

Transcript

On West Gray, The Future of Water in Norman w/Kyle Arthur, John Harrington, & Nathan Madenwald

Runtime: 42 minutes 18 Seconds

Tiffany Vrska 0:16

What's up everybody? Welcome to gray, the monthly podcast about all things local government in the city of Norman. I'm your host Tiffany Vrska, Chief Communications Officer for the city of Norman, and we appreciate you joining us. Today in the studio we have with us Kyle Arthur of the central Oklahoma master Conservancy District, John Harrington of the Association of Central Oklahoma governments, and our very own Nathan Madden walled city of Norman utilities engineer. They've joined us to discuss the status and future of water and Norman to include a lake longevity and our aquifer. Gentlemen, welcome to the show. Thank you. Absolutely. Good morning, we're so happy to have you. So as part of a master plan for Norman, or our area and infrastructure master plan, which is currently underway, and is comprised of strategic updates to plans for both water and wastewater, and Norman, we've been discussing natural resources even more often than we usually do around here. We'd really like to give listeners an overview of what our water supply looks like at this time and what we foresee in the future when it comes to water in the community. So first, could each of you give a brief introduction about who you are your field of expertise or the type of business that you ever see at your agencies each day? John, can we start with you?

John Harrington 1:36

Sure. My name is John Harrington. I work for the Association of Central Oklahoma governments and the Garber Wilmington Association. Basically, it was an organization formed under a cog, specifically to generate information and explore the Garber Wilmington aquifer, which I've been doing for 35 years, something like that. So my field of expertise is Geology and Geophysics.

Tiffany Vrska 2:05

Wonderful, Kyle.

Kyle Arthur 2:06

Yeah. My name is Kyle Arthur. I'm the general manager at the central Oklahoma master Conservancy District, which is out at Lake Thunderbird. The district was formed in 1959. Through statutory authority and title 82 of the Oklahoma State statutes which deals with water and water rights. The district provides raw water supply from Lake Thunderbird and has since about 1965 when the lake was finished to the cities of Norman, Midwest City and Delsey.

Tiffany Vrska 2:36

All right, thank you, sir. And Nathan? Yes,

Nathan Madenwald 2:39

Nathan Madenwald utilities engineer, city of Norman. And my job is to plan and manage capital projects for our utilities department focused on water, wastewater, and solid waste. So

Tiffany Vrska 2:50

you collaborate or communicate often with these other gentlemen right, very regularly. All right. So Kyle, and we'll kick off the questions with you. Can you speak to AES about the longevity of Lake Thunderbird, our lodge largest source of drinking water here in Norman at this time?

Kyle Arthur 3:07

Sure, I'd be happy to. So two things I commonly hear from the public. Or they're just casual conversation or public meetings or presentations about like Thunderbird. And its role as a public water supply is that it's sedimenting in typically characterized as at an alarming rate, and that it has a very short lifespan, and we're coming up on that lifespan. And so I want to think a little bit about those two questions. Certainly, there's some truth there, for sure, but some context, and some additional information, I think is important to understand those issues as it relates to Lake Thunderbird, and in particular, Norman's future water supply. To do that, I'm going to talk a little bit about the characteristics of a reservoir. And so we often see a reservoir or Lake Thunderbird, in this case, sort of from the top, but let's turn it on its side and look at it from a side profile. And you can sort of stratify or or divide any reservoir, frankly, like Thunderbird included into different layers. And moving from the top to the bottom, we have what's called the Dead Pool storage, which is the very bottom segment of the lake. And the terms that are often used, or what I just said, pool or storage are names of broadly that are given to those levels. So at the bottom, as I said, you have the Dead Pool storage. And then as you move up from that usually the biggest part of a reservoir is what's called the conservation storage pool, which is kind of where the fun happens. That's where the public water supply comes from. That's where fish and wildlife propagate. That's where people recreate whether it be boat or fish or whatever the case may be. And then the topmost layer is called the flood Will storage. So that's where floodwaters are stored when we have rain events just like we did last night and have over the last week or so, there can be other storage pools and reservoirs, you could have a storage pool to produce hydroelectric power, we do not like Thunderbird, you could have a storage pool that has releases downstream to float boats for navigation, right, we do not have that at Lake Thunderbird. Normally, what we have are the normal three levels. So, when reservoirs are constructed, there is that bottom layer that is contemplated to store sediment that comes in to the lake over time. And so they designed the reservoir in a manner so as to absorb or take in and store at that very lowest level below where we can intake water by the way to provide to Norman,

Midwest City and del city, they have a zone down there that they designed back in the late 50s and early 1960s to absorb that sediment. And so we've been depositing sediment over time into that pool or into that level. And in fact, recent studies have shown that we're actually sedimenting in that that pool storage area that did pool storage enter area at a slower rate than was originally planned and calculated. So that's good news, for sure. But the more important point of the matter is where we get our water supply, we're Noren gets it Midwest City, and del City get it or not, is not from the Dead Pool storage area. Right. So as that fills up what it's doing now, it's not affecting our water supply. So the calculation that was done, looked at 100 year life of the reservoir in terms of filling up that Dead Pool storage. So the the the calculation was was targeted towards saying 100 years from now, right from 1965. That we want to say the Dead Pool storage is now full, right. And only once it gets past it pool storage level will start to affect conservation storage level. And that's where we get our water supply. So right now the sediment is going in is going into its own little storage area where it was designed to go and not affecting the volume of water now, will it eventually fill the Dead Pool storage and start to eat into for lack of a better term, our conservation storage where we get our water supply? Yes, it will. But it is sedimenting. And at a at a slower, slower rate. So that that is particularly good news, it's important to understand too that we have a permit, the district does from the Open Water Resources Board to deliver 21,600 acre feet of water per year, that's a little over 7 billion gallons of water that the district has a right from the Water Resources Board to deliver we don't deliver quite that much. Norman tanks are full allocation, the two cities do not. But in any in any given year, there's far more water than that. There's about five times as much water in conservation storage, typically in the reservoir. So that's kind of more of a worst case scenario. So even in times of drought, there's an even if we start creeping from the sediment pool, Dead Pool storage up into conservation storage, there's a lot of room in there to absorb that 21,600 acre feet that we need to deliver.

Tiffany Vrska 8:27

So the sediment pool or the the dead pool that you were referring to you said that we're in good shape where it's actually filling ups at a slower pace than what we predicted. So do you have an estimated timeline? Or does it just depend on a lot of different factors depends on

Kyle Arthur 8:44

a lot of different factors. So one of the major factors would be practices and behaviors in the watershed above the lake right? How it is we develop in Norman and for that matter of Moore and Oklahoma City as well, because they their city limits are in the watershed of Thunderbird not just not just Norman but Norman has the biggest share in the watershed. So our practices in the watershed to prevent sediment runoff and sediment loading into the lake will have an effect as far as a point in time that's been calculated. No, I don't have that and haven't calculated that. But yes, it's good news in the sense that it seems that maybe we're pushing the time horizon out, and the better we can do in the watershed. The farther out it would seem reasonable to say that we will push that date but the date will come sure nature will reclaim now there's another misconception that I've heard that in 100 years from the date it was constructed. You'll walk out to what was once Calypso Cove or or clear bay or somewhere on Alameda. And you'll look at the lake and it would just be kind of a like a soupy mud puddle where I do

almost not exist anymore. And that's not the case. Like I said there's there's over 100,000 acre feet Conservation storage acre foot is, is a measure unit of measure for water, it's the amount of water it takes to cover one acre of land one foot deep, so about 326,000 gallons. So that's I use the term acre foot. That's what I what I mean when I say that. But so there's a there's a, there's a lot of capacity in the reservoir. But, but make no mistake, the behaviors of today and the decisions that we make today in the watershed will affect the usability of the reservoir as we move into the future. Sure,

Tiffany Vrska 10:31

and these layers or pools that you've referred to, is it your agency that's kind of charged with monitoring and measuring those different layers. So

Kyle Arthur 10:42

you know, we have we have a gauge that we're we we measure the lake elevation on a continuous basis. We we manage the reservoir from the perspective of the central kOma master Conservancy District does from the perspective of managing primary the water supply infrastructure that delivers the raw water to the three cities. We also manage the dam itself, all the property, all the infrastructure, all the equipment is still owned by the federal government, the Bureau of Reclamation, we manage it essentially under a contract with him and have since the very beginning that's been the arrangement and continues to be so just like Oklahoma Department, tourism, rec manage the recreational aspects out of the lake, under an agreement with the Bureau of Reclamation, the federal government also so so we measure lake level back to your question. When there are when there is water in that flood pool that top level, the decisions that are made about whether to release out the gates down little river, so through the dam that water or to hold, it is not our decision. It is decision of the US Army Corps of Engineers, Tulsa District. So we report every day, what has come in what our lake level is, right? How much rain we've gotten, how much evaporation in the summertime that we've gotten, because that's an output, right? You lose water through evaporation. And, and then how much we've pumped out to the three cities. And based upon that information, and then you know, all the different lakes, they're also managing, particularly downstream of Thunderbird, they make a decision about whether we are to release water or not release water. So we, we we make minimal operational decisions on the lake level. That's really we more report and then respond to what the Tulsa District of the Corps of Engineers ask us to do.

Tiffany Vrska 12:42

Alright, sounds like a lot of collaboration and communication. Who knew that lakes were so complicated right, guys? So all right, so that is some wonderful information from you. Thank you for sharing that with us, sir. John, could you share with us a little bit about aquifers? Are they drying up? We've heard a little bit of chatter about that. Oh, okay. Well,

John Harrington 13:03

first of all, there are at least two dozen bedrock aquifers in the state and probably just as many alluvial aquifers. Okay, so, whenever you hear news about the UK for drying up, the one that's probably going to hear they're probably talking about is the Ogallala which is out in western Oklahoma. Okay. And yes, that is a serious matter out there. The Garber Wellington aquifer, which is what we're on, no, there's there's not a problem as a matter of fact, we had two years ago, we had static water levels that were the highest in more than a decade. And so yeah, we're now we've backed off a little bit in the last two years because of the drought but we're we're looking fine as far as quantity goes. Okay.

Tiffany Vrska 13:55

So the wells that the city of Norman uses and pumps from is that all coming from the same source that private well owners are using or is it a little bit more complicated than that?

John Harrington 14:07

I want to answer yes and no. Because yes, it's complicated. Okay. Um, when we talk about the Garber Wellington aquifer you know a lot of people think of this massive you know, underground lake first of all it's not doesn't behave anything like a lake okay. So if you think it behaves like a lake you need to kind of set that idea aside and think about more like saturated sponges and because that's kind of what the way they they act in the Garber Wellington, you have a series of sandstone units, about a dozen actually a sandstone units. Each one of them acting kind of on its own. Okay. So consequently, the domestic Well, owners Generally, we'll drill down the first 200 feet, and they'll tap into three of these of top three. Okay, city of Norman usually bypasses those three, and they usually start looking for water around 300 feet, 400 feet, 500 feet. And so consequently, although you're in the quote unquote same aquifer, you're actually tapping different sandstone units. Okay, so that way I can say that they're not really sharing the same water as your domestic Well, owners are, is

Tiffany Vrska 15:40

it fair to say that the sandstone units or maybe you could think of those as like layers

John Harrington 15:46

or actually almost like individual little aquifer layers? Okay. So yeah, there they be, they're really fairly different. And matter of fact, you had generally have different chemistry between each one of them. So that's why we know that they don't communicate very well between if you've got a nice 20 or 30 foot shale in between the two sandstone layers, they probably don't communicate.

Tiffany Vrska 16:09

I've also heard the city of Norman was founded as a groundwater city, meaning that we didn't even originally have a leg to pull from so during our founding, I guess we just Okay, let's,

John Harrington 16:20

let's go back to our founder. Okay. Okay, who is

Tiffany Vrska 16:23

Abner Norman right. Okay.

John Harrington 16:25

And what did he do?

Tiffany Vrska 16:26

What did he do?

John Harrington 16:27

He was a surveyor. Yes. Okay. He surveyed for the railroads. Okay. So when you're serving for the railroads, what are you looking for? Remember, this was back during steam engine times, you're looking for water. As a matter of fact, he set up camp down at Red around the Oh, you duck pond. And then, because there was a nice spring there. Then he proceeded to go northward. And there was a really nice spring at Andrews Park. And that's the direction that the railroad took. As a matter of fact, that's the reason why downtown, the streets in downtown Norman are all caddywhompus. They don't go north south, because they go parallel in orthogonal to the railroad. Okay. And so you could say that, you know, the centralized planning for the first few years was really dependent upon groundwater. And the first water wells that were really drilled for the city, were actually in Andrews Park. So that's how Norman developed it was originally, and quite frankly, this is also the way probably most cities in the Midwest were founded. I could probably guarantee you that in any city that was founded in the early 1900s. Probably has a waterwell within a quarter mile of the intersection of Broadway in Main Street, okay. It's because people were needed railroads, people, they were very dependent upon railroads. The railroads were dependent upon water, and they were very dependent upon groundwater springs.

Tiffany Vrska 18:17

All right. So I'm not sure if this is a question for you or for Kyle, but I was hoping one of you could speak in general terms to me about water rights in Oklahoma.

John Harrington 18:29

Can I have a question maybe a little bit more more. Sure,

Kyle Arthur 18:36

I can give you the 35,000 foot overview. So in in Oklahoma, groundwater and surface water are permitted from water rest perspective, separately. Groundwater is a private property right. So subject to reasonable regulation by the Oklahoma Water Resources Board which basically revolves around regulating the quantity that you can take as a private property owner overlying a groundwater basin one of the many that that John was referencing so it's a private property right cities can use planted lands as I recall, I'm going reaching back in my memory banks here a little bit. So if I misspeak John correct me but use plotted lands to to dedicate that overlay a groundwater basin an aquifer and get water from from that aquifer. And that's of course, how Norman has it dwells surface water, so surface water meaning something flowing down, defined a channel with bed and banks, a creek stream or river, which ultimately can terminate or partially terminate in a lake. That's all surface water. And surface water is the property of the public. So No one individual outside of domestic rights has any rights to water flowing by in a stream, it's public water, also subject to regulation by the Oklahoma Water Resources Board. So, so okay,

Tiffany Vrska 20:14

and a good place, maybe for folks to read further into water rights would be through the Oklahoma Water Resources Board.

Kyle Arthur 20:21

So yes, I've gotten some good information online and fact sheets, and you bet.

Tiffany Vrska 20:25

Okay, wonderful,

John Harrington 20:27

I might want to add a little bit. As far as groundwater rights go, we get a lot of Texans up here. And they have a little bit different way of looking at things. See in Texas, you own your groundwater rights all the way to the center of the earth. Okay, and that's yours. In Oklahoma, we don't look at it that way, you own a share of the total aquifer. Okay. So it's, it's a bit different in so you get interpretations that are much different than what you would do south of the Red River,

Tiffany Vrska 21:03

Oklahomans know that sharing is caring, sharing is caring.

John Harrington 21:09

And so, not only do you not have you have sharing and caring, but you also domestic wells versus municipal wells, you do have a domestic right to water, you can drill on your property, and use it for domestic purposes, which is generally, you know, your family, and also maybe growing, you know, a pretty nice large garden like my grandmother did. So, it was really large. So consequently, you can do that. But once you get too much beyond that, then we start saying, Okay, you are going to need to get a permit from the Water Resources Board. So there's, there's a point where it becomes non domestic, or if you're, you know, you really are, you know, have a huge garden, and you're really kind of starting to make an industry out of it, and you're really making profit and stuff like that, then things can you can start sliding over across that boundary to commercial purposes. And then that's when you really do need to get commercial well permit type of thing, right. So it's

Tiffany Vrska 22:25

very important, you know, folks that might be interested in having their own well, that they do some research and into this and see what any rules or regulations may exist within their state or municipality,

John Harrington 22:37

it's always good to research if you're on domestic water, domestic well, how your boiler is constructed. I always recommend getting a good water chemistry analysis. And also, I highly recommend doing a little bit of historical research. If you want I got the aerial photos back to 1940. In for most of the copper Willington, you'd be surprised. You'd be surprised at how many people go out and build a house and put down a well, and they happen to be in the middle of an old oil and gas field. And then they start wondering why they're getting saltwater. So you need to do research, because you may be in a vintage oil and gas field. And they didn't really do environmental regulations very well back in the 40s. Sure. So.

Tiffany Vrska 23:39

All right. So research is everything it is. So Nathan, can you talk a little bit about when and how the city may come into making decisions about drilling new wells?

Nathan Madenwald 23:51

Yeah, that's a really good question. So John gave us some good history on where Norman's been with groundwater wells, and are kind of how we got to this point. So groundwater is a vital component of our water supply, it supplies about 30% of our water. And though that varies from year to year, depending on precipitation demands, what our customers need. So when we looked at, decide if we're going to drill additional wells, it's it's a very involved process with the city of Norman. And in 2014, we developed the 2060 strategic water supply plan. That was very lengthy, involved process where we had a lot of stakeholders help us decide what our water future would be. As a component of that the recommendation was for us to drill 10 new wells in our groundwater system. We've done nine. So we've actually hit the amount that we want. But we want to drill one more well, just to help our supply a little bit. So we're working to do that also drill another well to replace a well, that's failed. But then, as you mentioned at the beginning of the AME Norman effort, we're going to look at water supply. We did the 2060 plan, but how is that plan tracking? Do we need to make some course corrections and so We will reevaluate our water supply options and groundwater will be a component that we will evaluate as part of that study. Okay,

Tiffany Vrska 25:05

so my might be a silly question, but especially for folks that are not involved in master planning for cities. So you said this is the 2060 water supply plan that you had talked about? So it's 2024. So how does that is this like where we want to be in 2016? Is this something that we want to accomplish like way before, then how? How do those timelines I guess, work out?

Nathan Madenwald 25:28

Oh, no, really? Good question. So yeah, when we say 2016, strategic water supply plan, we're looking at, what is that population growth that we would envision to happen by 2060? What is that associated water demand that we will need to be able to provide to our customers, so people can use the water in the way that they want? So yeah, we're looking at what steps do we need to take to make sure as population grows? We're staying ahead of that with our water supply.

Tiffany Vrska 25:51

Got it. Okay. And can you also shed some light? I think we've talked just a little bit about it, but on overall resource stability. So we've discussed water from the lake water from the aquifer, and we also purchased water from Oklahoma City. So what does that look like for us? And why do we do that?

Nathan Madenwald 26:09

Yeah, so some, similarly to the groundwater, when we did the strategic water supply planning, we also made the decision that we want to purchase water from Oklahoma City, we buy 1 million gallons of water per day from them, just kind of a flat rate that we buy. And that's about 8% of our annual usage, we buy that water at a set rate from them. So we know the price is something that's published under

city ordinances. And I just want to note that it's a little bit different than the water that we purchased from Oklahoma City in the past, in the early 2000s. We bought water from them on a on demand basis, and the rate was a lot higher, because we're saying, Hey, we really need water because everybody's using it. And at the same time, all our customers are saying, Hey, we really need water, because everyone's using it. So that was at a higher rate. Now we're at a more reasonable rate, something that we know, and we can plan for Oklahoma City is a regional water supplier, they actually serve 19 to 20. Utilities or cities within the metro area. And their top seven customers are other cities. So that is something that they do as their line of business. So you heard the phrase, don't put all your eggs in one basket. So we'd like to think don't get all your water from one bucket. So by having three water supplies, that helps us be a little more reliable and resilient for our customers. So if we have a 42 inch water main break outside of our water treatment plant, and we have to shut that down, we can ask Oklahoma City to use a little bit more water from them on that emergency basis, turn up our water wells. And then we're still able to meet that customer demand while we work those through those issues. So having those three sources has been a great insurance for us to make sure we're still meeting our customer demands with the minimum impact the level of service. So we would see Oklahoma City groundwater, and like Thunderbird for at no cost won't say it's there for forever. But it's going to be there for a really long time longer than that 100 year life that they're saying. So we're planning to keep using those for moving forward. But then also when we do the AME. Norman study, look at are there other options that we need to consider? Or do we need to just maybe strengthen those supply sources? Yes.

Tiffany Vrska 28:15

And I think that process is coming around along really well. We're expecting to have some some results and findings on AIM, Norman by the end of the year. So first, Kenna folks can look out for that at Norman ok.gov, or at public meetings. So do we foresee drought coming anytime soon? I know Oklahomans are very familiar with that most of us has lived through it. And but are there reliable tools or data in place in your opinions to really predict that sort of thing? Whoever wants to take it. I'll

John Harrington 28:49

jump in on that one. Predicting drought. I'm not a climatologist or meteorologist. I know a few people that you could I could recommend. But the bottom line is is that drought is in terms of actually predicting it like to tomorrow the drought starts, you know, no, no, we don't do that. But there are always tendencies. For example, we are going from an El Nino to a La Nina condition over the next four or five months. And what in when we have la Ninos our climate generally as a general rule tends to be a bit drier and warmer. So we are already the state is already a third in drought. A third of the of this of Oklahoma right now is in drought. So I expect it to get worse not necessarily better. As far as drought affecting our our local water supplies. So far this year, actually our recharge rates have been right on track for the for the aquifer. Now. With that saying, since ographers, 2000 square miles, some areas are getting it better than others. And Norman happens to be one that's getting it better than than others. So consider yourself lucky actually, guys. But as it's no doubt in my mind that a year from now, we will probably, we will probably be in a little bit worse drought situation than we are in now. And we recharge rates will probably decline. So, I'm trying to remember who it was It says, When you're in Oklahoma,

you're if you're not coming out of a drought, you're going into one. And that's about where we are right now, we are starting to go probably slide into another one, you know, within three to six months.

Tiffany Vrska 30:50

So what exactly comprises a drought? How would you define that? I know you talked about climate, you talked about lake levels. I mean, is that

John Harrington 30:57

is that is a million dollar question because drought means something to different people in for in different disciplines. Okay. A drought to a farmer can mean three weeks without a rain. Okay. A drought to a climatologist they actually have very defined scoring, so to speak, to define what a drought is, but and then if you go into the groundwater world, well, I look at it a drought, where we have, you know, when static water levels fall, and then come back up again, that's a that's a drought situation when they fall, it's a reach good recharge rate when they start coming back up. And so, you know, I and I look at things probably a little bit longer term. Sure. Then your, your local meteorologist when it comes to drought. So are we in a drought? I'd say that since a third of the Oklahoma is in, technically drought, yes, we're probably now Cleveland County at the moment is not in the drought area. But you go up north to like alfalfa County. Yes. They're definitely in a drought. So

Nathan Madenwald 32:09

maybe just add on to jump with John saying so yeah, it changes very quickly in Oklahoma. So as water supply professionals who always just kind of think a drought is coming and prepare for it, always

Tiffany Vrska 32:22

conserve Yes. year long, conserving here in Norman. Right.

Nathan Madenwald 32:26

If we can use water wisely and make sure we we've got enough to get us through those those tough times. Yeah. So plan for the worst hope for the best.

Tiffany Vrska 32:33

All right, that odd even watering and all of the water Wednesday tips we put out? Yeah, we're always encouraging that conservation out. However,

John Harrington 32:42

as far as, as far as looking at the beginning of a drought, we're in good shape. We really are. All the reservoirs are full. The aquifer looks pretty good. You know. So you know, if we're going to have a drought, you know, we're ready. I feel I feel comfortable that we can't get much better than we are right now.

Tiffany Vrska 33:04

All right, as long as people keep conserving, right, right, keep,

John Harrington 33:07

let's let's lead. Let's don't, you know, water our lawns on a summer afternoon.

Tiffany Vrska 33:15

Don't do that. All right. So through strategic communication efforts at the city of Norman, we've made a bigger push recently to focus on messaging related to water protection and water conserve conservation, as I just mentioned. So with three water experts on today, can you tell us in your own words why those things are important? Community or statewide? Sure,

Kyle Arthur 33:38

I'll take that to start off. So water protection, water conservation, I'm taking water protection domain, particularly as it relates to water quality, right. And so behaviors, as I mentioned earlier in the watershed, do affect the quality of the water speaking specifically, here about Lake Thunderbird, they do affect the quality of the water that's in the lake and then ultimately, that you drink now, Norman, Midwest, city and del city do a fantastic job treating it. But certainly, from both an aesthetic perspective, when you're at the lake, as well as the treatability and the extent of which water needs to be treated by those three cities. Those are greatly affected by the quality of the water that's in the lake. So we think about behaviors in the watershed that affect the quality we primarily think about sediment loading, right that causes suspended solids or turbidity, or lack of clarity. We know that certainly about the water that's that's in Thunderbird, we also think about nutrients right. Nitrogen and phosphorus primarily from from fertilizing activities that make their way into our, our bucket, known as like Thunderbird, and there they get me Next and provide great food. For the growth of algae and algae become unsightly, algae can, through their lifecycle, their entire lifecycle can impact dissolved oxygen levels and fish populations. And then ultimately that that algae will die and fall to the bottom and be broken down by other organisms. And then the light turns over, we have taste and odor issues and people don't like taste and odor issues me included, and so on the cycle goes. So really, it really though starts upstream. And so protection of the water, this protection of the quality of the water that's that's running off, which is where we get all the water for Thunderbird, we get it from runoff is critically important. On the

conservation side we talked about. We talked about that, that that that did pool storage that we have at the bottom of the lake, and that it was designed to fill and take the sediment. And that's going a little slower rate than we thought which is great. But eventually it will start to impact that conservation storage that profile that segment of the lake where we do get our drinking water. So how do you stretch the the supply, conservation and using only what you need, right and using it smartly and efficiently doesn't put more water in the lake per se, but it makes it go farther, which in a sense, arguably accomplishes the same thing, or at least very similarly, back to water protection and water quality. Also, if we can present prevent sediment from going in there, we're slowing the deposition rate right of that sediment that's going into the dead pool or hopefully pushing that timeframe out. One thing I wanted to say now I'm shifting back to conservation. So kind of going back and forth on these are all on topic. Yeah. Great. Glad to hear. So on conservation, kind of going back to the drought discussion we were having a moment ago, obviously, that's our our biggest threat, right? Really is is drought, groundwater, and every aquifer is different behaves differently than surface water does an aquifer does in drought situations. Our Lake is certainly susceptible to drought. And in a drought situation, obviously, less water coming in less less water than ultimately is available to give you some context about that and the importance of conservation in terms of the amount of water that we use. So I mentioned that we have a permit from the Water Resources Board to, to withdraw in any given year, 21,600 acre feet of water, which is like I said, a little over 7 billion gallons of water. So and I also mentioned that in conservation storage in that section of the lake, we have far more water than that in any given year. But on the opposite in, it can get quite severe. So the recent calculation for the lake would say that our firm yield, which is the amount of water that could be delivered in the drought of record. So the drought, all we have is the past when we talked about predicting drought, the only way you know you're really in a drought is when you're in one and then you know you're in one. Start. And when's it gonna end? Who knows? But you know it when you see it, but it's hard to see it coming. Right. So what we have to rely on in terms of modeling sort of that vulnerability for a lake is to look to the past. That's what that's our best information. Right? So when we looked at the past, and we looked at the drought record in central Oklahoma, we'd look to the 1950s. And in the 1950s, if the lake had existed then which it did not, but if it had, and we were trying to deliver 21,000 acre feet in the mid 1950s, we would not have been able to deliver 21,600 acre feet, we would have we think been able to deliver about 12 five to 13,000 acre feet. So not quite half a little more than half. So there can be very wide swings, right. So so no, you know back to Nathan's point about not putting all your eggs in one basket. This is why these these sources are vulnerable to forces we can't we can't control. And so conservation in terms of usage and what we call demand management, another term for conservation is critically important to stretch those supplies during those times in particular. All

Tiffany Vrska 39:39

right, well thank you for that. And there's some great guidance and tips from our Division of Environmental resilience and sustainability at GreenNorman.org. So anybody can visit that web page and get some really great information. Is there anything else that you gentlemen would like to share with our listeners? There's

John Harrington 40:00

other than us best management practices when it comes to groundwater. You know, a lot of times, if it doesn't run off your property and go into the lake, it's going to go down into the aquifer, and then it's gonna sit there until you pump it back out again. Right? And it may not well, matter of fact, I'm reminded of a of a situation one time I had a well waterwell that people said it was just beginning to taste funny, and they didn't know why. Well, it turns out that in the shed, back in the garage, there was an old abandoned waterwheel and the gentleman was disposing used motor oil down. Yep. Okay. So but, you know, it's one of those things. He wasn't putting two and two together and he didn't understand, you know, what he was where his water was coming from, he didn't have a good grasp and understanding of, of the aquifer, and so he thought it was perfectly fine. Oh, my Yeah, that's what that was interesting. But the bottom line is, you learn best management practices, think about what you're doing. Go ahead and take your hazardous materials and put them in the proper places dispose of them properly. So it doesn't get into the the watercycle.

Tiffany Vrska 41:27

One water, it's all connected, all the oil is connected, believe it or not, all the water we have today is all the water will ever have. So we have to take care of it. Right. All right. Well, thank you, gentlemen, so much for joining us this morning on the show. We appreciate your time. Thank you. Thank you. Thank you very much. Questions or commentary about on West gray can be sent into public affairs at Norman Okay, dot give shoutouts to our producer and editor Mr. Bryce Holland of the city of Norman communications office. Until next time, stay engaged. Stay informed and always remember to cast your ballot. I'm Tiffany Vrska. Thank you for joining us On West Gray.

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