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Transcription of Working with the Front Range Collaborative Forest Landscape Restoration Project to develop tools to monitor forest spatial patterns, 5/7/2013

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[00:02 - 02:03] Kristen Pelz: All right. Thanks, everyone for coming. It's nice to see so many familiar faces and a couple of unfamiliar ones, but not too many. So I just want to talk to you about the progress we've made towards developing some monitoring tools for the Front Range Collaborative Forest Landscape Restoration Projects. And talk a little bit about what those are. And I've worked on this project with C. Affrey [phonetic] and particularly Yvette Dickinson, and Beck [phonetic]. And so I want to thank her and then also thank the CFLRP, and I'm sorry, I'm gonna be using that, acronym a lot. So that means Front Range Collaborative Forest Landscape Restoration project. Yes. But these are some people, there are some members of the group that have been really helpful in this work as well. [pauses] So, here's the outline of what I'm going to talk about today. A little bit about the CFLRPs, specifically about the Front Range CFLRP. Talk about the monitoring problem of looking at forest spatial pattern, and some different scales of monitoring of, forest spatial pattern that need to be done, and then talk about where we're going from here, from what we've done so far. Okay. So there's been a trend in the past few decades of increasing collaboration in forest management policy. A lot of that has been a reaction to some more litigation based changes in forest policy that happened in the 80s and 90s. We've all heard about that, and I'm not a forest management policy expert, although there are some in the room, so I don't want to dig myself into a hole [laughs]. But collaboration has sort of become an important thing at the national level in forest policy.

[02:03 - 04:27] Kristen Pelz: And the new national forest planning role that just got written recently specifically, they specifically said in the press release for it that it focuses on embracing locally

driven conservation and entering partnerships that focus on large landscapes, scale conservation. So the CFLRP project, or CFLRP has really fit into that trend. The Collaborative Forest Landscape Restoration Act was passed in 2009 by Congress. And one of the primary goals behind it was to reduce the cost of fire management. And there's this idea that collaboration was going to increase understanding of the ecological and social objectives of these projects, and then also the likelihood of achieving these objectives. And also the idea that if you bring stakeholders of forests and forest management into the room, you're hopefully going to decrease litigation against the Forest Service and other agencies for their proposed projects. So here's some, in the words of the Forest Service, why CFLRPs have been implemented. There to "encourage ecological, economic, and social sustainability. Leverage local resources with national and private resources. Facilitate the reduction of wildfire management costs," this is a big one. And they, the way they're going to do that supposedly, is by reestablishing natural fire regimes and reducing, reducing the risk of uncharacteristic wildfires. And I'll talk more about this in a little while. There also to serve sort of a demonstrative purpose to show how ecological and restoration techniques can be used to achieve ecological and watershed objectives. And there's also a major economic component to the CFLRP legislation. They're supposed to encourage utilization of forest restoration by-products and offset treatment costs. And they're supposed to benefit the communities where they are, with the goal of improving forest health, whatever that means.

[04:28 - 06:34] Kristen Pelz: So there's been about two dozen projects funded in CFLRPS since the act was passed. To be funded, they must show that there's a local consensus towards achieving these objectives. They have to show that they're economically and socially viable. And so treatment costs, only 50% of treatment costs can come from the funding from the federal government. And the hope is that, that will encourage local or more local federal agencies, more local units of the Forest Service to step up and provide funding. But then also that the economic, return from removing forest products would actually pay for some of the treatments. That's an important thing. They have to present a collaborative monitoring and adaptive management plan to be funded. And this is easy to say, but what that actually means is a little more complicated. And so, these are the criteria. And like I said, about two dozen, 23 have been funded as of late 2012. And most of them are in the Western U.S., here's a map showing the funded projects. I'm sorry, it's sort of small and it's not that clear, but I'll try and explain it to you. This tan color is Forest Service land. These sort of dark spots, which are red, but they sort of look brown, are high priority watersheds identified by the Forest Service. And then the CFLRP projects are outlined in this sort of yellow green color. And so you can see that the majority of them are in the Western U.S. Here's Colorado, there's the Front Range. There's another project on the Uncompahgre Plateau. There's this forest restoration initiative in Arizona. Lots in the Northwest in California as well.

[06:34 - 08:52] Kristen Pelz: So just to get an idea of where those are. And part of the reason they're in the Western U.S. is because these areas have historically high frequently occurring fires that occurred in these forests, and infrequent fire systems in the Western U.S. There's been a lot of change in forest conditions since settlement occurred. So, like I said, forest structure has changed in forest where fires were frequent historically. And a lot of that has to do with fire suppression and livestock grazing. Because of fire suppression, fires that would have burned in a landscape were put out, and regeneration of trees has been able to occur and be more successful in the time since settlement because of fire suppression. And then also livestock grazing has a major impact, has had a major impact on forest structure. If you think about what livestock are doing in a forest system, they're reducing the fine fuels because they're consuming all that grass. And so the horizontal continuity of fine fuels of grasses is reduced. And so if you have an overgrazed area where there would have been previously a continuous bed of grass for fire to spread through after a lighting or perhaps human ignition, the lack of that grass, because livestock ate it, would reduce fire spread and likely reduce the occurrence of fire in these areas. Some of the structural changes that have occurred because of this generally are increased tree density, because the regeneration was able to survive and was not killed by frequent, frequently reoccurring fires. And then increased vertical and horizontal continuity of canopy fuels. Vertical continuity allows fire to spread from the surface up into the canopy, and if you have smaller trees underneath and overstory tree with a higher canopy, that could increase the vertical continuity of fuels.

[08:52 - 10:55] Kristen Pelz: And then horizontal continuity as you have more continuous fire coverage of trees across the landscape, as you see here. Now, this is from a, from a gut reaction, you'd think that this would probably lead to an increase in fire behavior and activity. However, there's lots of other things to control fire behavior. So weather, topography, and things like that. But all other things being equal, if you have an increased tree density, increase vertical continuity and horizontal continuity of canopy, you're likely to have an increased fire spread in the area. Now that's a, this is a slide of summaries, summarizing tons and tons of research. And there's lots of caveats and controversy about it. But this is sort of the, the story that's easiest to present and most understandable, I think. So here's some pictures of Sunshine Canyon, outside of Boulder, Colorado. And you can see in the historical settlement era times, there was a low tree density in this area. Now this area was logged. So some of that may be due to the logging effect, but by 1985 is a very different landscape. You can see here much more dense canopy, much more continuous forest. And this is what we see today and what we're used to. But there's evidence that historically there was a much lower tree density. This area actually burned in the four mile fire, which is really sort of interesting. And I just wanted to point out, like I said, there's a lot of controversy about this. If there's

evidence that forest structure, forest density has increased in many places as a result of fire suppression and grazing in the historical era and things like that.

[10:55 - 13:07] Kristen Pelz: But this isn't a universal change that happens, happened in all forests. It's really prevalent where fires were very frequent historically. We had a low severity, frequent fire regime. In areas with higher severity, less frequent fire regimes, it's not clear that we've had that, we've had that effect. And also, even in areas with lower severity fire regimes, there was a lot of variation on the landscape. So it wasn't all super low density of forest structure. But that's another talk or another, you know, class. So one thing that, switching back to talking about the CFLRPs and what they have to do. They have to monitor the effectiveness through time. They have to produce annual reports and then also five year reports that are much more detailed. And that's a major challenge. The monitoring has to be collaborative, address local and landscape, scale effects, and it has to be economical. It has to have a low cost for its value, and has to be repeatable. It has to be done for 15 plus years. So it has to be something which is relatively easy to repeat and doesn't require extremely intensive field work. This is the CFLRP monitoring framework, and there's a lot of things that sound nice and our, sort of buzzwords of how we're going to do this. But the methods for actually doing this monitoring in a collaborative way, addressing local and landscape scales have not really been developed. So that's one of the things we are working on. So, Colorado has two CFLRP projects. I'm going to focus on the Front Range CFLRP. That's this area outlined in yellow here. It sort of spans a whole lower and mid-montane, I guess, zone of Ponderosa pine and some more mixed Conifer forests along the Front Range.

[13:07 - 15:14] Kristen Pelz: Fort Collins is over here. Denver, about right here, I think. So this is the area I'm talking about. There's another CFLRP in Colorado, the Uncompahgre Plateau [unintelligible] and a CCC fellow for the current cohort is in the room, Megan Martinez [phonetic]. And she will probably be giving a lecture about her work with the Uncompahgre Plateau partnership next year. So you can come back for that. [laughs] Yeah. So stay tuned. But I'm going to be focusing on the Front Range. The Front Range CFLRP has identified some goals that, they include these things right here. These are quotes from their initial proposal. They want to create forest conditions that reduce threat of catastrophic fires. Increase resilience to fire, insect disease, drought and climate change. Provide sustainable vegetation and watershed conditions, wildlife habitat, and provide for community needs. So these all fit in, you know, 20 words right here. But that's a lot of, some really lofty goals that they're working towards. So, just wanted to give you a little bit of background about the Front Range CFLRP structure. This is an exhaustive, but just to give you an idea of where we're working. There's the Front Range Roundtable. It's the larger group, and it was formed initially following the 2002 Hayman fire. And there are several sub-parts of that group. Generally represents about ten counties

along the Front Range in Colorado. And then we've been working with the landscape restoration team, which is a subgroup which reports the Front Range Roundtable, about monitoring and scientific and ecological, let's see, issues. And then there are some subgroups in this landscape restoration team that includes, spatial heterogeneity team, which is what I've been working on with Yvette, who's the project lead on that.

[15:14 - 17:10] Kristen Pelz: Understory vegetation team, wildlife team, social and economic, monitoring team, historical forest reconstruction team and, I think there may be some more, but I'm not sure. So, we've been working with our subgroup, which meets every month or so to talk about these issues. And then the landscape restoration team meets every month as well. I've gone to a few of these meetings, and then I've been attending the spatial heterogeneity subgroup meetings, and working on this with them. So because fire is such an important thing, the spatial pattern of forests is, has a really large effect on fire. And the spatial pattern of forests is an explicit concern of the Front Range CFLRP. So we have to monitor, monitor it, but we don't really have a good way of doing that. They say that they desire a complex mosaic of forest density, size and age at stand and landscape scales. Some of the things include increasing tree clump and spatial heterogeneity in stands and increasing the number of openings. Those are some of the specific directives. But we don't really have that well defined. We're sort of calling this the groupy-clumpy pattern of the forest, and that's sort of what everyone is, that's almost the technical term [laughs], but it doesn't sound very technical, and it's not very well defined. We don't know exactly what that is. So we're trying to work on defining that. And there are lots of people in subgroups are working very hard on projects that will inform these desired conditions. Rob [phonetic] in the audience [unintelligible] to call everyone out. He's working on a big project to sort of summarize what we know about historical conditions in these areas, and that's going to inform this desired condition piece.

[17:10 - 19:14] Kristen Pelz: But with those annual reports, and the five year report is coming due in 2014, we really need to develop monitoring protocol to put into those reports. And we can't really wait around for everyone in the group to agree on desired conditions. Does that mean, well, it's going to happen, but we'll see when. [laughs] And just to point this out, the desire for this heterogeneous spatial structure is based on historical reconstructions of the forest, from looking at trees that are out there and then remnants of wood that are on the landscape. People have decided that there was this clumpy, groupy-clumpy forest structure in the forest in the pre-settlement era. And we're trying to get back to that and restore that. And though that spatial structure has important implications for fire spread, especially crown fire spread, but also other processes such as, you know, understory tree, or understory plant diversity, wildlife habitat use things like that. So, if any of you are sort of, well, I'll get to it later, sorry. Okay. And then, there's the issue of having multiple

scales to consider. So, there's a stand and treatment scale. That's pretty obvious. And that's the scale that management activities occur on. This map, you can see the treatment scale right here. These are different stands, I think there's four, I'm not sure how many, but this is one right here. I, these may be subdivided, I can't remember. And then there's the landscape scale, which is as of yet sort of undefined. The, our subgroup has defined what we think it should be but that's sort of was a nebulous thing, we need to define that.

[19:14 - 21:11] Kristen Pelz: And here you could see a HUC 12 watershed, it's not very bright, sorry, surrounding this treatment. And this needs to, this scale needs to be something in which these treatments can actually be making a difference. So, you can imagine if it was much larger than that. This amount of treatment area in this landscape isn't going to really make a difference. So, to monitor forest conditions within treatments, we have multiple data sources. There's basic forest inventory data being collected that includes things like tree density, tree size, canopy base height, canopy with things like that. Some of that takes a lot longer, so [unintelligible] that might not include canopy width and some more information. But we have some basic force inventory information that is a spatial, it just usually presents averages across the whole stand. And then to get the spatial structure, we are using aerial imagery. The reason aerial imagery makes sense is sort of obvious. You can see and quantify the forest spatial structure pattern from aerial imagery. Now there are some problems, is not as straightforward as you might think, but I'll get into that in a little bit. So why do we want to quantify canopy cover pattern? Like I said, canopy cover has, is, has important implications for fire spread and things like that. We are using canopy cover as a variable for measuring tree spatial pattern. It's a proxy for the distribution of trees. It's not perfect, but for the question we're wanting to get it. We thought it was the best variable as a group. It has implications for fire spread, but also wildlife habitat, understory plant species and other things.

[21:11 - 23:14] Kristen Pelz: Now, what we're trying to do is quantify this pattern of lands, of trees across stands and across the landscape. But we're trying to create a pattern that maybe our desired restored pattern, but restoring the processes that would occur in this landscape before it had been perturbed by our actions. That's something like an assumption that we're making about the pattern restoration, but it's not at all certain that the restoration of processes is going to happen by restoring the pattern. So, that's a big assumption in our work. But we're really starting from looking at what we can monitor and then trying to define what these processes are later. I'm sorry. The, the color is a little funky, but it's, it's fine, I guess. Okay. So, for stand scale monitoring, as I mentioned, we're using aerial images. We are using NAIP data, which is one meter resolution. It has four bands, so there's a near-infrared band which allows you to distinguish vegetation in a much more accurate way. And the great thing about it is it's free, especially since we have a lot of Forest Service

collaborators, collaborators. They can get it for us. What we're doing is classifying image, images into canopy cover, which is this yellow color right here. And not canopy cover. We're using then a free program called FRAGSTATS to analyze this canopy cover pattern, and I'll talk more about that. But there are some things you can quantify from this pattern into real numbers that really describe it. And then, I'll give an example of two-30 hectare patches that we did some test methods on. So here are these about, our 30 hectare patches, I [unintelligible] acre.

[23:17 - 25:43] Kristen Pelz: That these two areas that we are testing on. One area has a lower density of trees, less continuous canopy patches. This area has higher density and some more continuous patches. And we thought these were pretty obviously different areas. And we wanted to see how the analysis quantified them, and see if there was a difference in them. So, to classify these images, we did a supervised classification using NDVI software and that did that, by the way. What you could see is the raw image here and the classified image, and there's 87% accuracy for conifer classification. And it's sort of hard to see this difference between conifer canopy and bare soil on this. But you could see that there's conifer canopy area and it roughly lines up with where you see the conifers here. And we classify it into four categories: canopy, other vegetation, bare soil and shadow. [unintelligible] and here you can see what they look like for those two areas. But there are some issues with these data. Shadows are sort of a black hole for data. You can't really see what's in the shadow at all. And to deal with the shadow issue, one of the things we did was change the resolution of our classification based on some work in the literature. But, we also just ignored the shadows in our analysis. And so, in this picture, you can see all these blank spots are count as nothing. They were shadows. And that has implications for the way this is analyzed. This is a canopy cover patch, and this area is seen by the analysis as being contiguous, even though there's this empty hole there. So, I'm sorry. This should be standard scale. Oh, never mind. I'm sorry. So, FRAGSTATS is a program which was used to, it was developed, related, to quantify forest structure and pattern at the landscape scale.

[25:43 - 27:40] Kristen Pelz: But we're really bringing it down to a much smaller scale, but it still works in the same way. We are quantifying the pattern with metrics. They include the percent of the landscape in each patch or in each class rather. So the percent of this area that's covered by forest canopy. Patch density is the number of patches per hectare. Largest patch index is the percent of the total area which is taken up by the largest patch. Edge density is a measure of the complexity of these shapes. It's just a ratio or a, it's a measurement of meters of edge per hectare of patch. Patch area is just the, each patches area associated with it. Perimeter, perimeter to area ratios like edge density. And Euclidean nearest neighbor distance, it's the distance between each patch and its nearest neighbor of the same type. And between these you can really quantify the pattern and

different types of patterns in different ways. So, you could see these from the analysis of two areas. We have really different values. So, this is a good thing because we could see that the canopy cover pattern is pretty different in these areas. Percent of landscape in canopy cover and area one was 42%. In this area it's about 66%. And I won't go through all of these. But, there are some major differences in the way these are quantified with our method. And what that does is it allows us to start talking about these more sort of nebulous questions of, or more difficult to talk about questions of canopy cover in a more quantifiable way. That's really helpful for talking to our, the collaborative group about it. And one thing we can do is generate distributions of canopy characteristics.

[27:40 - 31:50] Kristen Pelz: For this area, you can see that most of the patches, there's a high frequency of small patches, and the largest patch area is less than four hectares. In this one, you have a lower frequency of smaller patches, but then you have one patch that has a patch area of over 12 hectares. And so by doing that, you can really start to get at the nitty gritty of the forest structure. One of the things that that's really useful for is we can create some distributions of the desired conditions and compare that to existing forests. And I'm sorry, this color is really not showing up. This is supposed to be bright green and that goes with desired conditions. And then existing forest is this bright yellow. And that is right there. So using these distributions you can visualize how these patch characteristics are really different in, a treated stand versus a pre-treatment condition or comparing the stand to the desired condition. Now that requires us to someday define what the desired conditions are, or maybe the undesired conditions. But this gives us a framework for doing that. And what we're doing right now, actually in the next few weeks, with the help of Josh Hawley [phonetic], who's over there, is going to be starting to define some of these characteristics for some areas that this group has identified as being desirable, or perhaps having desirable characteristics. And so, we're going to be implementing this approach this summer. So, this data can add to just basic inventory data and really provide a complete picture of treatment structure. And move beyond stand means to talking about the actual spatial structure of these forests. So, now to move to the landscape scale. We are not moving as quickly at monitoring in the landscape scale, but we are making some good progress. Just in the last few weeks, we've sort of nailed down some, some directions we're going to be going in this, so that's good. So as a landscape scale, we really have to define the landscape size. And like I said before, we have to choose a scale which treatments will have an effect. Here's that treatment area I showed you before. The HUC 8 size watersheds were the original treatment, water, excuse me. The original landscapes size proposed, and the boundary for that is right around here. And no matter what we did in this treatment area, it's not going to affect this landscape size. So we agreed as a group that moving to HUC 12 size watersheds, that's this area around here makes a lot more sense. You could see that this treatment would have the potential, perhaps, to have an effect at this larger treatment or landscape level. So that's something

we've agreed upon. We have to define the variables of interest that we want to monitor. And that's, there's lots and lots of things that are important. And different people have different perspectives in what they think is important for this monitoring. And we have to consider which data are freely available because we need to repeat this monitoring through time. And it needs to be economical. So like I said, we've made progress. We define the landscape size as a HUC 12, about 5 to 20,000 acres usually. And we've made some progress on defining the variables of interest, but there's still a lot of work to be done. In our little subgroup, we've talked about using canopy cover, basal area, species composition and some other metrics, maybe things having to do with connectivity.

[31:51 - 34:04] Kristen Pelz: But that requires consensus from the larger group and then the group above that probably. So, that's definitely going to be a process in defining what information is important to monitor at this large scale. And we have to define the appropriate scale of these measurements, once we define what they are. The definition of a patch and the function of a patch is going to be different at this scale, rather than within standard scale. So, that's really important. And then, we've identified some data for our variables and scales of interests that may work. There's landsat data, landfire data, and I'll talk about that here. Oh no, next slide. Sorry. And so, some of the things we've also made progress on are, toward choosing monitoring variables like I just explained and towards, establishing some ideas of desired conditions. And this is just some brainstorming that we've done recently that event led. So we've defined or started to define some undesirable patterns of forest conditions. We agreed that continuous homogeneity of the forest, no matter what condition that homogeneity or what type of homogeneity that is, that might be a regular pattern or it might be regular closed canopy, regular, just openings. But anything that's continuously homogeneous doesn't make sense and that's undesirable. Patterns that are mismatched with topography are undesirable. So there's this idea that the highest density of forest would probably be in the most productive areas or on north slopes, things like that. And we don't want to see the patterns not matching up with the topographic conditions. But, that's really complicated. These are just some ideas we've tossed out. And then, we started thinking about processes that, that drive landscape forest structure, such as past management, disturbances, environment and environmental controls on productivity.

[34:04 - 36:00] Kristen Pelz: But moving from that to the actual variables that we want to monitor, it's going to be a challenge. So, I just wanted to point show some of the data possibilities. Landsat is a free satellite-based national data set And you can get information on it from much of the globe, really. Its resolution is 30 by 30 m. And then there are some derived data sets, such as LANDFIRE that use this free satellite imagery, and then also some GIS information like digital elevation models and things like that. This is just a picture to get to show you what scale we're talking about. This is

the forest, and then this is the 30 by 30 meter resolution. So, um, this is what we're working with right now. And we need to figure out what variables we can actually measure from data that are available. So moving forward from here. We have a pretty good method that's agreed on for implementing stand-scale monitoring. And we're going to be doing that on some test sites to hopefully start to get it, maybe what some desired or undesired spatial pattern conditions are. We need to define what the criteria for progress and monitoring is though at the same scale. And that's something that has to happen at the larger group level. We have a lot to do on the landscape level monitoring. First, everyone needs to agree on what we want to monitor. And then we have to develop and validate methods based on what we want to monitor. Yvette is leading some validation fieldwork for this summer. That will be pretty cool at the landscape level. And we have to define what the how we're making progress for the CFLRP.

[36:01 - 37:10] Kristen Pelz: And then as part of my CCC fellowship, I'll be creating a monitoring step by step tutorial, and we'll be working on that. And then finally, the whole goal of this is sort of to use this technique to report the results in the five year annual reports. And the first one is [unintelligible] can we do pretty soon? So that's where all of this information will go eventually. So with that, I wanted to take a minute to thank, again, the CFLRP and the spatial heterogeneity subgroup that Dickinson has been leading that and she did a lot of work in this project. There's many members of the sort of CSU forest management community that are involved in this group. So, thank you. And I want to thank the CCC for allowing me to participate. And with that, I'll take questions. Thanks. [applause]

[37:10 - 37:10] Speaker 1: Parmalet.

[37:12 - 37:12] Parmalet: I have a question about shadows.

[37:12 - 37:13] Kristen Pelz: Yeah.

[37:13 - 37:19] Parmalet: So you have this problem with shadows [unintelligible]. Have you found that it's more of a problem for certain [unintelligible] or can researchers [unintelligible]?

[37:19 - 39:04] Kristen Pelz: No, it's not consistent. [laughs] There's, so one of the studies we use to decide on the resolution of the data resampling for the image analysis, they had looked at the effect of resolution from, let's see, one foot up to, I think about nine feet pixels, and how that affects the canopy, the classification of shadows versus the canopy. So, if you have a certain density of forest, you sort of want your pixel size to match the size of each canopy. So, if you have a much more dense forest, it's going to sort of ignore the small shadows based on your resolution. And then, if you

have a much less dense forest with a resolution that's a little lower, you could have much bigger shadows actually showing up in the final analysis. Another thing that's important is the effect of topography. So on one side of the slope you'll have a different shadow, and then repeated flights of aerial imagery. You might sort of get oblique view of a site from one year and then a straight up and down view from another year. So, there's a lot of issues with shadows, but hopefully, hopefully it won't be too big of an issue [laughs]. Another group has sort of developed similar methods to us. So, we found that that was sort of convergent evolution [laughter] was reassuring, even though a lot of the shadow machines are sort of scary. So. Okay.

[39:06 - 39:23] Speaker 2: We talked about this before you came in, that there are a lot of complex [unintelligible]. [clears throat] [unintelligible].

[39:23 - 40:22] Kristen Pelz: Sure. I'm sure other people, like, perhaps that might be able to tell you better, but from what I, I think that one of the things is sort of defining what you actually mean by a patch or a clump, whether or not the canopy, the crown actually helps the interlocking or whether the canopy crowns are sort of close to each other. Is that a group if they're close to each other, but not interlocking? The the arrangement and sort of number of trees in each group or clumps is also another thing that's important. So one might argue that a regularly spaced sort of checkerboard where you have like this pattern on the wall here of the dots. If each one of the dots were a tree, that that would be, they each be a group. But is that really groupy, if you don't have multiple trees in each canopy cover patch? So there's a lot of things like that.

[40:23 - 40:27] Speaker 2: Is it mostly the researchers that [unintelligible] they discovered that local [unintelligible]?

[40:31 - 40:31] Kristen Pelz: No.

[40:31 - 40:32] Speaker 2: It's on one of the CSU photos [unintelligible].

[40:38 - 40:59] Kristen Pelz: You know, I I don't know if I can really say. I think people have their own specific idea of what that means. And the divide might be more between people who are actually implementing or creating false prescriptions versus people who are [unintelligible] doing that. But, I can't prove there's a clear divide.

[41:01 - 41:02] Speaker 1: Yes, Tony [phonetic].

[41:02 - 41:34] Tony: So you're, everything that you know about [unintelligible] processes and projects. Should we be focusing on tree patterns, or are tree patterns the things that are most important when we think about restoration? Or are there other aspects of the physical landscape that provide us a better idea about restoration pathways and, pathways that result to more resilient systems?

[41:34 - 42:44] Kristen Pelz: I think that the pattern is, could be really important in many areas, but that you have to adjust what's important. You're important to place on the tree canopy cover pattern based on those bio-geophysical differences. So maybe the pattern is really important, maybe at the lowest level or lowest elevation where you have had a historically most high frequency fire, and then maybe it's less so at higher elevations. But I, I struggle with that question a lot. I mean, are we really going to restore the process if, the way fire burns through these stands based on the camp cover? It's not really clear. At higher, more intense fire weather [unintelligible] times the pattern characteristics is probably going to be overridden by, by the intensity of the conditions. So, I don't know [laughs]. Sounds like a brilliant question [laughs], but my brain is dead on this one [crosstalk].

[42:44 - 43:04] Tony: [unintelligible] Perhaps an answer lies in what you talked about in the very beginning of your slideshow, which was the [unintelligible]. And the fact that raising half or, not the trees but with the grass [unintelligible] understood and carried that process.

[43:04 - 43:06] Kristen Pelz: Right.

[43:06 - 43:13] Tony: So, why are we focusing on the trees when it's, there's understory [unintelligible] facilitators of [unintelligible]?

[43:15 - 43:16] Kristen Pelz: Right. So and then again...

[43:17 - 43:20] Tony: And to call you so I'll refer to my [unintelligible] friends.

[43:20 - 43:40] Kristen Pelz: Well the light environment is going to have a huge effect on the understory response too. So we chose to focus on the canopy cover because it was most direct. But, the idea that it would impact the openings as well was definitely talked about. And we talked about analyzing the opening in the same way so.

[43:44 - 43:46] Speaker 1: Tough question, Tommy. [laughs]

[43:46 - 43:48] Kristen Pelz: Yeah. It's a good question.

[43:51 - 44:21] Speaker 3: Um, if I interpret the presentation right, it seems to be two sea ports that are in Colorado, are mostly in the central stage right now. And you've identified, some, some crucial locations for treatments. Have there been treatment implementations? And so [unintelligible], and so what's, what large [unintelligible] have been treated [unintelligible]?

[44:25 - 44:29] Kristen Pelz: Does anyone else have a good answer to that question? Yvette, do you know?

[44:30 - 44:30] Yvette: No.

[44:30 - 44:34] Kristen Pelz: Yeah. What's up?

[44:36 - 44:40] Speaker 4: [unintelligible] to know. I mean, obviously we're talking, you know, [unintelligible] is a landscape.

[44:40 - 44:41] Kristen Pelz: Right.

[44:41 - 44:42] Speaker 4: Landscape is as big as [unintelligible].

[44:47 - 44:54] Kristen Pelz: I think a few hundred acres have been treated already. And the stands in the Front Range, um, in the Uncompahgre Plateau.

[44:55 - 44:59] Tony: Several thousand have been treated by this thing, 100 acre [unintelligible].

[44:00 - 45:00] Kristen Pelz: Okay.

[45:02 - 45:18] Speaker 5: And then from the first 17,000 acre unit is all about mechanical treatment, but then they want to burn most of it, and that hasn't happened yet. And the environmental assessment for the 130,000 acre next step is out for comment is almost finished. But not implemented because [unintelligible].

[45:21 - 45:52] Speaker 3: So, so you [unintelligible]. These groups are composed of collaborative groups. It's the, the point is to increase local investment in the local landscape and [unintelligible] litigation issues, which is great. Are most of the people that are collaborating then on the fringe? Is mostly inter-agency people? And let's just look at the [unintelligible] agencies and communities to the public?

[45:52 - 46:19] Kristen Pelz: That seems to be the way it's worked out. The Front Range Collaborative is a lot of agency people. There's some private and there's a few environmental groups that are represented. And on the Uncompahgre Plateau, it seems like there's much more of a grassroots sort of community involvement, involvement. But, I haven't been familiar with that, for a few years.

[46:19 - 46:20] Speaker 3: And it's all federal land?

[46:22 - 46:44] Kristen Pelz: Is it all federal lands on for you guys? If this is intermixed, so there's a lot of private state, other land mixed in with the Front Range area. But it's all, it's all, federal lands being treated. [cross-talk] Yeah.

[46:44 - 46:58] Speaker 6: [unintelligible] we wait for the monitoring. I got a quick question on, early on, you said that one of the goals was to get some revenue from the forest products. That [unintelligible]. Do you have any idea if that's happened? [unintelligible] what's done?

[46:59 - 47:17] Kristen Pelz: No, I don't really know. I know people have been working on it. But that's not my area of expertise at all. But with, I think there are some efforts to do, bio-fuels stuff on the Front Range with the peak to peak highway group. But I'm not really familiar with all of that stuff.

[47:18 - 47:24] Speaker 6: We have a, we have a [unintelligible].

[47:28 - 47:29] Kristen Pelz: Done by another CCC fellow?

[47:29 - 47:30] Speaker 6: Yes. [laughs]

[47:41 - 47:41] Speaker 1: Any questions? Thanks. [applause]

END TRANSCRIPTION