USDA Forest Service

URBAN FOREST CONNECTIONS

webinar series

The Power of Tree Canopy Data to Plan, Prioritize, and Inspire Stewardship

Part II: Connecting with the Community

Wednesday, October 28, 2015 | *1:00 – 2:00pm ET*

TRANSCRIPT

Jill Johnson: We will dive right into the topic, tree canopy data. This is a two part miniseries. Today's session is part two and will focus on connecting with the community. We'll hear from three speakers, Jarlath O'Neil-Dunne with the University of Vermont and jointly with the US Forest Service, Ian Hanou with Plant Geo, and Earl Eutsler with the District of Columbia.

Our first speaker, Jarlath O'Neil-Dunne, helped develop the Forest Service's Urban Tree Canopy Assessment Protocol in 2005. Since that time his team has helped more than 70 communities, in the US and Canada, better understand their green infrastructure through tree canopy mapping. Thanks for being with us today, Jarlath. I will turn it over to you.

Jarlath O'Neil-Dunne: Thank you Jill. Thank you for joining in. I'm going to give you an overview and background of the urban tree canopy assessment. What I think is great about the assessment is it brings balance to your urban and regional planning efforts. For a long time we very much focused on our grey infrastructure planning. Thinking about roads and buildings and mapping those features, or perhaps we focus on our tax space. Mapping property parcel boundaries. What we really neglected was our green infrastructure. What the urban tree canopy assessment does is give you a level playing field that brings balance to all urban regional planning efforts, by mapping your green infrastructure alongside your grey infrastructure. If you are a major city, like the city of New York, and you embark on a one million tree initiative or you are a small community and looking to establish an urban tree canopy goal you probably have a lot of questions, such as: how much tree canopy do I have right now? How much room do we have to plant trees? Where is this land we have located and who owns the existing trees? There are five phases to the urban tree canopy assessment.

We start out by mapping your land cover. Tapping what you have in your tree canopy and other land types, we can tell how much canopy you have and where there is room to plant new trees. Then we analyze that data so you understand the relationships between tree canopy and your properties. Tree canopy and demographics. Then we generate products that help you communicate the message and better communicate the findings of the urban tree canopy assessment. Because the data is geospatial, which means they are mapped data, we can integrate them into your existing geospatial support systems. Finally, we come full circle and monitor your tree canopy over time. We can tell how your efforts are faring. Are you losing tree canopy? Where are the gains and losses occurring? The foundation for the urban tree canopy assessment really is map data, specifically high resolution remotely sensed data, that can include imagery such as this. This imagery is great because it is required of most places in the United States about every three years. In addition to that, we use another data set called light detection and range. This is really unique because it is a laser that is shot from a plane. But don't worry, the laser will not hurt you. It allows us to see through shadows and measure the heights of things. So, if you're in a major city with lots of tall buildings, like Chicago or New York, this type of data is really useful because we don't have shadowed effects from buildings and also for a lot of other communities because we can measure heights of trees.

We integrate these data sets to generate high resolution land cover. With high resolution land cover we are generally mapping seven clauses of land cover. Tree canopy, grass/shrubs, bare soil, water, buildings, roads and railroads, and other paved surfaces. Unlike other existing maps where you only have buildings or parcels mapped, now you have everything. Once again coming back to the fact that you have your great green infrastructure mapped together so you make more holistic and rounded decisions. When we have that land cover this is where the real fun starts. We can begin integrating other data sets to help us better understand not only our current tree canopy situation, but also how we might expand the tree canopy. At the smallest or finest scale are the property parcel boundaries. That is what you see here in black. Each boundary represents a parcel. Using the land cover data we can summarize information for each of those properties. Here we are showing you the existing tree canopy, which is to say the amount of tree canopy that is there right now as a percentage of land owned—land area—you can imagine how valuable this is. For every property parcel in this database you now know the percent of tree canopy. If you want to compare across residential parcels, or between your schools, you know that information. We can also give information on what we call the hospital tree canopy. This is the plausible area. This represents a percentage of land area; how much land you have available to plant new trees. It's saying the land is available, not saying this land is the best place. There are a lot of factors we can't map from above, but this is a great starting point when you want to think about the true space we have to plant new trees. Because our property parcel data often includes valuable information such as homeownership, or land use, we can aggregate that information up to make better decisions. We are sorry about some of the formatting issues. We received word that some of the text got moved around. But hopefully you can read things.

This is the summary of a tree canopy for a watershed study we did. This really helps to understand who owns the tree canopy in this watershed. From this pie chart we see that 38% of the tree canopy is owned by the residents. Residents are really important for maintaining tree canopy within the watershed. 22% are street trees are located in the public rights. 27% institutional and 10% commercial, and then 3% agricultural. This really helps look holistically at your watershed, community, and county, whatever scale you are working at. It comes down to the possible tree canopy, where can we make gains? You can see here, and this is total acreage, similar patterns emerge. We have a lot of room in the residential, but when we look at the other land uses we can see that the rights-of-way has a lot less room. So perhaps an indication that there are a lot of street trees already. And perhaps we look beyond that and look into the commercial and residential. We can also bring up some more interesting patterns. What we are showing here is each circle represents an individual property parcel for the community. On the x-axis you can see the year that parcel was developed, when the home was built. And on the y-axis you see the existing tree canopy. What is interesting about this slide is we are able to understand is how previous land use and homeownership pattern influence tree canopy today. If you look at that area around the late 1800s and early 1900s, you see a lot of property with high tree canopy. In this area the tree canopy resides in individual parcels that were developed at the turn of the century. As a result, those trees are probably nearing maximum lifespan. Not all tree canopies are created equal. One of the things we can do with the tree canopy data set is divide into different patch clauses. We know the larger tree canopy patches, or larger forest patches, can provide more ecosystem services. So when you think about wildlife habitat, or other ecosystem services like creating healthy watersheds, large patches are more valuable. And by running rather fancy algorithms we can trick -- take the data set and break them into large, medium, and small patches to understand how the tree canopy are configured in your community. Going back to the earlier slide, you remember we have these data sets, or light detection and ranging, which are 3-D data sets that gives us the height of everything across the landscape. It is that information and pining with our tree canopy data that we mapped to produce the average canopy height across your entire community. So here we are. We have taken our tree canopy data set and broken into polygons to represent largely individual trees, and from each one of those tree polygons compute the average canopy height from the LiDAR data. And then we can graph that out in the upper left-hand corner.

We know the distribution of height. If you are in a temperate climate, which a lot of us are, you can often assume that height and age of trees are at least correlated in some way. This will give you an idea of the age of the forest. What is really valuable about this is we have done it at such a fine scale, down to the individual tree, you can [Indiscernible] for watershed or even down to an individual parcel. Now we spend a lot of time thinking about doing these five scale mappings. Mapping trees and other land cover features at a very fine scale. And we are doing things like mapping a patch of five scale and mapping the tree heights, but really the power of the assessment is in the detailed mapping that allows you to make decisions across a broad range of geographic boundaries. At the very fine scale, of course, it's parcel data that we shared an earlier example. You can integrate social demographic information: census

boundaries, neighborhood boundaries, and finally to the cross jurisdictional boundaries such as your watershed. Let's look at this. A tree canopy assessment -- many of you will recognize the river paths are test pattern. This is Pittsburgh, Pennsylvania. Here we have the neighborhood boundaries. For each neighborhood we have computed the neighborhood tree data. This next slide shows the surface temperature for each one of those neighborhoods. This was mapped from a satellite. It does relatively coarse 60 m. resolution thermal data very valuable when we aggregate this stuff up to a neighborhood level. Now we have two data sets we can merge together at a unit of analysis that is meaningful to the people in our community. We know the amount of tree canopy and we know how hot those neighborhoods are. We spend a lot of time talking about the ecosystem services the trees provide, but these can be difficult to illustrate. Take health for example. It's really challenging to do a detailed survey in your community and relate information, such as asthma or obesity or longevity to tree canopy. We know those patterns exist but we don't always have concrete data for every community. Surface temperature, thanks to the satellite, we can get this for every community. We can combine that information with our tree canopy data to come up with some meaningful patterns. Let's take a look at all of these neighborhoods here within the city of Pittsburgh.

Each circle represent the neighborhood. Under the x-axis we have surface temperature and on the y-axis we have the amount of existing tree count in each neighborhood. We also have some other information displayed. We have the percent impervious and the number of crimes per-person. See this clear inverse relationship between surface temperature and tree count. As the number of tree canopy increases we see a drop in the surface to mature. This is viable for the community because if you are in one of those neighborhoods the benefits from tree canopy, your cooler, will have less risk of viable populations dying in a high heat event. And now we have integrated some other neighborhood data. This is neighborhood crime data. Per capita crime. It is symbolized in the color gradient. Each circle is sized according to the amount of tree canopy. These types of graphics also help illustrate patterns that we've talked about before. Or you have neighborhoods where a lot of things are wrong. There are not a lot of trees that are hot and high crime. This can help focus your rejuvenation and planning efforts. There are other types of planning we can do. Let's take a look at a watershed example.

Here we have a tri-county area. We are going to take a look at four very different watersheds. Take a look at information that will help a planner or help an urban forester strategize about how to best approach increasing tree canopies in the watershed. This next infographic asks about the amount of possible tree canopy that is plantable area in each one of the watersheds. Let's take a look at the top one. See that is a watershed that is heavily developed. We see that most of the room to plant new trees is in residential land and rights-of-way -- we probably need some sort of private ownership outreach if we want to increase tree canopy. But also a pre-planting initiative will work well. Let's go down to the bottom and look at the upper 10 mile creek. It is an agricultural? some needed watershed. You probably want to think about establishing trees within riparian buffers on agricultural land. Of course we're not going

to plant trees on actively farmed land. After that, it’s focus on a private initiative of reaching out to residential landowners. This type of information, which we summarize in aggregate, can really help you understand and plan for your initiatives. Here's another example. We had a community interested in planting trees near large forest patches on riparian buffers. So we identified a priority matrix for them that helps identify those locations that meet the three criteria. And now we can present that information in infographics and more detailed reports. This is very valuable. You have two minutes with the City Council or you want your planners to have a more detailed 15 page report.

I mentioned early on that we can go back and revisit and map change over time. That is really valuable to help you understand the changes to tree canopy in your community and if the initiatives are working as you hoped. Just to give you a highlight about what we are doing in the future, we are mapping tree canopy now for very large areas. We just released a 1 m. resolution tree canopy data set for the entire state of Pennsylvania. It's very detailed. In 1 m resolution you can see some highlight. The costs are coming down and we are hoping to make that land cover data more accessible. Finally, I would like to wrap up quickly by talking about what are the people, things that can make an urban tree canopy assessment successful. The people are really important. Make sure you don't just involve your own foresters and planners. It's a very data-driven exercise and having those people on board is crucial. Think about who your consortium and partners are. Governmental entities, nonprofits, and private sector. Having your GIS people on board will help you understand the data framework. The better data you have in the more accurate. Finally, the funding. Think about how much your community is spending on property mapping, building mapping, and road mapping. And paying for all the great data that we use. Chances are that is many times higher than what you're going to pay for a tree count. That sums up my presentation. I will turn it back to you. Thank you so much.

Jill Johnson: Thank you Jarlath. Now that we have a chance to settle in with one presentation let's take a minute to learn more about who is listening in on the webinar. So we will post a few questions on the screen and ask you to respond to them fairly quickly. The first question is where do you work?

Jarlath O’Neil-Dunne: In terms of where we work our projects are all over the United States.

Jill Johnson: I am sorry, Jarlath, these are just general questions.

So the first poll question is where you work. I will give you a few moments to fill it out. Our next question is what is your profession? Again I will give you a few moments to fill that out. And we will close that. And question is where are you from? We will close that in -- now. Our last question is how many participants are listening at your location? We will close that now. Thank you very much.

We will get back to the presentation. Our next speaker is Ian Hanou, the founder of Planet Geo. He has 14 years of private industry consulting experience and has been recognized for his innovative urban tree canopy and tree planting applications. We are glad he could be with us today. Now I will turn it over to you.

Ian Hanou: Thank you. Can you hear me?

Jill Johnson: Yes.

Ian Hanou: I believe it was about 7.5 years ago that you moderated the first presentation that I gave in urban tree canopy. We have some history. It is a great privilege to be here today. I think Jarlath's presentation was up terrific segue in a way I can reiterate some of these comments. What I want to talk about and share with you today are ways of designing an effective urban tree canopy study. I will do that with a case study from Columbus Ohio, and some online interactive tools we built and wrap up with some impacts and outcomes from across the country. And show some resources as well. And this will illustrate different scales, products, and partners. We have been focusing on the accessibility of the information and different ways it can be used interactively. Just to reinforce the concept that the process, as a whole, really does create a lot of buying and collaboration. I think most of you know that. Columbus Ohio a little over one year ago the project started. They had a lot of different motives for why they wanted to conduct an urban tree canopy study, ranging from climate protection and sustainability to invasive species. I won't read everything. We worked with the green space working group that was developed in 2012, and they were a great stakeholder group to have as a partner. This is really a comprehensive assessment and online tool.

They really needed to create an outreach campaign and also have an accurate baseline for developing, and maybe enhancing, their ideas on an urban tree canopy. This is a quick look -- quick look at the different paths of the project. With limited time I'm going to briefly talk about number two, number four, and number five. I will show a few illustrations and community tools that we developed to bring everything together. Jarlath already introduced the scales that can be assessing as part of the -- I want to reiterate the audiences these can target. This is an example of the different scales that were chosen for the Columbus study. They reached the front audiences. From street and parks staff to planners. Two more regulatory and policy initiatives, as well as green structure and stormwater projects. This is what we chose for the Columbus project. One of the tasks of the study was to look at the relationships between tree canopy and sociodemographics. The American Community Survey was useful for this and one of the outcomes we found is as the tree canopy increases so does the indicators here. And we can spatially show ways that this works out across the landscape by the intersection of where we have below average tree cover and below average median household income. Those are the oranges areas.

Moving along into the online tools and out of the assessment phase. Those data layers are then used as inputs into an online tool that is really a comprehensive application focused on getting any user to interact with the urban tree canopy data. I want to show you ways that we have developed this so that users can view, plan, and grow the urban tree canopy at maybe a citywide, county, or regional scale. Then move into more of an intermediate scale, where we can get into implementation, tracking, and outreach. By actually plotting our implementation activity, and then keeping track of the progress, we're making at more of the neighborhood scale. I will jump right into this. This is an online tool. Anyone can access this. There is no software to install. The first thing is you might want to get the canopy data. If you don't have GIS skills or software, which a lot of users don't, this tool allows them to interact with the information very easily and quickly. If you are applying for a grant and you want to show areas that have the greatest need for tree planting.

If you look at the red slider bars on the left, you see the arrow. All we have done is move the slider bar and now what we are showing is just the area at the block level. You can change the geographic scale for those different boundaries at the block level. We are showing areas with lower than the average citywide tree covering. And, higher than the average planting space. This is one example of how you can interact the data. You can hover and get some statistics as well. Working with the green space working group another process was basically focused on prioritization. What are the priorities in terms of where we want to maximize trees as part of our overall tree canopy goal? They came up with these six themes that you see on the left. They are represented as slider bars that represent the weight that you want to give to particular criteria. You can slide these bars as example I have shown here, we have focused on economic vitality. This is where we have opportunity for tree planting, where there is also areas of below average income, education, over occupancy, and age. This is information for the census block layer, but it is very quick and easy to see the new slide these bars where these different priorities in the landscape exist and how they play out in terms of tree canopy goals. Moving from the landscape scale, city or county wide scale, down into actually implementation.

The users in Columbus can register to add tree planting events to the site. They can do that by dropping a point into the map and enter information about the organization, the number of volunteers involved, the funding source…things of that nature. They can do this of course to engage citizens, to track what they're doing, and even get volunteers to sign-up specifically for tree planting events. Finally at the individual tree level, we can choose species and add those to the form. These essentially get added to each event. I should mention, going to talk in a moment about some of the outreach programs they have developed and where this tool is linked through that program. Finally, there is a quick reporting tool that summarizes and tracks. Where they are in the process of their goals for tree planting. I will talk about that in a moment. With that quick introduction to different visualization techniques and ways to design an effective urban tree canopy study. I want to shift focus to what is asked of us a lot.

What are the outcomes and impacts from these canopy studies? This is hard to quantify. I actually reached out to several clients to get input from them specifically on now that it has been a few months, or a year or two, can you tell us what would have been different about the assessment. To maybe wrap things up with a case study on Columbus, I will start with that example and I have a few others. The single biggest impact from the UTC study in Columbus was the development of the branch out campaign. To piggy back on Jarlath's comments earlier on private property and where the opportunity is, the assessment really helps to show that there is a need and a role for citizens' private property and that there are 300,000 goal is not happening without partnerships. It also provided clarity in a previous target. Realizing it was probably not realistic to go from 22% to 27% in five years. The city also said they are really doing a lot more proactive management and less reactive. Now that the study has been completed, they emphasized the need for more well-defined standards for urban tree management and protection. They developed a committee with the hope [Indiscernible]. The last point is getting back to the watershed scale for assessment and planning.

We are doing a follow-on assessment with the local community in upper Arlington. What this will help do is there is a group called flow and the data is now going to be wall-to-wall or more copperheads of at the watershed. I wish I had a full hour to talk about everything they are doing in Grand Rapids. I'm going to share a few highlights. We worked with the city of Grand Rapids earlier this year, and they already had in process an update to their zoning ordinance, with emphasis on tree and landscaping. So a few things happened there recently. One, they have established urban tree canopy goals for their web used types. They have also been using the data at the parcel level to review site plans and work with developers, who in the past have attempted to learn information about the property, where Demetrius are there?, and remove those trees prior to getting a permit. What they said to me is having this baseline, now at the parcel level, is really an expendable thing that they want to move forward on being able to come back and say, we had this data. This relates to a downtown canopy plan anymore overarching plan. They're using the canopy data to establish a goal.

It has been several years, maybe four or five, since they established a 40% canopy target. It's currently at 34%. Downtown is just 4%. It is starting to get conversation started and it has not stopped. They're developing the plan. What they learned from the study is that with 10 acres downtown of planting space that is vegetation versus 70 acres that was plantable impervious area largely parking lots, what they need to focus on is tree health in parking lots. They've actually already approved a volume-based soil requirement for trees on media in parking lots, instead of a two-dimensional requirement. That is a big step up to get more canopy downtown, in that 70 acres for total possible area. One of the other things they are doing is a neighborhood level plan in the East Hills neighborhood. Again this will reiterate what Jarlath talked about. They had less than 200 vacant street tree locations based on a current updated inventory, if they have 34 acres in this neighborhood of planting space. Open-space ingress areas.

Again, the canopy assessment helps to inform that plan. In addition, we are wrapping up a hydro study using the canopy information as well. It is funded through an EPA resiliency grant. That is just a small portion of the great things they are doing. Moving on to a couple other samples; The University of Memphis has conducted a geospatial analysis for land cover and urban tree canopy across the entire county. We were brought in by the Wolf River Conservancy, later in the game, to take the data and help apply that in more of a setting approach. We were really proud of the public outreach component. About one year ago, we held a stakeholder workshop and conducted a SWOT analysis (strength, weakness, opportunities, and threats). We presented the information that came out in the study and also provided surveys to 10 different communities in the county. You can take a look at the end and ways in which the canopy data was used to form a plan.

Two last examples and I will give my recap. We worked with the Savannah Tree Foundation last year, and earlier this year. One of the startling findings is that over a 15 year period the county has lost over 21,000 acres of forest cover. I was thinking about how to present that when I went to visit. We came up with is equal to 2.5 football fields of tree canopy every day for 15 years. One of the other findings seen from the study was that there are over 5000 acres of parking lot within that county. What this has helped them to do is to secure funding from a federal NOAA grant through the Georgia Department of Natural Resources, to look at parking lot design and ways we can make parking lots more tree friendly. This was not new science but needed to be done locally, and hope this would be impacting municipal ordinances along the southern coast of the United States, terms of tree canopy, and all the benefits that come along with trees in parking lots. Those are a few of the highlights.

In Aspen, Colorado we conducted what they wanted to call a “community forest analysis.” They are working to develop stormwater credits for property owners, in terms of managing and planting new trees as well as preserving trees during development. Similar to Grand Rapids, I don't know if I mentioned this, they're using the data specifically at the parcel level to look at the site plan review process and to maintain as much canopy as they can. I have on my next slide a recap of some of these resources. That is what I want to share with you today. Here is a link to some of the reports and planning. We have done a few other related software applications. Memo to explore these. I will go to the second one. Links to the Columbus branch out campaign, and the canopy action plan; the urban runoff management plan for Aspen, Colorado. I will hand it back to Jill.

Jill Johnson: Thank you. Our final speaker today is Earl Eutsler, from Washington DC. He is the Deputy Associate Director for the district Department of Transportation, Urban Forest Re-administration. He's been there for 12 years. He helps direct a team of 20 dedicated arborists who care for the city's trees. Thank you for joining us. I will turn it over to you.

Earl Eutsler: Thank you, Jill. Thank you to everyone for joining this webinar. It has been fascinating and I am honored to anchor it. Thank you for your time. I will quickly introduce what I will talk about for the next few minutes and then jump right in. We are the urban forest re-administration in the city of Washington DC. We have two primary missions: 1) is caring for the district's street trees, of which we have approximately 140,000, and 2) we also administer the urban forest – relates to the removal of trees and private property. What I will do here is discuss a few of the ways that we put a range of UTC data to work, detecting and enhancing the season urban forest. This map shows existing urban tree canopy at various neighborhood scales, across the city of Washington DC. When it comes to urban tree canopy, one study is good. It helps us identify the resources and opportunities for expansion. It enables research managers, such as our group, to land for canopy stewardship. By conducting studies over time, we move beyond simply knowing what resources exist, where they are, and how the canopy is changing. This map is showing a change in canopy over a five-year reporting, on the same boundaries. Obviously gains are shown in green and loss in red. The initial study provides a basis for managing the canopy and follow-up studies provide an opportunity to understand how effective it has been. We can compare the change over time with other sources. We can assess levels of compliance with those regulations across the city. It is vital to understand the drivers of urban tree canopy change. This map shows again the same loss in red again. In green, and somewhat transparent circles, are private tree removal permits. The larger the circle the greater the aggregate of trees removed from the site. You can see in some areas, such as in the far western part of the city, we have a pretty tight correlation between canopy loss removal permits. We have a good understanding of what is driving the change over there. But in other areas the changes are less well understood. In the southeast section of DC we have areas of high unexplained canopy loss with few permits. That helps us identify which areas that require outreach, and from time to time enforcement. For instance, here is an undeveloped block in that same southeast neighborhood. It's the title block that is more vulnerable from a tree population standpoint to unregulated tree removal. Our team is aware that sites like this are vulnerable, so we're on the lookout for things like this which is trees being removed. That happened on the site.

All those trees got cut down, but once we noticed that had happened we were able to immediately gather details about where the trees had been to solve what occurred on-site. Now I will pivot to how we view conventional urban tree canopy studies to gauge what is happening in the city's tree canopy, and how effective our management LAN is enhancing the canopy and caring for it. To how to follow-up with additional tree canopy data that was discussed earlier, we used LiDAR to drill down and solve what happened

and seek enforcement. We have incorporated LiDAR data, for which we can determine the height of the trees. We can use this data in a traditional for street equation to interpret the diameter. You can see the geo-processing model at the bottom of the screen. It's the model we use to use determined the diameter of the trees that had been on the site. But of course you can also construct the same model in an excel sheet using basic formulas. We were able to use the points of vegetation to accurately interpolate the diameter of the trees. From that we can use those data points to assess the corresponding fines to the property owner. In this case, it was $100,000. Using this LiDAR information we can accurately measure what is no longer present on the site. I had to include this. This is the forest service paper we used when looking for trunk taper formulas. They were most appropriate. This is actually the way they published it. This must've been the only copy they had left when the digital revolution arrived. I love these little scribble notations. In any event, it is a useful paper. If you search for the title you can find it. I should also note that when we did this on this site and others, since we were able to use the same approach on trees that are still present in nearby as proof of concept to guarantee that what we are doing, the approach we are using is accurately measuring what was present.

So in the case of the previous example of those trees that were removed, we found that comparing to other trees still growing nearby we arrived at a 4% overestimation. We will control for that when issuing a fine. It lends an extra layer of credibility when proceeding with an enforcement action. In the same way that multiple conventional urban tree committees overtime is useful, so are multiple light art data sets overtime. What you're looking at here, these are the parcels in that previous example. It is taking LiDAR data sets that were captured on the trees that had been present, then more recently after they had been removed. Doing a simple canopy height, vegetation height, it's taking a look at where the canopy has gotten taller since the original data, gotten shorter, or disappeared altogether. You can see on the right side of the screen those are the approximate diameters of the trees that have been removed. It's a very compelling approach to identifying what has gone missing. It has proved very useful.

In this example we had in between these two areas where trees had been removed, is a fairly large force that remains. The property owner for that area wanted to develop, and we were able to provide some outreach and education to that property owner. The owner has come to work with us as they make their plans to prepare for developing. This bodes well for those specific tree entries, and trees in general. I will wrap up here. I will talk about the power of LiDAR.

If you are in a city or have been working with the urban tree canopy study for six or seven years, you probably know that those studies have become more granular, detailed, and accurate. But a lot of the studies can be biased towards loss. It makes sense. When you have a large tree that is removed that thing is easily detected. When you get another tree canopy study it is easy to focus on. I don't to say too much, but you can focus on all the loss that has occurred because some of the small incremental change that is taking place on smaller rapidly growing trees can go unnoticed. One of the beauties of LiDAR is that it is sufficiently granular. You can actually detect the

smaller and more incremental growth. You can detect very subtle changes in tree canopy. This helps to allow you to understand the good and the bad. Not just the loss but also where you have gain. So, for resource managers we can take that and try to understand if the plans we have devised are working.

In the center of this slide you see an area along the road with lots of dark green. That suggests lots of vegetation height growth. The trees have gotten taller. That is useful for us. We can compare that with things like this. These are tree planting data for street trees we have installed shortly prior to the period when this data is captured it allows us to say, this is good. It validates some of the actions, management actions, we have taken. It also allows us to gauge what we are doing is succeeding. We can actually sense and understand these trees we are planting, to make up for some of the loss that is occurring for development. It's actually starting to pay off. These trees are growing in and the tree canopy is accruing. That is what I really wanted to talk about. Those were a few examples. I will share this if you want to learn a little more about the tree canopy in DC. Click on that eight and it is a nice self-guided tour through the history of urban tree canopy in DC, as well as the steps we are taking to detect and enhance the resource. I will turn it back over. Looks like we'll have time for questions.

Jill Johnson: Thank you. We do have a couple of minutes for questions. The questions are for all of our speakers. Just as a reminder if you want to ask a question please type it in to the group chat and questions pod at the bottom of the screen.

The first question is what is the time range of the imagery used to determine canopy loss? I think that is directed at you Earl Eutsler.

Earl Eutsler: We had the urban tree canopy studies conducted. One in 2006 and the other in 2011, good company. And the LiDAR that I was using was captured in 2013. And in March of this year, 2015.

Jill Johnson: Great. I don't see any other questions. If you have any other questions start typing it so we know to hold the time. Can any of you recommend educational resources that explain how to incorporate LiDAR into the UTC image classification process on arc map? I bet Jarlath has a video.

Jarlath O'Neil-Dunne: When you are talking about UTC mapping classification, really it's not just using LiDAR most cases have to use a combination. One of the key things to keep in mind with LiDAR data is quite often is far. As a result, it is going to vastly underestimate the deciduous species particularly in force at areas because those trees are growing very tall and thin. As a result, the LiDAR returns will miss them. Earl got really lucky with his data. The leaves were just coming out. But your LiDAR data might be missing as a result of the complex process, where you incorporate leaf on imagery

with leaf on LiDAR data. I haven't got a bunch of video on my YouTube channel to talk about future extraction using imagery, which you will have to use specialized software.

I would like to follow-up and say we've been using a product that is an extension to our Arc maps which is called LiDAR analyst. It's effective in its extracting features. It's from LiDAR data sets. We have done it across the city and found it to not to be 100% accurate, but pretty good at extracting trees both in stands alone and forest setting [indiscernible]. That is LiDAR analyst. A good program.

I would add in we made a decision a few years ago to use a lot more open-source, [indiscernible] software. I would be happy to talk about that. There's one called Saga that we use.

Jill Johnson: I do not see any other questions. If anyone has any these type them in. I just want to add a follow-up, to the first question, about the time range for comparing canopy loss. Morgan Grove typed in that he recommends about six years because any more quickly might be compounded by the relative [Indiscernible] of the data. That was a becoming case you did not see. I don't see any more questions.

We are getting close to the wrap-up time. With that I want to thank our speakers Ian Hanou, Jarlath, and Earl Eutsler for sharing your expertise with us. Thank you online for participating.

If you're taking credit please write down the code. It is US-15-010. And send that code into ISA for CEUs. If you're interested in receiving other certificates type these into the question pod and we will make sure to get you a certificate.

It is also worth mentioning that we have written a synthesis report on urban canopy assessment that will help serve as a guide for urban managers that are looking for general information, common approaches, and key tips for conducting analysis. That report is in progress and will be out this fall.

Looking ahead, our next webinar will be on December 9. We will skip November. We hope to see you all at the Partners in Community Forestry conference in Denver.

Please let us know how we are doing before you sign off. Tell us how you would rate the webinar and provide your comments or suggestions by responding to the poll on the screen. If you go ahead and fill those out it would be much appreciated. We will leave those up for a little bit. Thank you all. Have a great rest of the day.

Thank you.

[Event concluded]