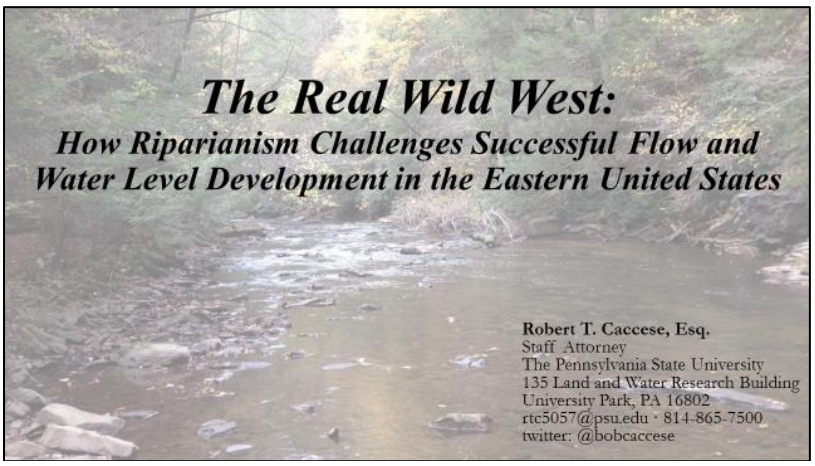
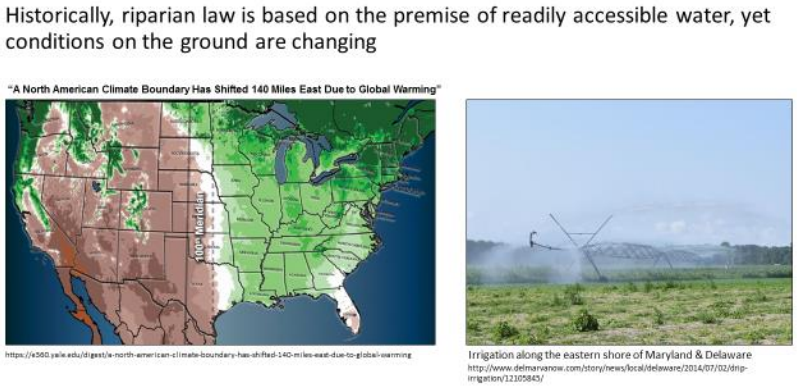
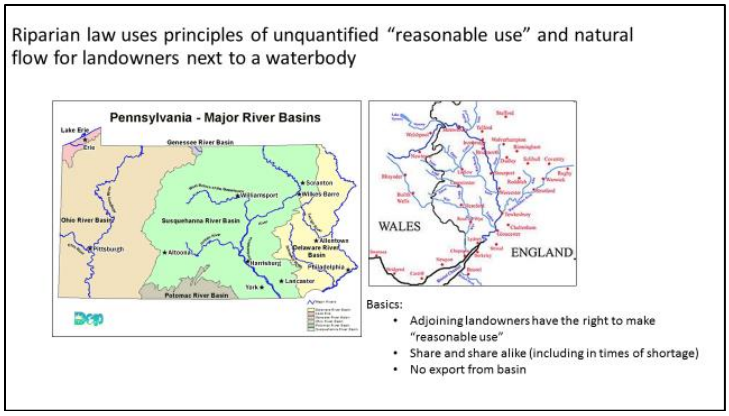
Bob Caccese:



I think so. You all hear me okay? Great, awesome. Okay, thank you. So today we're going to switch gears a little bit, and I'm going to talk about the Eastern United States. And if there's three takeaways from my presentation I want you to remember: It's number one, that there's a perceived surplus or at least that the Eastern US has a lot of water. Number two, that's not necessarily the case, and number three, right now, there seems to be a lot of reactive planning as compared to proactive planning with respect to this topic in the East. So let's get going.



So for those of you who attended the workshop or the training sessions yesterday, some of this stuff came up, but again historically riparian law relies on this idea of reasonable use. But right now, conditions are changing on the ground. As you can see, that map there on the left from an article from Yale, you can see that the boundary of the 100th meridian which historically has been the separation between prior appropriation and riparian law, has shifted eastward due to changing climate. So something to keep in mind with respect to the Eastern United States, things are changing and again if you did see the presentation yesterday, major irrigation is occurring over in Maryland and Delaware with center pivot systems. So again, something to keep in mind as far as that, things are changing in the East as we speak.

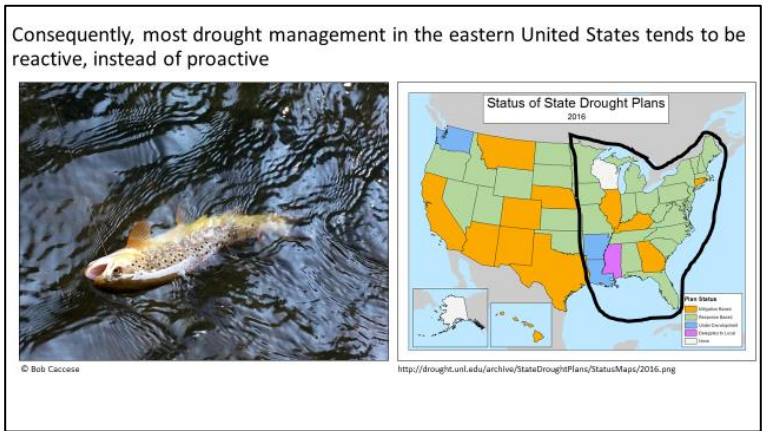


So a quick primer on riparian law. Again it's this idea of reasonable use, but generally it's unquantified. And if you're going to have "right to water" in the East, you have to be a riparian i.e. a landowner that's next to a body of water. For those of you that are familiar with the doctrine, you're sharing in times that there's a lot of water, and you're also sharing in times where there isn't. Typically there's no export from the basin and again it's adopted from England.

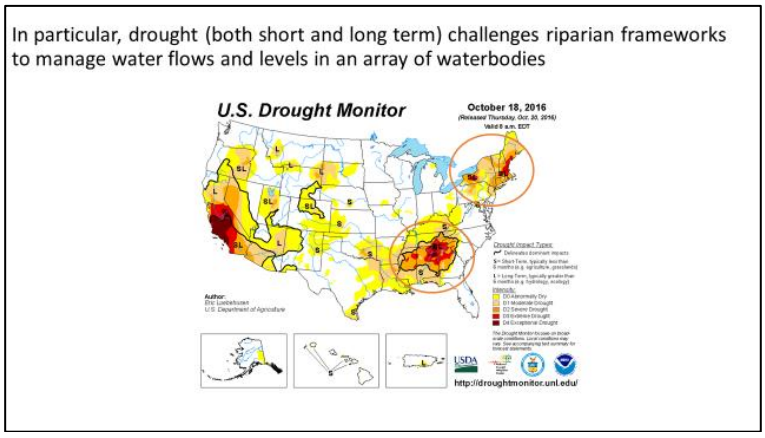
Now for ground water law, we still have this idea of reasonable use, but more specifically I liken it to the law of capture or the rule of capture, which is used in some states like Texas. So you can have this idea of reasonable use for ground water management in the East, but you have to put it to some sort of beneficial use, and if you look at a lot of legal definitions of what constitutes a beneficial use in the Eastern United States, with respect to ground water, pretty much any legal management and use of water in the East, is okay. So we have to prove that either you're using the water maliciously or wastefully in order for some sort of legal remedy to kick in with respect to this.

As I mentioned before, I wanted to take a big broad look at the Eastern United States, or at least riparian jurisdictions, to see what's the picture of drought right now from a legal perspective. And as you can see, this is a little dated, but back to 2016, most of that map on the Eastern side of the country is reactive drought plans. Again there's a few orange ones in there that are mitigation based, but for the most part, drought management in

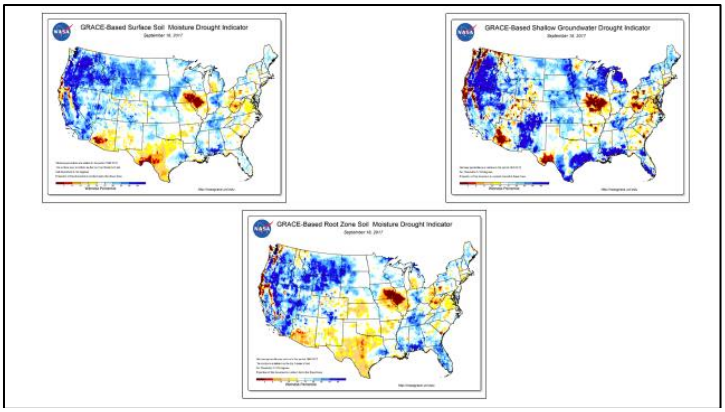
the Eastern US is sort of, you know when it happens, we'll worry about it, but right now, because we have this perception of a lot of water, well we're not making it a high priority, in order to plan in advance.



But again, as we've seen, that's not really the case, because drought is occurring on a more occuring basis in the Eastern United States, both on a short term and a long term basis. And as you can see up there for those again who attended the workshop yesterday, back in 2016, California got a lot of exposure with the five year drought that they had, but in the East, especially in the South East, and the New England region, they were hit just as bad. Towns in Vermont and Connecticut and New Hampshire were running out of water. And folks really weren't sure, what are we going to do? You know, this isn't supposed to happen in this part of the country.

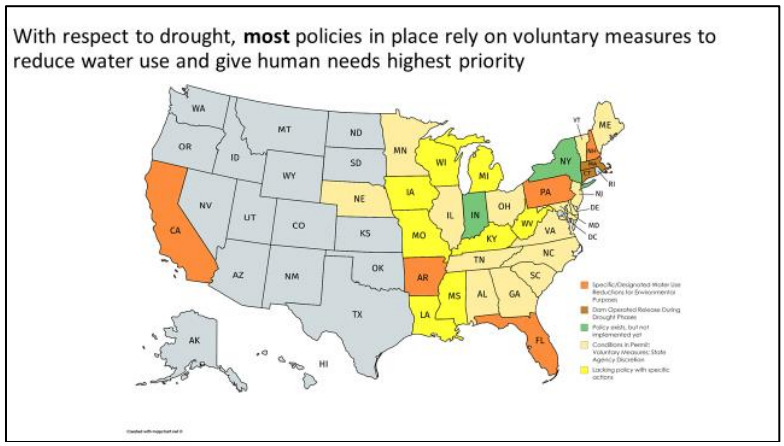


So that's 2016. Let's look at 2017. This is from the former NASA Grace satellite. As you can see, we're looking at ground water, root zone and soil moisture. Yeah for the most part, there's a lot of blue on that map, but again, certain parts of the East, you still are seeing drought conditions kick in from year to year.

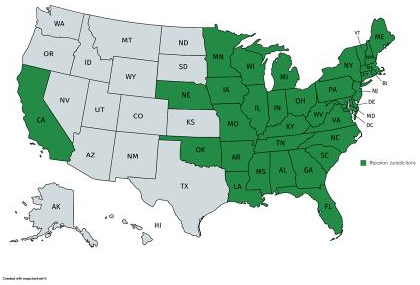


So what did I want to do? Well, and this is specific now. So what I wanted to do is I wanted to take a look at every state that manages water from a riparian point of view. It's most of the Eastern US and then you have California that still uses riparian principles, as well as Nebraska for certain things. I think Oklahoma uses the doctrine a little bit as well. And what I did, is I wanted to figure out, okay with respect to drought plans and drought policy, do those plans have a mechanism from a legal perspective that's going to protect or preserve environmental flows for fisheries or other aquatic purposes?

So everything you see up there in tan, that's either some sort of state drought plan or something along those lines where there's a condition and a permit, or it's up to state agency discretion. Everything in orange is actually specific reductions that when a drought does kick in, these are specific quantified management methods we're going to employ in order to protect or at least conserve water in streams and lakes and rivers. The stuff in green on that map, those are new drought policies that have been enacted by those states with respect to preserving environmental flows from a quantified standpoint. They just haven't been implemented yet, or at least they haven't gotten the opportunity to do so. And then everything in yellow, again for the most part, that's ... I want to be specific here ... They may manage drought, they may have a state drought plan. What I'm focused on is within that state drought plan, is there a specific policy to manage environmental flows?



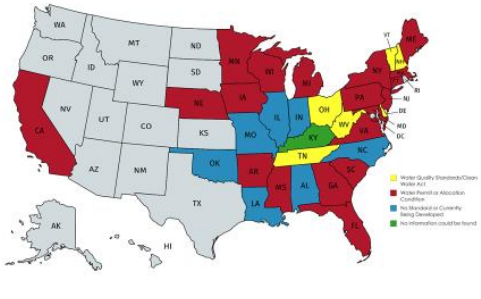
For surface water regulation, riparian law is used predominately in the eastern United States



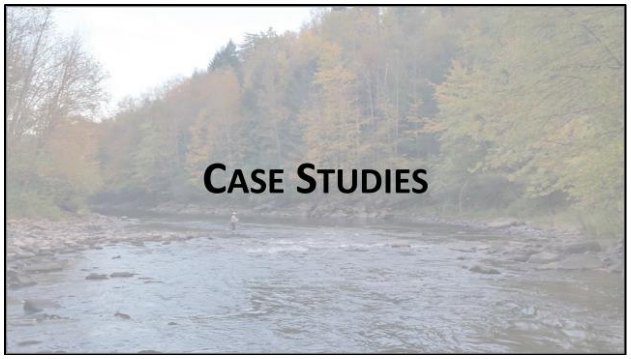
As I mentioned, we're talking about riparian law. We're talking about where does this really exist? Again, it's along that 100th meridian, as most of you know. And again, certain states in the West. So based on riparian principles, how do we protect instream flows? Well, there's really two main ways we can do that. It's either (1) some sort of condition and a permit, so again if you've a water right or a water certificate or a water permit, we're going to throw something in saying, you need to cut off when flows go to this x amount threshold. Or we can go more along the lines of The Clean Water Act and go with water quality standards.

The states up there, some of them have both, so if you see Tennessee, even though they have a yellow for water quality standards for maintaining instream flows, they also have flow criteria from a permit standpoint as well. And actually on the flight over here, I did see that Kentucky does manage this from a water quality standpoint. So it took me a while to sort of consolidate and track down the states as to what exactly their policy is, but as you can see, it's pretty diverse and then there's some states where again there isn't an official state wide policy on this subject. They may have stuff in certain permits with NPDES, with water quality standards, but an actual state wide policy is what I was looking for. So even though North Carolina may have enacted standards and a methodology, it still hasn't been put into a statutory format or code.

Under riparian law, instream flows are protected primarily through water quality standards, permit conditions, or a combination of both

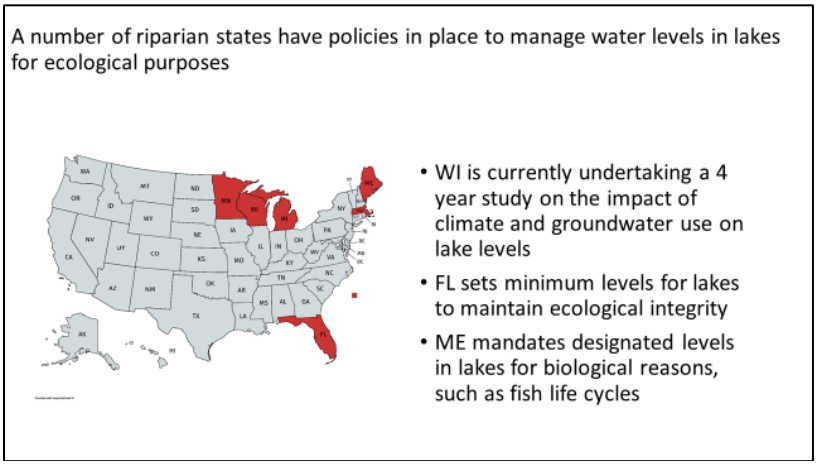


So that's what we're working with. We know permits and water quality standards from this area of legal doctrine is what we can do, but let's see what's actually being done on the ground, instead of talking about it.



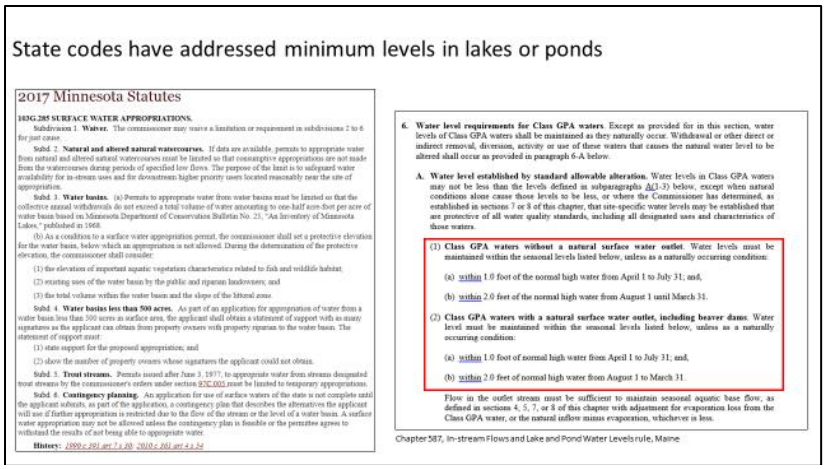
What I wanted to do is because part of this conference involves water levels and lake levels, is there any sort of protection being done in riparian jurisdictions with respect to lake levels. And here on the map, it's no surprise the states that are highlighted in red do have some sort of provision, an administrative code or there's statutory provisions where they do try and mandate some sort of maintenance of a water level for ecological reasons or environmental purposes. And again, most of those states that are highlighted have a lot of lakes.

Three things I wanted to focus on is: Wisconsin because a lot of the activity in the Central Sands region for water use is being conducted. So they've gone and performed a study right now to sort of figure out with respect to water lake levels in the state, how is our ground water use and climate change really impacting the levels in the lake, and how can we better enact policies to protect and maintain those levels, so that you're not going through extreme swings. Florida with their 1972 water code, same deal. Even though they said that water must adhere to minimum flows, they're defining that from an ecological perspective. So we want to maintain a minimum flow, but to maintain the ecological processes at that point. And then lastly, Maine has a provision in their administrative code which I'll show you on the next slide, that mandates for classified lakes in the state maintaining a certain amount of water, at least a threshold of what you can take down if you're withdrawing from it.

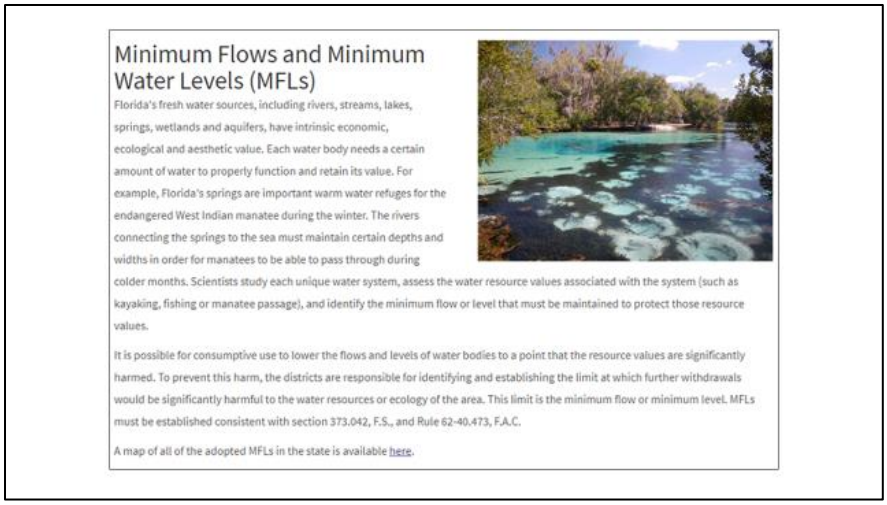


Okay. So here's some examples. So on the left is part of Minnesota's code and they do mandate, and again, I'm going to make the slides available, but it's really just to show

you that something does exist in black and white from a legal perspective, that we are trying to maintain and mandate certain levels in lakes for the purpose of fisheries, and wildlife and aquatic habitat purposes. On the right, that's what I've just mentioned with Maine. Every water body in Maine is classified in some sort of way, whether it's a river, stream or lake. So in this case, lakes they do have limitations based upon what time of the year it is in terms of managing how much you can take out or how much needs to be maintained.



And then lastly, on the lake side, as Florida does have this idea of minimum flows and minimum water levels. And again, so if you're familiar with Florida, each water management district, so there's five of them, have to figure out, okay what's our water use like and then allow mandates on determining minimum flows and levels to maintain the ecological processes that are being performed down there, whether it's for species, whether it's for fisheries purposes, whatever. But the law mandates that the districts need and have a duty to do so. So that's the difference that you're seeing in some states in the East is going that step further from voluntary measures and conservation measures and state agency discretion, is actually throwing this into the code to mandate those duties on state governments and local governments. Florida also has a part of their laws, a reservation for water, so if they're going to give out a permit, they can reserve a certain amount of water that be not used or in the event that that water user is using a certain amount of water in the permit, that if a drought does kick in, we're going to tell you to tone it down on some of that use. So again, as far as the Eastern US goes, I would say Florida definitely has the model so far to go after in terms of that.



Minimum Flows and Minimum Water Levels (MFLs)

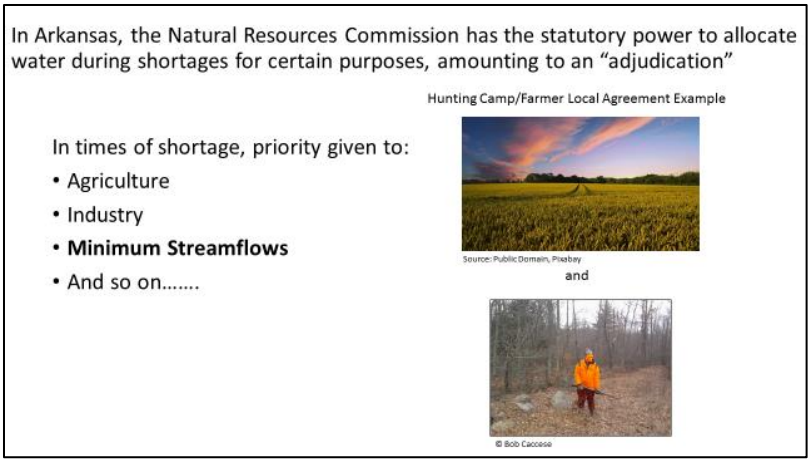
Florida's fresh water sources, including rivers, streams, lakes, springs, wetlands and aquifers, have intrinsic economic, ecological and aesthetic value. Each water body needs a certain amount of water to properly function and retain its value. For example, Florida's springs are important warm water refuges for the endangered West Indian manatee during the winter. The rivers connecting the springs to the sea must maintain certain depths and widths in order for manatees to be able to pass through during colder months. Scientists study each unique water system, assess the water resource values associated with the system (such as kayaking, fishing or manatee passage), and identify the minimum flow or level that must be maintained to protect those resource values.

It is possible for consumptive use to lower the flows and levels of water bodies to a point that the resource values are significantly harmed. To prevent this harm, the districts are responsible for identifying and establishing the limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area. This limit is the minimum flow or minimum level. MFLs must be established consistent with section 373.042, F.S., and Rule 62-40.473, F.A.C.

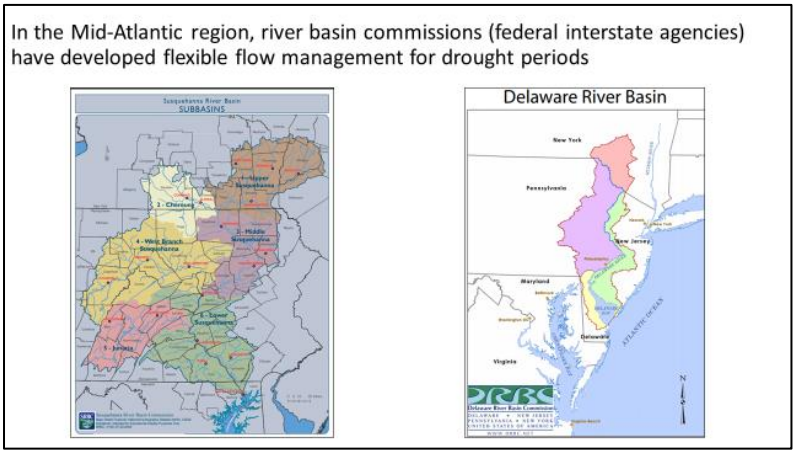
A map of all of the adopted MFLs in the state is available here.

But what about flows? Well, I did a lot of research. It took me about two and a half, three months. I figured out, well how hard could this be to do riparian jurisdictions. And 30 states later, I figured out, well this is a lot to go through. But anyhow, at least in Arkansas, when I talked to some folks from their Natural Resources Commission, they actually have the power to allocate water during a shortage, if water is available. So in this sense, you're always going to give priority to human and domestic needs that are exempt from certain permits, but in this sense they do have a mandate where minimum streamflows need maintained. So you have minimum streamflows that are protected in the state, but if there's available water to pump down a river or stream that nobody's using, that's where it sort of lines up in the pecking order at that point.

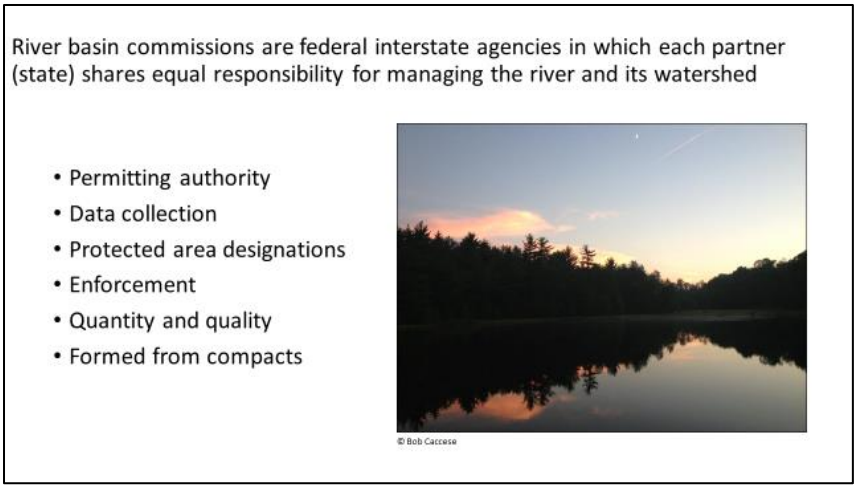
Somebody that I talked to from the agency said, well in this case, we had a local agreement where there was a hunting camp and a farmer next to each other that both used the stream, and they were worrying about, well if a drought kicks in, who's got access to the water? We really don't want to go to court over it. So they ended up developing an agreement that in times of shortage for this specific stream segment, whether the farmer's going to get priority to use it for certain crops, or the hunting camp can use it to fish, they came together in that sense to avoid any litigation on that part. So again, local agreements for certain stream segments in Arkansas seems to have worked.



What I want to talk about is more in my neck of the woods, is this idea of river basin commissions. And with the river basin commissions, they've gotten pretty creative in how they're maintaining flow during drought periods. So up there, we have the Susquehanna River Basin Commission, as well as the Delaware.



But let's start off with, what the heck is a river basin commission for those that aren't too familiar? Well, it's a federal interstate agency that's made up of the states that are within the basin that we're talking about, as well as the United States Government. In the case of the Delaware and the Susquehanna, the Army Corps of Engineers are representing the Federal Government. They're usually formed from compacts and they do a whole array of things, whether it's permitting authority within their jurisdictions, maintaining quantity or quality, approving projects that want to be done that may have some sort of impact. So it really is this big umbrella organization that's overseeing an entire watershed and the water use within.



I the case of the Delaware, they started this program in 2007 called the Flexible Flow Management Program. And what they wanted to do and a little bit of background on the Delaware Basin would be helpful. There's about 15 million people that live in the Basin and rely on it for drinking water. And it's also next to the ocean, the Atlantic. So you have this salt line that moves up the river and in drier times, that salt line continues to move up the river, where Philly gets all of its drinking water, so if that line gets up to Philly, we're in trouble.

So part of this program is sort of trying to maintain how do we take the number of people that are in this Basin, as well as all of the great trout fishing that's within the Basin and on the river, and again, the politics that come into play with New York City and the larger cities ... How do we sort of manage all of this during drought periods or at least between competing needs? What they ended up doing, and that link there is actually to the document of the program, is figuring out, well let's figure out quantified amounts for using water within the Basin during an array of times. Now as you release water from the reservoirs that supply New York City, a lot of that cold water's coming down and it's a trout tailwater habitat. So they want to maintain that because fishing in that part of the Basin's really become a big economic driver.

But because this is about drought, is during different drought stages, there's quantified uses for how much water is going to be released from the reservoirs or at least diverted, and it's a tiered approach. So if New York City doesn't really want to release as much water, then at that point it's going to fall on New Jersey to at least change how they're using their water, or diverting it from those reservoirs. And then in that case, when New Jersey can't really keep up with where the compact and the commission really wants the water use to be, then Pennsylvania at that point going to again, the so-called next man up theory. That's how it's operating in this sense.

And one neat thing between this that I wanted to focus on is New York City developed an operator support tool. And that's where a lot of the modeling comes into play here. So again OST and what the City has done, it's been able to take all of this most current data it has on gauges and fisheries considerations and where that salt line is, and then figure out based on population increases and where things are going, how much water

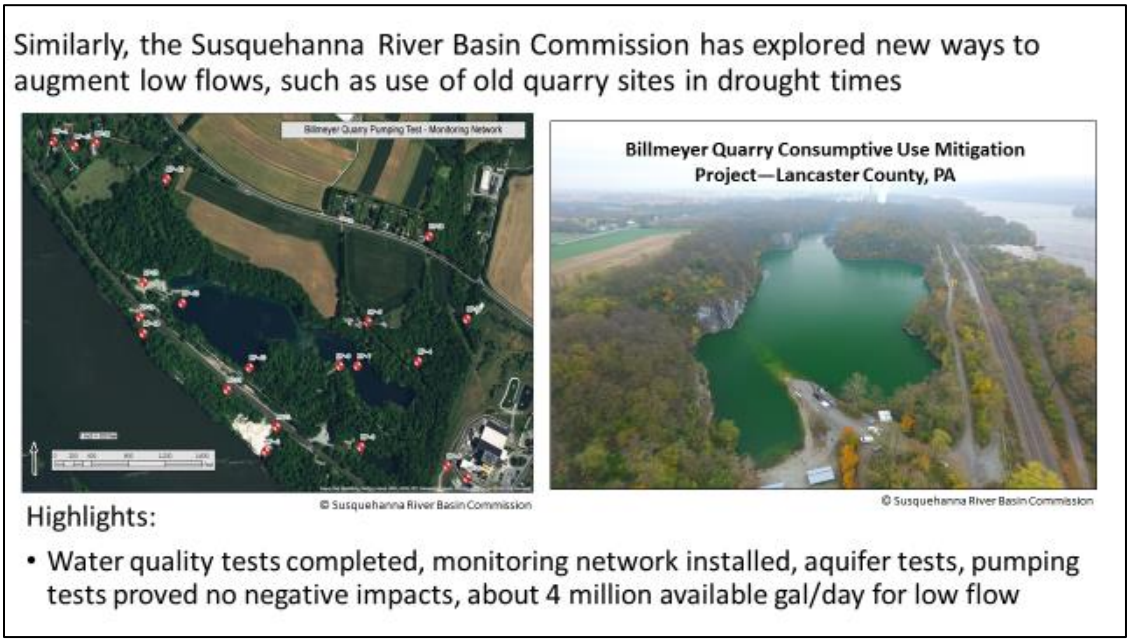
can we release from the reservoirs, or use per year, so we can get an idea to tell everybody. Hey, we're planning on keeping this amount of water in the reservoir for drinking purposes, but we're going to start creating offset banks at the same time. So again, I don't want to go into too much detail, but just know at least in the Delaware River Basin, this is something that's sort of developed in terms of this flexible flow and management program. It's going to be a 10 year, they just renewed it in October of 2017. It'll go on for 10 years. They're going to study different things as far as mussels and different species and again certain water uses that are coming into play within the Basin. So that's the Delaware. We've got a lot of people, a lot of different factors that you have to consider.

Shifting westward to the Susquehanna River Basin and the Commission that operates that part of the state as well as the entire Basin, they've got a little more creative. We don't have as many people that live within the Susquehanna River Basin Commission, but one of the things that we have to consider is the Chesapeake Bay. It's the largest watershed that contributes to the Bay and again we have a total maximum daily load (TMDL) for the Bay that needs to be complied with. So for the Susquehanna, it's sort of a two tiered approach where we have to make sure we have enough water in our streams to make sure that there's not as high nutrient levels going through. But also again to maintain for low flow periods. So what the Commission has done is they've started to take a lot of the rights that have been grandfathered which in this case for either agency, if you're using 100,000 gallons or more a day over a 30 day period, you're going to be subject to some sort of water permit that has to be approved by whatever commission you're within their jurisdiction.

So in this case, what they're trying to do is get a handle on how much water is actually being used within the Basins, and how are we going to regulate that? And because of the number of consumptive users within the Basin, they figured out we need to somehow mitigate this during low flow periods or get a little more creative. So what the Basin Commission has done, and this isn't finalized, there's still a few more administrative things that need to be done, but they've decided to figure out, okay

we've got an old limestone quarry next to the Susquehanna River in Lancaster County. What if we took water from the quarry and then pumped it into the river during low flow periods? Essentially as a natural reservoir at that point. You know, and then you start thinking, what about the quality in the water, and everything else at that point.

So I spoke to a commission staff at a conference last week. So far at this point, all the water quality tests are completed, it's looking great. They've installed a bunch of monitoring and gage sites as well. As you can see on the picture on the left, well pumping tests that they've performed and after the testing that they've done, they figured out, we can afford to pump from the quarry between four, and four and a half million gallons a day over a 90 day period in order to augment flows in the Susquehanna River next to the site. So again, right now this is seeing where things go. They took the fish out of the reservoir and re-transported them, but again this is just something recent, something creative that's being done here where you really wouldn't think it's a part of the country that has to deal with water quantity issues with respect to drought. But again, this is something that the Commission has at least looked at and I know that there's some staff from the Commission that are here today, but at least I thought it was pretty cool for getting creative with the regulatory authority limitations that you have and what you can do.

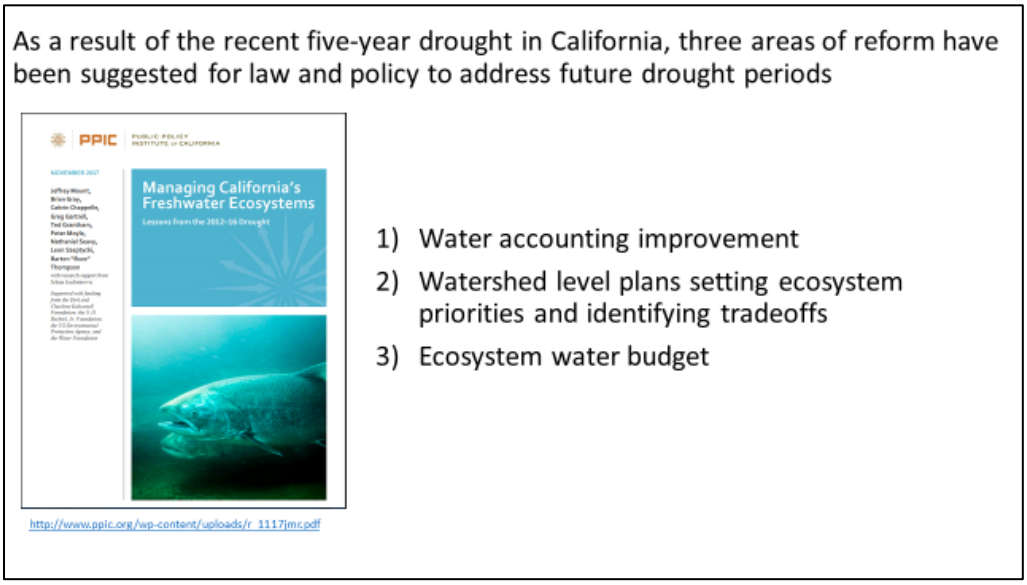


So the last case study I want to talk about is California, because even though it's not located in the Eastern US, it still has riparian principles that are used. And I think about six months to a year ago, they came out with this report from the Public Policy Institute, detailing lessons learned from the five year drought from 2012 to 2016. It's a pretty big report. Again there's a link there if you want to look at it. But the three main takeaways that they took from a legal and policy perspective, are that you need to have really, really good water accounting. So if you think of it as a portfolio, we need to know how much water actually exists from gauges or data or whatever, and how much water we're actually using. So we need a good foundation to work from if we're going to develop

policy and laws to determine before we enact that sort of stuff. What are we working with?

Number two talked about planning. So certain parts of the state fared better during the drought than others, and the Yuba River Accord seemed to have worked quite well because there's advance planning with who was going to get cut off, how much water was going to be used, how much water was going to stay in the streams, etc. So you had more of a mitigation based planning style with that specific example. But other parts of the state didn't have that data. They didn't have the advance planning. They didn't have cooperation amongst your entities between state agencies and local governments. And that's really where you solve most of your problems. So again, water accounting, advance planning.

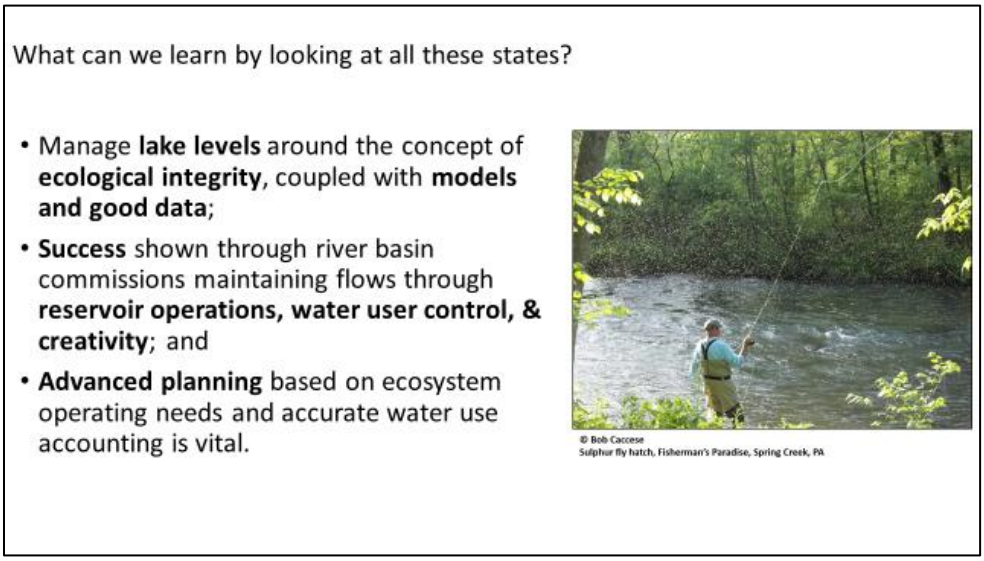
Third thing they talked about was ecosystem water budgets. I'm still trying to wrap my head around this, but essentially trying to integrate an ecosystem water budget into the water rights system. And there's more information within the report on that, but essentially it's figuring how much water do we need for the ecosystem to operate properly and how do we build that into the water rights system or at least integrate it? So in that sense, how much water is available, maybe if it's a plentiful year, we don't need as much water for the ecosystem processes. Maybe we can lease it out to somebody that does need it.



So again, we've done a huge bird's eye of this, so what's the "so what's", and what can we learn from these states? Well, as far as lake levels are concerned, we have to approach it from an ecological integrity standpoint and couple it with some sort of modeling component. If we can do it that way, then what you can do is enact policies and laws to actually maintain what you want to happen in the environment at that point.

With respect to the river basin commissions, what I've found has worked best in the East is some sort of bigger umbrella organization overseeing an entire watershed. Now granted, some river basin commissions in the Eastern US don't have a regulatory authority, such as the Potomac and up north in the Connecticut River Basin, but if you do have some sort of regulatory authority and the creativity and data and technology to really get a good picture of how your watershed's operating, really what that's going to do is result in stabilized policies, so when you do have a drought occur, everybody knows who's doing what at that point. Preparation is vital as far as I'm concerned when it comes to the legal component.

And then lastly, as we talked about is this advance planning idea. Rather than waiting and cramming before a test, if you do your homework beforehand, I think it always ends up being better. The challenges are obviously politics and getting everybody on board. Everything gets done when there's a crisis, but I think if you can get some sort of advance planning, whether it's just meeting together and talking about, hey we share this watershed. Can we come to some sort of agreement or contract on who's going to reduce their water use and when? That's been helpful as well.



So again, I know I went over a lot. I do have more specifics or if you want to get in touch, give me a shout out. There's my Twitter as well and I'm happy to take questions during the discussion. Thanks.

Questions?

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