>>Getting started with our conservation webinar I'm Casey Sheley, National Technology Specialist for NRCS's West National Technology Support Center in Portland Oregon. Greg Zwicke will be our moderator today. Greg is an Air Quality Engineer also in the West National Technology Support Center. Greg the floor is yours to introduce today's topic and to give the presentation.

>>Thank you very much Casey, and many thanks to each of you who are taking the time to log in today. We've got a lot of material to cover on this Dust Mitigation Handbook webinar, so I'll turn things over to Emile Elias with the USDA Southwest Climate Hub to kick things off. Emile, take it away.

>>Thanks Greg. As Greg said I'm Emile Elias, Acting Director of the Southwest Climate Hub. I've had the privilege to work with Steve Smarik and the dust handbook team over the past year on this collaborative project. Today you'll hear from Rachel Steele, National Lead for the Climate Hub Network, Mike Wilson, Senior Scientist for Climate Change at the NRCS, Greg Zwicke with the NRCS National Air Quality and Atmospheric Change Team on impacts of particulate matter, Brandon Edwards at the ARS-Jornada Experimental Range in Las Cruces New Mexico on climate considerations linked to wind erosion, and Nick Webb also at the Jornada Experimental Range on wind erosion models. Steve Smarik, NRCS State Resource Conservationist for Arizona and liaison to the Southern Plains and Southwest Climate Hub. Steve is the lead author on this project. He will describe conservation planning, wind erosion abatement on croplands, controlling wind erosion on natural areas, and USDA programs to address wind erosion. I'd like to acknowledge Skye Aney our technical editor and Ericha Courtright our webmaster for their tireless contributions to this handbook. With that I will turn it over to Rachel Steele for an overview of the Climate Hub program and opportunities for partnerships with NRCS.

>>Thanks Emile. Like Emile said I'm Rachel Steele, I'm the National Climate Hub Lead and I'm really excited to showcase this project for everyone today. The Climate Hubs were established about five years ago. We were a USDA interagency program meant to convert science to action and you can see our website and Twitter account in this slide.

We were established to develop and deliver science-based region-specific information and technologies so that agricultural and natural resource land managers would be empowered to make climate informed decisions. The USDA Climate Hubs are a OneUSDA approach to address the impacts of climate change on working land. The program does this by connecting USDA research agencies to program agencies to build resilience to a changing climate. You can see below some of the agencies that we work across, not to mention University Extensions and other private and public sector partners.

So today we're going to be highlighting one of our NRCS liaison projects. Each year we have a new set of liaisons and projects from across the USDA. In 2016 this program was started and since then we've had a number of liaisons working on a number of really interesting and innovative projects. Just briefly I will go over this year's run, I will

go through this year's list folks who are working with us and I will conclude with Steve Smarik who will be presenting today. So Stacy Clark is working with our Northern Forests Hub to advance climate adaptation to the Midwest and Northeast. Chris Miller is working with the Northeast and Southeast Hubs to provide an assessment of how agricultural producers are dealing with vulnerability in the coastal areas. And then Charles Peacock is working to continually expand and update our Adaptation Resources for Agriculture Workbook – it's a climate adaptation workbook that helps land managers anticipate and plan for a changing climate. Justin Mount is working with our Midwest Hub to improve understanding of management factors and variables that affect crop system wind and water erosion, and finally Steve Smarik, who you will be hearing from today, has been with us for two years, we've had the good fortune of having him longer to work on this wind erosion and dust mitigation handbook. So with that I thank you for joining and I'll turn it over to Mike Wilson.

>>Good morning, I just have a couple of comments, one is that NRCS has made an effort to be part of the climate hubs with both personnel and funding since their inception, because really we see the Climate Hubs as being an excellent opportunity not only to expand the knowledge of our employees but also the outreach of our programs and practices, and it's really a cross-section of all USDA working to improve farming and ranching and the resilience they have there. One example, and this is Steve Smarik's project, but also I might point out that above all that we have an interagency agreement that both ARS and NRCS have contributed to on air quality, and that agreement continues over the next couple of years and really looks at both dust as well as pesticide drift in the Midwest. And this is really important to NRCS because we do have some resource concerns that specifically address these issues, one of those is Emissions of Particulate Matter and PM Processes. And finally then, I'd just like to turn this over to Greg Zwicke I might point out before I do that we are soliciting more climate hub liaisons through NRCS for this coming year so if you have any questions about that program let me know. Okay, Greg.

>>Alright, Thanks Mike. For everyone the Dust Mitigation Handbook is organized into chapters, so the remainder of the presentations today are going to be organized that way also. Chapter 1 covers the impact of particular matter, which includes dust, and sort of sets the stage for why we even put the handbook together in the first place. Before we talk about what those impacts are though, I think it's important to understand the geographic scope or scale of impacts. PM can have impacts on a wide range of scales depending on both the source of the PM as well as the size of the PM. On a local level, you can have nuisance dusting or even local visibility impacts. There are still stories of traffic accidents caused by dust blowing off of fields in some areas. At the regional scale you can get impacts related to concentrations of PM compared to air quality health and visibility standards and of course here in Colorado we tend to get pretty cranky if we can't see our mountains. On a global scale you can also get PM transport pretty much across the world. Satellites have picked up different images of PM plumes from erupting volcanoes, forest fires, and even deserts that end up traveling across continents and even across oceans.

I just briefly mentioned a few of the impacts of the particulate matter but the impacts usually fall into one of these three categories. Health impacts - when small particles are breathed in, our bodies actually have a pretty cool defense mechanism where larger particles will deposit out in our nasal cavities or throat, some of the smaller particles will deposit out a little lower where we can still cough them up, but the smallest particles end up making it into our lungs where you can get irritation and also the body tends to attack those smaller particles that get down there by forming scar tissue over them, and once that scar tissue builds up considerably it starts to affect lung function and reduce the ability of the lung to actually absorb oxygen and put it through our bodies. Other impacts can be visibility, I mentioned both regionally as well as locally which can also present a safety issue, and then also deposition or nuisance dust. And with that I will turn it over to Brandon to help you better understand wind erosion.

>>Aright, briefly on climate considerations, when we are considering the impacts of the wind erosion and wind erosion management. Aeolian activity, if it increases beyond the amount that it is at a current site, has important ecological and hazard implications, including soil loss and redistribution and can also affect nutrient and land potential and as Greg mentioned has the ability to impact long-term health and also provide episodic hazards such as dust storms. Overall, climate change is expected to increase vulnerability to wind erosion in many of the landscapes of the Southwest, so understanding some of those potential effects is important for appropriate management.

Very briefly, to look at some broad-scale climate change projections, there has been increase in temperature recorded across much of the West and this is a trend that, most scientists agree, we expect to continue through the next century and on into the future.

In terms of precipitation and then wind speed, we are experiencing more variability in precipitation and also a drying trend much over the Southwest. There is a seasonal component to this as well that could have impacts for wind erosion into the future and we expect these trends to largely continue. In terms of wind speed, there has been wind-stilling noted in the U.S., so we're actually getting slightly slower wind speeds overall.

And look at how those will impact wind erosion. Overall we would expect that these projected changes will impact vegetation production, cover, and community composition. We anticipate overall to have a decrease in primary production and shifts possibly to more woody species or grass shrub transition. This can also lead to increased susceptibility to extreme events in the case where these occur, droughts etc.

In terms of wind erosion, one of the most important controls on wind erosion is the vegetation structure in terms of the spacing on the surface, how dense the vegetation is, and the distance between individual plants as well as plant height. So if we have decreases in overall vegetation cover and transitions from high density cover grasses to shrubs with bare spaces in between, we'll effectively increase the long-term vulnerability to wind erosion, and we take a look at the diagram on

the side we see the arrows indicate relative magnitude of wind erosion that can occur on a site where you experience a decrease in grass cover and increase in shrub cover. As well, there could be an increased frequency of convective storms due to extreme events becoming less predictable and those can cause episodic dust related hazards.

In terms of management, given the current vulnerability, understanding uncertainty into the future in terms of wind erosion should come into play when we look at managing to combat or mitigate wind erosion. Fortunately many of the options to limit wind erosion and manage for its impacts are similar to those for other disturbances, so implementing planned management now that has multiple benefits is also likely to the best strategy for wind erosion and will likely increase resilience and adaptability into the future.

>>Thanks Brandon. This is Nick Webb and I'm going to have a look at why we use wind erosion models and what they estimate, and then I will talk a little bit about three models that the handbook describes - the Wind Erosion Equation, ~~and~~ the Wind Erosion Prediction System, and a new Aeolian Erosion model that we're developing at the Jornada.

So primarily we use wind erosion models to obtain estimates of soil loss and sediment transport, including dust emissions for different ecological sites. Once we have done this we can start to evaluate the impact of the management practices and inform selection of practices specific to different ecological sites. In general there are two types of wind erosion models that I have ~~got~~ illustrated here. The Wind Erosion Equation and WEPS are true wind erosion models that estimate soil loss in units like tons per hectare per year from one or a small number of agricultural fields. These models are highly empirical and they tend to have a high level of fidelity in terms of how they represent management effects on the soil properties and the erosion process, but as a consequence they tend to ~~[Indiscernible - background noise]~~be less generalizable across land use and land cover types. On the other hand there are a number of dust emission models which tend to be physics-based and therefore more generalizable across land-use and land cover types, but have slightly lower fidelity in representing specific management impacts. Instead of estimating soil loss these models tend to estimate fluxes of~~in the~~ sediment, like the horizontal sediment flux and the vertical sediment flux which I have labeled as F here and which we understand ~~i~~as the dust emission.

The Wind Erosion Equation was a very early wind erosion model published in 1965 to estimate soil loss by wind from individual agricultural fields. The ~~w~~Wind ~~e~~Erosion ~~e~~Equation has a structure that's very similar to the Universal Soil Loss Equation ~~so I'll~~and calculates ~~that:~~ annual average soil loss as a function of soil erodibility, soil ridge roughness, a climatic factor, field length, and a vegetation cover factor. Application of the Wind Erosion Equation is really truly limited to agricultural fields, and because the model is highly empirical – it's not physically based - it's less generalizable to other situations. It also tends to be very inaccurate relative to more process-based models.

The Wind Erosion Prediction System was developed to overcome the limitations of the Wind Erosion Equation. It's a process-based daily time step model that simulates weather, different field conditions including plant growth, and soil loss by wind erosion. The relationships underpinning WEPS were developed from extensive wind tunnel and field experiments conducted largely by the ARS. It includes sub models~~,~~ for hydrology, crop growth, and dynamic soil properties, and represents a large range of different management practices~~ which makes it,~~ This capability really enables users to test lots of different scenarios and evaluate practice effectiveness in reducing wind erosion. However WEPS is also highly empirical which has reduced its generalization and it is currently limited to crop lands.

To address the need for an all-lands wind erosion model, the Jornada Experimental Range has been developing an Aeolian Erosion, or AERO, model~~ and~~ AERO is being developed from a selection of the best available physics-based schemes to represent just the first order controls on sediment transport and dust emission processes. So it estimates fluxes of ~~the~~ sediment rather than soil loss. The criteria we used for selecting the schemes in AERO were that they have a high level of process fidelity balanced with very ~~large~~ small model complexity~~ies~~, ~~so~~ we wanted a small number of parameters rather than hundreds of parameters, and we also wanted the model to be applicable directly to existing ecological monitoring data~~-~~sets like those collected by the NRCS's ~~and the~~ NRI as well as the BLM's Assessment Inventory and Monitoring, or AIM, program.

AERO can be implemented in a number of ways: in a time-series mode, in probabilistic mode, and as a spatial model connected to a larger numerical weather model. The maps on the right here show some examples of the model application to estimate horizontal fluxes ~~to~~ of sediment on the top, and then PM10 and PM2.5 emissions based on AIM and NRI data across the West. We are currently working to integrate these plot level estimates of sediment transport and dust emission with ecological site descriptions in EDIT, and from there we'll relate these indicators of wind erosion to other indicators of ecosystem services and function~~s~~ to identify what we might consider to be tolerable erosion amounts for different ecological sites and how we can best respond to them. I will now pass it over to Steve Smarik.

>>Thank you. Yes Steve Smarik here, good morning folks thanks for joining in here this morning. Before we leave Chapter 3, Chapter 3 is our modeling chapter but what we did throw in at the end of that was a little section on soil and interpretations and the importance of understanding that. If you have not been to Web Soil Survey, all you have to do is type that into your web browser and it will take you right there, and if you haven't been in there for a while you have to get in there every now and then because they're always developing new interpretations, but taking a look at the soil properties and understanding some of the things that affect wind erosion is critical, and critical to understand. Soil is the foundation of everything we do here with NRCS and so that is our first go to reference, so Web Soil Survey folks. In that Web Soil Survey you'll be able to look at the ecological site assessment and we'll talk about that later on, but some of the interpretations that have been developed

include: Organic Matter Depletion - so what is the susceptibility to certain soils, whether or not they have a high organic matter depletion rate. Fragile Soils Index is another one, and that is basically a little algorithm based on content of organic matter, low aggregate stability, and weak soil structure, they put all those together and come up with this Fragile Soils Index. Soil Surface Sealing is another one, even though that's not looked at as a very positive soil attribute when you're talking in the Southwest for instance, how well the soil surface seals over - it can be a benefit in this rare instance when you maybe have no vegetative cover, its propensity to seal over is one benefit to those types of soils. Another one to look at is Unpaved Local Roads and Streets, where you have local roads built with local materials it gives you a little highlight how susceptible those roads would be to erosion. Even Recreational Development is another one there, and they talk about campgrounds, off-road motorcycle trails, paths and trails, picnic areas, all these with a rating for how dusty they would be, so those are a few odd ones that you can look at. They also have one related to Valley fever. Valley Fever is recognized as a disease from airborne fungus that gets in people's lungs, here in the Southwest it's really prevalent but I understand it's now being found up in the Northwest and as far east as Kansas, so it is moving and there is an interpretation there on soil susceptibility for the growth of this fungus. And one last one I want to point out is Range Production. Range production is a good indicator, if you have low production potential on that range site then you can pretty well assure yourself that is also going to have a pretty high potential to erode by wind.

That's it for Chapter 3. For Chapter 4, we won't get into that one very much for the sake of time, but that one talks about measuring airborne particulates and gives you several links that you can go directly to some websites that have information that you can retrieve off the site. So we'll just move along.

I just want to reiterate what Brandon was talking about earlier about climate and climate projections. This came off the Northwest Climate Toolbox, if you've never been there I would encourage you all to go check it out, there are a lot of tools there that go way beyond just the Northwest. For instance, this is their Future series, where you can predict the future for different climate aspects, and here you can see the maximum temperature. And since about 2000 to current we've already seen a rise of at least a degree there in maximum temperatures, and if you look at the next one this is potential evapotranspiration and you can see that's on a steady climb too. Evapotranspiration includes wind, it includes temperatures, it includes solar radiation, all of those go into evapotranspiration so that's on the climb as well.

So to put it in context, what does all this mean with rising temperatures and erratic rainfall? What it's going to blow down to is some vegetation types are just not going to survive in their existing environments. Some seeds are going to lose their viability, I mean if you look at how they store seeds they store them in a cool environment, a cool relatively humid environment at that. Some adventitious plants may invade, and you heard Brandon talk about brush species, micro-fauna, soil micro-fauna might not survive, naturalized pasture may require planting

to new varieties, and so you have to ask the question - what kind of potential do we have for ecosystem collapse out there?

So I want to show you a few slides here, this is off of Interstate 10 here in Arizona, by looking at that you'd say "oh, man, that must be abandoned cropland or something", well we did some soil tests out there, and you know what? pH levels were fine, sodium levels were fine, salinity levels were fine, by all accounts that should be growing something out there. Well there is some kind of desertification process going on, and so how do you control these kind of things? This picture was taken by Greg Johnson right next to Interstate 10 and he did not stand in [momentarily lost audio] there but I will talk a little more about what we did on this particular site a little later if we have some time.

Here is another picture, we went D4 in northern Arizona, several counties here in northern Arizona – Navajo, Apache, and Coconino counties went D4 for almost a year, and what has happened here, what you are looking at is a complete die off of perennial species. Perennial species, they're supposed to maintain themselves over a several year period and it just totally destroyed them. You can see what kind of damage that is, and that's going to be hard to recover from when you have a year with no growth, no seed production, that area up there is still suffering today. And if you look in the background you can still see some of the brush is still alive out there and that's what Brandon was talking about, these hard droughts do favor shrubby species over herbaceous species.

Another thing here is idle cropland, what are we going to do with all the idle cropland that seems to be cropping up? We have to realize that our surface and groundwater supplies are finite and it's already resulting in a lot of temporary fallowed grounds waiting for improved conditions, and we're going to see a lot of long-term fallow where we get successive years of low water. You've already seen California go through that, different parts of the country has experience in this, and in fact a lot of it, because of water shortages, we have a lot of permanently abandoned cropland in the West, and you can see what happens there you look at the bottom of that ditch that's all aeolian sediment there.

So I belong to a couple of dust groups here in Arizona and we have these meetings so a lot of chatter after these things and one of the things they ask us is how does NRCS identify you have a problem, how do we know if we have a problem out there? And then what do you do to address the problem? That's why I felt like we had to have a little bit of a lesson here. I cannot explain it in five minutes after a little conference on how we do things, so I thought we'd put it in this handbook and discuss our processes. So chapter 5 has Introduction to Conservation Planning - how do we assess wind erosion and particulate emissions and how do we go about inventorying the resources and formulating alternatives and analyzing the effects of these alternatives?

So that's the content there, so I have a little bit of an introduction to conservation planning in there, and NRCS uses a nine step planning procedure and this - identifying the problems, determining objectives, inventory the natural resources, you can read the list of how we go about the conservation planning process but that particular process

has been adopted by many different businesses and units of government for other things besides conservation planning, it's a pretty standard process. So that's NRCS's process.

Assessing wind erosion resource concern what do we do? Well, when you're gathering data, the first thing you're going to look at is what kind of cropland and what kind of perennial cover do you have, if any. Are you growing something that just stays on the ground for multiple years in a row? What kind of residues do you have out there in between crops? Do you leave them there? What is your tillage intensities for each of the crops you grow? We've got to take a look at all that. We utilize the Wind Erosion Prediction System, and in assessing an existing benchmark condition out there you can do visual observations of sediment deposit and fence-rows, ditches, looking at potential sandblasting of crops out there, and on rangeland we use the Range Health Assessment primarily as our main tool to assess the potential for wind erosion on site.

So as I said before, soils is the first thing we look at, we go to Web Soil Survey. One of the first things we look at is Wind Erodibility Group and its corresponding Wind Erosion Impact, so I will talk to you a little more about that. Ecological site description, we will look at that and try to assess what state this ecological site is in and we use Web Soil Survey to get us there, it will cross-reference over to our EDIT tool which is the database where we house all the ecological site descriptions in. We utilize WEPS to evaluate existing condition, as I said in the previous slide. So what is WEPS? It is a little data intensive I will admit, but you collect a lot of field data, you have to understand what the farmer's tillage system is, how do they till in between crops or even during crops, and then also WEPS can account for irrigation so you have to get an irrigation schedule, know what the crop rotation is. And on range, there again we conduct a Range Health Assessment. And Range Health Assessment we look at several different attributes there, we look at soil site stability we look at the hydrologic function, and then the final one is the biotic integrity.

So talking about Wind Erosion Groups, Groups 1 through 8 are grouped and all soils are categorized into these wind erodibility groups where 1 has a severe potential for wind erosion and 8 has no potential; 8 is bedrock, it's not going to erode by wind. I will say that again, 1 is the most severe and 8 has no potential. Also you will see in the column next to it is Wind Erosion Index and that is a corresponding value that, with no management, essentially what kind of tons per acre per year can you expect in erosion. So when you look at that chart though, you see you're going from 8 with no erosion, all the way up to, with no management, up to 38 tons per acre in group 7, so that's a really wide margin. 38 tons per acre is not, I mean that is pretty significant erosion with no management, and my point there is that you can see that pretty near all soils can erode by wind so you have to manage them properly.

So formulating alternatives. We utilize the Field Office Technical Guide. Each state has their own version of the Field Office Technical Guide, so when you go into FOTG you will select your state and it will

take some browsing to get used to what's all in FOTG if you're not familiar with it, but under Section III we have a discussion on resource concerns and many of the states will have these little sheets, little cheat sheets so to speak, on what practices will address soil erosion by wind and what practices will address particulate matter emissions for air quality concerns and of course you can consult our conservation practice list as well and there is a link to that in the handbook itself to take you directly to the conservation practice list, there is I believe 169 conservation practices and not all of them address wind erosion obviously.

How do we analyze the effects? We have what we call the Conservation Practice Physical Effects database. It's a little bit subjective, and when you take the CPPE on a national level you have to realize different practices will have different effects across the United States, some are going to be more effective in some states than others, so that's why each state has their own CPPE and it's an assessment by professionals what kind of effect you will have, the practice will have, on each resource concern that we acknowledge here at NRCS. So it goes from a -5 to +5, as you can see there, with +5 being a substantial improvement and -5 being a substantial worsening of a resource concern. I will say I don't believe I've ever seen a -5 on any of our conservation practices for any resource concern. That does not happen often.

Anyway, analyzing effects. You can use the CPPE database to look at each practice that you might be proposing and see what the effects are, or alternatively we have what we call an RMS Planning tool, there's links to get to these things, where it will automatically go through all of our practices and if you're just selecting the wind erosion or the particulate matter resource concern in the opening page, it will scan through all of our practices and tell you which ones have a positive effect for wind erosion or particulate emissions. So that is an easy tool that you can use rather than scanning through the 169 resource concerns we have.

Another cool thing that we have here is these T-Charts where you can assess positive and negative effects real quick. You have negative effects on the right side and positive effects on the left, and some of these are two pages long so it's a pretty good run-down. There's a link to all these T-Charts in the handbook, so you can look up any practice you're interested in and look at your and positive and negative effects. Each state has its ability to actually modify these, they're in Microsoft Word form, so you can add to it. Like for instance cover crop in there, you don't see anything in there dealing with the irrigation thereof of a cover crop, and in the Southwest that's a concern and the cost of the water is one of the largest inputs and so that's something we have to consider. But we use these as talking points with the farmers or ranchers when we're talking about the implementation of each practice.

So chapter 6 we get into actual practices. What practices do we apply on cropland? So, running through our RMS Tool I said we were in cropland and we have wind erosion and these are the practices it spits out as having positive effects for wind erosion. So you can glance

through there and you see some in the 1s and some all the way up to the 5.

So how do we control dust on cropland? We have to interrupt the creep and saltation processes, those are those horizontal flux processes that Nick had talked about. We have to slow down wind at the soil surface or possibly even divert wind flow. So how are we going to do this? We're going to do that by reducing soil disturbance, we are not going to till the soil so much, we're going to to bind the particles together, that's that organic matter thing - organic matter's the glue that holds everything together, so we have to encourage organic matter, increasing that in the soil. We have to keep the soil surface covered, that is your residue component and that includes things like your tillage and no-till which keeps the residues on the surface. If nothing else you want to increase surface friction, the roughness, and we have practices that do that, if you are expecting the land to be out of production for a period of time you might want to put it in some kind of ridges or furrows to increase that frictional component and thereby allow the wind speeds at soil level to be reduced, and then of course you can create barriers to wind so that's things like your windbreaks, wind fences and that kind of thing.

So when I assessed what practices we do, what are the most popular practices across the country, and I did that both in dollars and in numbers of instances where we've installed the practice, and you can look at these charts in the wind erosion handbook, and you can see cover crop by far and away is the most popular practice there with $258 million over a five-year period from 2013 to 2017, that is our most popular practice across the country. And, what you have to realize is that some of these practices have more than just a wind erosion benefit, there's soil health benefits, there's water quality benefits, and some of these practices some of these top practices actually address several resource concerns, so we cannot say that every cover crop we've planted was for a wind erosion concern, but it is one of the most effective at controlling it. So anyway, looking at that, our conservation crop rotation is a little bit of a distant second but another popular one, mulching and tillage practices are also big.

So this is the next set and as you can see we dropped from the tens and hundreds of millions of dollars being spent down to even less than 1 million spent. And some practices like strip cropping, for instance, you look at that one, we have always thought looking at these wonderful pictures in the Great Plains in the Midwest of strip cropping of how much we implement that practice, but it's actually very little down there, less than $100,000 across the country in implementing that practice, so there are some surprises in here on how much some of these practices are used, so I encourage you all to look at that.

And then we have included state specific graphs, so that's in an appendix and you can go to the state you're interested in and see what they're doing in your state for instance. So here is one from North Dakota and you can see their big practice is windbreaks, and that's a significant number there, and that is reported in feet, and you will see down at the bottom what the practices reported in, some are reported in

acres and some in feet, and so that has a tendency to make your graph a little wonky in some cases but nonetheless you still get the numbers. But yeah, I will say North Dakota is our leading state in the implementation of windbreak installation.

Take a look at California. California - a huge diverse state and they have a huge diverse number of practices that they implement, with their top one being hedgerow planting, number of feet there, that's pretty significant.

And let's go look, just for fun, let's go look at Florida across the country in the Southeast and look at what they are doing. They do a lot of herbaceous barriers, and so did California by the way, and that kind of thing is evidence that maybe that's some coastal work that they're doing, controlling some wind erosion along the coast. So anyway we will move along here.

So under conservation practices, in that chapter you will see a definition and description of each practice that we implement on cropland, you will see hints on how best to implement them, there's a lot of links to pertinent guides and you have to look down at the bottom, a lot of them look like footnotes in the handbook, they are actually links as well and it will take you to a lot of these guides. And then we have photographs of each practice as well so if you're not familiar with that practice you can get a visual look at what one is, and then we have graphs depicting the top states that implement that practice, so for every practice we have a graph in there on what states are implementing this practice in a high amount, and this is an example of that: so I just threw in cover crops and showed you what the graph is there, you can see Indiana is our top cover crop state in the country and it looks like they do twice as many as the next state which is Iowa, so kudos out there to Indiana for all their work with cover crops.

And here is one on no-till and reduced till, I threw them in one graph just so you can see the differences there. Some states do by far more no-till than they do reduced till. Oklahoma hardly does any reduced till, as you see there it's mostly no till in that state.

So at this point you're probably saying why all these graphs? Well, first and foremost it gives farmers, ranchers, and conservation practitioners a glimpse of what works in their state, and it even allows our agencies, not just NRCS but other conservation agencies, natural resource agencies, to look at their organizational structure based on what kind of staff they're going to need in the state to implement these different practices. And states might recognize new opportunities, adjacent states might be doing gangbusters on one practice and you have to wonder why we don't do any in our state, it might give you some opportunities to look at that and share expertise across boundaries.

When you go to assembling the plan, and this is something you can do in the inventory stages, you have to know your wind speeds and your wind directions and your critical time period, so you also have to know what your crop rotations are and figure out what your critical time periods are. Generally that is between crops when the soil is the barest

and where you've just got seedlings perhaps out there. So, this is an example of a wind rose, and just real quickly, it gives you the percent of the winds, based on their wind speed and what direction they are coming from, what compass direction. This particular one is a wind rose that NRCS actually has a wind rose website that you go to, and these are predetermined, they are by month, you get the closest one to the site you're looking at, and we have one to two per state in there, and at a minimum you can take a glance and see that. And this is from 1961 to 1990 so a little outdated I will say, not particularly the most recent.

So unfortunately I'm directing you away from a NRCS website and telling you that you are better off going to this Midwest Regional Climate Center, you have to register for this site but it is far superior to the NRCS where they're already just canned wind roses. This you actually put in the data of what you're looking for and I will show you the interface here. You do a custom, you can do a custom, where you look at a time period, you can customize the time period - your beginning date and your end date, you can customize what years you want to look at and even the hour, you can get down to the hour, what are the winds like at 2 AM in the morning, so can customize that, and you can ask for how many spokes as you want, whether you want 36 points on the compass or just 16.

So let's talk about Chapter 7 real quick, we are running out of time, so dust abatement on rangeland, natural areas and unpaved surfaces. Here again, here is the CPPE values for all the practices that address wind erosion on these natural areas, unpaved surfaces, rangeland and pasture land.

So what are we looking at here? We are trying to encourage robust vegetative growth, a practice that would do that is prescribed grazing; we're looking at how do we best provide cover, that's heavy use area protection, normally that's a gravel around a heavy use area; and we try to distribute livestock, that's watering facilities; and we try to limit traffic, and there's an example of a practice there.

So grazing land practices, we do have some with some inherent risk and that's only because of the temporary reduced cover that these practices will give you, and that's practices like prescribed burning, brush management, and grazing in mechanical treatment. Those will leave the surface bare, so you have to plan those practices when you expect the least chance of dust emission, so there again, look at those wind roses.

So here is one on prescribed burning and I will just give you one example, we have prescribed burning, where is prescribed burning going on? It is going on in the Southeast it's plain and evident, in Alabama, Florida, Georgia, and Mississippi, and the farthest west in the top five is Oklahoma. You don't even see the Southwest in here - Arizona is nowhere to be found, even though we like that practice we just don't do it often because it will probably burn until it gets to Oklahoma before they can put it out. That's a little bit of a joke. But anyway we do like to burn here where we get the chance but wind speeds, temperatures, and humidities often don't allow us to.

So real quick we have USDA programs that can address wind erosion concerns across the country, focusing in this particular chapter on FSA programs and NRCS programs, but I have a little bit of a disclaimer in here. This information is based on current programs as they are today, but what we have is the 2008 farm bill and there are some unpublished rules there for all these programs so I cannot really talk about the rules in specificity, so I have to have this disclaimer and let you know that we are going to try to update this particular chapter as these rules are developed.

So for NRCS our top program here is Environmental Quality Incentives Program. All the practices discussed in this book are cost shareable through this program but I will warn you some of them may not be available in your state because your state does not do very much of that practice. But this chapter discusses the financial assistance available, talks about payment schedules, payment rates, and payment scenarios, what all those are and I know it is a mouthful with all that, it tells you how we develop all that and also the requirement to follow a conservation practice standard and specification.

Another one is Conservation Stewardship Program: those are five-year contracts where you already have a certain level of stewardship but this program is designed to enhance what you are already doing, so we have bundled enhancements, we have single practice enhancements and you have an opportunity to renew after that first five years but the caveat here is you must include all your agricultural lands in your operation in this particular program if you sign up for it.

We have the Regional Conservation Partnership Program - that is a partner sponsoring where they can leverage money from different partners. There's several different programs, I've listed them there, that are umbrella'd into this particular program. In 2018 RCPP gets its own funding, whereas in the past we had to pull the program dollars out of each of those other separate programs, but this can allow where you recognize you have a wind erosion program and some communities are already doing so and are trying to organize an RCPP proposal based on all the partners that are interested in it. It's a pretty good program and getting popular every year.

For Farm Service Agency, we have several different programs here. The Conservation Loan Program to help farmers come up with upfront money to get some of these practices implemented that NRCS might recommend to them and it definitely can include wind erosion practices.

Conservation Reserve Program: that's a long-term program to set aside ground over a 10 to 15 year period, to take these highly erosive soils, highly erosive lands, out of production and put them into some permanent vegetation, help control erosion, but it's not just for soil erosion, it could be for improving water quality, or reducing the loss of wildlife habitat, and you get a rental payment and some cost-share to establish that vegetative cover.

Conservation Reserve Enhancement Program is just like CRP, the only thing you have a partner in there and in particular that partner is a state agency that's willing to make some contributions.

You have Emergency Conservation Program where you have a natural disaster, FSA can come in there to help remedy some of those issues you might find on the land.

Emergency Forest Restoration Program, here again an emergency program that is specifically to forest, and you have some limitations on what kind of land is eligible.

I think that's it folks. Sorry I went a little bit long here but here is our contact information on the handbook itself and I encourage you guys to ask questions if you have any specific questions on the handbook but I will turn it over to Greg at this point.

>>Alright, thanks Steve. Take a little break there, you've been talking quite a bit. Now is the time for questions and if you do have a question this is a reminder to submit those through the Q&A pod, and we did get one question in and looks like Emile you may be the right person to answer this one. It's related to any work on dust through the Climate Hubs out near the Salton Sea in California.

>>Thanks Greg. The Salton Sea of course is a major environmental challenge, particularly as the water levels decline and expose those benthic sediments as a dust source in windstorms. It's particularly problematic because, like many reservoirs and lakes, those sediments have accumulated arsenic and selenium and pesticides and other chemicals over time, and the Climate Hubs often interface with resource managers at the federal, state, and local level to address major challenges like this one, but in this instance the state of California is really leading the charge with their restoration plans that propose spending about $9 billion over 25 years to restore the Salton Sea, so we are not working directly on the Salton Sea at this time, but there is certainly of course a weather and climate component and I could see either the California Hub or the Southwest Hub interfacing with local and state and federal resource managers, probably in the context of bringing people together to talk about solutions and then how to implement those solutions, so that's a great question, thank you.

>>Again, if you have questions please submit those through the Q&A pod and we don't have any piled up right now but one thing I wanted to add maybe Steve to your discussion on the NRCS programs the Environmental Quality Incentive Program - there is a special carveout actually under EQIP for the National Air Quality Initiative, where funds are specifically put towards the air-quality projects, and every state has the ability, every NRCS state office has the ability to request funds through the National Air Quality Initiative to specifically address air quality issues. I know Texas and Oklahoma have pretty specifically targeted their National Air Quality Initiative funds towards looking at wind erosion on range lands especially, and so they have done quite a bit of good work there for the past several years, but if any other NRCS

states are interested in participating in the National Air Quality Initiative, that's something you can talk to your programs liaison and figure out how to go ahead and get that request in and figure out if we can get you some money to help address some air quality issues.

I'm not seeing any more questions and answers and we are just about at our time. Casey, I think if we shut it down now that should be fine. If anybody has questions that pop up afterwards feel free to contact any one of us listed on this slide for contact information and we will direct you to the right person.

>>Thank you Greg and presenters for making presentations today, thank you to all participants for joining in. We have more than 100 people joining today's webinar. Participants, provide your feedback and if you selected continuing education credits please return to your open browser window to continue the process on step 2 and this concludes our webinar presentation.

[Event concluded]