Jeff Herrick and Mike Pelland discussed state and transition models and how they are important sources of information for developing record sheets.

So, Jeff, take it away.

Thanks Mike. Over the next few minutes, we're actually going to do a couple of things and one of them is just provide a general overview of state and transition models and how we use them as part of the Range Health assessment process. I'm not sure how many of you've had an exposure to the state and transition models, we'll provide some references later, post it on the web site and you can go back and read more about them, this will at least give you a bit of an overview. Then, we'll pause for a few questions and move into the second part which is where we talk specifically about reference sheet development. We are going to spend a lot of this broadcast talking about reference sheet development. So, with that, I'm gonna go ahead and move to our POWERPoint slides and the presentation here. While Mike's getting that set up, let me go ahead and just start off with the concepts that we are trying to address through the state and transition models process. Basically, we wanna know what the reference is and that's always a real challenge. This is a typical situation, happen to be in north eastern New Mexico, poor folks were standing around in the field and the person that was taking this picture was asking us what we could expect, what, what, what if, if, if, you know, if this land has been managed well for the last 50 to 100 years, what would you have expected or what could we expect if we tried to

manage this site for recovery and we always think about green grass, at least, in New Mexico and I think that's the case every place I've around the country around the world, but, then, they're always a number of optimists in the crowd. These two guys that they were just sure we could get a riparian area back. The reality is though n most cases, what we're trying to do is simply define burnt area and in some cases completely devegetated where we don't have any vegetation clues if we could even stabilize this site. In the case of this particular ecological site, what we're trying to figure out if we could even stabilize it at all, whether with microbiotic crusts or vegetation or whatever and the same transition models are gonna help tell us what is possible, now, you've also gotta look at what's realistic. So, basically, to summarize, Rangeland Health reference is based on what is possible. The Rangeland Health is evaluated relative to a consistent standard which is the reference state and we'll show you what that is in a minute here, but, they also indicate what's realistic because they tell you what kind of communities you may be able to get to without significant input, knowing what's possible then, what's actually possible on that site if you had enough resources to put into a restoration project gives us consistent standardsis for inventory assessment monitoring. There is no moving target. Rangeland Health uses the same reference each time it's applied, no matter what the current status of the land is. We've talked in the past about applying this to former parking lots. How can we do that? As long as the soil profile is intact and the climate hasn't changed, we can apply Rangeland Health to a parking lot. I think I know the answer before I even apply the protocol, but, the point is it can really be applied to almost

anything as long as you've got an intact soil profile and the climate has not changed, which again, is something that we're gonna probably increasingly deal with in the next few years. Complete range of management options, it also provides that. What's realistic, in other words, what we can achieve without significant additional input provides a secondary standard, in other words, you go ahead and you do your assessment based on the standardized reference and then you say okay, but, what's really, what's really realistic here given the fact that we don't have a lot of resources to put into it, but, it's gonna tell you which plant community you should be able to manage for, so, this is an example of a state-and-transitional model that, the specific one, but, before we do that I'm gonna turn to the overhead and go through a generic one here that's actually on page 16. So, if you could turn to page 16 of your, of your manual and here on the overhead, we'll actually run through a couple of these, a couple of these examples. So, basically, most state-and-transitional model should look something like this. You're gonna have a reference state, usually up in the upper left corner, not always, but that reference state is going to include the historic climax plant community. The historic climax plant community may not be identified as such, but, it'll be there and I think you'll, in most cases, if you know the area, you're gonna recognize it. However, you'll also see a number of other communities, in most cases, not all, included in reference state. These are all plant communities that are either on a successional pathway with the historic climax plant community or which are connected fairly easily through time. In other words, through a fairly simple and inexpensive change in management,

maybe adjusting stocking rate, season of use, pulling the awkward vehicles out of there that have been in there doing donuts, given the few years, you should be able to get back or manage for one of these. Then, we've got other states and these are states that once you move into one of these communities, it's gonna be tough to get back to the reference community. You may actually have more then one of these states and we're gonna show a couple of examples where in fact, this is the case, but, basically, it takes a lot of input to get back. So, an example here might be shrub removal. You've had a grass plant state here in the reference that had shrubs and native perineals in there perennials in there, we had shrubs increase and some exotic annual grasses come in. To get back, you're gonna have to get rid of the exotic annual grass and maybe do something about the shrub density. So, with that, I think we'll actually switch to, back to the power point and look at a specific example mike.

Yeah, for those of you in the great basin, this example is probably familiar, this is a loamy ecological site in southern Idaho and as Jeff pointed out, the reference state, the historic plant community probably was represented by this, many of you looking at the ecological site description, you know, that show a mix of about 40-50% grass, 30-40% shrub in that neighborhood, but, within the disturbance regimes that would occur on this site, if we have fire at fire return intervals that we would expect historically, maybe in a, a 40 to a 70 year period, we could easily shift back to a shift in dominance to another community dominated by grasses, over time, the shrubs that reestablish within this is sagebrush and we

may even get to a situation later on where we have a fairly large component of shrubs and then another fire and within this cycle then this is a reference state with the communities that we would accept. Jeff mentioned we can cross thresholds and with the introduction of cheatgrass, we've certainly seen a change in the under story, we replaced the perennials for basic grasses with an annual grass that's very susceptible to fire. With an event such as fire, then, we can literally go to cross another threshold into another alternative state, this is dominated by these exotic annual grasses and once we get down to this situation, we really get locked into a cheatgrass wildfire cycle with very little hope of going back to any other community without some pretty significant management input into it. So, hopefully this gives you a little better feel graphically to what Jeff described on the overhead from a conceptual model standpoint.

I think, yeah, that's an excellent summary and a very nice example of a site that is clearly undergoing some pretty dramatic changes throughout the great basin. One of the things I'd like to emphasize is down at the lower right corner of that previous slide, we saw the definition of a threshold and it said it was a relatively irreversible transition. Now, that doesn't mean that you can never go back, it just means it gonna be a lot harder and thresholds are, it's a tough term and one that we've, we've really been struggling with. A lot of times people use it and they say "ups" I'm over the threshold there's no way we're going back. That's not the case, it simply means it's gonna take more energy. I'm gonna turn now to the

overhead again and take a look here at another state and transition model. This one is from southern New Mexico, the upland sandy and southern desert and one of the first things to note about this is you had three states in that previous model, in this one, you've actually got six different states and that's significant. You're gonna see a lot of variability in the number of states and in fact, as you move further east into some of the great planes areas, you may find that you're in areas that really have just effectively one state because they've got a high level of recoverability, okay, it's like a tall grass prairie. You can hammer that pretty hard. It's pretty hard to take it into a state unless you go out there I suppose and compact it with a road grater or something, you could probably turn that into another state, but, you're gonna have a variable number of states depending on the system dynamics. So, if we can go back now to this example of the sandy site, we've got a reference state up here that shows actually five different plant communities and we zoom in on that, this is also referred to in our case as the black Gram estate, but, you'll find that you've even got snake weed in here which for anybody from the southwestern part of the country might kind of roll their eyes and say, how can we have snake weed in a reference state. Well, because snake weed is something that bounces in and out depending on the weather and depending on the disturbance regime, but, if you, if you got snake weed in there, it will often go back out on its own or decline to the previous level. Now, the other thing I'd like you to know is that we've got this dropseed black grama plant community. This also shows up in another state. Now how can that be, you've been telling me, well, I, how am I suppose to be able to, to identify these

particular states if the thing that I would normally use to identify in the plant community and the plant community is the same in two different states. You gotta go to the text, you gotta be able to look at the descriptions that are written up in association with these models, don't just look at the models and what you'll find when you go to that text is that what's different between these two states is not so much the plant community, it's the soil dynamics and degradation of the soil surface horizons that has occurred and this is where these range health indicators can often help you understand what's going on in a state-and-transitional model, it's not just the plant community, it's the plant community together with the soil and the processes that are occurring. So, so go back here once more then to our overhead projector. The thing to note is that in each of the transitions, I'd like you to note, each of the transitions are labeled and those are as I said tied to descriptions in the state-and-transitional model. So, with that, we'll go back to the power point projector again and look at the next slide. In summary, then, the state-and-transitional models are ecological site based, in other words, there is one uniquely _____ ecological site and it can be used in a couple different ways. The reference state indicates what is possible based on the ecological site potential, where you could get, if you're in a community within that reference state, then, you can probably get there pretty easily, but, if you're not, you better start looking at the plant community in the current state because that's probably what's realistic in most, but, not all cases. If you've got sufficient resources, you can probably get back to the reference state and %%% and spend a lot of money, NRCS has provided quite a bit of money, the Forest

Service has put quite a bit of money into what we call range improvement. A lot of these range improvements would fall into the category of moving a piece of land from one state back across the threshold to another state. So, S & T models are in the case of Interpreting Indicators of Rangeland Health are used to determine the departure from the reference state. Now, there is not a one-to-one correlation as people have often asked us. Why don't you just say that wen it's moderate or moderate to extreme it's cross the threshold? That's not how this was developed. Interpreting Indicators of Rangeland Health is designed to help you better understand what's going on and so, in case of a none to slight departure, you can be fairly certain that it is falling within the range of variability for the reference state, slight to moderate, moderate, moderate to extreme simply indicates that a threshold is being approached or has already been crossed and again, I use that example of those two plant communities in the sandy site where the process that was important air with soil erosion and soil surface degradation. In the case of extreme to total, that's a situation where you can be pretty sure that you've crossed the threshold and you are in a different state. When you cease to the complimentary, but, you've got to be careful not to link them too tightly together. Finally, the two can be used together to identify specific issues or concerns. So, as a teammate tell you that you're in a different state-and-transition model may tell you that you are in a different state, but, it doesn't tell you exactly what the problem is and Interpreting Indicators of Rangeland Health , those indicators will help you do that and also to help identify and communicate

management options. Anybody who has pushed the clock can come in right now with a question on this topic.

This is Ed Horne from Prineville.

Hi ED, go ahead Ed.

Ah, whose developing these models and where do we get' em?

Excellent question, these models are being developed in a state by state basis by both BLM and NRCS Forest Service is actually now starting to get involved as an interagency agreement, an MOU that's been set up and they're actually setting up an interagency team, the forest service, NRCS and BLM to develop standards for ecological site descriptions for rangeland, but, for the time being, the best source for finding out what the status of those is for your particular area is to call the state office of the NRCS if your local BLM Office isn't aware of anything going on. In some cases, I'm afraid in some states, the state office, the NRCS, simply because they haven't had a chance to get around and talk with everybody may not be aware of all efforts, so, it is worth also talking with a local BLM Office and the other thing is if you find that some of these have been developed, these are intended to be document models that will help integrate our understanding as it evolves over time. So, I worked for the Agricultural Research Service Jornada Experimental Range. We tried to get the best available science

into these state-and-transition models, but, we don't have all the knowledge, we don't have all the information possible and we're continuing to do research and you folks out in the field are continuing to make observations that can be used to improve these. So, we strongly encourage you not only to get involved in developing these, but, also, if you don't have time to develop them, but, you're using them and you've got some observations, please foreword those, for now, it would be to the NRCS State Office for your state, in the future, that may change depending on what the results of this MOU group are.