in a lot of places in the West. And so the idea is using community resources to help get good fire back on the landscape for ecological and cultural benefits as well as to help our communities be more fire safe. And so to be able to participate in this, I had to do what was called a firefighter type two certification, which is a 40-hour course and then a physical test where you have to walk three miles with 45 pounds on your back in under 45 minutes.

([24:00](#)):

It's a fun activity. And then we do, once you've gone through the initial certification, you do a one-day refresher each year and take that physical test again. And so in these courses and in our refreshers, we get trained in fire line safety, radio use, the incident command structure. So how we communicate and interact with each other on the fire, responding to injuries if they occur, how to do the fire lighting, moving around on the fire line, preventing an escape. So preventing fire from leaving the intended unit that we're burning. And I really enjoy doing this volunteer work because there's a lot of applications for weather. And someone's designated to, when we start the day, to get and to read the spot forecasts that we get from National Weather Service and then to take weather observations on the hour or sometimes less than an hour. It's called the fire effects monitor.

([25:08](#)):

They also watch fire effects. And so we'll use a Kestrel handheld instrument or a sling psychrometer to take those measurements. And when you're in this fire effects monitor or FEMO position, your goal is to keep the burn boss and all resources on the fire informed of whether we're staying within our prescription, our set range of weather conditions for the burn. And then you're also following the weather conditions well before to plan out when would be a good burn window. So yeah, it's a really interesting application of weather that's kind of different from research and day-to-day. And if folks are interested, look and see if you have a local prescribed burn association in your area. And having meteorology experience is extremely

helpful to doing these prescribed burns. And you can trade your knowledge for what other people have on ecology, fire behavior, the incident command structure of wildfires, et cetera.

Kelly Savoie ([26:21](#)):

Is it kind of like an on - call type volunteer position? When there's an event, they go through the network and tell people who's available to help out?

Nina Oakley ([26:33](#)):

Yeah. Yeah. So there's an email listserv and folks will post, "Okay, we're having a burn and who wants to sign up?" And there'll be a signup sheet and you sign up and you show up and do the thing. Yeah.

Kelly Savoie ([26:52](#)):

So that's not the only thing you've been volunteering for lately. You are also a member of the newly formed Board on Certified Climate Science Professionals. Could you talk a little bit about this new AMS certification program and who would be eligible to apply?

Nina Oakley ([27:09](#)):

For sure. Yeah. So I'm really excited about the Certified Climate Science Professional certification. So folks are probably familiar with the Certified Consulting Meteorologist program. And so this is similar but addressing climatology, which is...there's not necessarily an overlap. So the certification is for people working in applied climate, climate services community, those who might work on climate projections, climate modeling and climate adaptation and mitigation science. And so this certification indicates that the certification holder can provide solutions to climate related problems for those seeking climate services and can give these unbiased and authoritative analyses. And so meteorology, climatology and other disciplines that may have climate related applications such as geography and engineering, people holding degrees in those fields are eligible to apply. But the applicability of any particular degree will be based on review of those transcripts. And also to apply requires five years of experience in climatology related field.

([28:30](#)):

And so there's a lot of crossover between meteorology and climatology. And so there are a lot of folks who might consider the Certified Climate Science Professional who may also qualify for the Certified Consulting Meteorologist and vice versa. And so folks should check it out if they're interested. There's information online and this will officially launch in October of 2026.

Kelly Savoie ([28:57](#)):

Exciting. Yeah, I can't wait.

Emma Collins ([28:59](#)):

If you are hiring a staff person, what types of skills and experience would you be looking for to fill a climatology role? What advice do you have for graduates to help them be competitive in the job market?

Nina Oakley ([29:10](#)):

Yeah. So I think the primary skill I'm looking for is somebody who's really inquisitive and willing to learn and enthusiastic about the work that they're doing. And then in every role I've had, I'm working across disciplines. And so folks who are excited about collaborating across disciplines and who are good listeners and are interested in helping use their weather and climate knowledge to meet user needs. And something else that is really valuable is understanding observations, weather observations, and as we get further and further from the actual observations we make on the ground and we've got re-analysis products, AI, et cetera, knowing and valuing how observations are made, their benefits and limitations, how we can keep them going and understanding how things go from these surface-based or upper air or satellite observations to these modeled products, AI products, and really understanding that pathway. And then good programming and data visualization skills.

([30:42](#)):

Data visualization is key and the ability to, you can create great science, but you need to be able to communicate it as well. So those are also some of the skills that I'm looking for, is being able to communicate information well and a lot of it needs to be visual.

Kelly Savoie ([31:07](#)):

Right. Well, we're so grateful for everything you've told us about your career. However, before you go, we always ask our guests one last fun question at the end of our show and I want to ask what's your favorite hobby? I think I might know what it is from what you discussed previously, but what is your favorite hobby, Nina?

Nina Oakley ([31:27](#)):

So I really enjoy surfing. I love surfing and try to do it as much as I can. And yeah, so currently living in Northern California and surfing the cold waters of the Sonoma Coast, but we have a good time.

Kelly Savoie ([31:48](#)):

When did you start surfing? How old were you?

Nina Oakley ([31:51](#)):

I was 16 when I started surfing.

Kelly Savoie ([31:55](#)):

Oh, okay.

Nina Oakley ([31:56](#)):

Yeah. So I spent nine years going to school in Reno when I wasn't going to school and working in Reno. So I didn't get to surf as much as I wanted. So did a lot of standup paddle boarding to try and fill the gap. But now that I'm back living near the California coast, surfing a lot more again.

Kelly Savoie ([32:21](#)):

I'm good at standup paddle boarding, but I'm very bad at surfing. Those are two really different types of boards.

Nina Oakley ([32:29](#)):

You can stand up paddle surf.

Kelly Savoie ([32:30](#)):

Can you? It seems like this..

Nina Oakley ([32:32](#)):

Yes.

Kelly Savoie ([32:33](#)):

The surfboard seems really a lot harder to balance. And I still, I mean, I haven't done it a lot. I went to Hawaii for a vacation a couple of years ago and I was like, "I'm going to just try it. " How you hop up to stand? Lying down to standing? How long did it take you to get that skill?

Nina Oakley ([32:55](#)):

Yeah. I mean, since I started as a teenager, I was much more spry then. So yeah, probably took a couple months to be able to stand up, but you start on a big board and then I worked my way down to a much smaller board that you can do more maneuvers on.

Kelly Savoie ([33:16](#)):

I love watching the people who are good at it because they make it look so effortless and then when you try it, it's just like, how are they doing this?

Nina Oakley ([33:24](#)):

Yeah. Yeah.

Emma Collins ([33:25](#)):

Have you ever competed?

Nina Oakley ([33:28](#)):

I think for only one year I was on the UC Santa Barbara surf team and I didn't do well. Despite the amount of time it remains a very difficult sport to get good at. So yeah.

Emma Collins ([33:43](#)):

I can imagine.

Nina Oakley ([33:44](#)):

Yeah. So that was the extent of my competition. Yeah.

Emma Collins ([33:48](#)):

Still fun though, I imagine.

Nina Oakley ([33:49](#)):

It's still fun. Still fun.

Emma Collins ([33:51](#)):

As a beach lounge myself.

Nina Oakley ([33:53](#)):

Yes.

Emma Collins ([33:54](#)):

Well, thanks so much for joining us, Nina, and for sharing your work experiences with us.

Nina Oakley ([33:58](#)):

Thanks so much for having me. That was really fun.

Kelly Savoie ([34:01](#)):

Well, that's our show for today. Please join us next time, Rain or Shine.

Clear Skies Ahead: Conversations About Careers in Meteorology and Beyond is a podcast by the American Meteorological Society. Our show is edited by Johnny Lay. Technical Direction is provided by Peter Killelea. Our theme music is composed and performed by Steve Savoie and the show is hosted by Emma Collins and Kelly Savoie. You can learn more about the show online at www.ametsoc.org/clearskies, and you can contact us at skypodcast@ametsoc.org if you have any feedback or would like to become a future guest.