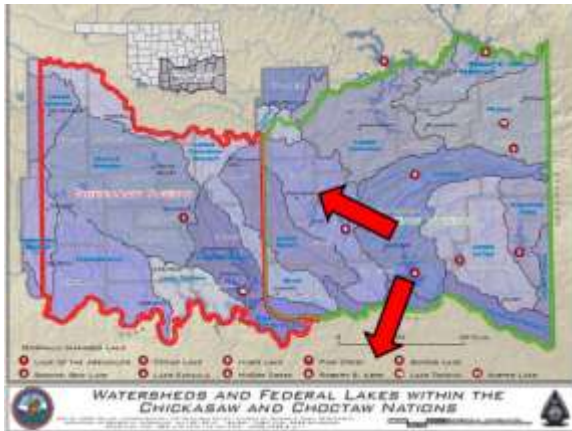




Barney Austin: Garrett made a joke earlier about my last name being Austin and living in Austin and it's actually better than that because I live in a little small community called Dripping Springs which is more or less on the outskirts of Austin. A water resources engineer with the last name Austin, living in a suburb of Austin called Dripping Springs. If that doesn't sound like destiny to you, well, I don't know what to say.

The project I am going to talk about though is not in Texas, it's in Oklahoma. And you've probably heard in the news or otherwise about the desires some certain water providers in Texas had for water in Oklahoma.



Southeast Oklahoma is a relatively wet, humid part of the state and it's a relatively low population density so there's a pretty good amount of water there. Water providers in the Dallas-Fort Worth area, which is just south of there, really wanted to go get some water out of Oklahoma. And was in negotiations with the state of Oklahoma about getting that water and there was going to be payment for that water. Ultimately, those negotiations didn't go the way Texas was hoping they would go and so Texas sued Oklahoma to get that water for free, essentially. They wanted to apply for a water right and get that water and transfer it to the Dallas-Fort Worth Metroplex. Ultimately, that lawsuit went all the way to the Supreme Court and Texas lost.

Immediately after Texas lost, Oklahoma City came in and said they were going to take that water because they need water as well. In the meantime, the Choctaw and Chickasaw nations, which occupy the whole Southeast quadrant of Oklahoma, a twenty-two county area, said hold on a second, this is in our tribal jurisdiction. There is so much interest in water, maybe we need to take a more active role in decision making related to water in our part of the state.

Unlike most other states, the tribes in Oklahoma don't live on a reservation. They have a jurisdictional area but they are living in a community of folks with other regular Oklahomans as well as tribal members. Nevertheless, the Choctaw and Chickasaw Nations then sued Oklahoma City and the state of Oklahoma for the right to decide their future with respect to water. And because it was a tribe, it went straight to the Supreme Court. The Supreme Court said you guys need to figure this one out by yourselves so they appointed a mediator. We fired that mediator almost immediately and appointed another one who was much, much, much better. That's when I got brought into the grand scheme of things here, helping the Choctaw and Chickasaw Nations understand all aspects of water. Water availability, environmental flows, and impacts of climate change. There were lots of things that the state of Oklahoma was not looking at but that were interesting culturally and otherwise for the Choctaw and Chickasaw Nations.



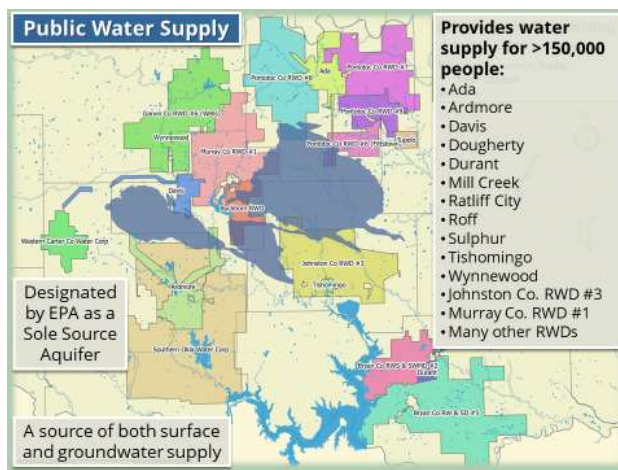
Right at the beginning of this process, and this is all background to help with the main topic of the presentation, which is the drought contingency plan. One of the things that I really like about this process that we have embarked upon with the Choctaw and Chickasaw nations is they developed a mission statement from the get-go. So what are we trying to accomplish with respect to water, not to ostracize any particular water sector but to clearly delineate to their stakeholders, to their tribal members, to the community as a whole, what they are trying to accomplish with this water planning process. Essentially, they called it the Seven Essentials. It covers the needs of small communities, large communities, urban, rural, environment. Basically looking at sustainability of water resources across this whole region for all water sectors. That's kind of been our guiding document.

About the Arbuckle-Simpson...

A physically, environmentally and culturally diverse region

- Significant source for municipal/industrial, mining, irrigation and other water uses
- Recreational and cultural resource
- Underlies ~500 square miles in south central Oklahoma
- Outcrops in 5 counties:
 - Johnston
 - Pontotoc
 - Murray
 - Carter
 - Coal

For the purposes of this presentation, I am going to be talking about a drought contingency plan for the Arbuckle-Simpson Aquifer. You may or may not have heard of the Arbuckle-Simpson Aquifer. It's in south central Oklahoma. It's very similar to the Edwards aquifer in central Texas. Coarse limestone, lots of springs, endangered species in the area, very pretty area. It's actually both a coarse limestone and sandstone aquifer. It's about 500 square miles in size so it's a pretty big area. It's a significant source of water for municipalities but also for agriculture and industry. Lots of mining activities over the aquifer as well, both for the limestone and sandstone.



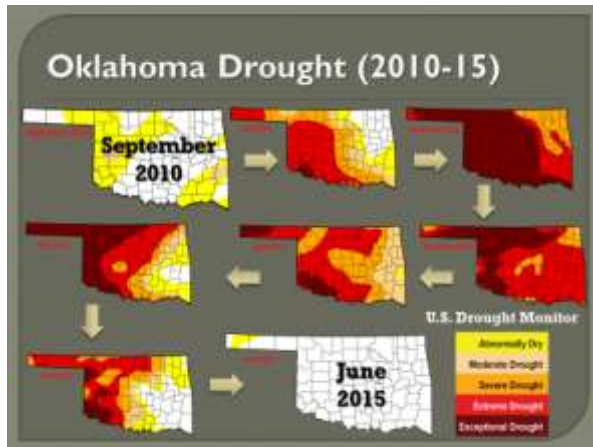
The aquifer itself is a source of public water supply for a large number of communities and those communities are both drawing groundwater from the ground, good quality ground water, but they're also so many springs and natural seeps over the aquifer that there are a lot of communities that are downstream of the aquifer that also rely on that water. When those springs dry up and those aquifer levels go down, they are very vulnerable from a water supply perspective.



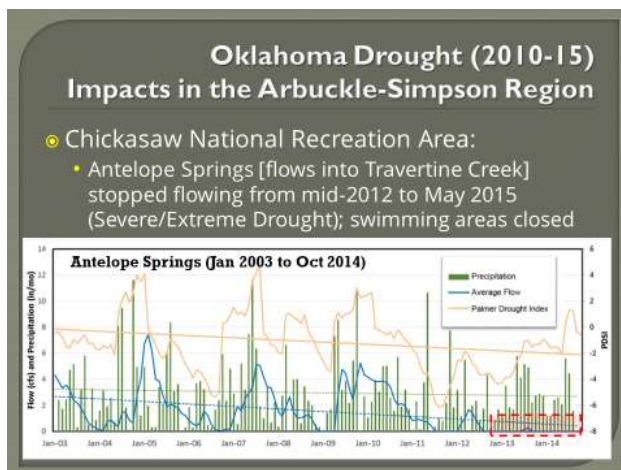
It was designated by the EPA as a sole source aquifer. From a public water supply perspective, about 150,000 people receive water from the aquifer. Remember, this is quite a rural area. Land use, agriculture as you would expect, very important. A lot of cattle grazing and a little bit of forestry. Not very much irrigation.



I think Brian mentioned in his lunchtime presentation, it is about the economy-stupid and this area is very important from a recreational perspective. A lot of folks will go to the Lake of the Arbuckles, or the Arbuckle-Simpson area to enjoy the amenities that are offered there. There is a national recreation area there called the Chickasaw National Recreation Area and that area alone brings in about 100 million dollars a year to the local economy so it's a super important area. And that economy is based largely around those water features. We have artesian wells, we've got waterfalls, we've got a nice lake, we've got all kinds of really cool things to see and to visit and to do while there. That's one of the artesian wells near the national recreation area.



How many presentations have we seen over the last two days that show these drought monitoring figures. How useful is that to water managers and people like us trying to talk about the severity of drought? So good to have an index to tell folks or to convey the message of how severe a particular drought is in an area. But we had a very severe drought situation from about 2010 to early 2015 in Oklahoma where we went from a relatively good situation in 2010--2011 was both the hottest and driest year on record for this part of the nation. That had a devastating effect and that effect continued for several years until some pretty bad floods in 2015--in fact, some communities like Tishomingo were under water for about three weeks.



Of course, that's the point where we decided to do this drought contingency plan. Bringing folks to the table to talk about drought when they are having to take a canoe to the meeting room was kind of interesting. If we look at specific monitoring during that time of drought, Palmer drought severity index is going down, precipitation been going down, spring flow has been doing down. A lot of folks are visiting the area, like I mentioned, are there to look at springs and waterfalls and things like that. And when there's no water flowing over your waterfall, it is nowhere near as impressive. And if you show up in your bathing suit to go swimming in a swimming hole that has no water in it, it's not quite as fun.

One of those areas, Antelope Springs, that feeds a swimming area--was dry for almost three years. You are trying to attract tourists to the area to see the water features when there's no water, you can imagine the impact that has on the economy.

Protecting the Arbuckle-Simpson Aquifer

SB 288:

- New state regulation reduces Arbuckle-Simpson allocations by 90 percent
- Improves aquifer's long-term sustainability, but also compels many water providers to secure additional land and water rights to maintain existing supply

The state recognized, the feds recognized, the importance of this aquifer in this whole region a long time ago and about ten, maybe more like twelve years ago, the state introduced a bill called Senate Bill 288 to protect the aquifer, to provide some kind of protection. Oklahoma has a fairly sophisticated system of ground water rights administration. Strictly after the passage of Senate Bill 288 they commissioned a study of the aquifer to try to figure out what level of protection is needed to sustain the water supply, the springs and things of the region. What they realized through that study, through the development of a really sophisticated MODFLOW model, was that they needed to reduce what they called equal-proportionate share--how much water you can withdrawal for your area of land, down from two acre-feet per acre, to .2 acre-feet per acre. A ninety percent reduction in the amount of water you could withdraw for your area of land. Not surprisingly, there was a fair amount of push-back from some people. Senate Bill 288 also offered some protection around springs, around streams and things like that again to try to maintain the effectiveness of this resource to supply recreational needs and water supply needs.

Arbuckle-Simpson Aquifer
Drought Contingency Plan

**A plan for
SUSTAINABILITY**

The ASA region requires a plan to mitigate future drought events and identify strategies that will enhance water supply reliability and protect other interests dependent upon the aquifer.

This presentation is about the drought contingency plan and this is one of the water smart programs that Darian talked about before - yesterday I guess it was. If you haven't sat down to talk with the Bureau of Reclamation about how they can help solve a water problem in your part of the nation, then you really need to do so. The Bureau of Reclamation has been very helpful in working with the Choctaw and Chickasaw Nations to solve problems across that whole southeast Oklahoma area. This particular program, the drought contingency plan, is essentially geared towards developing mitigation actions and response actions related to drought.



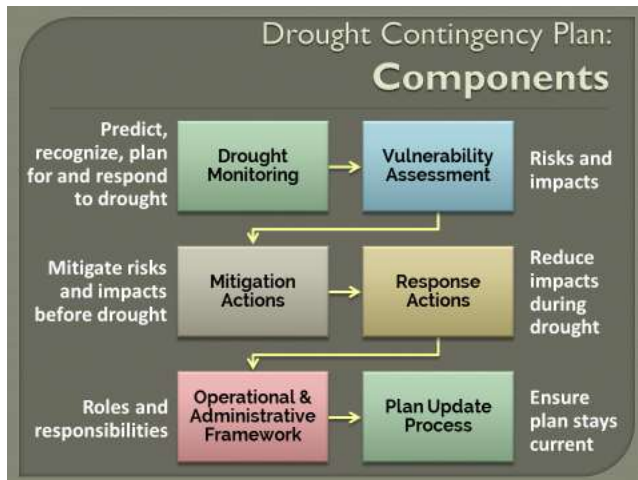
The slide features a dark green background with a light green border. At the top left is the U.S. Department of the Interior Bureau of Reclamation logo. The title 'ASA Regional Drought Contingency Plan' is in a light green font, with 'Funding & Support' in a larger, bold, light green font below it. Two bullet points are listed in white text. At the bottom right is the 'Choctaw & Chickasaw REGIONAL WATER PLANNING TEAM' logo in white and red text.

ASA Regional Drought Contingency Plan
Funding & Support

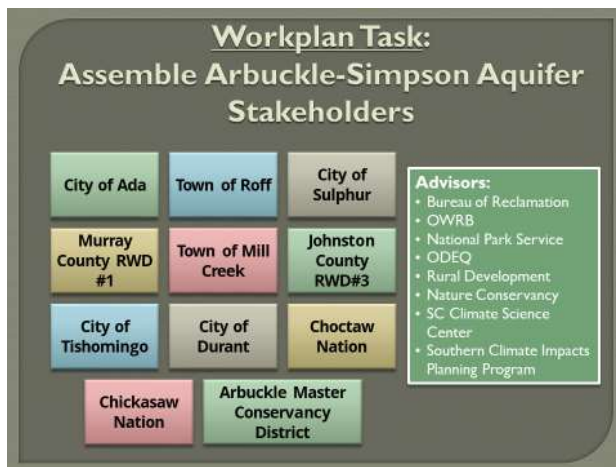
- USBR & the Choctaw and Chickasaw Nations (\$400k)
- Financial/technical assistance for water management entities to develop plans to mitigate future drought episodes

Choctaw & Chickasaw
REGIONAL WATER PLANNING TEAM

The Choctaw and Chickasaw Nations as I mentioned, they're very active in water and that is helped partly through their gaming business. The Dallas-Fort Worth area being so close and wanting water is both a problem and also a benefit because the Chickasaw nation has a big casino just north of the Red River and the Choctaw nation has a casino just north of the Red River, which are both about an hour of the Dallas-Fort Worth Metroplex. The Windstar Casino, owned by the Chickasaw nation is the biggest casino in the world. They use that revenue for good things across the region. They are building roads, they are building hospitals, they are building schools, and they are funding water resources consultants like me, which is probably the best thing of all. This particular project was funded jointly by the Choctaw and Chickasaw Nations and the Bureau of Reclamation.



There are several different steps in this process of developing a drought contingency plan. It starts with drought monitoring and a vulnerability assessment. Where does it hurt when we are in a drought situation? Mitigation actions are these longer term actions. What can we start doing now in anticipation of the next drought to reduce the harm that that drought causes. Response actions: so what do we do once the drought is in place to reduce the hurt? And in an operational, administrative framework, how do we implement? And what is the process for periodically updating the plan? That structure is laid out very nicely by the Bureau of Reclamation, it's almost like a recipe to work through for developing these drought contingency plans.



The first step of the process, which wasn't on my previous flowchart, was to identify stakeholders. This is not something that is implemented in a region "Thou shalt implement what we think is good for you guys". This is more about a stakeholder-driven process where we identify key individuals, decision makers, folks that have the ability to reduce the demand on the aquifer, who have the ability to implement change basically. When identifying the stakeholder group, we wanted to make sure we identified and invited to participate anyone who had any interest in water in the Arbuckle-Simpson area. We started with the folks we've been working with, state agencies and federal

agencies, but we've also been working with a lot of these communities with the Choctaw and Chickasaw Nations in the water planning process.



In order to get things done, we had to really identify a core group of stakeholders we called the Task Force. These are the individuals like I said who have the ability to make decisions, who have really good local knowledge about their particular water sector or their particular responsibility in water. We convened this group of folks, we invited all stakeholders, but we worked more closely with this Task Force on the development of mitigation actions and response actions.



This Task Force provided input and contributed information. We had workshops where they would talk about their particular sector, whether it was agriculture, whether it was industry or mining. Municipal water suppliers talked about their particular interest and their particular vulnerabilities.

ASA DCP Task Force Responsibilities


An Active Role in the Planning & Implementation Process

- 1. Provide input:**
 - Workplan
 - Mitigation/Response strategies
- 2. Contribute information:**
 - Supply/Demand
 - Infrastructure
- 3. Ensure implementation:**
 - Permanent organization
 - Meet regularly now and into the future

We spent a long time gathering data, gathering information on vulnerabilities but also on monitoring. How do we identify the best sources of information for predicting the next drought?

Identify Drought Monitoring Network

- Current SW/GW monitoring and climate sites
- Needs for additional monitoring points & infrastructure.
- Options for monitoring real-time drought trends

A map of a region, likely the Southwest, showing a network of monitoring points and infrastructure. The map includes a grid, major roads, and various symbols representing monitoring sites. A red box highlights a specific area on the map.

This drought monitoring network, for estimating or for predicting the onset of the next drought: we wanted to look at several different aspects. We looked at the Palmer drought severity index, but we were also looking at aquifer levels, spring flow and streamflow, we were also looking at rainfall. We were looking at all of these things to get a good sense for the status of the drought across the entire region.



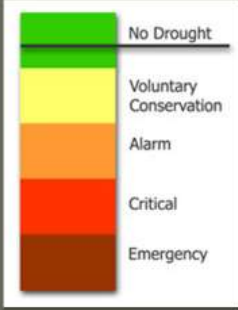
Those vulnerabilities, those workshops, were fascinating. We identified individuals who are very knowledgeable on their particular water sectors and their particular subjects. For example, we invited ranchers to participate in those discussions; we had someone from the Cattleman's Association come give a presentation to talk about those vulnerabilities. The heads of those organizations that represent water sectors in the region are ones that are best able to convey those vulnerabilities and discuss potential mitigation actions or response actions.



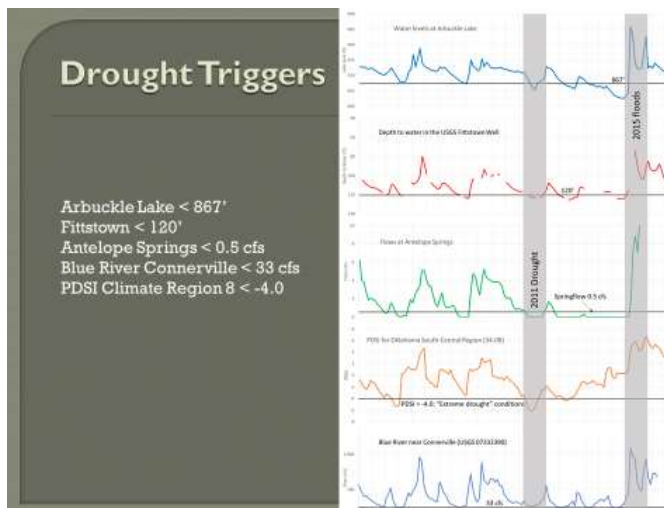
Those mitigation actions can take all kinds of different forms. It's focused on things that you can do now while we are in the flooding situation to better prepare for the drought situation in the future. It's about reducing demand and it's also about increasing supply. Sometimes one is more appropriate than the other but typically it's a whole portfolio of measures that you might take to improve the resiliency of your operation during drought conditions. We developed a number of mitigation actions with each of these communities, each of these water sectors.

Identify Response Actions

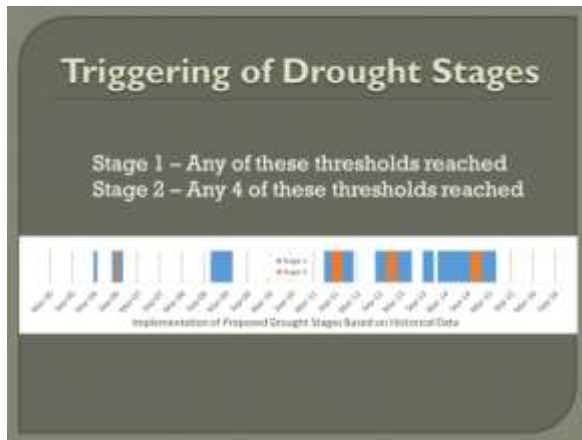
- Appropriate triggers and other actions to reduce drought impacts
- Specific for each community/provider



We also had to identify when response actions would be implemented. In addition to developing those response actions, we discussed how to tell folks you are in a stage one drought or in a stage two drought or whatever. I wish I had a really clever algorithm to put up there, but actually what we ended up doing is just looking at some of those key monitoring stations across the region and basing the triggers on thresholds for each of those monitoring stations.



We picked out an important spring, we picked out an important stream gauge, we picked out the PDSI, we looked at aquifer levels and lake levels. Basically, we did some statistics and determined that at certain times when one of those indicators went below the threshold, we would trigger a stage one drought, and when all of those monitoring stations went below that same threshold, then we would trigger a stage two drought.



Stage one had a certain set of measures and those measures would be implemented individually by each of those communities so they all had different things to do when stage one came about. They would all have a different set of things when stage two drought came about. We've got real time monitoring on all of these stations and we have an email that goes out once a day that says we are not in a drought situation or we are in a stage one situation, or we are in a stage two situation. It's up to them to then implement whatever measures they've agreed to implement.

So, a couple of things that I want to say about that. We conducted this whole process with no regulatory authority. I mentioned the Choctaws and Chickasaws had some regulator authority in this area but it's not related to water. These stakeholders came to the table and developed their response actions and mitigation actions voluntarily. The sale there is a couple of things. Most of these communities don't have any kind of drought contingency plan in place at all. Nothing. So they were somewhat interested in trying to figure out how reduce the economic damage associated with droughts in the future. The other thing, is that most of these communities tend to brag about how low their water rates are. And that's a good thing and a bad thing, right? The bad thing is that you can't build new infrastructure very easily and so drilling a new well to bring water in from ten miles away or going to build a dam that might be fifteen miles away is super expensive and it's going to affect their rates. Bringing them to the table was somewhat easier when talking to them about alternatives for water supply and the other options.



Those specific response actions, like I said, were different for each community. Each community developed their own response actions and mitigation actions. We are working with them on implementation.

The conversation about conservation is difficult with a lot of folks. It's like talking to a retailer and saying "Hey, under these circumstances we want you to sell widgets". Water sales is their sole source of revenue. Some of those communities use the revenue from water sales to fund other activities like trash collection or mowing the ball fields and things like that. So, it's a tough conversation sometimes.



This drought contingency plan is done. We had great support from the Bureau of Reclamation. They provided some good input throughout the project. I should've put a link up there for further information, but if you are interesting in getting the plan, just Google Barney Austin from Austin and I'll send you a copy.

Thank you.