ERDC-EL

Moderator: Courtney Chambers
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12:59 am CT

Courtney Chambers: Okay. At this time, I'm going to give you today's speakers on Assessing Exposure of Biological Communities to Dredging Plumes.

Dr. Deb Shafer is a Research Marine Biologist at the ERDC Environmental Laboratory. Dr. Shafer conducts research and development, impact assessments and provides technical support and technology transfer to assess, manage and restore seagrass and coastal wetland habitats for the Department of Defense -- including the Army Corps of Engineers -- and other federal agencies. From 2003 to 2010 she was the Program Manager for the Submerged Aquatic Vegetation Restoration Research Program. Currently she oversees multiple research projects directed at advancing the status of the science with respect to large-scale restoration of submerged aquatic vegetation communities in the Chesapeake Bay and elsewhere. She is nationally recognized as the leading expert in the physiological tolerances of an introduced seagrass species on the Pacific Northwest coast -- Subspecies Zostera japonica.

Our second speaker, Ms. Cheryl Pollock is a Research Hydraulic Engineer at the ERDC Coastal and Hydraulics Laboratory. Ms. Pollock conducts research and development, impact assessments, field evaluations, and provides technical support and technology transfer in the areas of coastal processes, coastal structures, and dredge material placement. She has worked extensively with the design of coastal structures and the evaluation of the interactions between coastal structures and the nearby coastal processes. Ms. Pollock was principal to the development of procedures for evaluating and ranking the physical and structural condition of coastal structures for the Corps of

Engineers and worked on rapidly deployable floating structures for wave attenuation. Ms. Pollock has also developed design guidance for the placement of dredge material in nearshore berms, and is presently involved in evaluating biological and physical impacts of dredging activities in nearshore region.

More about Deb and Cheryl can be found in their bios posted with the presentation and recording of today's meeting on the DOTS web page for your reference.

We are very happy to have you ladies sharing with us today. Now I'm going to give you the presenter rights, will enter listen-only mode, and then you can begin, Deb.

Recording: All participants are now in listen-only mode.

Courtney Chambers: All right, Deb. You should have the presenter rights and can share your desktop at this time. And you'll also need to unmute your phone line.

Excellent. We're seeing your presentation. However, we're not hearing you yet.

Deborah Shafer: Okay.

This is Deborah Shafer. And Cheryl and I are going to be co-teaming this presentation. So I'm going to start with the first few slides and then at some point I'm going to turn it over to Cheryl to talk a little bit more.

So, we'd like to talk about evaluating exposure of biological resources specifically during dredging and placement operations and why this is sort of an important need for the Corps is that resource agencies generally assume that there are negative effects associated with the dredging which can lead to exaggerated limitations, unnecessary costs, and/or delays in dredging operations.

So the other point that I want to make is that, trying to evaluate exposure and subsequent effects on these biological resources are often very difficult to interpret unless the measures, parameters can be directly related to physiological thresholds of the target organism. So, very often -- for example, turbidity is measured, but it can be difficult to relate turbidity measurements to these physiological thresholds of the biological communities or resources of concern.

So what are the resources of concern that we're talking about here?

Well, things like macro algae -- like the picture in the upper left -- coral reef communities and, of course, seagrass communities -- which is my area of expertise. Another potential one could be oyster reef communities.

And for three out of four of those, that is all the ones that involve plants -- the seagrasses, the macro algae, and the coral reef -- light is one of the most important factors. Reductions in light associated with the dredging plume can have effects on these communities.

And it's much easier to interpret potential effects from measurements of light rather than measurements of turbidity. And so, that's largely what we're going to be talking about in the remainder of this particular presentation, is how do we go about measuring light in some new and innovative new tools -- that we're testing right now -- to do a better job of assessing changes in the light environment associated with dredging so that we can interpret them with respect to what effects they may have on these resources of concern.

So I'll start with a case study that I was involved in a number of years ago to assess the effects of dredging in disposal - in-water disposal operations on a - at the Port of Panama City.

There were three major studies in this component. It was a multi-phased study that provided different kinds of information at a variety of spatial and temporal scales.

At the largest scale and the largest area, we have hydroacoustic mapping of the seagrass distribution conducted at large spatial scales and at large temporal scales.

For those of you that may not know, St. Andrew Bay in Panama City has one of the largest areas of seagrass resources in the Northern Gulf of Mexico. And given that there was in-water disposal being proposed, that was definitely a concern for this particular project.

The resources we're interested in - the resource agencies were very interested in whether or not the distribution of the seagrasses might change as a result of potential dredging impacts. And so, that was one of the reasons why we did this hydroacoustic mapping to map the distribution of the seagrass both before and after the dredging operation.

So the second piece of the puzzle is we measured continuous PAR measurements at small spatial scales over the course of months, both prior to and during the dredging operations as well as afterwards.

And I'll define PAR. PAR is photosynthetically active radiation. It's just a fancy word for light measurement, but it happens to refer to this specific part of the spectrum that the plants are able to use.

And then the third piece of the puzzle in this project was a plume tracking using acoustic doppler current profilers to assess the magnitude and the behavior of the sediment plume at relatively small spatial and temporal scales ranging from hours to days.

And the take home message that I'd like to leave you with regarding these three parts of this study was that by using careful interpretation of these combined datasets provided us with insight regarding the potential dredging effects that would not have been possible if each dataset were only used individually.

So, just to orient you here is a map of St. Andrew Bay. The areas in green and various shades of green around the edges are all the mapped seagrass beds. The large red blob at the center of the bend is the in-water disposal area. And the smaller red area up next to the shore is where the material is being removed.

And, of course, you can see the navigational channels. The box labelled P1 and P1 where were we put our light meters to assess changes in light. These are placed in the seagrass beds. And then we have a third reference area up towards the north.

So for the hydroacoustic mapping component, this was what's known as a Before-After Control-Impact study design or a BACI design where the green area - the big area or the green circles were four different reference reaches that does - so we had four reference areas. The areas within the red circle indicate we had five different project areas that were within proximity to the dredging and disposal areas.

And we conducted a survey at one year intervals prior to - we did this in late August, early September -- prior to the dredging -- and then we came back around a year later and did it again to assess the same areas. The reason for that it has to be at the same time of the year so that that filters out any kind of seasonal variation. We want to have it measured about the same time of the year to limit variability from other sources such as seasonal variability.

And what we found from this is, one, there was a significant decline in the maximum depth of seagrass colonization in both the project and the reference reaches. This is consistent with what you would expect if there had been a chronic light reduction effect. And the magnitude of that change was about twice as much in the project area as it was in the reference area. So if you just look at the hydroacoustic survey results, you might conclude that there had been a dredging effect.

So then, when we looked at the ADCP data -- for example -- the image shows an example of the plume associated with the sediments being deposited. And you can see that they're pretty much going straight down, settling vertically through the water column with very little dissipation from side to side. The major reason for that is because they were predominantly coarse sands, of course, which settles very quickly. So these ADCP measurements indicated that there was very little potential for the seagrass beds to have been affected by this plume because the plume just didn't spread that far.

And then the light data collection. As I said as green plants, the seagrasses require light in order to survive. The good news is that the minimum levels for many seagrass species are fairly well-known, but how long they can tolerate reductions in light has not been well quantified.

And if you are interested in assessing potential dredging impacts, light is probably the most important parameter that you'll want to be able to measure, again, because you have the ability to relate that directly back to known physiological tolerances for the particular seagrass species that occurs in your region.

And as I mentioned earlier, we're talking about - when we say PAR, photosynthetically active radiation, what we're talking about is a fairly narrow band of the spectrum - visible spectrum ranging from 400 to 700 nanometers. And to measure this requires some fairly specialized instruments.

In the case of the St. Andrew Bay Project, what we did was measure continuous time series, light data both prior to, during and then following the dredging operation because we wanted to be able to compare light conditions during the dredging and disposal with background both prior to and following to be able to put that in the context of what normal background conditions should be for that particular area.

And here's an example of some of the data that we found. In the top right picture you're looking at a graph of the mean light attenuation coefficient. And you can see that there's a large spike where the light attenuation goes up prior to the dredging. That was a result of a storm that came through.

And then following that, the light attenuation coefficients are fairly low throughout - both during and throughout the duration of the dredging and disposal operations, and then they began to ramp up, again, towards the end --

which again was indicative of more storms that came through. This is being done in January and February.

And the reference area, a little bit more variable, but still a fairly similar pattern. And so what we're able to show from this is that the light attenuation associated with the disposal operations really did not differ from ambient calm conditions. The disposal operations caused no additional light attenuation over and above the typical background conditions, and that they were generally always above the minimum seagrass thresholds within both the projects and reference areas.

So to summarize, we really needed all three pieces of data in order to get the full picture. Resource agencies are generally very interested in potential changes in the extent of the distributions of the seagrasses. And this is provided by the hydroacoustic mapping results. However, if you had only used hydroacoustic mapping results, you might have concluded that there was a dredging effect.

However, the light levels within the seagrasses, really, were not affected by the dredging and disposal operations. And I should mention that the nearest edge of the seagrass bed was more than 500 meters away from the actual disposal operations. And the sediments were also a very coarse sandy material which, of course, settled rapidly with very little dissipation. And so, that was the primary reasons why we weren't seeing much in the way of light attenuation occurring in the seagrass beds with this particular project.

And the other point I'd like to make is that this really showed us that storm events can cause light attenuation to more than double compared to normal calm background conditions. And so, we need to get measurements during ambient and storms as well as during the dredging periods to really place the light environment in the appropriate context.

And so, back when that project was underway, the sort of standard instrument that you use to measure light and seagrass beds was this thing that looks like a light bulb on the right. It's a LICOR Spherical Underwater Quantum Sensor that measures that PAR.

The challenging thing about this is while the sensor itself was designed to go underwater it has to be connected by a long cable back to a surface data logger which cannot get wet. And so, you've got a fragile underwater light sensor and that's linked to a surface data logger by a long cable so you've got this connectivity issue there. And the data logger has to be protected from being wet which limits your options as far as deployment.

We also have the issue of fouling with the sensors and so I actually had to send someone out to periodically hand wipe and hand clean the sensor itself to get rid of any sediment or a (fine) plankton deposition that was occurring on top of the sensors to make sure that we are getting good data.

As you might imagine, this is very labor-intensive and can get pretty costly, and it makes long-term deployment difficult and cost prohibitive. And so, we were looking for an alternative to this type of environment. And as it turns out, there's a new instrumentation out there.

This is just some examples of the equipment and what's involved. This is from a recent project we did in Egmont Key, Florida. And so, you need a stable working platform. You've got lots of cables and tripods and, the boat has to remain anchored over the deployment site so that you're not disconnected from the cables. And so this is a very labor-intensive and very tedious.

And so, Cheryl and I began collaborating together to try to find out if there was something better out there that we could use to develop these kinds of datasets to measure light that didn't have all these drawbacks associated with the LICOR instrumentation.

So I'm going to turn it over to Cheryl now and let her talk to you a little bit about the new work that we've been involved in under the DOER Program for the last year.

Cheryl Pollock: Okay. Hi, everyone.

One of the things that we're constantly asked in the Corps of Engineers is to be able to explain or predict what these impacts might be to the resources. And defining those with certainty is quite difficult. But what we can do is we can make a comparison by taking quantifiable measurements of these impact indicators and comparing those against ambient conditions, storm conditions for the area, as well as the dredging event and a dredging disposal operation.

And so, what we're doing is we're working to develop some long-term deployment options and set up sampling process and comparative records so that you are able to take a look at a dredging event and have some idea of what might happen and whether the impacts will be greater from the dredging than any other ambient conditions that might occur -- such as a storm.

Our approach is to develop a large set of instrumentation that actually measures these impacts and gives you quantifiable measurement and relates this to the exposure of the biological resources. And to do that we wanted to group together these pieces of equipment so that they were committed exclusively to being able to quickly gather up and go to a dredging opportunity and measure the events and be able to report this information. Because a lot of times when you start into a field study you start trying to collect the instruments and some of them are already committed in different areas.

We want to put together a package that is rapidly deployable and that we're able to know in advance what the data collection processing will be and make plans so that when we start comparing from case study to case study, all of the datasets line up and we can make a apples to apples comparison.

And so, our approach would be to coordinate with the districts to look for future reimbursable case studies for these opportunities to go out and not only test the equipment but start to collect these case studies.

Then we create the library of these dredging-related light attenuation events and the exposure of the resources, and what impacts we can derive from the result from the dredging or how they might compare to the ambient conditions.

With these case studies, what it does is it improves our communication with the resource agencies and helps us to expedite the project approval. And through doing that, one of the things that happens is that we create a dialogue or a vocabulary that makes sense to everybody to communicate back and forth actual impacts that we can measure.

Deborah was talking about the equipment that we've used in the past. Well, what's given us the opportunity to move forward with putting together this large package of pieces of equipment to go out in the field quickly are a few new devices, new technology that have been provided.

And you can see in the bottom of the screen -- this one on the right -- is an Odessey and this is only about 6 inches long and about an inch-and-a-half in diameter. And it's self-contained. Actually, both of these are self-contained. The batteries are inside and the data logger is inside.

So they can be placed for a long-term deployment without us having to be located on-site. We can cover a greater area for a longer period of time picking up your spatial and temporal coverage -- which is something we haven't been able to do when we started tracking the plume for dredge events. Because you either have a boat tracking it and you get some specific event information where the location of your instruments are. But we really want to blanket the area and be able to identify changes as they're happening. So these long-term deployments now become more feasible for us to do.

We want you to notice on the other instruments. Now, this is a wetlab instrument. And it's probably about 14 inches long by about 3-1/2 inches in diameter. But at the top of it you can see this little wiper window.

Now, this is the light sensor right here that replaces the light bulb that Deborah was talking about. But this little wiper blade stays across this light sensor until it is directed to collect data and then it swings open and allows - the light sensors to actually sense what characteristics of the light are available. And then it will pause back over the light sensor so that it is - preventing it from being foul and needing to be wiped.

The Odessey also has a wiper that can be attached to it, but it's a separate piece of equipment that is purchased in addition to the sensor.

So, right now we're in the process of testing, calibrating and evaluating these instruments. And we're not only evaluating for their accuracy, but we're also evaluating them for their ease of use and how reliable they are and how difficult it is to manipulate the data.

And we're coming across a lot of interesting information on how the different instruments actually process the data. And so, we're working on making sense between the different instruments to make sure that we're, again, able to compare apples to apples.

So presently we've accumulated - 15 of the little blue Odesseys, two of the wetlabs, one of the LICORs and we have a YSI that actually - collects the hydrodynamic data as well as some of the water quality information. We're testing these instruments in air and in water.

And for the field applications, as we said we wanted to pick up – groupings of multiple instruments and deploy them as a package so that we can pick up the size, the intensity and the duration of the plume because this information has not been well documented in the past.

And so what you might see is a blanketing as this might be the area that you're concerned about. And you might design the experiment by putting your one hydrodynamic set up device -- like our YSI -- which would collect the hydrodynamic - your information from that specific site, and then we would relate it to the other instruments.

And then you might blanket the area with some of the PAR sensors and at some locations you might have PAR and turbidity sensors so that we can make the correlation between PAR sensors, data, and between the turbidity information that can be collected. As well, I don't have it identified here but we do have to have one above water PAR sensor to be able to relate the other information and to develop the coefficients for attenuation. We want to be able to do this for short term and long term deployment.

And it's necessary as Deborah said for us to get the ambient background conditions. As well as the dredging events, whether it is the dredging operation or the placement operation. And then we also need the post-dredging events condition data.

So that we can look at how quickly the area returns back to its ambient condition and so that we may catch storm events that we can compare against. From there we are developing standardized data collection processing and analysis routines.

So that when we report the information, every time you talk with someone about the your upcoming dredging you can compare from one case study to the next case study and you can look for the same identifiable characteristics and use these cases as a predictor of possible outcomes for your project.

This is a beach nourishment project that was done in at Perdido Key and the before picture is actually from Pensacola beach which is on the other side of the inlet. And you can see how clear and pretty the beach is.

And in the pictures to the left you see the end of the dredge disposal pipe. and the darkness of the organics and the sediment being disposed of. In the lower pictures you can watch the sediment being transported down the beach.

This is about a four or five mile range that you can actually see the sediment in the satellite pictures. The sediment is visible throughout the several miles, so, you know, you're going to get calls from agencies and the public.

You're going to calls from the public wanting to know how long is this going to last and what are going to be the long term impacts. And will there be impacts to the resources at this point.

If we have a large number of case studies that are similar and documented, we will be able to answer what is the typical expectation such as, you should see this dissipate in the next three or four days. Or after the period of about four weeks there will be only slight indications that the sediment was placed, or down coast 100 miles we did a similar placement and we saw no impact.

And, you know, you're going to see a lot of relief in your agencies when they're able to answer these questions up front without saying well we're hoping this is what's going to happen. This slide shows what might be an idealized beach nourishment PAR study. You can customize where you place your instrumentation based on what you actually want to study.

So this is just an idealized opportunity here. And you would want your hydrodynamic information collected at a centralized location. One PAR unit placed on land a so that we can do a comparison with surface light.

And you might want some in deeper water for your turbidity. But this would just be an idealized approach. And again you can customize the location of your instruments, but maintain a standardized collection rate for the data as well as a standardized processing.

And this might be an idealized channel study. This is from an earlier study in Egmont Key that Deborah was showing you. What we have here is your hydrodynamic suite and then you might have all your PAR sensors placed in different locations.

As the dredge tracks up and down the channel. As it's removing the material and the plume gets created, the sensors would document the intensity and the duration of the plumb. When we did Egmont, we set up in this area expecting the dredge to pass by. And based on the currents that we had seen, we expected the plume to come into this area. Well in our first testing we kind of missed that. Because there was only one boat parked with several instruments located the distance that the cables would reach around it the plumb was missed because it drifted away from the parked boat.

And so, you know, it was a big study. and a lot of time and effort putting it together. But on the one day for that one set of data we missed our opportunity to catch it because we did not have enough instruments to cover a great enough area.

So, it was very clear. We needed to have a greater amount of instrumentation placed over a larger spatial area.

So on the second day of the study, we actually did catch the dredge material moving. And we got a chance to look at how the plume dissipated. We did not catch the initialization of the material coming in. And in the third day we were able to actually catch a full operation.

Deborah Shafer: And I'll just add something. The shadow - dark shadows that you're seeing right along this edge, here. Those are the sea grass beds that were the resources of concern in this particular project. So, we had our instruments set up right on the edge of the channel within the sea grass beds. But as Cheryl noted, the dredge didn't dredge in that particular spot that day. Even though they had communicated to us that they probably would. So, the take home message from that is you really need to have lots of instruments so that you can cover a broader, spatial area to make up for contingencies like that.

Cheryl Pollock: This study was written up in an article that is in draft form right now. It relates the prior information along with some of the turbidity information. We wanted to show you just a couple of charts that come from that study. In the first one we have your Kd, which is your light attenuation coefficient versus time. This chart shows the day that we were able to document the decaying of the plume.

And you can see within just about an hour of time, the light attenuation coefficient drops significantly within just about an hour of time, leveling out to a consistent near ambient event. And so in the next day, we caught the pre-dredging beginning of the ambient condition. And you can see that the Kd level is pretty consistent. Then the dredge makes a pass. The Kd goes up drastically and it drops off real quickly. The dredge makes another path. The Kd peaks and drops off real quickly. Then plume starts to build up some background information. Dredge comes by makes a turn in front of us. What you are seeing each time is that as the dredge passes we have a peak and then a rapid decay in Kd. This is typical of a course material with very low organics in it. The larger particle sands fall out of suspension very quickly and the organics fall slowly.

And so as you would expect the decay is quite rapid. And as we get to the end we get it to drop off very quickly. The dredge is gone now.

There is some background material left in suspension. And as we get out here to the end of the chart, this rise in Kd reflects the end of the day, and the sun is starting to drop in its angle. And so what you have is a rise in your normal ambient coefficient that is not related to the dredging event.

If you look across the bottom of the slide, these pictures were taken every ten seconds.

And you can see how the plume came in and the light was attenuated. You can see it comes in very rapidly. And as you might expect, this relates closely to the charts. Well when the plumb leaves, you would expect that the visual decay would be almost the reverse.

And so our next steps in this work area are to complete the testing of the instrument. And then we need to develop the standardized routines from the data analysis and reporting.

And this figure to the right might be an example of where we might go. This. might represent the growth season for a particular resource. And this might be the typical light ranges during that season.

You could substitute a day on the axis and watch as the sunrises and as the sun goes down. But what you might see when you graph a normal day over a dredge plumb day or a normal growing season over a dredge window and a storm event is that the decay related to the dredging event is less than the decay in Kd due to a storm event. That graph might look something like this.

That the storm or dredge event changed the light for a short period of time. This other line might be a much larger storm. And this could be a hurricane where the sediment gets kicked up and stays kicked up.

It is a great exaggeration that it would be kicked up for that many months. But I was just trying to give an idea of what the graphs might look like when we start to report. So this might be an example of how we look at it.

These graphs might be related to the physiological impact levels. And that was just one starting area that we might start looking at. Resource agencies could be comparing these charts against the information they have on what thresholds exist for evaluating resource impacts.

And so we're seeking sponsorship opportunities for field deployment of the equipment. Once we've tested the instruments in the labs we need to get out there and make sure that the sampling rates that we're using, actually work well out in the field.

As well, we want to begin populating the database. Our library will correlate sediment types and grain sizes that are being dredged in the area or placed in the area and how they relate to the plume characteristics.

We have one potential opportunity coming up with the Jacksonville district. This study is also at Egmont Key but instead of a dredging operation, this would actually be a placement operation. They're going to do a beach nourishment project as a single point placement. And our contact here at CHL is Coraggio Maglio.

At Mayport Beach in 1972, they did a single point placement. And that's the plan at this point for Egmont. I've superimposed the picture from Mayport with the location at Egmont Key so you can visualize the outcome.

Additionally, you can see a conceptual idea of the instrumentation that we might be placing in the area. This is just one option and as I have said before, you can move these around and make some choices. But this might be the short term deployment idea.

And once the dredging event is over we may leave some of the instruments in this same orientation. Or we might decide that we need to move them because they're getting buried by the sediment being moved down coast. The expectation is the material in this area is likely to move to the North.

But we also have to place instrumentation to the South to make sure that we're catching the whole picture of what's happening in the area.

And so you ask, Well what are we going to do with this information? Well once you start looking at a dredging event that you are planning, you can take a look at your sediment grain size, your sediment type, and the hydrodynamic conditions. What is your dredging or placement method?

Query the library of case studies and look for similarity's in the sites, equipment, sediment grain size and type, and in hydrodynamic conditions.

And say, okay. Well at this coast area, they have this similar sediment situation. They have this current happening in the area and these are very similar to our planned project. Form there you can extrapolate that the PAR conditions and the magnitude and duration of the plume behavior are likely to occur for your study also.

This is like a group of pilot study where you start to get some information and start putting it together. And this should help communication with the different resource agencies in order to make some predictions as to whether the resources in the area will be impacted by the dredging event, or whether there will be no change relative to what the ambient conditions are.

And that's really what we're looking at. It is the comparison as to whether the dredge has a negative impact beyond what a normal ambient condition would have.

And so I guess we're open for discussion and your input. And if you guys want to go ahead and unmute the call.

Courtney Chambers: Okay. I'll do that.

Recording: All participants are now in interactive talk mode.

Cheryl Pollock: Anybody have any questions?

Courtney Chambers: I did receive one in the chat box right quick. I'll share with you. The question was how do you use ADCP measurements to track the sediment plume?

Cheryl Pollock: Well the ADC measurements - you're getting are back- scatter on those. You get a flexuation or rise in the backscatter when you are in the plumb..

And so like in Egmont we traveled through the plume and measured the differences in backscatter. We also did some grab samples. And we had the PAR sensors operating at the same time so we could identify the plumb and make comparisons.

Woman: Can I ask a question?

Courtney Chambers: Certainly.

Woman: Okay. What journal are you submitting the paper that you mentioned? If we wanted to look for that when it's published. Where are you going to put it?

Deborah Shafer: Initially it will be published in an (ERDC) Technical Report.

Woman: Oh okay.

Deborah Shafer: So it's not being targeted as a Journal at this point. We usually first publish things as tech notes. And then if we feel like it merits a peer review journal then we do that later.

Woman: Okay. Thank you.

Deborah Shafer: But those are all available online. Once they're approved, all the (ERDC) tech notes are also available for anyone to download online free.

Woman: Great. Okay.

Man: How expensive were the PAR sensors? And how did you mount them to the bed? Did you need divers?

Cheryl Pollock: Well for the Egmont event, we were in about five feet of water. And we placed them on pods and lowered them into the water. And, so they were raised up above the canopy of the sea grasses. We didn't use divers for that event. But as you can see, depending on where you're going and how deep you're going to place the equipment, you may need divers. You could use a driven pole and mount them to - they're very small.

You really have to look at your deployment window. Is it going to be out for a day? Or is it going to be out for a month? You know, how long are you going to be placing them out there? And so that location and placement method of each of the studies will differ. Because they're so small, there's not a great impact from the waves to the currents so the mounts can be simplified.

But, if you know, you have sedimentation happening. You don't want them to get buried. So you customize each one of the studies based on the conditions in the area. And then we maintain the sampling rate the same.

Man: How expensive are those?

Cheryl Pollock: The smaller units are quite inexpensive. And the issue with the smaller units is they have to have a calibration unit with them. They're in the $500 range when you start putting your burdens and everything together. But when you put the wiper blade on it, the wiper blade adds about fifteen hundred dollars, so about $2K each for the smaller units.

The issue with those is that they are calibrated against another piece of equipment like a Li -Cor. And so you can't just run with just those. You have to have some of the other equipment with you to do the calibration on those and set up. But we're getting really good results with them. And we're real pleased with them at this point.

Deborah Shafer: You know, you have to have one of the more - there's two kinds of instruments. Some come factory calibrated such that you don't have to perform a self- calibration. And whatever output units you get are the correct units because it's a factory calibration.

The lesser expensive ones are not that way. And so you have to calibrate. The user has to calibrate them against a known standard which would be one of these other factory calibrated instruments.

Cheryl Pollock: And so the wet lab ones are running around $6000 plus burdens on them.

Courtney Chambers: Okay. Thank you guys. I've got another question right here in the chat. It says is ERDC testing this on other turbidity plumes?

For example after a shrimp trawler passes. This would help communicate the impact of dredging versus other activities. Environmental resource agencies place costly additional requirements on dredging. While equally impacted efforts go unrestricted. It's kind of a comment.

Cheryl Pollock: That's exactly the point. We need to be comparing what really is happening in your area so that we account for all ambient and normal activities of the region against whether dredging has any greater or different impacts. And so if shrimping is a typical activity that goes on in your area, then definitely that's one of the things that during your long term deployment should be tested as a comparison.

And so again that's part of customizing you're study for your area. And that's very true. That the shrimp trolling is one of those things that have a great impact, and they're not being scrutinized in the same manner as the dredging is.

Woman: Do you know of any studies like this that have been done in an area where there's finer grain sediments? Or would that be compatible with sea grasses to begin with.

Deborah Shafer: Yes, I mean you certainly can get sea grasses occurring in fine grain sediments. Like I said a major reason for the findings that we had in the Saint Andrew Bay study was that it was very course grain sandy material. If you were in more fine grain material, for example, with a higher organic content, I would have expected to have seen much greater plume dissipation.

And much higher attenuation coefficients. But to my knowledge I'm not aware of those kinds of studies. That's - I said that's part of why we want to build up this library of projects.

Woman: Thank you.

Courtney Chambers: I received another chat question. The question was do you think the sensors could be used in areas with high turbidity. This is coming from the Savannah district.

Deborah Shafer: There's no reason why they couldn't. If it is in an area of high turbidity would definitely want to have the wiper blades installed. So that you are getting good data. Eliminating the problems associated with deposition of material in the sensor. But other than that I don't see any reason why they couldn't.

Cheryl Pollock: And I would think that the background information would be something that was very important over the long term record. Because you're currents are going to kick up your turbidity. And have a lot of changes in it.

So that long term record would be very important. But what's great about the light sensors is that they sense the change in not only the turbidity blocking the light, but different things. The tinting of the water itself, or different things that might be happening in the water. The light sensors sense that. With the turbidity sensors are only sensing the turbidity.

Courtney Chambers: Great. Any other questions this afternoon?

(Jase): Yes. Hey can you hear me okay? This is (Jase) from SAJ.

Courtney Chambers: Yes. We hear you (Jase).

(Jase): Awesome. So I had a couple questions. First on your slide 25. The one - the plot on the right shows coefficient versus the time with the dredge plume.

Did you guys - did you subtract the base - yes I see the baseline coming up and growing. Could you plot that where you remove that base line or the assumption of that baseline curve as the day changes? To actually see it reflected more in the dredge current.

So that - because that would bring the magnitude of the dredge plume down. Do you know what I'm saying?

Cheryl Pollock: Right. Yes.

Deborah Shafer: Yes.

Cheryl Pollock: Yes. We do have that where we've got the decay. You got the decay factor in it. But, that's in the paper.

(Jase): Okay. Cool, awesome. The other thing, somebody asked about fines. That Egmont project had a lot of fines in it the last time and will have it in the new iteration too.

But I'd like to talk with you guys offline sometime about the movement to the North. Because I had a conversation with USF kids. And I think that - about Egmont when we placed it this time coming up. That we may want to look at putting more instruments to the South also.

Cheryl Pollock: Okay,

Deborah Shafer: Yes. We'd be glad to talk you offline.

(Jase): Yes. And then I had one more question. Do you think that there is a way that the sedimentation could be correlated to the attenuation that you see? The actual rate of sedimentation in that vicinity.

Deborah Shafer: That's something that we're working on. Getting accurate measures of sedimentation when you're only talking about millimeters of sedimentation is extremely difficult. And I know that there has been another group of folks here at ERDC that have been looking at instrumentation to try to get a handle on that.

But I mean sediment traps, there is usually huge amounts of error associated with the traditional sediment trapping techniques. And so, yes that's an area that we're wanting to go to. And we're looking at it now. But I don't think we have anything quite ready for prime time, just at the moment.

Cheryl Pollock: (Jase) one of the things that we have talked about is the likelihood of the sedimentation falling right on the light sensors and if they weren't wiped or not. What would be the effect and would it different than is true for the plants on which the sediment falls. The sensors are higher in the water column and the current my blow the settled grains off the sensor where with the plants the sticky non-smooth surface may collect the sediments. So the currents can be effecting what is actually landing and what is remaining on the sensors. Where if they were down inside of the canopy you're going to get a different effect. And you're going to get the sea grasses moving around. And maybe wiping them themselves. So it's a really hard question because anything you put in there to measure the siltation or the sedimentation effects what's happening in the actual physical process. And so that's a big struggle to measure what is going on.

(Jase): That's interesting. I kind of - I would love to maybe design something that has a series of, like very fine mesh fabric that can move with the current as they change. And then trap them along the vertical column like down into the grass.

And then partial, you know, and step-wise up through it. So that way if we step, you know, I'm not sure what the guys that are working on the sediment collection are doing. But I think that correlating those two things, you know, is going to ultimately be like the most useful to us. Because we know, you know, learning, understanding how the plumes are developing. How they're migrating. And then the next question is well where do they go? Where are they landing? You know.

Woman: Could you do something like they do for monitoring wetland, marsh accretion. Like laying down a feldspar horizon. And then going back and taking a core to see what's above it?

Deborah Shafer: That has been tried. And, you know, if you're talking about centimeter scale deposition, I think that would probably work. But if you're only talking about literally millimeters of deposition, then no. And then you've got the issue of scouring to deal with. And so it's just very challenging to do. It's something that we're working on. And we recognize there's a real need there. But it's difficult.

(Jase): That was a good presentation. Thanks y'all.

Cheryl Pollock: Thank you.

Deborah Shafer: Thank you.

Courtney Chambers: We have time for a few more questions. If you have any please feel free to speak up or utilize the chat feature.

(Brian): And Courtney this is (Brian) with mobile district. If I understood correctly, these guys are looking for more case studies. So if we're aware of projects out there that might be able to help out in that regard, we do they need to contact?

Deborah Shafer: Either Cheryl or I. And, yes you're absolutely right. We are looking for case study opportunities. As we said, we have the one coming down the pipe at Egmont Key hopefully. But we're definitely looking for other opportunities. So contact either me Deborah Shafer, or Cheryl Pollock.

(Brian): All right. Thanks a lot.

Deborah Shafer: Thank you.

Courtney Chambers: Any other questions for Cheryl or (Deb) this afternoon? We've had some great discussion. Ladies do you have any final comments before we begin wrapping up?

Deborah Shafer: No I would just refer a lot of the sedimentation questions to (Joe Galani). Directing you to the right person who's working in specific areas on the sedimentation.

Courtney Chambers: All right. And I think (Joe's) on the line. (Joe) if you wanted to insert your email. That might be helpful.

(Joe Balani): Insert my email, where?

Courtney Chambers: I'm sorry in the chat box if you don't mind. And then if you could select to send to everyone?

(Joe Balani): Oh okay.

Courtney Chambers: If you are up for that?

(Joe Balini): Okay. All right. I'll do that now.

Courtney Chambers: Thanks. Okay. Well with that, (Deb) and Cheryl thank you very much for sharing with us today.

It's been a great presentation. And participants, thank you for joining. And speaking up and starting the discussion to help make this a successful webinar. I want to let you know we're going to be having more of these webinars. So please be watching for upcoming notices from (Cynthia Banks) here at ERDC. And I hope you all have a wonderful afternoon.

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