**Yvonne Allen – Remote Sensing Transcript**
**LOCKHEED MARTIN CORP**

**Host: Julie Marcy**
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URL's Referenced by Yvonne Allen:

Using the statistical package R in ArcMap – http://resources.arcgis.com/gallery/file/geoprocessing/details?entryID=F855D6D1-1422-2418-A0B2-643E624A8925.

Atchafalaya Basin NRIAS - http://abp.cr.usgs.gov/Home.aspx.

Julie Marcy: Welcome everyone. This is Julie Marcy, Research Biologist at the ERDC Environmental Lab and your webinar host today.

Welcome to our webinar on using remote sensing to track inundation and land use change in the Atchafalaya Basin and coastal Louisiana by Yvonne Allen of the ERDC Environmental Lab.

As always if you think of a topic that would be of interest or benefit to you we welcome those ideas. And all you have to do is send me an e-mail or give me a call and we'll see if we can't address that topic for you.

Just a few notes before we start our session today. If you are calling in as a group or if your log in information does not reveal your office of origin such as the district or lab or division you're representing please use the chat feature to add that for us. That helps us track usage and attendance at the webinars and is very helpful to us.

We will have about the last 15 minutes for your questions for Yvonne. But we're very informal. So please don't hesitate to interrupt at any time during this presentation if there's a term or a phrase that you're not familiar with so that we can explain that to you.

You can either take your phone off of mute and ask us a question verbally over the phone. Or, you can use the chat feature to ask your questions as you choose.

If you are using a speaker phone remember to keep it on mute when listening in especially if you're in a noisy area. But also remember to unmute it if you want to speak with us.

Some of you signed up for the webinar announcements using our system on the learning exchange of the environmental gateway.

If you haven't done that already, you can sign up to be added to the list for all the forthcoming announcements. And you can also specifically sign up for a particular webinar.

Now one final note, a little bit of a change for today. We are hosting this webinar for the first time from ERDC's new Environmental Lab building. Our new lab building is complete with a new digital phone system that's tied into our computer network.

So that means if we happen to have a computer network blurp during our webinar we will be disconnected. If that happens, I will reactive the session as the host and then you would then be able to log back in just as you did a few minutes ago.

But, I'm keeping my fingers crossed and hoping that the computer gods are going to smile upon us today and that that will not occur and we'll have smooth sailing.

Now our program today is as I mentioned going to be on land change and using remote sensing to track inundation in the Atchafalaya Basin and coastal Louisiana.

Our presenter is Yvonne Allen. She is a Research Ecologist in the ERDC Environmental Lab. And Yvonne is going to be our speaker today.

Yvonne Allen: Hi. I'm Yvonne Allen. I'm in ERDC Environmental Lab in the environmental systems branch but I'm located in Baton Rouge, Louisiana, in a new office we call the Wetlands Environmental Technologies and Research Facility.

If you all have any trouble hearing with volume please let me know. As Julie said I'm going to be introducing using remote sensing primarily not just to track land features which is commonly used for remote sensing but mostly to track inundation within the Atchafalaya Basin and coastal Louisiana.

So this is a brief outline of what I'll be talking about today. I'll give you an introduction to the Atchafalaya Basin floodway system and talk a little bit about management activities and options for restoration in the basin and give you a little bit of a historical perspective about, you know, how do we define what is restoration and what do we want to restore to.

Then I'll be talking most about this natural resources inventory and assessment system that I've been working on with the Louisiana Department of Natural Resources.

And then I'll be also using - talking about using this innovation mapping for some other applications within the basin and then also applying these to track land change in coastal Louisiana.

So this gives you a little perspective. Hopefully you can find yourself somewhere on this map. I'm located down here at the Atchafalaya River Basin. It's a major distributary of the Mississippi River. It currently receives one-third of the combined flow of the Red River and the Mississippi River.

So it's a floodway system that was primarily designed for flood control. It's also heavily used for navigation, also for fishing both commercial fishing, fin fish and shell fish for crawfishing, also for recreation. It's very popular for hunting and fishing and just general outdoor activities.

It's been heavily used primarily in the past it's kind of waning for oil and gas but we've got a lot of remnants of the infrastructure throughout the basin. Also it's used heavily for timber harvest.

It's a large tract of land, almost 1,000 square miles. And it's therefore an invaluable habitat and has some strong regional impacts for nutrient sediment and contaminant delivery also for carbon sequestration and nitrogen fixation.

So I'll talk a little bit about putting restoration into perspective. The Atchafalaya River is currently a major distributary of the Mississippi river. But that only really began in 1858 when a major log jam was removed at the head of the confluence of the Atchafalaya and the Mississippi River.

Before that it - since that time it’s begun to capture - or it had begun to capture a lot of the flow from the Mississippi River. So from that time until 1927 when there was the great flood in 1927 things moved along fairly slowly.

In 1927 of course the levees were built and the flow was channelized. The levees are here in red. And the flow was confined to the area within the levees cutting off some of these swamps that are off to the East. So there’s another major change.

And then between this two and three - between 1927 and ’63 within the basin you really saw the greatest change in land. And unlike the rest of coastal Louisiana within the Atchafalaya Basin because of the huge sediment delivery we’re seeing conversion of open water to land. And that’s a threat within the basin.

So in 1963 the old river control structure was completed and that set the flow that stops the increase in capture of the Mississippi River - the increase in capture of the Mississippi by the Atchafalaya.

Then after the control structure was finished then began a project of channel training to increasingly deliver water directly to the coast. So much less of the sediment laden water was getting off the main stem of the channel.

So when you’re talking about restoration you kind of - a lot of these changes have happened within people’s lifetimes. And you’ve got to identify what do you really want to restore it to. So you’ve got to have these spatial reference points in your mind.

So this is a - that brings me to the work that I'm doing with the Atchafalaya Basin Program. It's been charged with soliciting from the public and then evaluating, designing, and executing both water quality and access improvement projects in the basin.

And my particular part in this has been developing this suite of data products that we call the natural resources inventory assessment system. And these are system-wide comprehensive data layers that will be the primary sources of making science based decision making in the basin.

And then beyond this the development of the products we're mounting an effort to make these data layers as widely available and an easy to use format to scientists and managers and the public as we can.

The - so this geospatial analysis resource set I kind of think of these products that we've been developing as different tools that you would put in a tool bag. And you might not use all of your tools all at the same time for every project but you can use them in different combinations to solve a lot of variety of different problems.

And it's like 90% of the problems you can tackle or at least take a stab at with these basic data layers. And they include historical progression of land change. A lot of it is this base satellite imagery and aerial imagery that's captured at a variety of different river levels.

The Atchafalaya River can fluctuate up and down by as much as 20 feet. And this is an annual - a typical annual cycle. So a lot of the resources within the basin change in concert with this river level change.

The next one is using - interpreting this imagery into categories - into water categories that are water extent and water quality at these many different river levels.

Then combining all of these interpreted imagery into the frequency maps so you can find the frequency of inundation or frequency of distribution of water and different water quality. Beyond that then these inundation prediction maps where we have a continuous and predicted layer of the extent of inundation within the basin.

And then elevation maps - of course we have some minor elevation but then we use the inundation because it's wet so frequently we use the inundation information to find out where we really know something about elevation and where it's uncertain.

And then we combine this also with our long historical record of gauge data within the basin and with geo tagged photos. And I'll talk a little bit about these resource assessment units that I'm developing currently.

So this gives you a little bit of an overview of what the basin used to look like. This is a map from 1863. It was a Civil War map. It didn't go forward. There.

And this red again is the outline - current outlines of the basin that I've superimposed upon this. You can see in the middle here there was this great expanse called Grand Lakes and most of this is remnants. The rest of it are (unintelligible).

So this is - that silhouette superimposed over top of a current satellite imagery. So you can see there's - it's been about 300 square kilometers of open water that's converted to land.

And this gives you a sense of a long term change in the basin. This is the historical extent of Grand Lakes Basin from the original township survey. And then you can see this progression of extent of Grand Lakes through time.

And a lot of these changes really happens within people’s lifetimes. I mean, 1935 to the present that’s not very long to see a great transformation in the basin.

So - and that’s - and the river water has really been the driver for land change. So the river delivers fresh oxygenated water to the swamp and turns it into sediment laden water.

But it also will deliver the sediment. So this darker water is frequently associated with poor water quality which results in some - has resulted in some massive fish kills.

But the sediment laden water is well oxygenated but it delivers sediment. And you have to - any water quality project must really think about the potential consequences for land change.

So just to kind of reiterate the distribution - identifying the distribution and condition of water within the basin is very important. It’ll define the quality - the quantity of habitat for a variety of species.

It’ll control when resources appear within the basin, define the impact of - potential impact of flooding. And it’ll drive of course the geomorphology in the basin.

And it'll also affect your measurement of other variables whether by not allowing you to measure them or by changing water - chemistry of that particular medium.

So this kind of gives you a feeling for the complexity of the situation that we're looking at. So quantifying the extent of water within the basin is a real challenge. And getting access to and measuring the extent of water like putting a gauge into this forest is not the most easily managed option.

So what we turn to is using satellite remote sensing to capture system wide conditions. And the workhorse of this has been Landsat. It's available from 1983 to the present. It's got a 16 day repeat cycle and a moderate resolution so it's 30 meter pixel resolution.

It has a bunch of different spectral bands that give you a lot of different information about water extent and water quality. And the entire basin luckily is available within one scene so that's really helped us a lot.

So this kind of goes over how I use water to - or how I use Landsat to find water within the basin. Our criteria were - this is the data available at the time was from 1983 to 2008. I chose only cloud-free scenes during leaf off conditions so December through March when you can see through the trees to see the water.

And we found within given these criteria 28 images. And we're able to classify each image for land and I mean actually dry land because that changes of course within the swamp which is in this brown here.

Flooded turbid water so that's - sorry - open turbid water which is basically river water, flooded turbid water which is river water that's penetrating into the swamp, into the trees, open non-turbid water which is isolated lakes and ponds without trees, flooded non-turbid which is commonly associated with very poor water quality in swamps, and various shades of pink which are aquatic vegetation.

Now we use these 28 series of images in multi-temporal analysis. So this is how I go about looking at the frequency of water in the basin. So this is - and a single Landsat image classified into land and water.

Then I take the sum of many of these images through time and I can come up with this kind of composite image showing the frequency of classification as land.

So there are some areas that are - most of these are open water areas and Flat Lake to the South and what’s left of Grand Lake here. But there are some swamp areas that really stay completely inundated during much of the year.

And then I was able to relate this to historical gage data or the gauge that was observed at the time of image capture and relate that to the proportion of land. So there’s one key gage within the basin that really relates pretty well to areas that fluctuate up and down with the river. And that’s the Butte La Rose gage so you’ll see that BLR a couple of times in this presentation.

Okay and then I could do the same thing with turbid water in the Atchafalaya Basin. So I can identify those areas that are more frequently receiving turbid water which means they have increased sediment delivery and also increased oxygen delivery so - and all the implications that those two factors carry.

So then for at least for the land and water classifications I can go beyond this frequency image. And we have this relationship between the proportion of land and the Butte La Rose stage.

And then if you think about it for each pixel you can find a probability that that pixel - for each given river level or Butte La Rose level the probability that that pixel will be classified as water or land.

So I was able to do that through a (probit) analysis and come up with a continuous series of images. I'm just showing a couple here of how the basin floods up.

Julie Marcy: And Yvonne this is Julie. Could you explain what a (probit) analysis is - a little bit about that?

Yvonne Allen: ...but it's a relationship - it's kind of - it's a statistical function that defines the probability of a binary outcome so if it's land or water. And that's related - it can be related to one or many variables.

So in this case it's related to river level. So given at a particular pixel location with a sliding river level what is the probability that that pixel will be classified as land or water.

Yvonne Allen: And that statistical relationship was run on every pixel within the basin to come up with these surfaces. And everybody seems pretty happy about them. So it works pretty well. That's kind of that in a nutshell.

So I've gone through these grayed out layers here. I'll talk a little bit about elevation - lighter elevation and elevation on certainty maps and beyond that how we use photos and then how we put everything together in an example analysis.

So this is the State of Louisiana has been completed covered with LIDAR. This is just a snip out of the basin. And we had some - one of the first things that I was tasked with when I started this project was to look at this gross looking line right here at the bottom third of the basin asking whether that was real or not.

So after a little bit of digging we found that the basin for this area was actually flown in three different years under three very different water levels. So here in this Northwest corner it was very low river stage Butte La Rose at about four.

Then in this Northeast stage it was 6.2 feet. And then in this Southern stage - Southern phase it was quite high river levels. And the lower part of the basin is really the lowest elevation so we don’t have a lot of information about what’s going on down here.

So you’ll see on the right this is the land area sort of good is in the beige versus masked out area in the blue where it was likely inundated during the time of data capture.

So we break it out into these five different phases - these two on the North end - these two units do not respond very well to changes in river level so there were masked separately.

But we use this information then to - knowing that inundation was so important we designed some thresholds of when would be a good time to capture new LIDAR. And after two years of trying we finally got it done in December of this last year.

And I should be getting the data tomorrow I'm hoping that when - and the Butte La Rose stage was very low at 4.6 feet so this is our expected new LIDAR - new good LIDAR that we'll have available soon. So that's one way to use the inundation map to target specific times when it would be good to capture data.

So kind of putting this all together for the Louisiana DNR, what they wanted to do - one of their primary activities of course is to design and carryout access and water quality improvement projects.

So to do this they'll solicit public input through - primarily at this point through public meetings. But we're hoping to in the future solicit them online through this - the red outline here shows one of my preliminary assessment units.

So the public can go in and say within this area I'm concerned about frequent low oxygen causing crawfish dying. Or my trees in this area are not growing very well because they're inundated all the time. Or I need an access to access my little pond or lake here or something.

So then given that public input in a spatial extent associated with it then we go in and we look at the water quality. And in this pocket here - this Eastern pocket of the assessment unit you can see there is poor water quality and it stays - it doesn't get turbid water and it stays inundated for a long period of time.

So then we look at the LIDAR in this area and we can see these accretion patterns. And we can see how flow off some of the small little bayous here has caused accretion and some segmentation although this area is not too bad - certainly segmentation from East to West. And this pipeline canal to the South it's starting to build some real barriers to flow between this unit and other assessment units.

We can look then about the elevation accuracy, apply that LIDAR mask and we can see where we know the elevation is accurate and areas like this lower part where we really don't know how low low is.

Okay and then we can also look at the historical setting. This is that original township survey map laid over top of this so we can see that Indigo Bayou is an old historical bayou that delivered water to this area for a long time and that Murphy Lake has silted in quite a bit since then - Bayou Sorrel is in about the same location.

And then given all that you can look - put all those layers together flipping back and forth and try to start picking some best areas to start to introduce water - introducing it from the North so you're not building deltas or sediment - basically deltas I guess within the assessment unit that will cause further impedance to flow.

So our basic idea is to introduce flow from the North of the unit where possible. And then all these little dots on the gas pipeline is to - plans to introduce cuts so that to allow flow - an increased flow between this unit and the unit directly to the South of that. Not so much East to West because those are historical barriers to flow.

So those are identify possible solutions and then we go out and take some GPS photos associated with that and try to get a ground truth of what is realistic and what is not a feasible solution.

And we take all these points, cuts and gaps and first get the solution set back to the public sponsor and get - solicit their input to these ideas. And then once that's gathered and sifted through to go to the State Coastal Protection and Restoration Authority and then further to the legislature to solicit funding.

And then what we're working on beyond this is to make all this information available online through a web presentation so that it increases the transparency, it increases the ability for scientists and managers to talk to each other, but also for the public to understand what's going on and why we're doing these things.

Okay some of the other applications for inundation mapping using Landsat - we've done all these - or many of these projects in partnership with a lot of lot of different agencies. And I'll just get right into them.

By just looking at the satellite imagery and not even necessarily going into the classified or the class imagery we can get a lot of information. This is looking at hydrology in the area.

And it's a very complex hydrology. We'll see a slightly lower river stage. We get channelized flow very segmented but you see the turbid water signature moving completely through all these bayous in here.

And then once the river goes up even just a little bit -- this is only about a half a foot at this lower end of the basin -- we start to see overbank flow. And you'll see kind of this black water in here - this darker area is black water that's coming off the swamp.

And really the force of the river on the East and the West is creating this hydraulic dam and that and combined with the swamp water in the middle is creating this hydraulic dam where you don't see that movement back and forth from East to West anymore.

And that increases as the Butte La Rose stage increases until you get to extremely high river levels when do actually start to see sheet flow over the whole basin. But that takes a very high extreme.

Now some of the other applications - this is what we did for Nature Conservancy was to identify areas where we can define the number of consecutive dry days in a typical growing season.

So cypress trees have certain restrictions about how long they need to stay dry to gain a certain height. So we could identify the areas that might be best for cypress regeneration. And by that means also identify areas that they may target for conservation or for land acquisition.

And we can do this for - I did it for a typical like the average hydrograph - you can also do that for any given year's hydrograph. So how long was this particular location dry during that year.

Some of the other applications are to identify the effectiveness of management projects. In this upper figure you can see the sort of pre-conditions and the lower figure a gap was opened in the Mississippi River levee introducing fresh water with its turbid water signature into this area out of this open water area hoping to increase - decrease some of this stagnant swamp water that was coming through this segmented - this very segmented region that was caused by a pipeline to the North and a bayou to the South.

So some of the potential applications - this is one that hasn't gone real far but I've been mostly talking about turbid water but non-turbid water is frequently associated with conditions of low DO, increased temperature, increased dissolved organic materials, and decreased PH.

And all these conditions are associated with a variety of chemical processes that have implications for regional - excuse me - have regional implications. These include increased mercury (methylation) and perhaps increased (de-nitrification). So a base layer map like this could be used effectively for things like that.

In 2008 we had Hurricane Gustav come through this region. And it wasn't as much an impact from storm surge as it was an extreme rainfall event within the basin.

And this being a floodway system a lot of water was being pumped out of people's houses and out of people's farm fields and just general run off with being pumped into the basin primarily came down through Lake Henderson here in the Northwest.

You can see this incredible black water signature - introduced a lot of extremely low DO water into the system through Henderson which was down - you can see it translate all the way down the Western part of the basin and then eventually out through the Wax Lake outlet here at the very South.

The only fresh water was coming off the main stem of the river. And it was coming - being distributed mostly in those channels. Eventually it made it to the interior.

So there were a bunch of people that went out and did in situ water quality sampling. And these measurements matched up very well with the imagery - the classified imagery for an associated date. So we could see these point measurements but then we could also get the overall picture of what was going on from the classified TM imagery.

So these points are associated with low DO conditions. And we saw that really strongly associated with the black water. And we're able to get a lot of images post-hurricane and see - track the area as it was recovering.

Another application was to identify areas that would be dry and suitable for black bear during their denning season. And then we could also use different basic spatial fragmentation analyses and identify then beyond that which would be dry which ones of these would be the largest core tracts and areas that they may be interested in surveying for black bear dens.

Okay then beyond this I used - some of this inundation frequency was important in the basin. And then I used this to track changes in the Wax Lake Delta which is at the Southern end of the Atchafalaya River.

These are two images. You can see they're very close together in time - just a couple of months apart. The left image is in spring flood conditions. And the right image is a January image within the same year.

So you can see inundation extent has a huge impact on what you call land in this particular area. Wax Lake Delta is to the left and then Atchafalaya River Delta is to the right here.

So I primarily focused on the Wax Lake Delta. It’s an unmanaged delta versus the Atchafalaya River which has had a lot of management activities to help increase land building. I also compared it to this reference site Cote Blanche here to the left. And I won’t be talking too much about that. I’ll just mention it one time.

So here are the some of the processes that may be involved in actual land change within - in any area. But then there are some other processes that can mask as land change and these may be differences in sensors and method or an operator application.

But also, I’ll focus on the difference in water level - some of these - the sensor method and operator, you can, kind of, be aware of and constrain. But water levels, there’s not a lot that you can do other than just restrict yourself to only one water level.

So my approach to this was a little bit different. It was to embrace those water level differences and to classify as many images as possible under all available water conditions. So this is the suite of images that I looked at.

And I, again, used the statistical analysis in a multiple regression where my dependent variable was the amount of land area. And the independent variables were time or date, river level and tide height. So this is the raw results for (Wax Lake) Delta.

You can see there's a - definitely an increase in the amount of land area through time. But there's also this incredible amount of variability. And most of this is due to water level variations. So these are the results from the multiple regressions.

(And now it's just) through this entire time period, date and tide and river level were all significant variables in this regression. But what we really want to look at - or what people want to look at in this analysis is, what is the actual land building rate that we can expect? Because there are a lot of river diversion projects that are currently in operation or that are being planned for Coastal Louisiana.

So we want to get a handle on what kind of land building we can expect. And the (Wax Lake) Delta has been frequently used as a model for what we can expect for land building. So what we want to do is get a water level controlled estimate of change through time. So we can use these coefficients holding tide and river levels constant (and) finding out what the impact of the - or the trend through time of land change.

So this is the regression, again, for all years - that's a little interesting thing going on there. It's about a kilometer squared per year, which is a lot lower than some previous estimates. But then if you break it down - in the Cote Blanche Region, we saw a real step function in the amount of land change.

And this happened around the time of 2002 when there was a hurricane that came through and removed a lot of wetland area. So I broke this also into pre and post-2002 measures. And we can see the pre-2002 measure of land building was a little bit higher than through the whole time.

But since 2002, we haven't seen a lot of land building once you correct the water levels. So then we can start to - once we've corrected for water levels, we can start to look at some of the actual potential processes that are contributing to land change. And these include hurricanes, sediment supply levels and sea level rise. And there may be lots of others.

So, the first one that we do feel pretty confident had an impact in this area was hurricanes. Hurricanes and their impacts are not all alike. The dangerous side of the hurricane is always on the eastern side. And it's more dangerous when the approach of a storm is directly - when there's a large (fetch) ahead of it.

So the storm has a lot of energy to push a - storm surge directly into the area of concern. So in 1985, this probably certainly happened with - this is Hurricane Danny. But we don't have enough of a pre-record to determine what the impact was for that storm.

May have also happened in '85 for Hurricane Juan. 1992 - very strong storm, Hurricane Andrew, came through here on its second land fall. The - it probably didn't have a lot of impact even though it came right over the Delta. It didn't probably have a strong impact as it did from - the storm surge affected areas to the east.

In 2002, this is Hurricane Lily. This is the storm we're talking about. As you can see, it has, sort of, that perfect storm attribute of falling just to the west of the area of concern. Also, 2005 Hurricane Rita was the - was a similar storm, very strong storm, that had impact all the way throughout Coastal Louisiana.

Another potential contributing process (that) many studies have documented the reduced (sediment) and supply both on the Atchafalaya and the Mississippi Rivers. This is a - just a figure of the annual - average annual suspended sediment at - Simmesport and it’s been declining through the years and even, especially in more recent years very low levels. And there’s the chronic relative sea level rise.

In the blue box, you can see that this is the time period of concern right here. And it’s been increasing during this time. The area around here - the sea level rise combined with subsidence in the area are both strong impacts on Coastal Restoration and what we can expect from Coastal Restoration.

So some of the conclusions briefly (inundation) is, in my opinion, an important variable that influences many measurements of the system change - ecosystem function influencing change and condition in the Atchafalaya Basin and in Coastal Louisiana. Integrating many types of data on this open, available Geospatial Platform. By doing this through the Web demonstration, we’re hoping to increase public consensus and management consensus and really move toward - move closer toward actual science based decision making in the (basin).

And then a multi-temporal image analysis where you can really examine not just a couple of images - 5 - but massive amounts of images. You can get a much - with an explicit consideration, water levels can really improve your resolution of land change measurements. And it can allow you to focus on processes that may be actually causing land change.

And that’s all I have for right now. I’d be happy to take any questions that you might have.

(Annette): Yvonne, this is (Annette) in New Orleans.

Yvonne Allen: Hi, (Annette).

(Annette): Thank you very much. I'm so glad that this is being recorded and that I can go back and look at it again...

Yvonne Allen: Oh, (wonderful).

(Annette): ...because there's a lot of information here that I'm not as fluent with as you are. But, I really need some time to digest everything. You presented a very rich training session here. And I really appreciate it.

Yvonne Allen: Oh, okay. Thank you.

(Annette): You're welcome.

Yvonne Allen: I'm going to - I have the (Wax Lake) Delta analysis - is in review right now. So I'm hoping that that will come up in your review journals soon sometime.

Woman: Good, good. And as you had said, (Julie), that this new platform at (ERDC) - I will be able to go to it and open this presentation and look at it again that way.

Julie: Yes and I - you actually have several choices.....on the environment gateway, which is through the NRM Gateway that you can Google on. You have the option of either just looking at the PowerPoint if you want to review that. Or we will also have the written transcript posted.

Or we will have - a third option is the actual recorded Webinar, where you can hear Yvonne speaking as she goes through here slides. So - several options available there.

Woman: Well, that would be the one.

Julie: And then there are the - there's a very rich archive of presentations like this that we've been doing over the last couple of years.

Woman: Yes, that's been very useful. And this has been great. And I'm sorry there was that little announcement this week about the training. I imagine that's what frightened everybody off.

Woman: Well, as for my district in New Orleans and I believe the Valley, we were told that there was to be - we were to reduce our indirect costs. And that had to do with training.

Woman: Okay.

Woman: And that there was - because of all the budgets and the continuing resolution getting tighter and tighter. You know, it's going to end on the 8th, I think, of April. But that our indirect costs were way too high.

Julie: I see. Well that's one of the beauties of a system like this with the Webinars. We can...

Woman: I know.

Julie: ...very cost effectively bring (everybody) together to share.

Woman: Yes.

Julie: Does anyone else have any questions for Yvonne? She covered a plethora of applications, as (Annette) alluded to. Gosh, everything, Yvonne, from using the imagery for wildlife habitat to water quality, inundation, sediment deposition - just amazing how many different applications can be used.

Yvonne: Well it seems to come up again and again, you know, (want) - as a part a part of, you know, habitat for not only fish but for waterfowl, for tree species, for changes in geomorphology. Frequency of inundation - I keep hearing this come up again and again. People are really concerned about frequency of inundation.

So that's something that really comes together very nicely in the (basin). Anybody else?

Julie: And remember if you have your phone on mute, you'll have to unmute so we can hear you. Or you can use the Chat feature to send in a question if that's preferable to you.

(Darshon Dorsey): Yes, this is (Darshon Dorsey). I'm from the Seattle District in our Geospatial Section. And I'm just curious about the told you're using to run this stuff because it looks like there's quite a bit of image processing that was going in and also being able to extract some of the stuff (out there) to run the potential models. How did you automate that? Or was it all just manually done?

Yvonne: The classification in the imagery - of the imagery to different water - well, it depends - okay, a couple of things. The - within the Atchafalaya basin, the classification of the imagery was all done by choosing individual thresholds in your typical analysis using ERDAS. The - in terms of the analysis in the basin of the - of probability of inundation, that was done with a combination of (ArcMap) and using the R interface with that.

That was done in conjunction with some partners with USGS, where I, kind of, laid out the process. And they were involved in implementing our - I think within (ArcMap). And then the techniques for classifying into land and water for the (Wax Lake) Delta, that was an automated process (because) we used information from (BAND 5s).

And that could be more easily automated to single threshold analysis in (BAND 5). So that's why we could analyze so many images for the (Wax Lake) Delta. Does that answer some of your questions?

(Darshon Dorsey): Yes, yes it does. That really helps. Yes, it looked like ERDAS was going to be your choice for some of that. But it's also interesting to see - was that a custom extension for ArcMap that R application or...

Yvonne: No.

(Darshon Dorsey): ...is that something that's openly available?

Yvonne: I think if you Google on ArcMap and R, you'll see - I'm not sure about how they implemented it. But I know that it was - there is an interface between the two. SO basically, my role in this was I laid out to the programmers the tools that they could use. And I said, make that, kind of, happen.

And I - that's one thing that I would like to get to be able to cut away some time to write that up because they are very interested in having that technique out there as well.

(Darshon Dorsey): Yes, so would - our district would be very interested in that too, especially if we could develop, like, a standard scope of work for that or even just have a way for any district to get access to that type of routine or a way to contract that kind of work would be nice.

(Darshon Dorsey): Thank you.

(Glenn Landers): This is (Glenn Landers) in Jacksonville District.

Yvonne: Hi (Glenn).

(Glenn Landers): Hey - a question about water level measurements across the basin. And have you been able to link in those water level measurements to your water surface directly? Looking for a way to back in to land elevations based on water surface because the (lidar) is so inaccurate in situations like this.

Yvonne: I have done a little bit of poking around trying to get the elevation of a water surface. So you have, like, your predicted inundation extent. And above the "good lidar line," you should be able to find out what the actual elevations were on the perimeter of the surface.

And I had, kind of, middling results from that. So I've, kind of, put that aside. But definitely coming up with the (z) measurements of what - so we have, you know, this tie to one key gauge in the basin.

I would like to be able to tie it to a lot of the other different gauges in the basin. So that's something that's, pretty much, in the works. And - once we have this new lidar coming, then we'll be able to hopefully get a better handle on what your actual depth measurements are or what your water surface elevations are at different inundation - at different river stages. Yes.

But the access and getting - access within the basin is, aside from the channels, is extremely difficult. So this our best bet to - our best bet to finding it is usually remotely sent information.

Man: Yes, for Everglades we have a network of monitoring stations. And they're all accessed by helicopter in a lot of cases. But they're surveyed in with some precision. And the lidar surveys are typically plus or minus a foot in the areas with a lot of vegetation cover.

So the...

Yvonne: (Oh, wow).

Man: ...water surface elevations would be more accurate indicator of ground surface elevations if you have a considerable variation of - in...water surface.

Yvonne: Right. And the frequency of inundation really served as our surrogate for elevation for a while, for a long while. So we could really tell the areas that were lowest when we looked at the (driest) of the (dry) image and saw areas that were still wet even in the driest of dry times.

Man: Thank you.

(Cherie Price): Hi, Yvonne. This is (Cherie Price) with the New Orleans District.

Yvonne Allen: Hi, (Cherie).

(Cherie Price): Hi. You had mentioned that you were interested in trying to share some of this data publicly. Did you have any ideas on how you would serve up the data? Would you use something that's already in existence or...

Yvonne Allen: I...

(Cherie): ...like Geospatial One Stop? Or did you have some other ideas?

Yvonne Allen: We're - we are doing this through - there's a USGS contractor that we're working with. And that's part of the interface. It - hopefully in the next month or something like that, there's going to be a lot more in - information made available.

But, come back. This is the interface that we're putting up right now. And this is actually a URL. This is a snapshot from it.

(Cherie): Okay.

Yvonne Allen: And, I don't know - I could provide some of the - or the URL. You know what, I might be able to pull up a browser and find it. But I'm afraid to.

Julie: Yvonne, if you can send me, you know, the URL...

Yvonne Allen: Sure.

Julie: ...we can add that notation into the archive on the learning exchange so folks have that that they can access it.

Yvonne Allen: Yes.

Yvonne Allen: Yes. And basically the, sort of, design of it is to do a modification of a - of the desktop that I see most every day. We're trying to make it more user-friendly and more seamless to use.

But all the data are going to be served through here. And as you can see up at the top, it's got a mapping portion. And it will also have a library portion where the data are actually served out through that library portion. So you can go in there and grab the actual geospatial data.

(Cherie Price): Okay, great. Thank you very much.

Julie: Are there any other questions for Yvonne? Well then Miss Yvonne, thank you so much for sharing such a rich tool and so many different case studies and applications with us today. I think it's peaked some interest. And folks have been able to see that there may be some application to the work they're doing.

Julie: And I really appreciate your sharing your time and expertise with us. That will conclude our Webinar for today. I hope you can join us for our next session that's going to be in May 17.

It'll be (Sherry Whitaker) doing a demonstration of the Aquatic Plant Information System. And until we speak again, everybody stay healthy and active. And we'll see you in May.

END