Tribal SCAN Network

Please stand by for real time captions.

Let's get started, looking to the climate hub webinar, I am specialist for the natural resources conservation services technology Center, will be your host for today's webinar.

Also joining us is the moderator, Erin Lane, the coordinator of the USDA Northeast climate hub.

We will get started the presentation just a moment, go through a couple of items, the webinar is being recording, everyone is in listen only mode and all audio is being broadcasted through your devices speakers, computer or mobile device headsets can help you with the audio quality and volume. We still want you to be able to participate in today's webinar, so please type your questions or comments in the Q&A pod. Questions will be answered at the end. If you're having audio challenges, note the close captioning link that is provided, the captions are -- will open where you can follow along with the presenters comments. The status bar indicator to the right of help in the Adobe Connect menu bar, all green is usually an indicator that your network connection is strong and you should be able to join in today's webinar.

This webinar and all previous webinars are recorded and housed on her archive, the link for the portal is in the links pod, download a PDF of the PDF, the Hainan -- the handout, it will be brought to as a screen share, therefore the slides will be slightly different than what is presented. During the screen share portion, you may wish to use the full screen share option, choose to view the presentation mode, hover the cursor to see the options to return tomorrow return to normal view, you will need to use the card to type in your questions.

Erin, You may now begin.

Welcome to the climate hub webinar series, I see a lot of familiar names in there, I'm very pleased that you have joined us believe joined us. The USDA climate hub sorry national network created as a collaboration of USDA agencies, working together in partnership with other state and local governments and land-grant institutions and private organizations, covering all states from Maine to West Virginia including the District of Columbia, our mission with all of the USDA climate hubs is to develop and deliver science-based knowledge and practical enmity -- information, for farmers land managers, relating to the impacts of climate change. We are excited to host this webinar today, part of a series of informative webinar is the which we hope you will find valuable, Mike Wilson and Brian Belcher are providing tribal skin network, web portal for climate station data and decision tools. If you have questions, please type them into the chat box and I will monitor them and read them out, for the presenters to answer.

Our presenters are Mike Wilson and Brian Belcher, Mike Wilson is a senior scientist with NRCS, he works on issues related to climate change for the agency, and he is out of Lincoln, Nebraska. Brian Belcher is a climate applications developer with the Northeast regional climate Center, in Ithaca, New York, 20 years experience in research and applied climatology, is focuses on the development of numerous applications and online tools that enhance the utility of weather and climate data. Recently both Mike and Brian have been working on the tool that are powered by the Tribal SCAN Network, and they will describe how this is done, welcome, we are excited to learn what you have to share with us today. Take it away, Mike.
Thank you, Erin . I just want to say I don't have the slide screening component, so Jennifer, if you can move them and maybe select the next one, I will let you know when we change.
Will do.
The objectives of this presentation, my part is to give you a brief overview and history and status of SCAN, a demonstration that Brian and others have put foreskin and TSCAN. As well .

The objectives, to show or provide some improved soil and climate data for tribal lands, the forcing management decisions, strengthening the outreach, with stem education, a good opportunity for a lot of different agencies and partners to generate some on the ground partnerships with the tribes, providing support but also have a better land contact. We wanted to provide a brief overview, it was initiated in 2017 by Suzanne Baker, the resource conservationist in the state of New York. A climate hub liaison with the Northeast climate hub, and between Suzanne and the Northeast climate hub, they basically generated the initial phases of the project, and we've since participated with a number of people and it has grown over

time. It took us a year to get our first stations installed, and this year our decision-support website is going live.
A? image of what the TSCAN or tribal SCAN looks like, a modified version, that makes it more cost-effective, installation and maintenance is a little simpler due to the height of the instruments, but it is still a fully functional climate station. Some of the components that we measure, one of the unique things about SCAN and TSCAN, as is we do have different measurements at three different depths, air temperature, humidity, leaf witness sensor, rainfall, solar radiation and Winston Reid windspeed and direction. It is transmitted through a cellular transmitter.

One thing that we saw that has great potential in this when the project was being developed, we could create a lot of different partnerships, down the list, we have the tribes in RCS, also DIA, BIA and the Northeast climate Center in Cornell has contribute a lot, and you'll see is Brian Goetz going on that particular aspect.

As Brian Goetz going. gets going.

We needed the expertise to help design the station as well is the technical know-how. The water and climate Center provided that to us and you can see the whole list of how they are being involved. I might point out that over the last six months or year, they've lost six or seven staff members, the problem within the government is getting these positions hired back on, we are still waiting for them to hire a few good people. And get going, so it has caused a little bit of a slowdown on this, but there's been other problems, the coordination of installations and stuff, but we are still moving forward.

This is a status map of where we are with our Tribal SCAN locations, the blue stars, on the website, because they lost their data editor, we have to submit it against a ticket through service now, to get that information. Submit a ticket through service now. We get that logistical stepped on .

We have seven stations left to get installed, they have pretty much been delivered to the states. The goal for this particular year is to get these seven stations up and running and then have a network of 23 actually functional by the end of the year. That is probably a pretty good amount of workload to get done, due to the nature of trying to get people trained up and get the stations installed. We have to work through the NRCS staff, DRA, generating paperwork, there is some logistical things to get done, the national water and climate Center, her staff has put together a user manual or installation manual, it is really critical to help getting the stations up and running.

Just a little bit about the data, a separate TSCAN web portal, where you can go, you can look at the data, and the things that are on display there, we have information there, at the national laboratory, the K SSL data, and what we wanted to do, Suzanne has been pretty much leading this effort, we wanted to generate some decision-support tools, build on some tools that can be useful for agriculture, forestry and education. And this is our new website, and that is what Ryan would like to share with us today, for the rest of the time, it is Brian's pleasure to demonstrate his website and show you how it works.

Thank you, Mike. While I get this screen shared up, I am from the Northeast regional climate Center, we are one of six regional climate centers around the United States, and a great deal of historical climate data from a wide array of networks across the U.S., and if you put that data in a format, that is most useful for end-users in a wide variety of industries. One part of the regional climate centers that is instrumental in having access to this data and driving these tools is the applied climate information system. It not only archives the historical data that we access, and we are able to access it in an efficient and reliable way, but also has a great deal of other capabilities, processing the data on the fly, we can the tools in this manner very efficient.

We are happy to have included the data from the SCAN and TSCAN , that is what we will go over today .

A little bit about the site itself and the best experience that you can get out of viewing this website, would be kind of a larger desktop or laptop screen, while it is functional on smaller tablet screens and phone screens, the amount of detail, it is such that is on larger computer screens. I just want to go through all the sections of the site before I dive into these tools, what you're looking for right now. The travel skin, the dots on the map it all the tools underneath there, the 4 tools that have been initially developed.

The about page includes more information about these stations, and links to the documentation for SCAN and TSCAN, the brochures, and a static map here, that includes those same points that we saw on the landing page, and the updates as well as new stations are added.

On the right-hand side, about the decision tools, describes a little bit about the applied climate system, that I was talking about, and also provides? links to be able to do those four tools to this area as well, through the tool in the documentation for those tools.

The last section here is the stem applications, the first section of the STEM shows the instrumentation, and each are labeled with what type of sensor they are, you will see a little blurb on the right-hand side with information. About those sensors.

Next is a soils section, it provides a great overview of soils, and also the soil horizons, with a great description of, and pictures to go along with those. And also the soil reports, the key -- TSCAN sites, with soil scientists and the tools that they used to do these characterizations.

Manuals about K SSL laboratory data. And some examples from Tribal SCAN stations about the profiles that were taken, and pictures as well, the couple of examples are given here.

Also in the STEM session we have the tool documentation, I will click on one as example, all of the tool documentation is laid on the same format, we have a section of the top describing what the tool does, and the sources of data, what sensors may be used in those tools and if we are using any models within those tools, we will have publication information. And finally the last section, how to use the tool, we will go over any user options, that can be selected, and description of the output that comes out from those tools.

All the other documentation, the tools are laid out the same way, and in this section we have a page with resource links, useful links for the stem application. The first thing you're presented with, the scan stations, the red dots are the travel, as Mike said throughout the year, we will be having more Tribal SCAN stations coming online, and we had the map sectioned off into regions, with these buttons on the lower left and lower right hand side. And it will give you? access through the stations in those regions. By default, it will come to the continental U.S. section. And as you mouse over these points you will get information, a small box of information about the stations with the station name and a period of record that we know when the data started coming in and what it is currently active.

Clicking on one of the stations, will selected an update the data, the latest hour that we have available.

Stations can also be selected from the drop-down measure menu, -- menu, simply selecting the name and selecting it from the drop-down menu .

When you select a station, the last station that you selected will be the default station that you selected, when you come back, if you come back tomorrow or the next day, it will be centered on that particular location for you.

Tribal SCAN sites selected, the information provided to you on selection is the name and network, location, elevation, the period of record, like we saw in the box on the map, and the soil characterization. And there is a link here. It is going to pop up a new window for you and I click this in a couple of seconds here, it provides the characterization data from the soil profiles that were taken at those sites. I will close it out and bring it back to our landing page.

The latest conditions, the latest hour that is available to us, and a timestamp when that was observed. We also have a climate summary with year to date values with temperature and precipitation, year to date and month to date, and in the parentheses, when you have enough data at a station, you will see the values that are normally observed, the normal values for that period, with a view to date or month.

Going right into these 4 tools now, the tool that uses all the sensors that are available, and that is the weather graph. I can go directly to that tool, or go to the documentation first, I will go right into that tool. Then this is the format of all of our tools. Along the top here, you're going to see a drop-down where you can select the

type of tool that we want to use, few which it is by default, or a table view, within the table view, you can download a CSD file that you can directly import into the spreadsheet software.

Once again, the same type of station selection that you drop-down, or by a pop-up map. Like you saw on the landing page.

This particular tool, for all the tools, we have the view documentation button here, right below the title, if I to -- if I click on that, it will take me directly to the documentation, and there are buttons in the documentation that allows to go back to that tool pretty quickly. So the graph has 2 section sections, the weather data some reason the threshold exceedances. We are able to look at the data on different time frames in different time scales. First we can select which units we like, the ending date of the data., We can change that through the calendar quickly. The last date that Shona. The day that was selected. That shows the data -- I'm going to put that date back up to the current date. And on mouse over, you can see the actual values on those dates. For all of the variables that are selected.

I will go down to 2 days, which will give us hourly data for the last 2 days, on the left-hand side, these are all of our valuables variables that you can select. And one thing you noticed with the Tribal SCAN stations versus the SCAN, they have a leaf witness variable, an additional sensor, and also a difference that you may notice between the Tribal SCAN and the SCAN stations are the number of sensors that are therefore soil temperature and moisture, for the Tribal SCAN, there are three that are available, and for the SCAN there are often five that are available. And these can be selected when you click on these legends, you can activate or deactivate certain levels.

There is an option where you can toggle on all the variables you want to, that seems to be were a lot of charts where a lot of charts are, but a lot of data, but more or less, maybe two or three, so I like to toggle off a bunch of these, so that we can compare a couple of the variables at the same time. The 2 months brings us up to the daily data, and 2 years will give us monthly data. The Tribal SCAN , after was installed, the monthly data, 2018, the station started bringing in data, partway through September, September 2018, and since we didn't have a complete month, that is why the month didn't show up, so once we get the complete months, we start getting that data in for the complete month.

And since this is a station that has a shorter period of record, we will find a login create a record year. Okay, this is a SCAN station that has a longer period of record, we can fill out that 2 year daily data chart, you can toggle on those additional temperature steps, a great way, I've said that a picture is worth 1000 words, you can pick up so much information on how the temperature is distributed throughout the soil layers. When that flips per season, and what the temperature ranges are at various depths, all of that in one place, it is just a great resource, something we envision can be used a lot in STEM applications as well.

Look at the entire record, the application, temperatures, annual averages for rainfall, and assumes -- annual sums. Looking up -- at the threshold exceedances, this allows us to see how many days are above or below a given threshold, so we are looking at annual data, these are frequencies, the options we have here are for high and low temperatures, observed in a day, and total precipitation. By default, the high temperatures are selected, we can take the days, and type in the threshold, it will update that chart for us with the new extremes. For those temperatures, we will often use a day, less than, let's switch that to zero. So you can look at the church together, or toggle them all off, select one, and they will look at precipitation, for days greater than half an inch. The one thing you notice in this chart, does a couple of years here with missing data. The record goes back to 2005, in 2020, we can see with the current count is, for 2009, 2010, we have some missing data, the reason for that, even though there was data observed for that year, it might've been a certain number of days that the sensor went bad or something occurred where we don't have enough data to calculate the number of days, so we leave that so that what we are showing here is comparable from one year to the next.

Okay, if I want to switch tools, is going to go to the next one, before I do, this tool, it is all the sensors at the stations, and a pretty general tool and how it can be used. All of the other tools are quite specific, to use a specific sensor, variable from the station for a specific purpose. The first one I will go through is the calculator, this particular tool uses the temperature sensor, and calculates the accumulation of heating throughout a growing season. For a specific plant or insect. What it uses is the average daily temperature, and the difference between the average daily temperature in some base temperature. And the plants will tend

to grow above a certain threshold, and that growth is inhibited below some temperature threshold, that is what we are referring to here as the base, the difference between the average daily temperature, finding out how much heating occurred relative to what that plant needs, we do that each day and we will put that throughout the season. When we look at the inputs here, we have the opportunity to select a date of when we planted and also a specific date, going into documentation real?, and show you at the top of this documentation, you see a description, these these bases, you will see the example of different types of plant, and also different types of insects or diseases. So you can always go back to the documentation to refer to those.

Back to the tool, the temperature is a good estimator, of this growth. When there are no other stressors apparent, dry conditions affecting plant growth, or disease or pests that are affecting the plant growth, if those are not present, the heat accumulation is a good indicator of that growth.

This is a SCAN station, me changed a little bit longer. Back here. We can see the features on the chart. We are going to see the data, the 15 year averages the last 15 years, at that station. All the years combined, the green is diffusion to date, the lower left hand corner, we will go to the previous year so we can see that a little bit better. What I did was I clicked on the calendar, you have previous years available for that station, you can see the results for those years, the greenline here, they are what was observed in that year, 19 and how it relates to what is typically observed there. I can switch this in the calendar, maybe a specific planting date, when I do that all the calculations proceed from that date, in this case the date it was planted. But say we are working with the plant, quickly change that. And update. And it will recalculate for that particular species.

And just like the other tool, if we want to see the data itself in table form, you can do that, you can download a CSV, change the variables that show up in the table. Whatever your preferences are for viewing.

Going to our next tool, the water deficit calculator. Actually, I'm going to switch stations again. Again we are kind of early in the year here, the water deficit calculator tells us how much deficit we have in the water available to a plant, and we are combining the profile, the social characteristic information with the soil sensor information from the stations. And combining those where we know the melting point and we know the seal capacity by calculating from the soil characteristics and using the sensor data to determine what the actual deficit is at each station location.

Our inputs for this include the soil depth, we can put in a range of depths here, I have it set for the top 6 inches, and you can think of this as the effective zone for a specific plant. What I would like to do, since we are early in the season again, all of those years are available to us, I will go to last year, we can see a lot of data showing up here for the water deficit. What you will see is this blue line, and the redline. Bay plant stress reference line is typically put halfway between the field capacity, and we put a reference line, you can interpret these values as being the amount of water that you would need to add to the soil to bring that available water back to capacity, or raise the water level back up to field capacity. The addition of that water can be through natural rainfall or irrigation practices.

Again, the way I have it's listed is for the 4-6 inches, effective redzone, the legend, to see specific levels. Since I'm looking at the 06, I can look at the 2 and 4 and see how they are in sync with each other, as the soil moisture persists goes down, you can see the water deficit increasing.

Also at the bottom here, we have a precipitation chart, and since we are measuring the soil moisture directly, the precipitation is not used in the calculations were given here for reference as well.

We have one more tool left. This is our index. The lower production, in the case of cows, lower production, lower egg production, so we can monitor the stress that in animals likely to be feeling based on temperatures, humidity, solar radiation, when conditions. Combining those, and the documentation you can look at and see how we actually calculated.

What I would like to do is actually switch this to the more southern location near. So we can actually see some results in the chart.

The cattle heat index uses 4 different sensors, variables, air temperature, humidity, solar radiation and wind speed to calculate, but sometimes either we have missing data for solar radiation or windspeed, and simplified calculation can be done using just air temperature or humidity. That's why we created a general large animal and general small animal tool, so when you are limited on the types of data that you have, you can still get an estimate of what the heat stress is doing to the animals, the cattle, based on biological cooling methods. The small animals. The air temperature and humidity. For the real-time conditions. The historical frequencies. And what we are able to see here, these are annual number of hours in specific stress categories. For a dairy cow, what we are looking at right now is a timescale of hours. And as you mouse over those categories, you can see the specific numbers, in this case specific numbers of hours in this category. If you mouse over the legend, and say you want to focus on the more stressful categories, the alert an emergency, you can do that. You can see the days for each year.

I just want to emphasize, you can, for all of these, if you want to see it in dataform, select the table and you will get to see that, and downloaded in CSV form, imported to a spreadsheet. So that is our last tool. I will put it back up to the landing page, and send it back over to Erin for whatever question you might have.
Thank you Brian and thank you Mike, it was great to learn all of what you've shared with us. What great work you have been doing on that website, and think you've to Mike and Suzanne for putting this will project together and making it happen.

So you can all type in your questions into the question-and-answer box, and we can open it up to discussion.

We had a couple of questions while the presentation was going, I will start with those. One is about sites that are showing new data, April, Taylor was looking forward data from Choctaw Coke Oklahoma -- from Choctaw, Oklahoma.
It looks like it is at the site, I don't know if it is not getting collected by the Cornell site with Brian or not, I haven't had a chance to look at that, I thought I had better pay attention. We can make a note of that and look forward, but it seemed like the data was actually being transmitted to Portland, so I'm not sure why we are not seeing it. Go ahead Brian.
Yes, over the past we've been looking into a couple of issues, the station was one of those, looking at how we are accessing the data, might be missing something with the particular station, we are on it, we might be looking at what we are missing there, so hopefully that will be the result.
I might point out that Brian's website is brand-new, and our project is, too, we are trying to double check things, if you are familiar or interested in the particular TSCAN station, looking at the data, verifying if it is there or not, if it looks good, we are just getting out of the winter season, and all the stations but need basically somebody to go out in clean off the leaf moisture sensor, check and make sure the rain gauge is functional, there is nothing lobbed on it, we had a TSCAN, the backing of the clips or clams holding the solar panel on broke, during the winter, so really takes some hands-on to look at that, but I'll try to look at some of the data, we need to work through some logistics.

There are three sites in Maine that are installed, only two of them are online now, that is the situation where we are missing the data process or person to the climate center, so were having to go through another output, so we are at someone else's mercy, outside of the water climate center to get it done, and they are on the key.

Thank you for that. The next question is, are there any TSCAN stations available? Another way to asked that might be -- 23 stations are installed this year, will there be more purchased?
We have seven more left to be installed, those are spoken for, delivered to the site, except for maybe one of them, they will go in this year, and what we are trying to do is get all the bugs worked out of the network, as I brought up, the water and climate center has a need to staff up on the SCAN staff in order for us to continue on, and I know that Mike has something he is drafting, where we can get some more support for the SCAN and TSCAN networks. The lead scan person in Portland, she has now accepted a position here in Lincoln, as the national leader for the catalog lab and in the process of moving to Lincoln. That is one of our main positions down, as well as data editor and one or two more, but we hope to, I think that might be sometime next year, just got to make sure all the pieces of the puzzle are put together first and we can move forward.

Here is a good question, is there a way to make the location map triangulate and produce climate data for places other than the Tribal SCAN stations. And maybe not if in this arena, if it can be done another way?
That is a Brian question. [ Laughter ]

The way we set it up initially here is, we have specific point data, and the data we are showing on the site is purely from the scan -- SCAN and Tribal SCAN stations, we are not using data from any other networks, or any other grid products, into these, or have we done anything to estimate locations between stations for data at this time.
Okay, will the real-time data be shared with NOAA, like the regular scan site data are?
The data that we have in the applied climate information system is the same data that is available on the NRCS sites, the hourly and daily data, on the NRCS side, like Mike was showing you, it is transmitted through cellular data to the national water and climate center, and shortly after that we have access to it, and we bring the same data into our system. What we have for data is really no different from what is available on the site, the system includes this data, it has certain capabilities, for use in these web applications, as well.
I am giving them a link to the scan site that you're referencing, so they can put it into the link pod. That would confuse folks. The original scan site for NRCS. We will get that up there.

Steve McNulty asks if we can give an example of where the data and calculators are being used.
We don't have data about who is using them right now, coming up from the growing season now. These tools completed the usage of them, much more for the calculator and the -- the temptress warm-up, the heat index, we currently don't have any stats on who is using them at this point. The end of the initial development, and the initial usage stages.
Having been in the field, I would agree with that. The tribes that we work with. They practice with him, don't have any real-world examples of them using them, they would come in useful, the livestock index. On the historical frequencies, possible to summarize a different set of time, how much or how many hours of danger were experienced during a particular hot spell, they give particular livestock programs were payments are triggered at certain thresholds during a shorter time frame like two weeks. Surpassed, is that something that you can answer Brian? What we are seeing in this chart, the current development, we love feedback, what would be the most useful use of the data. They could be applied. And possibly add that in.
She also mentions that it could be useful to have a cold index. Informing the livestock indemnity program. They arty have their livestock cold index, good feedback, and he points out that these tools that are connected through this site that Brian just shown, would you be able to tell us a little -- little bit how they might be tracked for usefulness?
So another network. That I believe producers purchase stations, and after they purchased those stations, the data that those stations provide, part of the network. They have access to the site using the data. A different network of data. And produce different tools. Similar to what he was using the data, and it is similar, what you would see available, from tools on the newest site, using the newer network, could be similar to what you see on these tools. With the hourly data. The calculator as well that the use.
Fantastic. Thank you so much. It snuck right up on me, the Q&A pod open, to type in those questions, we will eventually have this archived at climate webinars.net, please be patient with us as we are getting that loaded up, there may be a little bit of a gap this time around. Back to you.

On behalf of the national resources conservation service in the Northeast climate hub, I want to say thank you to Brian and Mike for taking time out of their busy schedules, dividing information on the Tribal SCAN Network, data and decision tools, the web link will be available soon, thank you for attending today's webinar, we will see you next time in the climate hub webinar series.

[ Event concluded ]