0:0:6.490 --> 0:0:20.770
Evan Strickland
All right. Welcome, everyone. Thank you for joining us today. I'm just going to wait a few more moments, maybe 10 seconds. People trickle in. Looks like we have 28 people. Pretty good attendance so far.

0:0:21.250 --> 0:0:21.810
Evan Strickland
So far.

0:0:39.370 --> 0:0:59.10
Evan Strickland
All right, we have 30 people. Go ahead and get started. So thank you everyone for joining us today for this TWDB stakeholder meeting on the Yaegle Jackson Aquifer Brackish Groundwater Study. I'm Evan Strickland. I work the TWDB Bracks Department.

0:0:59.50 --> 0:1:16.290
Evan Strickland
We have with us today Jack Roche with Interra. He will be giving the presentation today. Before we get started, just wanted to cover a few housekeeping items. I have everyone's microphone and camera disabled.

0:1:16.810 --> 0:1:31.610
Evan Strickland
For the time being, while we give the presentation and the chat is also disabled, but and we'll do questions. We'll save those for the end of the presentation. So at the end you can raise your hand with that little hand.

0:1:51.485 --> 0:2:7.125
Evan Strickland
You can enter in questions and then people can interact with them. They can upvote the question if they like it. Other people can answer or you know, maybe add clarification, further clarification to the question if they like.

0:2:7.165 --> 0:2:7.245
Evan Strickland
Um.

0:2:10.205 --> 0:2:30.125
Evan Strickland
The presentation is being recorded, so please keep that in mind. If you do ask a question, you are consenting to being recorded, but the presentation recording will be made available online after the presentation in a day or two. So if anyone here is not here that would like to see it.

0:2:30.205 --> 0:2:42.85
Evan Strickland
They can watch it online. And I believe that's everything. So with that, I'll pass it over to Jack. So whenever you share your screen, Jack, I'll.

0:2:44.605 --> 0:2:46.925
Evan Strickland
Mute myself and turn off my camera.

0:2:47.285 --> 0:2:50.205
Jack Rochat
Absolutely. Let me.

0:2:51.245 --> 0:3:8.285
Jack Rochat
Let me share my screen, start my presentation. Yeah, thanks Evan for the warm introduction. Thank you everybody for your attendance this morning. Like Evan said, my name is Jack Roche. I'm giving, I'll be giving a presentation today.

0:3:8.525 --> 0:3:8.685
Jack Rochat
Um.

0:3:10.165 --> 0:3:29.845
Jack Rochat
This presentation and this study is on the David Jackson Aquifer, specifically identifying some potential production areas of brackish Groundwater and project is currently ongoing and should be finished at.

0:3:29.925 --> 0:3:44.765
Jack Rochat
Early fall next year and looking forward to sharing with you guys what we've been up to,

what we are going to be doing in the future and showing you guys some preliminary results.

0:3:45.855 --> 0:4:5.535
Jack Rochat
The presentation's going to be structured with just some general introductions of everybody from Intero, who's going to be working on the project. We'll share a quick synopsis of why we are here and and why we get to do really interesting work like this by way of the Texas Water Code Section 6.

0:4:5.525 --> 0:4:22.525
Jack Rochat
We shared some previous work that had been done on the Abe Jackson aquifer, specifically from Knox and and others in 2007 and then Deeds and others in 2010. Those two studies kind of laid the foundation of where we're working off of.

0:4:25.485 --> 0:4:43.5
Jack Rochat
And then we'll share some of the project specific goals and in the way of updating the structure and stratigraphic framework, doing some water quality evaluations across the study area and then finally designating some potential production areas.

0:4:43.445 --> 0:4:57.725
Jack Rochat
We'll have plenty of time at the end to take some questions from you guys if you if you need further clarification or have any just general questions about overall project objectives or previous work that hadn't been done.

0:5:0.85 --> 0:5:3.525
Jack Rochat
Introducing the Uh team members that are gonna be working on this.

0:5:4.845 --> 0:5:20.5
Jack Rochat
From Intero starting out, we've gotten Van Kelly. He's our project principal and senior advisor. We have Daniel Lupton acting as the project manager and technical lead, myself assuming some project management roles, but mainly.

0:5:20.605 --> 0:5:38.365
Jack Rochat
Focusing on the structural and stratigraphic analysis of the aquifer, delineating some of the PPAS alongside Thomas Ewing. Thomas Ewing, he's going to be doing most of our structural and stratigraphic analysis.

0:5:38.645 --> 0:5:54.165
Jack Rochat
We also have Max Tonalia and Corey Talcott who are going to be assisting with those structure and strap analysis and doing log interpretations for TDS and also delineating some potential production areas.

0:5:54.725 --> 0:6:13.765
Jack Rochat
We have Duncalo Suna and Andrew Osborne working on most of the hydrogeology, stratigraphic analysis and also assisting in log interpretation for TDs spearheading the Groundwater modeling aspect of this project. We have Neil Deeds.

0:6:14.405 --> 0:6:17.325
Jack Rochat
Clark Griffith and James Pinker.

0:6:20.725 --> 0:6:35.525
Jack Rochat
Moving on to why we are here, I mentioned it in the introduction introductory slides. We have Texas Water Code Section 16 specifically that aims to identify brackish Groundwater production zone.

0:6:35.765 --> 0:6:55.285
Jack Rochat
In areas across the entire state where water can be sustainably produced in 30 and 50 year periods while not causing significant impacts to Groundwater availability and specifically freshwater ground fresh groundwater.

0:6:55.365 --> 0:7:14.885
Jack Rochat
Resources. There's specific criteria that has to be met so that these long-term pumping and production goals don't interfere with fresh Groundwater availability. So this is a big

reason and a huge initiative that the Texas Water Development Board has been tasked with.

0:7:15.205 --> 0:7:30.685
Jack Rochat
Doing these brackish Groundwater studies, it's provided long-term goals and more importantly, project funding for the Water Development Board and other consultants across the state to conduct these types of studies.

0:7:34.125 --> 0:7:52.165
Jack Rochat
Moving on to previous work that has been done on the Yaywood Jackson Aquifer, the NOx and other studies from 2007 really kicked, really got the ball rolling and established the structural and stratigraphic.

0:7:52.285 --> 0:8:10.365
Jack Rochat
And depositional framework for the Ava Jackson Aquifer. This really acts as the foundation that can be used and and was used by state planners and other consultants for the development of Groundwater availability models for the aquifer.

0:8:10.565 --> 0:8:26.365
Jack Rochat
And then Deeds and others in 2010 really took that study and developed a three-dimensional Groundwater model for the aquifer and and that has since been used by state planners, water planning groups, GCDS across the study area.

0:8:30.85 --> 0:8:45.445
Jack Rochat
And other stakeholders to really guide our understanding of what this aquifer has in terms of brackish Groundwater and and just water as a resource in general. And we're taking that step further here and this.

0:8:45.445 --> 0:9:3.685
Jack Rochat
Study to specifically focus on brackish Groundwater resources. Moving into the Knox and other study from 2007, they had a total of 252 oil and gas geophysical well logs that.

0:9:5.125 --> 0:9:23.125
Jack Rochat
They used to produce a series of cross sections oriented parallel to the structural dip and strike of the Yaywood Jackson Aquifer. Some products of that study were isopac maps.

0:9:23.645 --> 0:9:40.645
Jack Rochat
From each of the individual units of the Yaywood Jackson Aquifer, sand percent maps for each depositional facies maps for each. And it's also very important to note that in this study there was no angle or perspective on water quality.

0:9:40.765 --> 0:10:0.365
Jack Rochat
It was basically only really focusing on the structure and stratigraphic framework of the aquifer. So in this study they very simply defined the general stratigraphy of the Edward Jackson aquifer into.

0:10:0.405 --> 0:10:17.725
Jack Rochat
4 main chronostratigraphic units. So very eloquently they they designated four of these units and and titled them or named them the Upper Jackson, Lower Jackson, the Upper Yewa, and the Lower Yewa.

0:10:18.205 --> 0:10:36.965
Jack Rochat
And so all four of these units were conveniently bound above and below by time synchronous maximum flooding surfaces. And so the general stratigraphic column on the right, we see the Jackson group being comprised of the Witsit, the Manning, the Welburn and the Cadell.

0:10:37.725 --> 0:10:52.765
Jack Rochat
That Jackson group obviously is broken into Upper Jackson and Lower Jackson, and then of the Upper Claiborne group we have the Yaywa formation being broken into Upper Yaywa and Lower Yaywa, but together these make the Yaywa Jackson Aquifer.

0:10:56.885 --> 0:11:8.925
Jack Rochat
The typical workflow that Knox and others employed in 2007 was #1 acquiring oil and gas logs that had for depth coverage at the gate with Jackson Aquifer.

0:11:10.165 --> 0:11:10.245
Jack Rochat
Um.

0:11:12.205 --> 0:11:31.445
Jack Rochat
From the initial analysis of those geophysical well logs, they were able to identify the four main stratigraphic units that that comprise the aquifer. Once those stratigraphic picks were made, they interpolated between all of those control points.

0:11:31.525 --> 0:11:49.45
Jack Rochat
And generated raster surfaces that represented the structural surface, the structural orientation I should say, of each of these chrono stratigraphic units, and then from there they can interpolate the unit thicknesses and project that across the entire study area.

0:11:49.165 --> 0:12:8.5
Jack Rochat
After that they made some initial sand picks and broke the aquifer into sands and clays. An example of that is where if you are looking at the well log on your right, we can see and highlighted now in yellow.

0:12:8.445 --> 0:12:12.925
Jack Rochat
Where these sand intervals may be interpreted where we have.

0:12:14.45 --> 0:12:31.325
Jack Rochat
Geophysical log signals on the left and right side of those depth tracks opposing, you know, trending in opposite directions of each other. And that's a very general idea that you've encountered a sand and then the alternating sequence of sands and clays.

0:12:31.645 --> 0:12:48.925
Jack Rochat

From these sand picks, they were able to generate sand percent maps, which is relative thicknesses of sands versus the thickness of the unit that you're in. And then they further did some depositional analysis and generated some depositional faces maps.

0:12:49.245 --> 0:12:58.605
Jack Rochat
The product of this workflow resulted first in isopact maps of each of the respective units.

0:13:1.85 --> 0:13:19.325
Jack Rochat
We see here on the right where the Upper Jackson, Lower Jackson, Upper Yewa and Lower Yewa have unit thicknesses depicted based on a on a very simple color scheme. One thing to note is the relatively uniform thickness of the.

0:13:19.325 --> 0:13:37.925
Jack Rochat
Upper Jackson, Lower Jackson and Lower Yewa from the central portions of the study area up to the northeast, northeastern part of study area where we do see some variance in unit thickness is in the southern parts of the study area in the Upper Jackson.

0:13:37.965 --> 0:13:57.285
Jack Rochat
Upper Yewa and Lower Yewa well control could be an issue there as far as the lack of data points to consider when calculating unit thicknesses. Another thing that could potentially lead to that is mispicks or misinterpreted formation.

0:13:57.805 --> 0:14:12.725
Jack Rochat
Tops that could give you some false calculations or misleading calculations for unit thickness, but generally generally generally we see some some good uniform thickness throughout the study area for these formations.

0:14:15.565 --> 0:14:32.365
Jack Rochat
After all those sand pics were made on on all of the geophysical logs, the sand percent maps were generated. We can see relatively uniform sand percent maps in all of these.

0:14:32.445 --> 0:14:51.805
Jack Rochat
Units. Everything in the Gulf Coast region of the state dips to the southeast at varying degrees, you know, per per mile or per any unit of measurement. And so the structural orientation of the Gateway Jackson Aquifer is roughly southwest to northeast. So these contour lines.

0:14:51.965 --> 0:15:10.805
Jack Rochat
That we're seeing in sand percents generally trend in the same direction as as a structural orientation of of the Yay Jackson Aquifer. And so sand percent is obviously just normalized based on what percentage of a unit thickness is occupied or interpreted to be.

0:15:11.245 --> 0:15:26.5
Jack Rochat
A sand a sandy interval. So we have a scale from 0% to 100%. Some noticeable or notable things to bring your attention to here is in the up dip direction, meaning towards the northwest portion of our study area.

0:15:26.445 --> 0:15:45.605
Jack Rochat
There seems to be more variance in in what is what is the relative sand percent of each of these units. And that could also be poor well control where you know logs, geophysical logs don't have proper depth coverage at those shallower intervals.

0:15:45.965 --> 0:16:1.965
Jack Rochat
Could also be a factor of once you're just closer to the outcrop region of these units, you tend to get less confidence in what's a sand and what's a clay, and it could be a function of.

0:16:2.205 --> 0:16:17.405
Jack Rochat
The tooling that was used when geophysical logs were were were ran and the data was collected back in the 50s and 60s. But again we see we see generally a a.

0:16:17.645 --> 0:16:25.965
Jack Rochat
An agreement agreeance between structural orientation and the relative sand percents for these formations.

0:16:26.925 --> 0:16:44.525
Jack Rochat
Lastly, the work product of Knox and others in 2007 was the distribution of depositional faces for each of these units and the the ones that are of most importance for our study.

0:16:44.605 --> 0:17:2.525
Jack Rochat
Are fluvial inputs, and those inputs are shaded in a light pink or rose color, and they're also indicated by the the black arrows in the figures on the right. We see that the larger arrows obviously are where we have.

0:17:3.45 --> 0:17:15.125
Jack Rochat
Sediment input axes and the size of the arrows is kind of relative to the sediment load that may have been deposited in each of these units.

0:17:16.125 --> 0:17:16.245
Jack Rochat
OK.

0:17:18.45 --> 0:17:22.885
Jack Rochat
Moving into work that we have completed so far.

0:17:24.965 --> 0:17:40.845
Jack Rochat
We have compiled all of the geophysical well logs that were used in Knox and others into our geophysical log interpretation software called Petra. We brought each of those 252 logs into.

0:17:40.925 --> 0:17:56.685
Jack Rochat
In in by hand depth registered them to imported all of their existing structure picks that were made and then began to look at where we could fill in the gaps we.

0:17:56.805 --> 0:18:12.125
Jack Rochat
Sourced geophysical well logs with proper depth coverage and as close to a full coverage as we possibly could throughout the entire study area. We more than doubled our control points. So now that our our data density.

0:18:12.125 --> 0:18:27.205
Jack Rochat
Is is roughly one log per 7 1/2 minute grid. Pretty a pretty robust data density. This this is going to give us a a a really great opportunity to.

0:18:28.45 --> 0:18:42.685
Jack Rochat
Constrain and really define the the structure of the aquifer and have great well control when we get into the water quality analysis for for this this portion of the study.

0:18:45.245 --> 0:19:3.5
Jack Rochat
The second thing that we did was took some down dip stratigraphic control points that were derived from a high density strike line in the year with Jackson Aquifer. Tom Ewing helped us out specifically with with this task.

0:19:3.565 --> 0:19:19.85
Jack Rochat
He tied some biostratigraphy markers and well-defined flooding services in the down dip region of the aquifer, projected those onto all of our project logs and correlated them a long strike and up dip.

0:19:19.325 --> 0:19:38.885
Jack Rochat
This gave us a great understanding of where the deficiencies were and the Knox and other study from 2007. We were able to see where our updated understanding agreed with the existing understanding of where logs or where the picks were made on on geophysical well logs.

0:19:39.325 --> 0:19:56.725
Jack Rochat
And then we all obviously saw some areas where the the interpretations of old didn't

necessarily line up with our our current understanding after you know almost 2 decades has gone by and we've had the opportunity to add well logs into the area.

0:19:57.325 --> 0:20:15.85
Jack Rochat
And look at this under a closer lens. Some examples of where Tom Ewing's picks and our picks agree with the old picks and and then in some areas where they differ are shown on the geophysical well log on the right.

0:20:15.485 --> 0:20:33.45
Jack Rochat
All of these updated structure picks are on our project logs. We've got 528 new control, 528 control points that have been reinterpreted, exported, rasterized into surfaces.

0:20:33.525 --> 0:20:48.245
Jack Rochat
And allow us to have an updated understanding of the vertical and lateral extent of the of each of these four main units.

0:20:48.805 --> 0:21:8.165
Jack Rochat
So as we can see the example, I I was able to pull together the top of Jackson, top of Lower Jackson and top of Yewa are largely in agreement with the Knox and others study from 2007 where we have some some difference in some cases 200.

0:21:8.285 --> 0:21:23.685
Jack Rochat
100 to 225 feet, we see the top of Lower Yaywa and base of the Yaywa Jackson aquifer have have some delta between the two and some implications of this are.

0:21:23.845 --> 0:21:39.405
Jack Rochat
Unit thicknesses, sand percent maps because we can see some sand intervals that weren't captured or were captured in one unit and now they will be captured by another unit. And then since sand percent is relative to unit thickness, we you know.

0:21:39.805 --> 0:21:46.805
Jack Rochat
Those will all be sorted out and more refined from this study.

0:21:50.445 --> 0:22:8.885
Jack Rochat
As I was, as I made reference to, all of our control points now have updated picks made on them. So from all of our geophysical logs in the study, we have a total of 304 that were used to generate an updated top of Jackson surface.

0:22:8.925 --> 0:22:24.5
Jack Rochat
When I referenced earlier that the general orientation and structural orientation of the Yaywood Jackson Aquifer, basically any unit that's in the Gulf Coast region of Texas, it trends roughly southwest to northeast.

0:22:24.525 --> 0:22:40.965
Jack Rochat
As we can see, these contour lines do exactly that. It dips to the southeast towards towards the towards the coast. All these control points are based on depth coverage of geophysical well logs and availability of SP.

0:22:41.485 --> 0:23:1.165
Jack Rochat
Or gamma ray curves combined with resistivity curves. All of these updated control points are used and tied into existing outcrop patterns that that were utilized in the OR I guess that are existing currently.

0:23:1.485 --> 0:23:19.445
Jack Rochat
As our current understanding of the outcrops for the Yale Jackson Aquifer, as we can see here, we have 304 total control points just for the top of Jackson alone. So we have already increased our data density for just this one unit.

0:23:20.485 --> 0:23:35.605
Jack Rochat
By a factor of 50 logs I would I should say based on when you compare that to the existing data density of the entire project in 2007. So because of that our up dip interpolations of.

0:23:35.965 --> 0:23:50.685
Jack Rochat

Of where we may be lacking in log coverage in the up-dip regions of each of these units, they're more accurate, but the outcrop projections at surface are unchanged. So our up-dip understandings are are better refined and and better understood.

0:23:53.485 --> 0:24:9.965
Jack Rochat
We can quickly get through the top of the lower Jackson. Here's the updated surface map for for that unit. The total control point data density for this unit is 338 control points as we move further to the northwest.

0:24:10.365 --> 0:24:17.205
Jack Rochat
We have the top of Yewa. The total control points there were 395.

0:24:20.325 --> 0:24:28.725
Jack Rochat
And then as we move up section or down section, I should say we have an updated surface for the top of lower Yale.

0:24:31.85 --> 0:24:34.605
Jack Rochat
With a total control point density of 425.

0:24:35.645 --> 0:24:45.285
Jack Rochat
And then we have base of yay with Jackson covering the full extent of the project area with a total control point density of 423.

0:24:50.725 --> 0:24:55.85
Jack Rochat
As our structure and stratigraphy is is.

0:24:56.125 --> 0:25:15.645
Jack Rochat
Updated or our understanding is updated. We move into the phase of project where we need to estimate total dissolved solids from from these geophysical logs. So with our 528 geophysical logs, we digitized the.

0:25:15.725 --> 0:25:30.765
Jack Rochat
SP and deep resistivity curves and shallow resistivity curves where we see significant separation and in those in those two curves and we can talk, I'll talk about that in just a little bit.

0:25:31.245 --> 0:25:48.485
Jack Rochat
All of the Knox and others well logs from 2007 have TD estimate TDS estimates made on them. After we had identified sand specific sand intervals on all of those logs, the TDS estimates were made.

0:25:49.565 --> 0:25:57.525
Jack Rochat
And um, that same workflow is being carried out right now on all of the info logs, the additional logs that we brought into the project.

0:25:58.765 --> 0:26:16.645
Jack Rochat
Some methodologies that we are going to use for this for this study are listed in the table on the left. We have resistivity of water from the SP curve, the Alger Harrison or a modified Alger Harrison method.

0:26:17.5 --> 0:26:27.485
Jack Rochat
Various methods from E step. We have the RWA minimum method and R mean RO or sometimes referred to as ROTDS method.

0:26:29.325 --> 0:26:39.925
Jack Rochat
We'll talk more about those in the following slides, but the table on the right shows a historical use of a variety of these methods in previous BRACS studies.

0:26:45.405 --> 0:27:4.285
Jack Rochat
First and foremost, our approach to log derived TDs is going to be three-fold. Firstly, we will begin with the RWA minimum method. Our approach here is to use the most robust method across the entire study area.

0:27:4.525 --> 0:27:24.445
Jack Rochat
And where necessary or where possible, apply some checks in the form of other log derived TDs methods to better refine our approach to the RWA minimum method so we can see that some important.

0:27:24.445 --> 0:27:40.165
Jack Rochat
Variables and inputs into the RWA minimum method is formation, water resistivity, porosity to the cementation exponent and formation of the.

0:27:40.685 --> 0:27:57.285
Jack Rochat
Excuse me, resist to formation resistivity. My apologies. Advantages of this method is that it works for a large range of TDs values and you can see that the individual inputs for this method.

0:27:57.405 --> 0:28:15.885
Jack Rochat
In the table in the central lower section of the slide, depending on the value that you can that you apply or that you can tune this approach with it, it it is an example of the sensitivity of each of those.

0:28:16.445 --> 0:28:35.845
Jack Rochat
Inputs into the TDS that's derived with this method. So our understanding is guided by some industry assumption, industry assumptions, but also additional methodologies that can be applied back into RWA minimum.

0:28:36.45 --> 0:28:46.845
Jack Rochat
And and we can have a very detailed understanding of what our TDS is of our formation waters.

0:28:46.885 --> 0:28:58.365
Jack Rochat
Waters. The table in the upper right part of the slide is some calculations using actual data calculations.

0:28:58.405 --> 0:29:9.725
Jack Rochat
That were the RWA minimum method was implied with or employed with actual data to have log derived TDs.

0:29:12.165 --> 0:29:29.685
Jack Rochat
The second check or the the first check, the second methodology that we can apply to this to to our approach here for estimating TDs is the modified Alger Harrison method, also referred to as the resistivity ratio method and this is where we see.

0:29:29.685 --> 0:29:45.125
Jack Rochat
Obvious separations between shallow and deep resistivity. We have different inputs for this method. We have resistivity of mud filtrate, we have shallow resistivity.

0:29:45.205 --> 0:29:59.885
Jack Rochat
And and then we have also some some similar inputs to the RWA minimum method and resistivity of the formation water and deep formation resistivity independent or advantages of this method is that it's independent of porosity.

0:30:0.245 --> 0:30:16.125
Jack Rochat
It's insensitive to clay content. The TDs that it's most suited for is anything greater than 3000 milligrams per liter, so that captures 70% of the brackish quality water that we will be focusing in on.

0:30:16.525 --> 0:30:35.605
Jack Rochat
It also provides approximations for formation factor, which is porosity to the cementation exponent used in the RWA minimum. So it allows us to kind of calibrate our our approach to the RWA minimum method using some very simple.

0:30:35.685 --> 0:30:37.965
Jack Rochat
Very simple algebra.

0:30:40.245 --> 0:30:56.725
Jack Rochat
The third method and the second check that we will be using for log derived TDs is the resistivity TD excuse me ROTDS method or mean RO and this is where we have.

0:30:57.45 --> 0:31:13.565
Jack Rochat
Water quality samples completed within the aquifer of interest and in this case of Jackson and we can apply those that lab derived lab lab sampled water quality directly to a resistivity profile.

0:31:14.925 --> 0:31:32.525
Jack Rochat
Obviously it it we we need proximity to a geophysical log for this method to have be more accurate and more reliable, but it correlates TDs to resistivity values measured in the same zone, so we have to have.

0:31:32.805 --> 0:31:52.725
Jack Rochat
A high degree of confidence that the sand interval that the water well is screened into is the same sand interval that we are estimating TDs for in our project. So those sampled water quality data will come from the USGS produced water base and.

0:31:52.725 --> 0:31:57.765
Jack Rochat
Quality samples that are currently archived in Texas Water Development Board's database.

0:31:59.205 --> 0:32:11.685
Jack Rochat
So this is just another another check to our initial approach of the RWA minimum method and the resistivity ratio method.

0:32:16.765 --> 0:32:35.525
Jack Rochat
Two very important parameters that are to be considered in the RWA minimum method are porosity and bottom hole temperature. The porosity approach that we are

employing is the same exact approach that was used in the Gulf Coast BRAC study by Young and others in 2016.

0:32:37.205 --> 0:32:51.445
Jack Rochat
We have within our study area identified 25 geophysical logs with appropriate porosity curves and 220 depth specific porosity measurements.

0:32:51.725 --> 0:33:6.405
Jack Rochat
Relationship that's well established or that was well established in the 2016 study by Young and others, as well as other studies throughout the decades, is that there is a reliable decrease in porosity.

0:33:6.765 --> 0:33:26.525
Jack Rochat
With depth in the Gulf Coast region for loosely consolidated sandstones, and so that depth estimate is represented in a linear regression curve that is shown in the equation on the left where roughly correlates with.

0:33:26.645 --> 0:33:32.5
Jack Rochat
Of 1% decrease in porosity per 1000 feet of depth gained.

0:33:34.445 --> 0:33:50.445
Jack Rochat
That relationship here shown by by Young and others in 2016 where they had all their they had found porosity logs with appropriate depth coverage in the Gulf Coast region and then plotted the porosity values in sand intervals with depth and.

0:33:50.845 --> 0:33:56.405
Jack Rochat
The relationship was established there with the best deadline on on that scatter plot.

0:34:1.565 --> 0:34:16.525
Jack Rochat
Second side of the equation there is temperature. This is important because temperature needs to be considered in order to have resistivity corrections made in order to have conductivity and TDs then derived from.

0:34:17.725 --> 0:34:34.165
Jack Rochat
Derived from our geophysical logs for each of our formations. In order to fill in the gaps where bottom hole temperature maybe was not recorded or it was legible on a geophysical log header, we pulled the.

0:34:35.565 --> 0:34:54.125
Jack Rochat
Average surfaces from the SMU geothermal lab database for near surface temperatures and temperatures at 3 1/2 kilometers depth and applied a linear, you know, understood that a linear relationship can be applied between these two temperature surfaces.

0:34:54.605 --> 0:35:13.685
Jack Rochat
And and then sampled into our project where our geophysical logs don't have bottom hole temperature. And so we were able to have a temperature correction applied to all of our logs because we had the ability to.

0:35:14.125 --> 0:35:19.765
Jack Rochat
Pull these um surfaces together and establish that relationship where the data was lacking.

0:35:25.965 --> 0:35:45.405
Jack Rochat
Moving into the portion of our study that deals with identifying potential production areas, very generally potential production area for brackish groundwater is going to be based on the coexistence of favorable depositional faces and available brackish groundwater.

0:35:45.565 --> 0:36:1.245
Jack Rochat
On the right we see a very, very general understanding of of what alternating sands and clays will look like in the Texas Gulf Coast region. Obviously the sands are.

0:36:1.325 --> 0:36:17.925
Jack Rochat
Going to be the subject of of our of our study and where they have modeled brackish

groundwater. We also need to meet make sure that the proper criteria is met in order to designate it a potential production area.

0:36:18.365 --> 0:36:35.885
Jack Rochat
That criteria was established by Young and others in 2016 for the Gold Coast Brack study. Obviously we need to have the proper water quality in place, and brackish groundwater is anything from 1000 milligrams per liter to 10,000 milligrams per liter.

0:36:35.965 --> 0:36:55.165
Jack Rochat
You need to make sure that that brackish groundwater is hydraulically isolated from any freshwater zones around it. Another criteria that needs to be met is that the aquifer cannot be or the the area that we want to designate as a PPA or that could be designated as a PPA is not currently a significant source.

0:36:55.805 --> 0:37:14.285
Jack Rochat
Source of water supply for any municipality or or being used for domestic or agricultural purpose. We also need to make sure that the area that we want to designate as a PPA is not already designated as a potential reservoir for an injection well.

0:37:15.5 --> 0:37:30.445
Jack Rochat
For a wastewater well and and then lastly being being aware that in areas where there are jurisdiction or regulatory jurisdictional.

0:37:30.445 --> 0:37:30.525
Jack Rochat
Um.

0:37:32.525 --> 0:37:51.485
Jack Rochat
Sensitive areas, right, where we have, you know, the Edwards Aquifer, the Edwards Aquifer Authority, we have the Harris, Galeson Subsidence Districts or the Fort Bend Subsidence Districts or any others that may have regulatory jurisdiction over an area. We're obviously going to be steering clear of those.

0:37:53.5 --> 0:38:7.845
Jack Rochat
Moving into some preliminary results. So the product of all of this work will ultimately end up looking like or one of the products of of all this work that we're going to be doing will look like a cross-section.

0:38:8.285 --> 0:38:27.805
Jack Rochat
Shown here where we have the depth axis or the the Y axis is depth and feet below ground surface. We have geophysical logs or series of geophysical logs along in this case along dip of the Yeawood Jackson aquifer where we have SP.

0:38:28.45 --> 0:38:46.205
Jack Rochat
Having deep resistivity curves shaded and color-coded based on sand intervals and their estimated water quality in areas where we have in the background there's a.

0:38:46.565 --> 0:38:54.405
Jack Rochat
Gray shaded areas, that's that is where we have not interpreted it to be a sand, so it's a clay or shale.

0:38:56.605 --> 0:39:13.565
Jack Rochat
So we have the formation tops that are colored. We've got the top of Jackson, the top of the lower Jackson, top of the Yewa, top of the lower Yewa, and the base of the aquifer in subsequent order. And then the color coding is based on.

0:39:13.645 --> 0:39:29.325
Jack Rochat
Estimated water quality. And so from here we will handpick depths to specific water quality zones or salinity zones that we want to bring, you know, into focus.

0:39:30.485 --> 0:39:44.685
Jack Rochat
And so hand-picked from this cross-section we can see the by the blue dashed line we we have depth to base of fresh water. We have by the yellow dashed line depth to base of slightly saline water.

0:39:45.85 --> 0:40:1.965
Jack Rochat
And then by the orange dashed line we have depth to base of moderately saline water or depth to base of brackish water or depth to base of top of or depth to top of saline water and you can you know.

0:40:1.965 --> 0:40:17.605
Jack Rochat
Call it a number of, you know, refer refer to it in a number of ways. From here the area that is of interest is the is the section of the cross of this cross section.

0:40:18.285 --> 0:40:35.525
Jack Rochat
Between where water quality is assumed to be between one and 10,000 TDs. And so from here we want to identify and keep in mind where some favorable.

0:40:36.765 --> 0:40:52.765
Jack Rochat
Sand intervals may may be present, favorable depositional phases, you know, fluvial inputs, great, you know, good looking sand profiles that could be produced out of that we can do our groundwater modeling from to estimate.

0:40:52.925 --> 0:41:9.445
Jack Rochat
How much water could be produced in 30 and 50 year timelines and so our focus is is further brought into these thicker sand intervals where we see brackish quality, brackish quality groundwater.

0:41:10.685 --> 0:41:26.725
Jack Rochat
And and these would preliminary preliminarily be designated as a potential production area, granted that it meets most of meets all of the criteria referenced in the slides prior.

0:41:27.325 --> 0:41:47.45
Jack Rochat
From Young and others in 2016. So again, these are all preliminary results that this phase of the study is currently ongoing. We're going to be looking more into the depositional faces on a on a finer scale.

0:41:47.325 --> 0:42:0.565
Jack Rochat
And looking at where we see, where, where we can place these, identify and designate these potential production areas where this cross-section is currently.

0:42:2.525 --> 0:42:20.285
Jack Rochat
Located from the existing understanding or established understanding of the depositional faces from Knox and others, we see that in the lower Yaywa and upper Yaywa in the bottom two figures that the first three or four.

0:42:20.325 --> 0:42:39.405
Jack Rochat
Geophysical logs had some fluvial input and then it moves into deltaic strand plane sorts of faces, but those are subject to change as our understanding of the distribution of these faces.

0:42:39.525 --> 0:42:53.885
Jack Rochat
Is sure to be updated with, you know, all of our additional control points. But then as we move into the lower Jackson and upper Jackson, we see an incursion, a little bit of of a more floodplain.

0:42:54.805 --> 0:43:14.285
Jack Rochat
Faces and so as we look at these logs in full along with all of the infill logs, our understanding of where potential production areas could be or are likely to be will be updated if it's subject to change.

0:43:14.725 --> 0:43:32.605
Jack Rochat
But that just gives us gives you guys a little bit of an understanding of the workflow that we'll we will be employing for the remainder of this study and some of the products that are are likely to come out of of the work that we're doing.

0:43:34.405 --> 0:43:49.885
Jack Rochat
With that, it concludes the presentation that I had for you all. I open it up to questions. I

hope there are some questions out there. I can. I'll stop sharing my screen and I can. I can navigate back to.

0:43:50.485 --> 0:43:58.885
Jack Rochat
Any screen or any slide that I need to. But yeah, thank you guys for your attention. Thanks for bearing with me. Yeah, like to see if there are any questions out there.

0:44:1.445 --> 0:44:16.405
Evan Strickland
All right. Thanks, Jack. Yeah, please use the Q&A feature. If you do have a question, my people are thinking. I'll ask you a question based upon our previous meeting. Could you highlight?

0:44:12.845 --> 0:44:13.725
Jack Rochat
Sure.

0:44:17.765 --> 0:44:25.645
Evan Strickland
Some of the differences, particularly in the data sets that will come from this study versus Knox and others 2007.

0:44:27.405 --> 0:44:41.805
Jack Rochat
Yeah, certainly some some of the difference the the largest, the main difference is going to be the water quality analysis and the designation of potential production areas where the data sets may be similar as far as the the products.

0:44:43.685 --> 0:45:0.285
Jack Rochat
Being unit thickness maps, same percent maps, depositional faces maps, those those boxes are still going to be checked, but our understanding of them will be so much more refined because of our our increased data density.

0:45:1.165 --> 0:45:17.885
Jack Rochat
How are and I forgot the the actual structural surfaces of of each of the units too. We've more than doubled our our log coverage. So we'll have a better understanding in the

southern part port portions of the study area and in the northeastern parts of the study area where.

0:45:18.245 --> 0:45:33.725
Jack Rochat
Log coverage was just lacking in general from the 2007 report. So we'll have much more widespread coverage, you know, along the periphery and then we'll have more logs to consider and correlate.

0:45:34.5 --> 0:45:52.445
Jack Rochat
Across so that our understanding of what these Services are doing as they continue to dip toward the southeast and so there will be some similar ones there. We'll also be doing the Groundwater modeling aspect that's kind of building off of the 2000 and.

0:45:52.885 --> 0:46:1.405
Jack Rochat
10 GAM. But so it's like a combination of both, but we're also including water quality atop of atop of everything.

0:46:1.765 --> 0:46:9.405
Evan Strickland
But also the the data sets from the study, it'll be much more easy to utilize by other people, correct?

0:46:8.485 --> 0:46:27.845
Jack Rochat
Absolutely, absolutely. Yeah. This would be a great opportunity for a young graduate student who's interested in in doing a doing work for his thesis or even a dissertation. The data set will be compiled and readily accessible.

0:46:28.85 --> 0:46:42.685
Jack Rochat
Much more accessible than it was to us when we had just TIFF images of the logs that we had to bring in and manually calibrate and do a lot of QAQC to make sure that the quality of the log was appropriate enough to.

0:46:43.365 --> 0:47:2.925
Jack Rochat

To actually start the project with so that yeah, that data set, once it's finally compiled in all of the ArcGIS formats and in the log interpretation formats that anybody would ever need, it would be something that anybody could take and run with and do.

0:47:3.45 --> 0:47:14.965
Jack Rochat
You know, subsequent reports on and and or if they they think we're completely out of bounds, they can, you know, take it up and do it again themselves. It'll it'll be there for anybody to grab and run with.

0:47:16.45 --> 0:47:25.725
Evan Strickland
Great, thanks. We do have a question now. I'll go ahead and read it. Vanessa asks, are there any groundwater monitoring wells that are monitoring brackish groundwater in this area?

0:47:27.205 --> 0:47:44.525
Jack Rochat
That's a great question. We have solicited data from all of the stakeholders that have jurisdictional boundaries that intersect with the aquifer. So any data that we can.

0:47:44.885 --> 0:48:2.205
Jack Rochat
We can acquire that's either either privately held or publicly available. We will consider for this this project if if it does have appropriate depth coverage and and aids in our understanding of what Groundwater levels are doing for the aquifer.

0:48:2.565 --> 0:48:22.405
Jack Rochat
Part of part of the need to update the structure and stratigraphy or really the structural framework of the the aquifer was to absolutely be able to identify if a law, if a well is completed within our aquifer and more importantly screened within our aquifer.

0:48:22.485 --> 0:48:41.445
Jack Rochat
Because you know if you get there is a little bit of Gray area especially in the up-dip regions where you tend to have more shallow wells, you know areas where fresher water

is being produced. We want to be certain that it is in the A with Jackson. So all of those additional control Points that we added for each of the.

0:48:41.445 --> 0:49:0.965
Jack Rochat
Of the units for the aquifer aids in, you know our understanding of what is going on up there because most of these oil and gas geophysical logs, they they may drill down to 200 feet and then start logging all of our formations, you know formations of interest because they're not.

0:49:1.125 --> 0:49:16.245
Jack Rochat
Worried about shallow coverage for their depths on their logs and and so to the extent that we have water wells or monitor wells that are in the.

0:49:16.565 --> 0:49:29.885
Jack Rochat
Yay with Jackson, we will certainly use them to in in our modeling approach and understanding where you know water levels are at and how they may be impacted by future production.

0:49:32.165 --> 0:49:47.565
Evan Strickland
And yeah, you kind of mentioned, I'll go ahead and reiterate that we did send out a call to GCD for data, but if anyone watching has any additional geophysical logs, water quality, other information you think we want to know about this aquifer?

0:49:48.85 --> 0:49:53.605
Evan Strickland
Then please share with myself or with Jack. Um and get you our contact information.

0:49:55.365 --> 0:50:8.285
Evan Strickland
We have a another question. Is the lithology, I assume the lithologic analysis you're doing A2 tier sand clay split or is there a tier for mix sand and clay sections?

0:50:8.885 --> 0:50:28.245
Jack Rochat
Oh yeah, great question. We're we're doing A2 tier approach, sand and clay and in in the

the best of the best I guess remedy for that approach it it in itself being limited for our our log derived TDs.

0:50:28.645 --> 0:50:47.605
Jack Rochat
Is that we are grabbing the resistivity value for at the 90th percentile of that identified sand interval. So it's not a continuously derived log TDs, you know TDs profile in each individual interval. So we're.

0:50:48.325 --> 0:51:8.205
Jack Rochat
We're trying to capture all of the sands, being mindful that yeah, we probably will bring in some sandy clays or clay sands or or mixed silt and sands, but we're really trying to focus on the the 90th percentile sand and that resistivity value value to in order to.

0:51:8.325 --> 0:51:25.245
Jack Rochat
To derive TDS. So that's why that's why you see in the cross sections or you will see in the cross sections the sand intervals will only ever have one color applied to them. Yeah, so our our approach is 2 tier, but we we put some measures in place to.

0:51:25.365 --> 0:51:32.805
Jack Rochat
Be able to account for that so that we have the most accurate derivation of TDs. I hope that answered your question, Adam.

0:51:35.285 --> 0:51:48.445
Jack Rochat
And maybe maybe it it it elaborated a little bit on on the approach for TDs and the the correction that we were gonna you know try and account for. But yeah it's it's a 2 tier approach but.

0:51:58.365 --> 0:52:1.125
Jack Rochat
Oh, Evan, Evan, you're muted.

0:52:0.645 --> 0:52:15.565
Evan Strickland
Thank you very much. Question from Jennifer. Will attendees get slides and reviewed

transcript or if published, please provide website slash link. So I don't know if you want to share your slides Jack if.

0:52:16.205 --> 0:52:16.245
Jack Rochat
I.

0:52:16.245 --> 0:52:23.485
Evan Strickland
If you find doing that, then I can upload those, but we can also just do the presentation. The webinar will be available.

0:52:20.5 --> 0:52:21.845
Jack Rochat
Yeah, I I.

0:52:23.525 --> 0:52:25.445
Evan Strickland
Webinar will be available.

0:52:25.605 --> 0:52:42.165
Jack Rochat
Yeah, the the the webinar if it's being recorded, I'm sure that could be archived on the project slide or the project web page providing the slides. I'll have to double check with that to see if if.

0:52:42.725 --> 0:52:47.5
Jack Rochat
If that's something that, um, we we can do, but yeah.

0:52:47.285 --> 0:53:1.605
Evan Strickland
I but yes, the this webinar recording will be available online and I'll look about also providing a transcript for it. I hadn't thought about that. There will it will be closed captioned the webinar.

0:53:3.405 --> 0:53:10.125
Evan Strickland

All right, well, never mind. Someone raised their hand, but then maybe they're looking for something else.

0:53:8.845 --> 0:53:10.125
Jack Rochat
Oh, no, yeah.

0:53:17.885 --> 0:53:37.445
Jack Rochat
Yeah, to Vanessa's question, Evan, you had mentioned that that initial data solicitation e-mail had gone out. Maybe, I don't know if it's, you know, contrary to the to to the norm or to the usual approach, but maybe a reminder e-mail.

0:53:37.525 --> 0:53:53.205
Jack Rochat
To be sent out, we'd we'd like to get most of the data that is out there and and available to share. We'd like to get that in, you know, 30 days from now, you know, kind of start in the early part of of March.

0:53:53.925 --> 0:54:9.405
Jack Rochat
That allows us to have all the data kind of on the front end of the project so that nothing kind of comes trickling in last minute that it would maybe disrupt our workflow. So the earlier we get the data the better, but perhaps we can send out a a reminder e-mail.

0:54:9.845 --> 0:54:29.485
Jack Rochat
I I have got I think two or three responses so far from some stakeholders that said hey we have data, we're compiling it, what format do you need it in and so waiting to waiting to get some returns there.

0:54:29.765 --> 0:54:43.565
Jack Rochat
So if you do you have any questions about how can I share the data, what format does it need to be in? What works best for you guys? Just shoot myself rather than an e-mail and and I'd be happy to happy to get what you have.

0:54:43.925 --> 0:54:59.845
Evan Strickland

Yes, thank you for clarifying the there is kind of a timeline in getting the data which I think we put as March 3rd and I think we have a follow up e-mail schedule and I'll check on that. Vanessa put a follow up to her question about the monitoring wells.

0:55:0.405 --> 0:55:6.845
Evan Strickland
For brackish groundwater, just do we see this as a need if there aren't monitoring wells?

0:55:10.245 --> 0:55:19.685
Jack Rochat
That's a that's a great, that's a that's a good question. Sometimes, um, sometimes when we have.

0:55:20.805 --> 0:55:35.485
Jack Rochat
Water wells that aren't specifically designated as a monitor well, we can sometimes use those as a monitor well to observe historical trends in groundwater levels.

0:55:36.205 --> 0:55:55.325
Jack Rochat
I would say that those control points are probably going to be few and far between, usually because if if it's a privately owned well, it's hard to get water level data from it, you know, past the point of completing an initial well report that the driller submits to the to the state.

0:55:55.965 --> 0:56:15.205
Jack Rochat
So we we could, there's probably some approach that we can take to use existing water wells and consider them as monitor monitor wells or at least like a baseline point of where groundwater levels are currently or.

0:56:15.445 --> 0:56:31.845
Jack Rochat
For then, um, I have to get with my Groundwater modelers and figure out what our exact approach is to that. But um, it's not. It's not absolutely a need, but it is a great resource, a great control point to have. Um, 'cause it just.

0:56:31.845 --> 0:56:36.605
Jack Rochat
You know, the more information we can gather on water levels, the better.

0:56:44.5 --> 0:57:1.325
Evan Strickland
It's currently no other questions in the Q&A chat. Again, if you just want to unmute yourself, I can unmute you if you raise your hand to ask a question that way, but maybe we'll wait one minute.

0:57:1.845 --> 0:57:3.965
Evan Strickland
The uncomfortable silence.

0:57:20.925 --> 0:57:37.805
Evan Strickland
And while I'm thinking again, just re re reiterate. Yes, I will provide the webinar recording. I'll probably be available by next week. I'll send down e-mail to the same e-mail list that this webinar was sent to.

0:57:38.485 --> 0:57:42.125
Evan Strickland
And yeah, a link will be provided.

0:57:44.845 --> 0:57:56.85
Evan Strickland
All right. I think that's the end of our Q&A session. So thanks a lot, Jack. It's a great presentation and it's great to see all the work that you all have accomplished already.

0:57:56.165 --> 0:58:14.645
Jack Rochat
Yeah, thanks for hosting, Evan. Happy to answer anybody's questions that come afterwards. I think you can contact Evan or myself. There may be some contact information online or any initial e-mail, but yeah, feel free to reach out and and we're looking forward to putting this.

0:58:14.765 --> 0:58:23.885
Jack Rochat
Putting the rest of this project together and and uh continuing on with with the

initiatives that the Brax group has has uh kind of set in place. So yeah, thanks again for hosting.

0:58:24.525 --> 0:58:28.285
Evan Strickland
Alright, well thank you everyone and have a great day.

0:58:28.645 --> 0:58:30.165
Jack Rochat
All right. See you, everybody.

0:58:30.45 --> 0:58:30.725
Evan Strickland
Alright, bye.