

## M04t09\_Compaction

Our eleventh indicator is compaction. In this indicator, we're looking at a layer of soil below the soil surface, but, in the profile that has been compacted into a dense layer of soil material as a result of some kind of an impact, maybe human traffic, other animal traffic, or traffic by vehicles, it doesn't matter, what happens is that that the weight of that impact has caused those soil particles to be compressed so that they have become more and more dense and the problem, the biggest problem that compaction probably poses is it restricts the penetration of roots into and then below the compaction layer. So, if you have a situation where your rooting depth under normal circumstances would be 10-12 inches or greater and now you have a compaction layer beginning at two to three inches and extending for two to three inches more, a two to three inch thick layer, compacted layer two to three inches down, then, the plants are restricted to that top three inches, so, whatever amount of water that can be stored there is all the plants are going to have access too, that water is also going to be susceptible to evaporation and so you're restricting your plants to the most arid part of your soil profile as compared to letting them continue to root down through that entire 12 inches of soil. So, you can greatly reduce; lose productive capacity of your plant community as a result of compaction layer. A compaction layer should not be confused with the situation such as shown in this slide where that you have a naturally occurring morphological characteristic such as this Caliche or calcium carbonate layer or any other kind of layer that is caused as a results as a process of chemically cemented layer. So, what you have there is where the calcium carbonate has been moved from the surface of the soil down to that particular

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depth and then because the water isn't penetrating much farther, this is an arid site, that's where the calcium carbonate accumulate, it accumulates there for eons of time as you have this naturally occurring layer develop here and it can be quite hard, but, it is not a compaction layer because it is not one that's been caused by these external impacts such as traffic over the surface of the soil, so, you need to be able to differentiate these two different kinds of layers that you might find because one would be rated down in a Rangeland Health evaluation and one would not. This shows our comparison, the porous soil on the left-hand picture going down into the roots, you can see the roots going down into the soil and then on the picture on the right, you can see, in fact, how that these roots at that particular level, layer of the soil, have had to go horizontal to try to find a way that they can get to water. So, this becomes the problem that we have with compaction layer, you have this massive soil structure with horizontal root growth occurring at that layer, that level, where your compaction layer begins and this indicator is important to all three of our attributes, soil site stability, hydrologic function and biotic integrity.