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Good afternoon, everyone. Welcome. We have a great webinar for you today. Entitled Library Research for Water Resources. With us today is our presenter, Emily Wilde, formerly with the USGS. Now she is with Princeton. Princeton University, let me read about Emily. Emily joined Princeton University's Lewis science laboratory as environmental studies library of 2018. She has a bachelors degree of arts and geology from Harvard and Master of Library information science from the University of Rhode Island. From 2008-2019 she was a librarian, as I mentioned physical scientist at the U.S. geological survey Denver library where she helped them find and use science and legislative materials provided science and government outreach information, graphing and map instruction and develop and present online and in person training sessions on topics such as chemical and physical properties of the atmosphere of rocks, sediment and water, geochemistry and geophysics, organic and inorganic chemistry and trends in the use of available mineral energy and water resources . From January 1996 through July 2000 eight she was a hydrologist in the New England states where she enjoyed fieldwork, modeling, report writing and stem outreach while moonlighting as an academic -- for scholarly interest, reference I-10 is just, physical

and laboratory sampling methods. Before we get started, I have to go through the usual housekeeping information. If you have questions or comments on the presentation please feel free to chat in the chat box located in the bottom right corner of your screen.

I will keep track of the questions I come in and at the end of the presentation I will read them timely and she will respond. We are also recording the session and will email a link to the recording and slides to everyone who registered. We will also send a certificate of participation using the email you used to register. If anyone needs additional certificates because multiple people watched the webinar, please email us and include the title of today's webinar along with the names and email addresses of those named certificates. If you need to zoom in on the slides being shown you can click on the full-screen button in the bottom left-hand side of your screen and to exit, mouse over the blue bar at the top so it expands and click on the blue return button to get back the default view. At the end of the session we will share a webinar satisfaction survey with you and let you know when it's available and the URL will appear. We very much appreciate your feedback after this session and please keep in mind to reserve your comment about presentation style and value for the survey and use the webinar chat box for questions he would like to ask the presenter and report technical issues you encounter. So with that I will turn the virtual microphone over to Emily who will take it from here.

Thank you, thank you for joining. Water, my favorite subject. This first slide is the Hudson River Valley. If you haven't been to New York it is one of the large water basins or water drainage systems on the east side of the state. The image on the left is where the Hudson River begins and the middle is an image of Albany, New York and the Hudson goes through the capital of New York State. Then this last image on the right is the George Washington Bridge, the double-decker bridge that spans the Hudson River. I was born and raised in New York State so I love talking about it and I was an employee so it's one of my favorite states to talk about with water because there is a lot and it is fascinating. I will sprinkle and information about New York throughout. Just to give you a quick overview. I will go through , my goal is to go through my past, what my experience was as a former hydrologist, what they do and I hope to answer these other questions of what does this mean because when I was a hydrologist and librarian, usually I found out information and they would say thank you but I don't understand what it means. So that is what I wanted to go through. Another question, people asked is there oil, gas or mining in my watershed and if so, where? Sometimes people ask what my most frequently asked questions are so I go through that. And finally a lot of budding hydrologists are looking to become hydrologists and I can go through how to find a hydrologist position and also what

classifies you as a hydrologist in a student or professional role. As a young child I became fascinated with water because we have the Erie Canal and there is a song that goes with it and a huge historical aspect that we were taught when we were kids. The state flag that I was introduced to had a picture of the water, mountains and earth on the state flag. I always felt New York was very earthy and environmentally aware and there's a lot of water. I was also a competitive swimmer from the time I was five all through high school and I stopped around college. A lot of hydrologists are swimmers and there's a lot of water when you are a hydrologist that you are in. I don't think I have met hydrologist that is in recreation or competitively. When I talk about water, how much water should you drink a day? From what I have gathered , you should probably intake approximately 64 ounces to half your body weight in ounces. So, we all need water. I would challenge anyone to go all day without water because you would be very thirsty at the end of the day. You just need it to function.

So past sessions are here, I put the links in here because I didn't -- the last session I didn't know they were still online. If there is any content and you have the links and you want to explore more of that, the content, earth age, oil, gas, etc., you can take those and put them in the Internet archive and you can see through time the webpage. The information might build their. I added this slide because I found my eight hour class I used to teach as part of the Department of Interior at the USGS library of information class. It's a class that goes through the details on how to use publication, library catalog, other information if you are looking, I created this in 2010. I taught it and helped people until 2012 and I think that is when this class went off-line. That is when I started doing these sessions in 2014. I think that is the correct timeline. Also, just as a quick information, the sessions for 2020, I do have the tentative dates for May which will be the library of research for climate change. This is a lot of resources, I did the geoscience library overview of and there are other ones coming specific to atmospheric and oceanic sciences and one session specifically for natural hazard event,?,

Volcanoes, wildfires, etc. and the last one I will do this year is using our to teach chemistry. This is me and this is my background. I started , I have always been and government , with academics and I started in local government working as a lifeguard and swim instructor and then I went to state government working for me know New York State Department of conversation and I work for one of the parks as an information greater person. For a summer. It was fun and I really like helping people and giving information out. My background with academics previous to hear was working at several different academic colleges throughout New York, Rhode Island, that I was at the U.S. geological survey in New Hampshire, Vermont and Massachusetts and Rhode Island , they had me do a lot with database and I also became a groundwater database administrator. What happened for me was backed when I was actually in New Hampshire and Vermont they found I was good at review aspect and even though I was taking advanced classes in engineering and looking to possibly get another degree in water resources , they let me explore the idea of becoming a librarian. So they actually encouraged it and I applied for both hydrology and library studies programs to go to graduate school. I got into both and it was a big decision and they talked to me and my friends family as well to go for the library degree. So I was a student in library school working, taking classes at night and on the weekend and working for the library and by day I was a hydrologist. So when I was about to graduate I was hired permanently as a hydrologist

by obtaining a library degree which I don't know how many people have that. If there are other people who have worked as a hydrologist and have the library experience, please let me know. We should collaborate. It is a unique skill set so eventually I found my way to the USGS library. I moved out to Denver and I continued to help people with water. And the overlap with mining and minerals and water resources and energy and hazards. The library there was embedded physically with mineral and energy

so they were within the hallways so to speak. It was nice to have hundreds of employees around. So now I am here and most of my questions here are somewhat , 90% of them have to do with water

resources. This is fun to talk about. This is my career path, one reason I included this was in case a student watching this and thinking if you get a college for one thing you can't switch. I actually love science and math and I was good at math but I loved science. This is actually applicable for the session. You can explore what a ninth grade or science class is like for the activities. Is to have it when I went to do outreach in Colorado. That is when I became interested in hydrology and geology. But I went to college for mathematics because I was good at it. I was recruited by the geology department because they showed me how there is a lot of chemistry and math and geology which I thought was exciting. So I worked for the department as a research assistant teaching assistant and tutor. I also got to dabble in library instruction because as a tutor I helped my peers in the library with the research. And a librarian step notice and actually asked and worked in the library for that summer after I graduated. I also went to an environmental law intern, that was another backup, to become an attorney. Physically and environmental law. My undergraduate thesis was biology and ideology diatoms. Looking at the environmental change . When I was hired to work for the U.S. geological survey and 95 I didn't get to start for quite some time because the government kept shutting down. That was an experience that I didn't know existed at that time. [Indiscernible low volume] then I was at the Rhode Island office working and going to graduate school. And now I am here and I do a lot with a lot of different groups on campus and still help with them as well. Of the fuzzy -- funniest things in the field and when I talk about that I was a hydrologist picture me holding a fishing pole. And going out in the field. Even when I was with my equipment with my waiters on about to go on the river, someone would yell from the street for the bridge and say good luck catching fish and it was just funny to me that no one ever looked at the equipment to realize we were measuring water. Or doing collection samples. It was interesting , even to this day people think I probably have a fishing pole and I have never been to work with a fishing pole or anything, this is what I look like doing data collection across the river . You have to go across the land, do the river and go up see you have to do that in several parts of the river to get a cross-section of where the river is with the floodplain. So my study now, one of the questions I have about on the go was was it like to,

what is your setting, what is it like to work at Princeton and I started to describe if you have seen the credits for house, the neighborhood I work in and the lake near Princeton , I decided to put that in here. This is pretty much the neighborhood I work in. And this is the lake in front of the University. Or within the University. This goes down into the river. Sorry, the lake Carnegie. Another thing that happens and people find out I was a hydrologist and love hydrology and talking about water, anytime they see anything about water quality, they asked me immediately

I had read this but someone at work said what you think and I said I think Princeton University knows what they are doing, I can't imagine the New Jersey American water supply would not tell the truth was something like this. As a hydrologist I was working closely with the health department and water supply and water managers that there is no , people are on it and people are checking and double checking data that it's not something they really , if something was really happening they would say something and they would do a don't drink the water type of situation. Sometimes you see something or someone might alert that there is something happening but it might just be a misunderstanding based on the data or information they have. I am pretty thorough whenever I read anything I want to make sure I see the data, where's the data, when did they collect it and what was the circumstance. This is another, when I first moved here, these are the things people told me immediately that I had to go to the Topaz to go jogging and explained the history and how much , the Delaware River is here and this is about here, it goes all the way here and it's on an angle. The other interesting aspect I never knew until someone told me was that a lot of communities receive Carnegie library and we received lake Carnegie so this is the Topaz here, and lake Carnegie is in the back. So the reason why I explained my setting is when you talk about water resources, it is very personal and away. The landscape around you, there is water, rain , groundwater, people living in

different houses, roads, we are all living in this community that has the water that is moving through it and we are using the water coming from a supply source. A lot of photos and getting to know your area and understand the history and what is happening now is such a big part of learning about water resources, more so than , that's what makes it harder to search for the publication. The first step is to identify what's around you. It can be very personal, the other aspect, this comes up all the time. The USGS was involved

in a civil action, a book and became a movie. Toms River is a book about waters, water supply and plumes, groundwater. And most recently this has been in the news a lot. The devil we know, the documentary, dark waters was a film that came out last fall. And this book also came out , he's the attorney that I think was played by this actor here. This is probably , this comes up pretty much every day. Somebody is talking about this specific topic. This, not necessarily this community , every single day but Teflon as a product. What people don't realize is they think it's Teflon but they don't realize the chemical that the contamination and getting in people's systems is that it is also Gore-Tex and sometimes people have spray and waterproof something a lot of the hiking communities didn't realize they were using this. That is more of an awareness. The other aspect when I talk about when I was a hydrologist is people bring this up , the Hinckley, the California incident expressed in the movie Berkowitz. The USGS was involved in this. There are studies being done these are two recent months and I used to get questioned, when I was in Colorado I got questions about this all the time. Will people didn't realize and I always hesitate to talk about this because I want people to , I am very private because I helped so many people everywhere but I did help her one time. She came,

and called the office I was working at and when I was in the Massachusetts, Rhode Island office, group office, she can because there was something going on and she asked about data sources. If there's more people out in the world that are concerned about water quality, there are issues like she was, but is great. I like sharing this information , anyone who questions anything or wants to know more about the landscape and the history of the land or what is going on between industry, oil and gas, mining, water supplies, all of it. It's very complicated but there is tons of information resources for pre-. That is what I wanted to show. Another topic that comes up a lot when I first moved to Colorado, someone told me about this immediately. Do you know what's going on at Rocky Flats and I said yes. It was part of my environmental studies class. So around the same time this book full-body burden came out about a woman who grew up in one of the neighborhoods. A lot of people don't realize is it was a plutonium plant , this is the foothills of the Rocky Mountains and the Continental divide is here. The whites are capped but there is also this , one of the largest uranium veins happens to be in this area. That is why they built a plutonium plant here. So what happened in the bigger scheme of things is there was a fire that caused some situations , the plutonium went airborne over the community and there is a figure here that was in this report but also when you have a fire, there is water used and water percolates down to the ground and other things can happen , storage tanks, any type of storage can leak so this is a pretty 20 him but and so this is what they were making. This is an example of research that was done in collaboration with everybody. The community, water suppliers, to look at the aquifer and they wanted to see where the plume was. Where it would go long term. So another aspect of that, I was asked because of my hydrology and librarian skills, they needed to do this work in a short amount of time and gather and give it to the state because there is a court case going on. So we put all of this information together and this is about the uranium mine near the plutonium plant which is now gone. It is basically a history of, hydrogeology of information. That is what , it is interesting to research but I know how to find the publications that are very on findable. A lot of them were considered classified or restricted and became open file. They missed their chance in the library world to become catalogued if that makes sense. There is paper indexes and online indexes that have the information but when people look for the information about uranium they don't necessarily, they are not able to go through and find everything by searching the

database. They have to, there are checks to it. That is one of the things we specialize in is finding the things that aren't actually indexed, per se. When I was preparing for this presentation I noticed this yesterday. I didn't realize this, instead of spending the money for the cleanup that is contaminated, they are looking to grow the nuclear arsenal. And the sites are in New Mexico and South Carolina. This is unusually -- from the local news station. This doesn't happen often that they decide to build a plutonium core. Anyway, that is just an FYI.

Going back a little bit. A lot of times people will ask me what is hydrology. It is water resources. Hydro comes from water. The study of water, and hydrologists study water. What a lot of people don't realize is they think it's just the surface maybe or sometimes the ground but a hydrologist looks at all the geological information, soil and surface, the chemistry of the water. This is an old figure. From my perspective as a former hydrologist, it is the whole ecosystem of the earth from the bottom up to the atmosphere. So we are collecting data and analyzing the data for everything. For hydrology that is why it is so interesting and why so many different people that major in different sciences or engineering programs can become hydrologists because it's very interdisciplinary. This is my favorite water cycle image because I like to see the water animated. It is the precipitation, snow and ice, the river, groundwater storage, groundwater flow and the ocean, etc. and evaporation and condensation. It is just a cute way to display the cycle. A lot of times people don't realize the surface water and groundwater interconnect. That is what I get questioned about the most. When I was working in Rhode Island, some of the communities didn't realize if something happened , if something went into the ground maybe 500 feet from the river that actually would eventually get into the river so there is different models we have, etc. The first thing I like to show is my colleagues in Texas came up with this. Anywhere in the United States you can take one part of the stream and click and go up or down. Upstream or downstream. When you click on, the default is downstream but you can click on downstream and have a trace report and when you do a trace report it will give you all the communities that the river goes through up or downstream and it has the watershed information and a lot more information that people might , there's a lot of information there. It includes the number of stages it passes through. It is a nice package of information. The other aspect is sometimes people don't realize hydrologists actually have a lot of experience with geology or they are hydrologists and geologists. There is an interaction within the water cycle with the ground and I was talking to somebody saying they didn't realize that water would be so connected to the ground and I was like if it wasn't, it would be precipitation. And they laughed and I thought that was funny way to explain hydrology. But you do have this interaction going all the time. So a lot of the reports are called investigations because one of the investigation aspects that hydrologists are looking for is that you have, you might have something in the rocklike uranium , that the water passes through and ends up in the river. You can also have a uranium mine that may not have been tilled enough so the uranium can go in so they look at the difference between a uranium product that might have a leak into the system, groundwater, surface water. So they investigate whether or not it's a natural weathering of the water going through the rock. The first thing you look at is a map to see if that mineral even exists in that part of that basin. Or is it being imported through humans? I was at a presentation a colleague was giving around 2000 and it was arsenic and groundwater and someone that I was sitting next to was surprised and didn't realize that they were thinking someone had poisoned the well. They didn't realize it was actually water moving through the rock that was made of arsenic. That is a huge difference when they talk about natural versus man-made. What I like to do , especially someone who is new to hydrology, learning about the systems is I use the streamer application and we go upstream or downstream and this is an example of the Hudson is a rare basin. This is the point where it is freshwater and I hit upstream and so from this point up, this is all going right to this point about to going to New York City. If there was any type of surface water spill you would definitely

need to be contained because it's going all through here. Down into New York. That is why there is so many different environmental programs and anytime anything like that happens, there is instant remediation. The other aspect I show people is better off geology and this is an example using this hydraulic Atlas and it is specific to this area. This is the basic generalized geologic map. This is the Adirondacks and these are different rock formations that looks like they are squished because they were from different events. This is the Hudson River basin. It goes down, that is the bedrock. Then there is this official deposit that is left. That is the gray and the yellow is the sand and gravel deposit. You can have water moving through or the bedrock . If you are looking to put a production while in for water or water supply or for your house, the yellow is rule of thumb where you would want to be. Also you would want to look at the area because of anybody else with in that zone , you could have some issues if something came in. Whenever I move anywhere I actually look at my drainage basin and everything in it to make sure I know where I stand within the basin that I am going to be moving too. So those are the three pieces that is the beginning to the hydrology story or understanding of water resources. I did the same when I was in college. This was just one over from here. This was going downstream and this is going upstream and this is New York and the Hudson. This is an example of the understanding , to understand your surface water up and down because you want to make sure when you hear something on the news , there is a flood coming and you want to make sure to get out of the way. This is just another example here in New Jersey. It is really exciting for geology. This is because New Jersey is where the glaciers retreated from. This is the southernmost extent. It is interesting because [Indiscernible low volume]

you can be walking and see the change immediately. Or driving along the road and see it happen. It was just about on every geology majors exam that you had to show on the map. So far New Jersey it is split in half. This is Princeton and I decided to do a downstream and the reason why is because a lot of times people think that when Rivers drained they drain to the south and they don't always, sometimes they drain North and this goes, this is the Millstone River and it goes into [Indiscernible low volume] and it comes out here and this is Brooklyn. And this is the ocean. So this is what makes it cool right here, to look at the different aspects . When I first moved here someone said, I moved here from Colorado and someone said it must be so sad because you are going from great geology to everything covered with trees and it is so cool because there is more change in a short amount of time so you can drive from New Jersey all the way to the Adirondacks or you can go to Boston and you can see the change , it is so fascinating. And that is why there are all these different colors. That is all different aspects of geology and different time, it is really fascinating. But I also went, when I was studying geology I was in the area. I think where he went to college is only three hours from here. This is within my study area. When I was a geology student. I think it is fascinating. This is the bedrock geology and this is the official geology and this is the extent here. It's actually a fun thing to find across the United States. Where that line is. What people usually ask is how much water is there on earth and is it unlimited or how is the balance and one of the things

this figure that one of my colleagues did is this is solid earth , the rock and this sphere went over the west , that is all water to represent a sphere of all water on earth and this other sphere is the freshwater liquid and this little dot is Georgia , the freshwater lakes. Sometimes people are like this can't be true but if you look at earth it is just a thin crust and this is the ocean. So there really isn't that much water on earth per se which is why so many people are studying and it's also accounting and making sure, looking at where it is, where we are going if you have a wet year, all of that has been documented through time because the water is so important and we have to have it to live. So where is Earth's water? Sometimes people do better with this one so I added this back in. The oceans are 96.5% of water, that was the same and freshwater is 2.5%. So of the freshwater most of it is groundwater, a lot of people don't realize that. They think they can see it they think it is ground ice so it's broken down going in this direction. And these are just water drops. If you want more information

there is a whole school website and other communities also have different educational tools depending on the state or university. So this is just a general overview of the USGS, the only reason I put this in here, almost every part of the USGS deals with water resources at some point because there is the intersect of it so when I worked as a hydrologist I worked with just about everybody in the USGS. When I moved out of the water resources group to become a librarian they were quite excited because I could explain and show the qualifications. This is another example of New York. This was from yesterday or the day before so this is the status of the gauges and this is what people have questions about the most. The dot are uniform across the country and in Canada because there was a page that has Canada and the United States on it. So basically normal is green and when you go into the blues and Blacks, that is when it is playing. And after it gets high there is another set that makes it very high, etc. And when you go into drought it is orange and red. So I can look at this quickly and figure out which one to look at. But the different percentile, once you get the hang of it you can just start looking at the map and figure out where the flooding or where the drought sites would be. People think it would be more , sometimes the water is more localized but they are not, all of the dots in New York are actually not, some of them are orange. Looking at that data set. So, here in New Jersey there is a lot of green. Only one blue. This is an example, anytime you click on one of these. You get this pop up that comes up and it has a summary, the discharge of the stage , the date, the flood stage, the percentile, the length of record, the longer the better and the class involved. Green is normal. If you click on hydrograph, this is what, this is from February 27th and March 5th. Or March 4th, sorry. And this is the median daily. So these are available, you can pick your own range when you come to the page. You can also look at the gauge versus the discharge, if you click rating, this is what we used to do on pieces of paper when I first started out, it was paper and it's all computer. You create a rating curve so if I had something this was actually dropped because it, usually that happened and the data wasn't good enough because it was slated.

There's a lot more in here as well and when you go to the record you can select the field entry and you can't see it but this is what it looks like. This is a note from when they went to the site. There is a record of it so when I was helping a student I showed her all the ones I did because we all have to make our initials. I put down what I saw , it is proof I was out there and this is what I saw. So it's fun to go back to , just a quick overview of this, this is during the Cretaceous here. The Western anterior

[Indiscernible low volume] from the water supply standpoint when it was seated,

because rock isn't actually solid , you can have saltwater lenses in these areas because the ocean was there. So this is an example of the last time we had this year. Then also it didn't necessarily, the ocean didn't necessarily retreat all the way. It was still up here to some extent. At this point there was land, the other thing that this says, a lot of people don't realize is that the original drainage for the Mississippi River and the way it is now actually goes to the north. These arrows. And after glaciation, the Mississippi River of what we have now. If you are ever looking for, this is the report people were looking for. It's from the Army Corps of Engineers and it is really pretty. The images. It has degraded. So it shows how many times the Mississippi River has jumped out and created a new channel. That is the way it was, this is the way it is not. These are today's drainage areas so these are redone into the data set. Sometimes on reports are information you will see some maps have one or the other. This is just an example of both. Just for terminology. These are the provinces, you small , this is the whole country. This is time, a Siri -- [Indiscernible low volume] this yellow part right here in the middle of the country and also green and blue because that is actually the Colorado Plateau and this , even though this is a geologic map, it is the same footprint as the Ogallala aquifer in the Midwest which I will show in the next slide. This is the fun part of New Jersey, I am in two geological provinces.

This is the Colorado Plateau and this is the water basin and the water flow. Within the Colorado -- it is very layered with rock formations going vertically. You have different oil and gas and different

mineral deposits, uranium, etc. That is what makes that a little more complicated because it's different than the surface water drainage. Likewise this is the Ogallala aquifer which is the same as the slide before. For water quality purposes in the United States these are the programs , these are all the aquifers on this map and this is the national water quality monitoring network and there are tons of circulars , etc. The other thing I like to show because people are concerned about different aspects of water quality and also radon in their basement is that this is a quick overview of the uranium concentration from 93, so the high concentration of uranium and the blue are radon. You can see here that this is the radon area. Where the pink, fuchsia, red is uranium so if you're looking for uranium deposits or mining, that is why this is how I mentioned before they were looking to create new plutonium products from the government for weapons and that comes from uranium and it does make sense to have it in New Mexico over South Carolina because that is where the uranium is. These are deposits here. They are also in Texas. This is actually a fun part of groundwater. I get really excited so if you go to any out cross and you see the water come through, that is basically groundwater. This is actually my favorite place to go and view it, I have been going there since I was a kid. The top of Whiteface Mountain, you are up over 4000 people you go into the rock and it is nice and cold and always the same temperature no matter what time I have been there in my life. It is always a fun time to sit back and always a lot of water seeping through the walls and on either side there are these goalie type things and it is water flowing through the rock. So this is actually near where the headwaters are. It is also where there are one of the data collection sites run by the system and Albany. It has been there since 1961 so you can go and see all the equipment. This is the real-time, this is linked up with

NOAA and all the data they are collecting. So if you were to do a search in the different databases, what I would recommend since it became available if you go to Google scholar and I typed and groundwater to see what was out there and it's over 7000 so I decided to limit it

but this is actually my favorite way to do it and the easiest because it captures all of the different indexes that are available and any state or federal agency that has Google analytics with their government reports, it picks this up, you get a one-stop shop for searching. It is so much easier, especially so you have something to do immediately if there is a flood or chemical spill in a waterway or something like that is happening and you want to make sure you do a thorough review of everything so that is my trick but if you want to save it, the information and organize it, if you are going to use it for writing, the easiest thing I like to do and show people and this is the way a lot of people do it and in other states and federal agencies I used to help or still help, you click on the search part and use

keywords you can also do author and you can export it and import it into a notepad. This is an example. The reason I do this, especially if someone is new to the area

is because if you search this you can see were people on this topic are publishing. In this search for groundwater Adirondack they are publishing and there is a New York report that is being indexed from 1990 so it is taking up the federal , there is a nature article so it picks everything up and you have it in one place and sometimes it doesn't automatically give you the full text link or, you have to go through and grab it. But it makes it easier than going, for me at least then going into and I found especially when I help students or faculty and when I was helping the researchers, using sinus or focus because it didn't capture what it needed for water resources so a lot of it is government or other things out there. This is an example of the same search and then I dumped it in to the web and what I used to do at my old job and I do it here, I create a shared space for whoever I am hoping and I can show them how to find the different locations and is this what you are looking for and show them the tricks to it and they have access to the information, the citations and other information. And then they can ask questions. When I am on different projects as a contributor I usually do 100 to 200 citations an hour. That is my rate for organizing, downloading and not reading because that is just

organizing. The reading takes more time. But filtering through and getting rid of the duplicates and getting the best citation and information , all of that. Especially if something happened or if there is a legal situation, if someone from either side or someone is doing a hearing, I used to pull information for that. This is an example when I went through the USGS to show and for New York State and I knew this growing up that the USGS was there and does a certain aspect but they don't necessarily, New York State does a lot of research and they published a lot as well. Some states, there is more at the state level, some it is a partnership. And other states they will do a majority of the information. It just depends on what's available at the state and local level. This is an example, not that many reports that came up for groundwater but I know they are out there, they are not necessarily in the USGS but information. This one I searched for the New York water science Center and this is everything related to the New York science center and you can go through and figure out which one. The other thing I wanted to point out is this shows that there are human aspects to not only collecting the data and the citation but there is a spelling error so that is something to keep in mind when you are searching databases that sometimes double check everything because this is Mercury , it wouldn't pick it up if you were just searching it. But by the type, I can't remember what I was searching but there was an extra L in one word so the title wasn't being picked up in the databases but it did exist. We are all humans and that just happens. So again with New York, one of the things that whatever state you are in this is just an example, make sure you check the local webpage for the USGS as well as the state and local agency but this is how you can get the different tools, news, software that is related

to the Adirondacks, it happened last fall. There will be an announcement and explain why and what is happening. So one of the things that is the biggest difference between being a librarian here and at USGS and being a hydrologist is the flood rarely happened , they almost always happened on the weekend or at night. You go out and measure the flood when it's happening, not necessarily between 9:00 and 5:00. So this is happening 24 seven so the data is selected as well. This is an example, I chose New York to show there is so many cooperative partnerships because, this is one reason why you can go through the local page, to find different publications and the other search I did -- sometimes there is a publication for the state that will list specific things for that state and so within the partnerships there is over 100 agencies that work with New York State and so I know New Jersey works with New York State so there is the Bronx River alliance, the city of Auburn, Ithaca, Cornell University, this is just a few I copied and pasted but this is like this in every state in the United States as well as internationally. And this is an example in New Jersey of how you can find weather information. So I moved here I started using this and one of my coworkers was like why are you going to this page for weather? I was like I am used to this page. It's easy enough to use so I wanted to see how much precipitation there was that first fall I was working and living there. So I always had it up and was watching it. It was raining so hard. So I monitor it this way so one of the other partnerships, my entire career when I was a hydrologist was I worked very closely with Army Corps of Engineers and NOAA . We were always working with them because we were all in water so this example, this is one of the weather sites that is in Moorestown, New Jersey. And in cooperation with the U.S. Army Corps of Engineers group in New York. Just because they are close. You will see anytime you go to the agent station or weather station or groundwater well, you will see who the cooperating person is and it is almost always someone there or it can be five people. Most of the reports are like that, as well. This is about, if you do have any, this is just a quick FYI. If you do have, if you need for some reason, all the information, library research, these two posters I did have tons of links and explanations , there is also if you are looking at world uranium resources, Susan created this report in 2012 and again, this is the one we did for the uranium mine in Colorado. So, this is just a quick overview if you are an undergrad or working with undergrads of the different types of opportunities that can happen in school or going to graduate school. It is good to have the mapping experience, I had so much fun doing it myself. It is one of those things you can have a conversation with you and you make other

people so I did a lot of mapping in New York, Pennsylvania and Vermont, I was really excited because this really happens but someone started working here and they had gone to the San Salvador Bahamas research station which is here, which is exciting because it is something that is so special and exciting but it's not that you meet someone who has done the same thing every day. And this is just an overview to show the different parts of hydrology I was involved in just because you have questions or you would like to me coworkers or contact a hydrologist herself, it gives a great cross-section so I was doing a project that was mandated because -- this was the New York State Thruway. And it collapsed and from this point on all the bridges across the United States had to be evaluated. I worked on a lot of slides for the project, I did a lot of literature reviews. I also was the water use specialist and based on my studies I was able to [Indiscernible low volume] -- time and effort and this , these aren't done as much anymore because they are usually part of a report. It is part of the mapping. And this is uranium. That is just a quick overview. One of the things , the other trick I like to show people is I know what I have published

and I like to see how they index things because that is something as an author you don't have control over. I know I have done over 70 publications but my employer only captured 64 so in this example, it only captured 32. When I am talking to people who are trying to find something that has been done, if there were other tricks to capture just about everything. This is an example of the bridge tower project. I did 54 reports for this but only 45 are indexed in the library catalog so there are some missing. The author always have the full list so to be honest within my colleagues, if you are looking for something and you can't find it and you know that person wrote something similar or they might have worked on a project, there are professional pages and local state and federal government agencies, to be honest it is just one of those things that , just contact them. They are there to help and people contacted me all the time and asked. So feel free to do that. The other aspect, this is an example. That I show the students, the difference between, I don't know some people might have access to articles plus. This is the Google scholar versus articles plus. In this version you can click on full text scholarly peer reviews and there are other options. I found for water resources a lot is not being captured through this and it's easier to do the Google scholar. The other aspect is we have more access with the paper plug-in so the students, the way they can click , it just opens and you can have it added to the library. So for water quantity and quality, this is an example of the overview of water supply systems, generalized. So water withdrawal, groundwater, surface water, this is for public water supply. Water distribution,

wastewater, wastewater treatment, water use, these are standard terminologies and whenever the water supply company or the water managers are putting information out there , this is the flow of how everything works. If you have a question and are looking for data, , here for terminologies but if you want to prep to see what's going on, there are organizations that publish and sometimes it is government but sometimes it is also private people doing the assessment. So sometimes in some states the information might be private and other states it's available for the public to read. It depends on where you are. So for New Jersey, this is our water supply for American water and it gives the information of where it comes from and where it goes and they have a lot of water quality reports and information. So water used in the United States, the USGS has mandated to collect this information for the entire country for different water use components. Every five years and it goes back to 1950. You can look at how much water has been used for agriculture, mining, supply, domestic, livestock, public supply, industrial, thermoelectric and etc. This is the results from the data compilation. The eastern U.S. uses a lot of thermoelectric, this is the agriculture and this is public water supply. You can see how everything changes a little bit across the country. How the water use is significant. This has come up several times since I've been a New Jersey. This is the bibliography , this is something that is typical for USGS, state, federal and water resources . There is a lot of bibliographies available so if there is a topic that is interesting for you for your state or region, if you

type into Google or Google scholar or within your state, the topic and bibliography , sometimes you get so much information and utilize those sources. You would be surprised how much is out there, when I showed these different tricks it takes so much time. I had a faculty member and student tell me, I showed them how to do something and they tried to do that and it took over an hour. Librarians, you can do , we can save some time but for water because I was a hydrologist and became a librarian I can do things pretty fast. So the groundwater, freshwater, saltwater interaction, these , the reason why this is coming up so much is because of climate change. Even though having a separate climate change is still related. This is coming up a lot because saltwater is intruding into the freshwater or groundwater so that changes the availability of freshwater so the community, especially for an island, this is the tip of New Jersey. Information about how the ocean went in. So this is an example of looking at water use and availability for a basin level based on groundwater,

it is a sole-source water basin where everyone is getting water supply from the ground, not from surface water. So all of these sand and gravel deposits is where the wells go for water supply so if you don't have much rain it can be stressed or if there is overpumping it changes the whole system. So that is what that is about. That was the first of a series and that became the law about water use and efficiency. They weren't capturing how much water people were using and also some self supply was going unaccounted for. Within the system as far as keeping track of the different types of water in the basin itself. So this is what the domestic private water quality while information is. This comes up a lot, especially with everything going on in the news. If you are interested in this, there is additional studies of access, this is from 91 to 2004 and it's the water quality of domestic wells in all these areas in the U.S. New Jersey is last May , they brought to court the DuPont , 3M firefighting foam. There is also other information going on here from the NRDC and USGS published this about they detected this in public water supplies and had a press release. A lot of these people don't realize the desperate aspect of the chemical, they are the forever chemicals so the Teflon pans, certain pink , the Gore-Tex jacket, these are just other articles that explain the different chemicals in the environment. So this is also something that comes up and if you aren't aware of it, these are indexed, I think you might be able to get them on Google scholar. U.S. chemical safety word does a lot with , if there are any chemical leaks , they will investigate and this is an example of an event that have pulled in Charleston in 2014. So they have

all of the videos as to why it happened, etc. And this is an example of the report so before the EPA existed, the USGS and other state and local organizations got together and were discussing the different aspects and different parts out West

as well as regionally in the Northeast, Southeast, etc. So they have documented everything and they are part of the solution of interstate water support but you can find in the library catalog, I don't know if they are online. I had to scan them all before he left but I don't know if the reports are online. So the other aspect is the water quality , if this comes up and you are looking for more information, please let me know. There are different websites, some of them have changed but I try to keep up on this. From a research point of view. To find all the different publications, state, local, federal, international and within the traditional publication . The earthquakes overlap and the produced water's database they may not be a and I'm not going to go into much detail on that. This might be something of interest especially if you have private land or you have a private well. Or for farmers or other aspects to get an idea of the different aspects of land-use in that basin that you are in. And then I published this in 2001 or 2002 so this is something I am updating because I have had so many questions about documenting my tips and tricks for finding information for state and local and federal water supplies. I am updating this article and segregating it out using an example I am working on a project with. So this should be out in 20 or 21.

And I always like, I loved being a hydrologist and when it comes to showing them the tricks, you can actually have degrees in engineering, geology, chemistry, trying to think of which other ones, there

was a biologist I worked with, he was a hydrologist/biologist. I was a 13, 15 which is the hydrologist series and this is an example, those are the salaries but this link is the classification and general schedule for the white-collar positions for the sciences. Or for actually everything. This is the physical scientist and if you know any students even though there is only one, make sure if you are interested in hydrology, look for student training, hydrology and those positions will come up. Likewise in this main search. There were 700 jobs. So then, thank you for your time. It is 3:19, we have time for questions and I want to thank you, the New England water science Center, as a hydrologist, they helped me a lot when I was a water use specialist and my colleagues at the time, New Hampshire and Vermont, they pushed me to get a library degree and I have had an interesting last 20 something years. If you are interested in anything here at Princeton, we have a lot of different aspects of information -- [Indiscernible low volume]

Emilie, still there?

Yes.

I am ready for questions.

Thank you, fantastic webinar. Everyone will get this slide deck. It's like a graduate course in a slide deck. Let's see, we have some questions here. Mary asked do you have any advice on searching for data for report about PBB's in specific I am wondering about studies done in the Great Lakes, Michigan, Huron.

Yes, I can help off-line. If she sends me an email. I have had this question, a similar question before. There is a couple different ways to do it depending on what aspect.

Okay, Mary you have that information.

Nick says can you discuss water related publications and research tools, how can one best find non-materials those found from the Corps of Engineers, do you have any tips to use the digital library?

Yes, I actually, I used to help the Army Corps of engineer and the Bureau of reclamation, a lot. One of the things they have downsized, there library staff. I believe there is only one person. I can show you there are tricks to finding it. From what the Bureau of reclamation said before I came back east, they said they were going to there library , it shrunk. It is only one person but the physical location is not necessarily their. They moved to a model if you want a Bureau of recommendation report, you actually have to do a request. I don't know if they are like that but I do know you can use the USGS library catalog and find the Bureau of recommendation publication if they are not, you don't , there's a back door to get to them if you don't want to go through --. There are other tricks, too. It depends on the topic, as well. It depends on if it is a specific dam or the building of a dam or the taking down of a dam. I can figure a lot of that out. You don't necessarily have to go through that. It was something they decided to do that is a Bureau. Was to go through that instead of the library.

>>, Melinda asks is there a national database for water quality are specifically PFO lesson grandmother --

It is so specific, you have to get a specific chemical version that you are looking for. I can show you the report on the PFAS AND PFOS. I can show you how to do that. There are two different national water quality databases

but you have to go in specifically and ask for that chemical. And the results will come back for that data.

You can see her contact information, if you want to get in touch with her, she can help you out. Vanessa has a comment, the national agricultural Library is updating their water and agriculture information Center which will house all types of information including the topics covered here. That is very good to know. Let's see if we have other questions. Any other questions for Emily? A lot of terrific information here. I had some very simple nonscientific questions, I wonder if you could answer, I am sure you could answer these but I just did a quick Google search, the earth is like 4000 miles to the center, how deep does the groundwater go? You must know that.

Off the top of my head, war, Europe or United States?

Anyplace. Just curious. It varies so greatly?

In the United States for example you can have water lenses or water tables taco down 300 feet, sometimes water at 10 feet. Out West one of the issues going on with the Ogallala aquifer is it is dropping several feet through time. Like quickly because it's being pumped so some of those wells are 3000 feet. You have to remember, there was

a -- because of the sedimentation, etc. During that time you can actually have

there can be a saltwater lens over a freshwater lens. It depends on the formation, there is a pocket that is deep and have that old saltwater lens in the formation from 1 million or more years ago.

So it doesn't go many many mining miles into the earth, --

it is within the crust.

In the crust. Okay. Sorry if I am asking such a basic question.

No, please ask away.

The satisfaction survey is in the chat box, Corey will put in links to Emily's done nine webinars if I count correctly, we have links to all of those great webinars. I just have a side question, another basic, clueless host questions. The uranium you talk about is kind of scary living over that, is that what radon, I should know this but I don't. Is that what radon is from a uranium deposit?

No, it is radioactive and newer. It is the parent. Radon is the breakdown so is led. So if you have the daughters and the radioactive families, so radium is a daughter, do you know what I mean? If uranium is the parent and as time goes on it becomes something else. So if a rock is older it won't necessarily have the fresh uranium but it would have radon. It would be radon now.

If I am living over a place that has high concentration of uranium, is that any danger to the people living there?

It is radioactive. To be honest if someone told me a story and I would be aware and this is why I do it because

when I lived in Colorado some people had no idea that some of their land was actually uranium deposits. So they were planting their garden, one family in Wyoming had made, they took different rocks from their yard and they made a fireplace in their house. And ethically my colleagues noticed and said , they brought the Geiger counter and and you said he realized he made, this is actually, I don't know how to say this and they had no idea.

So another aspect is when all that was happening with the Rocky Flats and Colorado, some people were very against having the plutonium plant but they didn't realize that their land actually also had uranium.

That is scary.

I like to do an awareness because as a hydrologist or former hydrologists, people I would say they don't realize what is in their basin and within the land-use in their area.

Corey just put in the chat box, a link to an article by a former colleague about the Academy and the things we do. Give that a look. We will see if there are any last questions. This is unbelievable, so much information. Everyone will get the slide deck so you will all benefit from it. It looks like no other questions. Let me go into my wrap up comments. We can still ask a few questions if you have. I want to thank Emily one more time. Fantastic webinar, as always. Number 10, great once again. I would like to thank Corey, my colleague for his great work and support. Don't forget our upcoming webinar, we have three more for March, the next is next Thursday March 12th entitled how Houston public Library engages the community with it resources , tips and tricks . And also in April don't forget our virtual conference that we have coming up. You will receive notice of all of our upcoming webinars when they are announced if you sign up for our news and events, email alert service. From the Academy webpage which is linked to in the in-depth section at the bottom, you can view a calendar of upcoming webinars and other events, access past webinars and link to a form to volunteer to present an Academy webinar. I know many people in the audience that could present a great webinar. Let's see if there are any other last questions. It doesn't look like it.

[Event Concluded]