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News and local risk reduction. Actions that we can work on. And so, we look forward to those future meetings. We could also have a small group, technical meetings to discuss, the method details, if that's, wanted by some folks. So some of the kickoff meeting goals here, this morning, are really for us to provide a general understanding of channelized debris flows.

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And then current research on post-fire debris flows in western Oregon. Walk through the scope, the project areas, the timeline and the project teams working on these projects. And then, the next steps and the risk reduction piece. So, as you probably saw at the beginning, I had, a, aerial photograph of of a debris flow that happened last year in the Eagle Creek fire area in the Columbia River Gorge.

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These types of landslides are a little unique. Compared to other landslides, they tend to initiate up here in the upper parts of the basins in several different ways. And once this material kind of gets into the channel, it comes, starting to transport down the channel. That's this part. And as it does that, they tend to grow in volume so they get bigger and bigger as they're going down this channel and faster and faster.

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And then, as they get to the mouth of the basin, what generally tends to happen is this material, spreads out because it's not confined anymore. And, so all right, Nancy said you can't see my screen. We try that again. Thanks for interrupting me. How's that?

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Better. Yeah, I see it. Thank you so much. Sorry about that. So, Yeah, I'll just start over with this piece. You know, these channelized debris flows are a unique type of landslide. Again, they tend to initiate kind of in this upper portion of the basin through, several different types of initiation. But again, as they get into the channel and they transport down the channel.

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This is where they're picking up more material, growing in volume, getting bigger and bigger and sometimes faster until they kind of reach the mouth of the channel down here. And then they tend to fan out and deposit kind of engulf everything. That might be down in this area. So this is the transport zone and then what we call the depositional zone.

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And many times we call this a fan down here. It creates this kind of fan shape. And these fans are usually build up of, many different debris flows that have happened over the decades or even hundreds or thousands of years. And this is the hazard that we're talking about here. And this hazard can be increased because of wildfire.

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And when we talk about risk, what we're talking about is kind of the combination of the hazard itself and anything that we're concerned about in this case, it might be, for example, a structure if there's a building or a road that's crossing this depositional area. That's where we have risk. And risk is the combination of these assets and the hazard itself.

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And this is an example of, unfortunate risk where a house was hit by a debris flow in the 1996 97 events.

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So before we dig in, I want to start with some background, kind of where this all came about. These projects. So in 2020, you're all very aware about the Labor Day mega fires that we had. We had five simultaneous, mega fires in Oregon. It was, it was a huge disaster for us. And at the time, the bears team, evaluated mostly the federal lands.

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And so the state of Oregon formed the Itar-Tass team to evaluate on Nonfederal lands. And this was the first time we did this in Oregon. California has been doing this for decades, and Washington state has done this for a number of years. And now, this is happening in Oregon as well. We had ten subgroups in the Itar-Tass, and one of them was the Geo Hazard Group, which was led by Bart Wills.

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Brandon Overstreet was on our team and myself. So those three of us kind of doing these to your hazard evaluations and these were very rapid, assessments of the post-fire debris flow hazard, mainly, and the critical assets and, that could be, at risk in these in these five fires.

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And some of the concerns and recommendations that, came out of that was, well, number one, the post-fire debris flow hazard is, poorly understood in western Oregon. And I'll get into that in a little bit more detail, but it's mainly because most of the research in the US, post-fire debris flows have been done in these kind of drier climate regions of the U.S., and they have a very different, type of vegetation than we have, especially in western Oregon, different soil development, different geology, different climate.

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And so, the USGS, when we have these fires across the nation, they do, post-fire debris flow hazard emergency assessments and, this data is mostly calibrated on, or these models are mostly calibrated on data from these other dry climate regions. However, USGS ran these models in Oregon after these fires, and we actually encourage them to do that because it's much better than having nothing.

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But we also, discussed with them the need for post-fire debris for research in western Oregon so that we can improve these models. And that's one of the things that we're really working hard on. And I'll get into that in a little bit. And one of the its recommendation was that because it was such a rapid assessment, we really thought that further evaluation of these post-fire debris flow hazards and the risk was, was a necessary kind of next step.

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So that was actually the first thing we did at Dog Army after, the air was finished. We started working on these proposals that I'm talking about today. And we started talking with FEMA about doing this further assessment. And, it took about a year for us to get these projects funded. But they were funded, which is great.

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That is the great news here today. And we want to thank FEMA, the Cooperative Technical Partners program, especially Wren lamb, who worked with us on getting these proposals through and getting them funded. And we want to thank all the people who supported these proposals, especially those who wrote letters of support that really helped these projects, become a reality.

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And we look forward to working with all of you on using all this data to do risk reduction in these, fire year. So let's talk a second about research, post-fire debris flow research. There is a lot of research that started immediately after the Labor Day fires in 2020. In fact, ogham is on several of these teams.

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There's the gear team, which is led by professor Josh roaring at a view of so many different scientists collaborating on that, the USGS landslide program. The Army's actually collaborating directly with them. Jason Keane and his group, we go out and we collect data after post-fire debris flows happen. So that we can understand how the post-fire environment affects these debris flows.

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What was the rainfall that happened, when they occurred? How did they start? How where did they end up going? And, there's also a group of folks that includes both of these groups above working on, directly working on post-fire debris flow research, led by Professor Ben Luzinski out of Oregon State University, funded through Odot research program.

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And finally a group, from the US Army Corps of Engineers, led by Paul Scott Fonti. And we are trying to, assess how we can do hyper concentrated flow modeling, which is, kind of the second part of the debris flow, continuum. So a lot of research is going on and just started, this is, you know, a year and a half ago when this research started, so very, new research that we're all, hoping to learn from.

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So let's dig into these projects. So which projects were funded and when are we going to be working on them? Well, we already got started on some of these projects, and I'm going to show you some of these initial results. And we started in January of this year. And we're going to we have about three years to, to, finish these projects, although, we will be trying our best to get them done as soon as we can and get this information out to all you folks.

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These are the, five fires that were funded, the Eagle Creek fire, which happened in 2017, in the Columbia River Gorge. The Betsy and the Lions had fires, 20, 20 fires on the North Santiam, the holiday farm fire, which is along the Mackenzie, and the Arctic fire, which is on the North Umpqua in Douglas County.

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Oh, look at the study extents. Where are we going to be doing this? These proposed projects? So this is the Eagle Creek fire. So Oregon is here. This is the Columbia River. Long year. Bonneville dam sits right in here. This is Washington state. And the fire extent is outlined in red. And the project extent is outlined in yellow.

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All of these little black dots here are structures. So you can see how close the fire actually came to the Portland Metro. And over here towards, the communities of hood River. Also, you can see some of the communities within the fire, like Cascade Locks and, Dodson and Lawndale.

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The next project area is the beachy Lions Head area. So again, outlined in red is the fire. Here's the big fire. Here's the lion's head fire over here. City of Salem is just off this map. To the west. This is the, the North Santiam runs along here. This is, Detroit Lake city of Detroit.

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And, again, the little dots are buildings. So, and the yellow extent is our, study extent. You can see it includes all of these communities like Mill City Gates, Detroit, Indiana, and then up the, little North Fork, including Mahama and, Elkhorn in here.

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Bill, I'm going to jump in. We're not seeing your slides advance. I don't think okay. We got we got stuck on the, I don't know, a couple of us anyhow are stuck on the slide with the research participants and not seeing the maps. So some of you are seeing the maps. Okay, so we are not sure what the issue is.

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All right. Sorry to interrupt. Yeah. No worries. Sorry you can't see the slides advancing. But it sounds like some of you can. Is that right? Yeah, we can advance. Okay, great. I'm. I'm sorry. You can't see them. Hopefully the recording is, recording all of this correctly, and you can go back and watch it later.

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So, hopefully that's the case. And so right now I'm on the holiday farm, map. And, so, this is the third project area in here, and this is, the holiday Farm fire again outlined in red. You can kind of see that extent here along the Mackenzie and the highway that runs, parallel, and all the communities, like by the Nimrod and Blue River rainbow.

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And again, all of these little black dots are structures, and the yellow extent is the extent of the project. And and within the holiday farm fire. Yeah. Please interrupt if you can't see or something's gone wrong. Thanks. Thanks for that. Hope it. I hope it, catches up for those who can't see very well. Fourth project area is the art fire.

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And so the North Umpqua kind of runs from steamboat down the middle of the fire, towards glide and then out. And the fire extent is this, red extent here. And yellow is our project extent in this case. And then again, these, these dots, these black, black dots speckled across the landscape are the location of structures.

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Okay. So, I've kind of covered, what, where we're going to do this and when. And now let's talk about what we're going to be, what we're going to be doing. There's four main tasks that we're going to work on. And task one in our scope of work is, mapping past, channelized pre flow events.

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And the deposition areas. And, you know, just by the way, all of these project areas are, susceptible to channelized debris flows, with and without fire. We have a lot of debris flows that happen in all these areas, kind of all the time. And, the first thing we're going to do is we're going to get in there, we're going to map these channelized debris flow fans or these depositional areas.

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And this is really what the lidar, high resolution topography really helps us with and allows us to see these come up through the vegetation and map these, map the extents of these fan, deposit areas. Second thing we're going to do is in Oregon, we have about 30 years worth of statewide aerial photos. We're going to use all those 30 years to map historic, debris flow events that have occurred within each one of these fire areas.

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So get kind of a 30 year record of what's happened in the last 30 years, and maybe older. In some cases. There's photography that goes back even from that. And these types of data sets are really useful by themselves. But mainly we're going to be using them to calibrate our models to help us so that we don't over or under predict the, the hazard in any location.

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Let's look at what this is going to look like. So this is in the beachy lion's head. Study. And again, the the North Santiam is kind of running along here. This is Detroit Lake in here. And the little four, it goes, up this way. All of these red areas are mapped, fans that we've mapped.

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And you can see they're mostly located kind of at the, at the mouth of these drainages. Right. So here's some red areas at the mouth of this drainage. There's these red fans down here and down here. And these are at the mouth of these other drainages. One thing you can notice about this right away is that there just appears to be more of them, kind of across the middle section of this project area, versus kind of over here, the landscape looks a little different.

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It looks a little more subdued. And that's because the geology is kind of changing across from. Right here into this area, versus this area over here. Over here, we have these kind of larger, deep seated landslides. The channels are less incised into the landscape. And when you get over here, you see a lot more relief and a lot more incision of these channels.

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You can really see these kind of steep channels. And the lighter, steep, confined channels. And, you know, that's what really, unfortunately, is part of the factors that, that contribute to, channelized debris flows. So get a map the fans first. Next thing we do is map the last 30 years. And in this case, we did that in the beauty lines had already and these are all of the historic debris flows that we located in this area.

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So the green, dots here are initiation sites, and then the green lines are, the transport paths of these, historic, debris flows, channelized debris flows that have happened in this area. And there was a lot of them. We mapped, 250 of these events in this, screenshot that you can see right here. So we've had a lot of events over the last 30 years in here.

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Again, I want you to notice across the middle here, there seems to be more of these than there are kind of, for example, way over here in the western part or even over here in kind of the south, eastern part of the study area. So we might have a higher susceptibility to, general susceptibility to channelized debris flows across the middle here than we do kind of in these other areas, which will, hopefully get reflected in our modeling.

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So that's task one. Really understand what's happened in the past. Task two is to model the channelized debris flow, hazard areas. So model, what might happen in the future. Right. And that's, to help us understand where these susceptible areas are. And we have a new method that Doug Army and USGS worked on. That's specific for Oregon.

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And the paper is due out in about a month. And it creates kind of generalized, channelized debris flow susceptibility zones. And I'll show you exactly what, examples of what, what we're going to be doing in here. And, then what we're going to do is add post-fire factors on top of that method. Based on results and conclusions from all those research teams that are, figuring out what are these factors that may increase this hazard after a fire, and we'll lay those factors on top of, this current method to look at, which areas might have more or less post-fire, debris flow susceptibility.

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So let's look at what some of this modeling is going to look like. So like I said in the beginning, debris flows are a little bit of a unique type of hazard. You know, there's this initiation, like, will they start somewhere within the basin and then there as well? Just because they initiate it doesn't mean they're actually going to transport.

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So how likely is it that they won't transport? Those are the first two factors that we look at. So our initiation model may look something like this over on the left. This is a little basin that's draining kind of to the north. And the areas of high, initiation susceptibility are, colored in this kind of darker red.

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You can really see it's in these kind of zero order channels up here and up in these hollows that are identified as as high initiation and. No, just by the way I put it on here, these black dots, these are actual historic, channelized debris flow initiation sites that have happened. And you can see how well they generally correlate with the initiation susceptibility model.

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The next thing we do is look at, okay, if one starts, how likely is it that it will transport or go down the channel and then be able to grow and then, inundate the valley below? And, this is our transport susceptibility model. And what you can see in here is that some of these channels, for example, these on on the eastern side tend to have higher transport susceptibility.

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And that's because these channels in here have a lot steeper gradient and they're confined. You can see they have these valley walls that are kind of raised up next to them. And that keeps all the material in the channel and kind of keeps it moving forward. Versus these ones over here on the west side, a lot lower transport susceptibility.

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And that's likely because the gradient is less. And you can you can't really see a lot of confinement that's happening along these. So we have initiation potential. We have transport potential. We take both of those data sets. We combine them and we identify all of these basins. And this is part of the pilot that we did, when we were developing the method.

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And those two, factors get combined into kind of a basin overall susceptibility score. And what this does is it says, well, this these basins here in red, have a very high initiation potential, and they have a high transport potential versus some of these other basins. Maybe the orange and the yellow have less chance of starting, less chance of going, and some of them have, no chance.

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And that's, there's, that's these kind of gray area ones here. And so we evaluate kind of overall, an area based on these basins, initiation and transport potential and then based on that, we are going to perform inundation modeling. And I'm going to show you what this looks like. We're going to zoom in on this little black box right here.

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Because we have a set of basins in here with kind of a range of susceptibility. This one's high. We have some that are none, some low and some moderate. So let's zoom in on that little area right there. Looks about like this I drew on a, aerial photo on top of the hill shade. You can see a lot of vegetation here.

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You can see some of these drainages coming down. And these black outlines are map fans, so some of them have fans at the base of them. Some of them don't. This is that high potential, basin. You can see, steeper gradient, well incised channel. And then a big fan down here, there's a road here, and here's a creek down at the bottom.

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And all this is kind of a flat valley. The other thing you can notice is there's a couple of structures here. It looks like a residential, house and maybe, agricultural type of building here on this one. And the first thing we do is we model what we call the typical, channelized debris flow susceptibility.

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And this is, you can kind of think of this as about a ten, 100 year return type of interval. It's not exactly that, but that's what we're kind of estimating. And what you can see here is in pink is the primary kind of, transport and volume growth, hazard zone. So those are these zones up here in the channels.

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And then in the red is the primary depositional, hazard zone area. So you can see like in this case, this dark red is where we would kind of expect this, this, this type of, of, of debris flow to, deposit that and same over here. And in this case, you can see this. The house and the, structure are not in, in the modeled zone yet.

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However, the next zone that we, map, which is, we do three of these, and the second one is what we call intermediate. You can think of it as more of, like a 100,000 year type of return interval. These are these orange areas. You can see they're a little bit wider, in the transport and volume growth area.

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And you can see the deposition is, is more than that covers more ground than, the typical. And one thing you can notice is now the house is actually, that structure is within this, intermediate hazard zone. And then the third zone that we're going to model is what we call extreme. And this is kind of a thousand year plus type of returns.

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This is the yellow. So now we have kind of a wider even a wider zone along the transport. And then even a larger area of inundation. You can see even the second building in this case has been touched by this hazard zone and this kind of just into our third task, which is, risk analysis. And what we want to do is after we create all these hazard zones and these maps of these fans, is we want to figure out, well, what and who are in these hazard areas.

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Are there buildings, are there people that live in those buildings or work in those buildings? Is there infrastructure? And, this type of analysis is what we call an exposure or at risk type of analysis. So let's take a look at what the risk analysis is going to look like. This is along the Umpqua River in the Coast Range.

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This particular area is very, prone to debris flows. In fact, many structures, were, were, completely damaged by debris flows in the 96 events. And we had, actually several fatalities that occurred in this area. So it's, it's very prone to debris flows in this area. But over on the left, what I want you to notice is these are structures, these black, filled in polygons with the yellow outlines are structures.

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And when we do the risk part, what we're going to look at well is, well, this building here is clearly not in any of the hazard zones. Neither are these buildings. But this building right here is within the model, hazard zones. And some of these buildings are actually within the modeled zone, but also on these map fans, this red outline here is a map van.

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Here's another map van right in here. Actually talk to, one of the residents here in the structure, several years ago. And in 96, they had debris flows come down. This these channels here, these green lines are, some of those historic events. And they were just really fortunate that those debris flows kind of passed by, all of their buildings.

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And they got a little bit of mud up against the building, but very fortunate that they didn't get more of kind of a direct, hit by those debris flows. So that's on the kind of buildings, side on the infrastructure side, the over on the right is another example. This is highway Oregon Heights, State Highway 38, that's running along the Umpqua in this case.

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And, you can see the typical inundation modeling here. And, what I want you to notice is, these black outlines here, these are actual events that happened in 96. So you can see, this event that came out buried part of the road here was another event right there. There's another, there's another, there's another. And again, what we're getting is generally good correlation between, historic events that have happened and kind of this, modeling that's, trying to protect, trying to predict these, susceptible zones, that in the future.

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So that's a lot fun task for is one of the most important tasks. And that is working on risk reduction. So once we have all these hazard maps and this idea of what is at risk, we want to work on, risk reduction. And there's three kind of main ways that we're going to work on that. The first way is through awareness and education.

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And you know, everyone needs to be part of the solution. We need to share these maps and these risk reduction actions. Put all this stuff on our websites, maybe make factsheets and share those. Like this homeowner guide for landslides. Story maps are another great, kind of modern way to do that. We want to also work on planning, through comprehensive, you know, updates of comprehensive plans and regulation and zoning and use these maps in any way that, that the communities feel is appropriate.

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We have this nice guide here, brand new guide that was published several years ago by Dr. Gammie and Dr. KD on land use guide for Oregon communities preparing for landslide hazards. And then finally, we want to work on warnings. This is kind of more of the emergency management realm. We want to continue the partnership with the National Weather Service and be able to inform people, what time periods that we're we're really concerned about post-fire debris flows within these areas.

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So just knowing where they are is one of the steps. But then knowing, hey, this, this, you know, next storm that's coming in looks like it's going to, rain quite a bit with high intensities. And we should be concerned and let people know that this could be a time period where we can have these types of events, and people should consider maybe evacuating and all of this is going to be done in partnership with these, various entities.

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We've partnered with, the Land Council of Governments and DLC, and the National Weather Service have been doing just a fabulous job on getting these warnings out over the last couple of years here. And we want to continue, all of those, partnerships.

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So those are the four tasks that we're going to work on. And, the project team really, is that was funded by this project. Is really this this group here? The Army. And again, like I said, we're kind of the overall lead of the project. And our focus is really on the hazard and the risk analysis, the science.

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As I, as I just shared with you and our main team is, Nancy Calhoun. John frantic, Alex Lopez and myself. But next, I'd like, el cog, to introduce themselves and, their team and kind of a brief summary of what they're going to be working on. Are you on there? Chrissy.

00:31:09:3 - 00:31:42:3

Hi. Yeah. I'm here. Chrissy barrows, with El Cog. Senior GIS, address and structure coordinator for the county. Bob Dowden is our jazz program manager, who is, not on this call today. And so, as Bill has been explaining, this project, we will be working on the risk analysis risk reduction portion as far as, mapping all assets in the risk zones.

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Critical infrastructure, paying special attention to, building footprints and, prioritizing those structures and, let's see, and then creating the interactive, web maps for the community and our colleagues, planning staff, will be, part of outreaching, to the results to the community.

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So I think that's about it for me. Fabulous. Thank you so much, Chrissy. The other group that, is, funded to work on this project with all of you is the LCD. And so, Marian, can you hop on for a second and, introduce your team? Sure. Hi, I'm Marianne lahav. I'm DRC's natural hazards mitigation planning program coordinator, and we have a team of, three other natural hazards planners who will be assigned to each of the just the project areas to, work with the jurisdictions in each of those project areas through a series of meetings to identify obstacles to risk reduction, figure out ways to overcome those obstacles, and,

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develop mitigation actions and prioritize them. We'll also discuss how to use the new maps for risk reduction, and we'll provide you some resources so that, you'll be able to take this material away and move forward with it. Fabulous. Thank you. Marianne. Okay, so, as I'm kind of wrapping up my presentation here just to summary slide, the great news is that these projects were funded and we're starting to work on them.

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That is really moving forward. You know, the other part of this is that research is happening on these post-fire debris flows in western Oregon, and we really need this to ramp up. And it is ramping up. There's a lot of groups and a lot of people working on this. But as I kind of, talked about, a lot of this research has been done in these kind of drier climate.

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And, you know, the biggest concern in these areas is really the first rain after the fire. So kind of one year after the fire is the, biggest kind of hazard timeline. But in western Oregon, our concern, for post-fire debris flows may last year. It may last five years. May last ten years. We're not actually sure.

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And that's what a lot of this research. Oh it also may change over time. And so that's what this research is focused on trying to help us figure out. And I made this little graph down here to kind of explain that, over here on the, the x axis. We have time. And then on the y axis going up and down, we have the channelized debris flow hazard level ranging from kind of non up to very high.

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And you know in Western Oregon we already have this background hazard level. That's somewhere up on this this range. So we're already starting up here. Even without fire. And you know, what happens in these drier climates is, well, we have a fire at some point in time, and then the hazard curve may look something like this.

00:35:14:2 - 00:35:42:4

It generally tends to go up very rapidly. And then, come back down pretty rapidly. After, the first rainfalls, happened in these areas. And then, unfortunately with that comes in some cases, really bad debris flows like we saw, several years ago down in, the L.A. region and in Montecito. But in Oregon, this curve may look different.

00:35:42:5 - 00:36:02:3

So we have a fire at some point, but in Oregon, our curve may look something more like this. It may take a while for this hazard to increase to whatever peak it's going to get to, and then it may take a long while for it to kind of come back to that background hazard level and what I mean, and I'll show you an example.

00:36:02:3 - 00:36:33:1

Why, we are starting to think this is, the reality here. If we look at what happened in the Eagle Creek fire, we had a fire in 2017. We went through, several, winter years, late 2018, 2019, 2020, and not much happened. And then in 2021, we had, major debris flows, dozens of debris flows in, in the, Columbia River Gorge and even a fatal one.

00:36:33:1 - 00:37:11:5

And then in 2022, again, we had major debris flows through the gorge. And you can kind of see it took a little bit of time, maybe for that, for those effects to take, full effect. So I went through the project tasks, these main four tasks that we're going to be working on with all of you, and I also talked a little bit about the National Weather Service and the warnings, and we actually have a briefing set up for later this spring, to meet with the USGS and the National Weather Service and Okami and several others to talk about refining these rainfall thresholds.

00:37:11:5 - 00:37:35:0

With the data that we've been collecting all the way along. And we really, really appreciate, the National Weather Service being, partner on all of this. So next steps and risk reduction, after we finish all the hazard mapping. And actually during some of it, we're going to start small group meetings with cities, counties and communities.

00:37:35:1 - 00:38:10:2

A lot of these meetings are going to be led by Dr. Seed, and we are going to talk about how we're going to use all this information and this project to work on risk reduction and mainly focused on awareness, planning and warnings. And with that, I come back to the, kind of the introduction slide that I had, initially, which has this little gift that plays, kind of, a block diagram of one of these types of landslides look like and this, event that happened a year ago in the Columbia River Gorge.

00:38:10:3 - 00:38:22:7

And with that, I am welcome to take any questions. Also, here's my email. And you can reach any of us, here at DOGAMI, via our website.