Sean Triplett:

Good morning. Good afternoon. Welcome. Thank you.

Carten Cordell:

Now that is a big long title. Can you walk me through your agency's mission? Obviously forest fires, wildland fires, it's a huge issue that we seem to hear about every year. Can you talk about what your agency's mission is and how you integrate into working on that?

Sean Triplett:

Sure. So first and foremost, I work for the Forest Service, the USDA Forest Service, but I'm located at the National Interagency Fire Center, which is kind of the hub for coordination and logistics for wildland firefighting. So at the National Agency Fire Center here in Boise, Idaho, we have the Forest Service from Department of Agriculture, and then in our Department of Interior partners with BLM, Bureau of Land Management, National Park Service, Fish and Wildlife Service and Bureau of Indian Affairs. We also have a Department of Defense. US Homeland Security is represented by the US Fire Administration. We have the National Association of State Foresters to represent all the states and territories. And then we also have National Weather Service and NOAA represented here. We all are co-located together because wildland fires, even though they may burn on state, private, tribal federal lands, they ignore those political boundaries and move across the landscape. So this center exists to help coordinate and work together to solve the wildland fire crisis that we're dealing with.

My role in there is I work for the Forest Service, but I work very close with our interagency partners. And I run a program. I have a great team that I work with to evaluate tools, technology, geospatial applications to support wildland fire management, pretty much focused on the operational side of fire. We do get into a little bit of pre and post fire work, but we're really trying to solve problems that exist for our wildland firefighters as they're operationally fighting fighters.

Carten Cordell:

Excellent. We've heard a lot of different capabilities around GIS and geo data. Can you talk about how it influences your work and what it brings to the table in terms of addressing wildland fires?

Sean Triplett:

Yeah, absolutely. So by nature or by mission, most of the agencies that are responsible for wildland fire are either public safety agencies or land management agencies. So we're attached to a geographic piece of ground, and so geospatial data is critical to understanding what fire is doing on the landscape. So we have values at risk, critical infrastructure, watersheds, habitats, all those areas are geospatial data, and then we put in action on there. So we have a wildfire that's started either by lightning or could be human caused. And so GIS allows us to visually see the fire's impact on the land, what resources and values it's threatening, and what can we do to mitigate the risk to those and actually operationally control or fight the fire. You also have to couple that again with, because fires are terrain, fuel and weather, and so we work closely with NOAA and our National Weather Service partners to understand the atmospheric conditions, what the weather is doing and how that's going to influence the fire behavior and/or where we could have outbreaks of dry lightning, which would be then an ignition for fire.

Carten Cordell:

Awesome. Now, you mentioned obviously a lot of the federal agencies, NOAA, Department of Interior, that you're collaborating with. I imagine that collaboration goes down to the state and local level as well. Can you walk me through how you do collaborate on those different elements, how you share the data, how data standardization works for you to make sure everybody has the information that they need?

Sean Triplett:

Yeah, so first I think data standards is most important. Here at NIFC, we have what's called the NWCG or National Wildfire Coordination Group. Originally it was started out training qualifications for firefighters, so we had that consistency across the country. And it also worked to standardize our firefighting tools and equipment, so engines and the hose and the couplings that they use. What that allowed is it brought in the standards, it allowed engines from the state of Utah to work with engines from the state of West Virginia, the members on those engines had the same qualifications, the same training, the same background.

As technology has progressed and worked its way into the wildfire community, we have a data management group now. And that group has responsibility for the integration and management of data to support wildfire, and part of that, a big topic or big subject area there is standards and terminology. So through that work, we've been able to develop data standards for all the different essential data sets that we map and use in wildland fire. We also have the same terminology, so when we refer to a piece of data and we say something like a fire perimeter, it's consistent across all of our partner agencies.

And then last, but not least, because you're dealing with geospatial data, when you actually map that entity on the ground or on a map, either digital or by paper, we have a approved symbology. So if you see a blue square on a map, everybody knows what that blue square means. If you see a hash line on a map, everybody knows what that hash line means. And so it's been very critical to have those standards. We can't really go forth and build and develop new applications, new models if you don't have those standards established upfront. And all that is done through that cooperation.

But yeah, another part of that is we have a lot of blanket MOUs that we work with. And so we tap into each other's expertise and resources. So we'll work with the state of California, who was on earlier, the state of Colorado, and we have MOUs with them where we work to share each other's technology and expertise to solve problems that we're dealing with. We have master agreements with NASA, NOAA, Department of Energy, where we leverage the expertise in there. So example, like with NASA, we have an earth scientist where they've done a lot of work understanding the earth and its different dynamic systems, but they're also expertise in aviation and aeronautics, so they're able to help us.

One of the projects we have with them is looking to optimize our airspace. So when over a fire, we have a cylinder of air that we're operating a lot of helicopters, a lot of tankers that are dropping retardant and other aircraft that are doing mapping and coordination missions, and that airspace can get very crowded. Now we want to throw in unmanned vehicles. And so we have to have very, very good structured and rigid data so we can build sense and avoid systems, and everybody can operate within that airspace safely and effectively. So NASA's working with us on that. But all of that again, goes back to a geospatial product and a geospatial data. So the location, the X, Y, Z of those aircraft, their speed they're heading, we have standards for all of that so we can be able to integrate all that data into our systems.

Carten Cordell:

Excellent. Well, you already touched on a number of the things that you're working on now, but over the span of time, we've heard a lot of examples this morning about how the data has always been there. It is

exponentially growing, but the tools and capabilities that are coming in are providing even more detail at the ground level as to what can be done. How over the span of your career have you seen, geospatial data obviously already played a role, but how has it grown and modified over time and what you're able to do?

Sean Triplett:

Well, I think it's not only that it's growing, but I would say it's also the access and the tools that have been built and available through browser type applications. When I first started my career, pretty much we were hiring subject matter experts and there was only a handful of people that could run the GIS system but also understand what they were doing when they were working in a wildfire space. It's a very complex, very dynamic environment, and then you throw GIS into that, and it took a lot of work to mesh those together.

But as the technology has evolved, absolutely it's allowed us to do better modeling and better data, but it's also opened up the capability to other areas that haven't traditionally used geospatial data. And so now we're able to have expanded use of the data, we're able to tap into different areas through dashboards and web and mobile applications. We're now able to put that mapping capability, that data creation capability into a hand of a firefighter that doesn't necessarily have to have a very strong geospatial background. So they're able to go out and collect features and information for us in near real time, and then that now makes everybody more situationally aware of what the fire is doing, what the conditions are, and that all then will feed into models and information, hopefully in the long run, will give us a better handle on fire behavior and fire prediction. As we looked at how that fire moves across the landscape.

There is a downside to that which you have to deal with, which is maybe too much information. And so the next struggle there is how do we handle all the information that's available and distill that down into pieces of information that the decision makers, those frontline firefighters can get and understand.

And then the last part about that is where we fight a lot of our wildfires is we have very limited connectivity, and so we can create all the data in the world, we can build the best web apps and dashboards, but if we can't get those to the firefighters, we can't get those to the decision makers, it's not really a valuable product. It could be a great product for someone sitting in an office, but getting it out to that frontline firefighter is the next hurdle we're over. And then once we get it there, we have to make sure that we're giving it to them in a format and a structure that they can quickly read the data, make an analysis of it, and then make a decision. If we give them a product that's too complicated, takes too many clicks, has too much attribution to it, things like that, it's just not going to be of value to them. They have to be able to make that quick decision off of it.

Carten Cordell:

Excellent. Now, some of the things that you mentioned through the memorandums of understanding with NASA, with NOAA that brings new capabilities to you. I imagine you're always staying abreast of the technology that's out there as well. Are there things that you're looking forward to, capabilities that are starting to come online and starting to come in play moving forward that will be very instrumental to you?

Sean Triplett:

Yeah, absolutely. So I mentioned unmanned vehicles earlier and all the different sensors that they provide, but the big things that we're looking at right now is trying to extend that connectivity, that bandwidth out to the firefighter so we can get data and information to them. And then along with that is

being able to do more enhanced remote sensing. And so that could be a static feature like a camera system or a static feature of an atmospheric sniffer or sensor, and then all the low earth orbit and mid-earth orbit satellites that are going up and have different mapping or spectral ranges for being able to provide us a more up-to-date information of the condition of the land and the fire. When I first started my career, MODIS was a new thing. It was just coming online. People were trying to figure out what to do with it. And now we have MODIS and VIIRS and all these other different satellites that are up there. So they're all able to provide us more up-to-date, more rapid information about the changing landscape.

And fire's a very dynamic environment. It's a very broad area. You have to think about, we have fires that could be burning in Florida all the way to Alaska. Right now we're supporting our Canadian partners and they have fires that have burned from the Atlantic coast, the Pacific coast, and all the way up into the Northwest Territory. It's very broad areas, so being able to map and understand events on that broad of a geographic scale is a huge challenge. So we're very dependent and very excited about all the new technologies that have been made available to us that allow us to have almost near real-time observation of these events across these broad areas.

And so technology is always going to continue to evolve, but they're always going to have to come back to what problem are you trying to solve with that technology. If we throw data and all these capabilities out there and it becomes just noise, we have to be very cognitive that we could overburden our decision makers with just too much information.

Carten Cordell:

Well, I'm sure that leads to a lot of feedback and a lot of coordination even when you're not dealing with wildland fires in terms of what tools are helpful, how to best get the data and the information to the firefighters and what works best for the mission itself?

Sean Triplett:

Yeah, I mean, we work very close. We're always in touch with our firefighters on the ground. Several employees that I work with on my team, they're out actively operationally involved in fire, learning what firefighters need, learning what they're doing. And then you look at just how the landscape is changing. I mean, people have been moving into the woods, we're building homes and infrastructure in areas, what's called the wildland-urban interface. Obviously the climate's changing and that's drying out our forests and driving out the fuels and making the vegetation more susceptible to fire. And so these technologies, as rapidly as they evolve, I believe the environment is rapidly evolving too. And so being able to keep a pulse on what firefighters need and understand what decisions that they're up against and what their environment is pushing on them, we're rapidly working to making sure that we're providing them the capabilities they need.

Carten Cordell:

Excellent. Well, Sean, I am going to give it a last chance for questions from the audience, but I want to thank you for the presentation. Thank you for the time. It's been incredibly informative and thank you for joining us.

Sean Triplett:

Yeah, this has been great. Thank you very much.