**Transcript: Conversation with the Director of NOAA’s National Hurricane Center, Ken Graham**

**{Intro Music}**

**[Mark Peterson]** I'm Mark Peterson and this is the FEMA podcast.

**[Mark Peterson]** The Atlantic hurricane season is generally considered to last from June first to November thirtieth. That's not to say that tropical systems can't develop outside of that timeframe, but this is generally the time with the most activity. FEMA is constantly planning for and learning from the types of storms we see during this time of year. In fact, just last year, 2017 was the busiest hurricane season for the US in terms of landfall and impact, and today we continue to be very actively involved in the recovery of those storms in Puerto Rico, Texas, and Florida. When storms begin to develop anywhere in the Atlantic. FEMA depends on the expertise of our partners throughout the government to get ready for the storm well before the storm becomes a major story in the national media. All of this work begins with NOAA’s national hurricane center. As systems begin to give clues that they might form into the more severe storm systems like hurricanes, FEMA, the whole of the federal government, including the White House, all depend on the considerable expertise of the hurricane center's team of meteorologists, to give guidance on the forecast of the storm assistant, understanding the confidence in that forecast and then to assist in evacuation decisions made by emergency managers.

**[Mark Peterson]** The hurricane center is with FEMA every step of the way through preparations and response. They are one of FEMA closest partners. On this episode of the FEMA Podcast, I met up with NOAA’s National Hurricane Center director Ken Graham in Montgomery, Alabama. We met up during the annual hurricane awareness tour and discuss some of the things that the hurricane center has learned from 2017 and how the center is working to provide better information to save lives and property.

**[Mark Peterson]** All right, so the national hurricane center is a major, major partner for FEMA and your team is integral to the planning that we do and the planning that our emergency management partners do a in the lead up to a storm and then actually even into the response phase of the storm. So Director Graham, thank you so much for joining the FEMA podcast.

**[Ken Graham]** I'm so happy to be here. Thanks for doing this.

**[Mark Peterson]** So director Graham, you're. You're pretty new to this role at the National Hurricane Center.

**[Ken Graham]** Yeah, it's interesting, you know, the weather service about 24 years and before that television, but in this role a month and I've been on the road for a month. So yeah, Brandon just the position and super excited, real humbled at the same time.

**[Mark Peterson]** Now I imagine being the director of the National Hurricane Center. Certainly during the hurricane season itself, the pace of work has to just be very, very intense. So what drew you to this role?

**[Ken Graham]** You know, it's interesting for us to know. People think we're probably busiest from June first to November 30th, which is the season, but you know, for us, preparedness is all year long and part of it's a events where you go talk to the public, but there's a big role for the, the hurricane center in teaching. We work with FEMA all the time to teach some of the courses, uh, to emergency managers. So we're on the road all year, you know, getting people ready for the next hurricane.

**[Mark Peterson]** Sure. And I think, I think people, especially along the coast, they're very accustomed to listening to local forecast and they're probably very used to their local meteorologist on their local station. So what role does the hurricane center play in forecasting hurricanes and then feeding, maybe those forecasts and then also supporting the federal government?

**[Mark Peterson]** You know, it's an, it's interesting when you look at the whole big picture of this, so you know, there's the whole science part. So there's the science of modeling and collecting the data with a hurricane hunters and getting that data into the modeling. And part of it is also, you know, really looking at the preparedness part. So you know, all the science and the world find a perfect forecast is fine, but if it's not interpreted and understood it doesn't do any good. So the other part of it is the preparedness part with the public and the part that a lot of people don't see is the part with the emergency manager. So it's the federal government, it's the state government, but also right down to the county and parish. So it's the briefings, it's the, we call it, um, you know, impact based decision support.

**[Ken Graham]** I mean that it's all about that final decision and one thing, I'm not sure everybody realizes evacuations or where, where government is going to put a sheltering and everything. There's science behind all that. So it's the, it's the forecast and it's the translation of that science into something that's actionable, that's the whole game. And that's what not everybody sees.

**[Mark Peterson]** You know, you mentioned the education, you bring emergency managers and local officials to the hurricane center, right?

**[Ken Graham]** Yeah. We have several courses. The emergency officials, first responders and emergency managers come to the hurricane center and we put them through a week course. And if you think about it, it's critical to understand the science and also all of our products well before the next storm because when you do that you'll understand what the products are actually saying and it helps to make that decision.

**[Mark Peterson]** So they kind of leave as sort of like an amateur meteorologist?

**[Ken Graham]** Yeah. As part of it. Absolutely. But you know, we have products called, you know, potential tropical cyclone, you know, I have yet products like that. So what does that mean or what is a, what does a hurricane watch me? How far out in time, what does a hurricane warning means? So, I mean, it, it's teaching the nomenclature, it's teaching what these products being, uh, you know, we teach things like, you know, what is a potential inundation map mean why is it called potential? So we actually go through it and talk about why that is.

**[Mark Peterson]** So I, I read that the 2017, the forecast were 25 percent more accurate than average. So what do you attribute that to?

**[Ken Graham]** And there's a couple things to think here. So we need to first of all understand that, you know, the bigger the storm, the stronger the storm. The models have a better fix on the storm. So a lot of times when you get stronger storms, the forecast will actually be better. So we need to really be, we need to say, hey, we did a great job. It's, it's great to have such improvement. The forecasting and what a huge difference going back decade by decade that that the science has come so far and being able to get so much better with that forecast, but what we have to realize if you have a developing storm a week storm, then the forecast is going to be a little tougher, so it just depends on the season.

**[Mark Peterson]** And do you find that storms in different locations at the Atlantic are more difficult to predict? I mean if they're in the Caribbean, are they more difficult than say, you know, out further into the Atlantic?

**[Ken Graham]** I think it really has to do with how strong it is. I think, you know, it's interesting when you see a developing storm and we hear the models are all over the place and as the case because if there's not a center yet, the models don't know where to have that fix on the hurricane. You're not really sure what's going to steer it. A strong store may go one direction and a week store may go another direction. That's, that's the reality of the physics is physics of the atmosphere. So as a result, you know, weaker storms are tougher for us, so I mean I think you're going to see some variability in their forecast and then the other part of it is in the intensity, so we made huge progress with the track forecasting and it's not by knot so to speak when it comes to the intensity, intensity is still challenging for us.

**[Mark Peterson]** Do you, do you feel that there's a number of misconceptions with those forecasts, uh, you know, that you're battling with the public or do you feel like people have become more accustomed to that forecast?

**[Ken Graham]** I think they're accustomed to it. I think. I think what we have to remember, we're, we're kind of a little bit of a victim of our own success because if you look at the cone, the cone is a cone of error. So the better we do it, you know, it really looks at the era of the last five years. So if you have five years of good forecasting, your cone gets smaller. If you have a couple bad years, guess what? The Cone may get a little bigger. So what we've done is the cones getting smaller, which is a good thing because fewer people evacuated and you know, fewer people are thinking they need to leave, but the reality is the smaller the cone, the more impacts or outside the cone. So now we have a communication challenge to say you know, you have impacts outside that cone even hundreds of miles away from where that cone is.

**[Ken Graham]** So I think what we're seeing as the science is getting better, but I think we're seeing that communication is still an area that we need to focus because it's all about those impacts.

**[Mark Peterson]** So you mentioned the science getting better. Are there new tools that the public can expect this year that maybe we didn't have in 2017 leading into 2018?

**[Ken Graham]** 2017 was the big test for, you know the look at the storm surge watch and warning. That was the big test there. And the potential tropical cyclone product. It doesn't sound like much right? But if you're an emergency manager sitting in a county or a parish, that product gives them 18 to 24 hours lead time that they wouldn't have had in previous seasons because you can actually start registering the products, watches, and warnings before development. So when it happened, and, and Cindy in Louisiana where there was actually an additional 18 hours of lead time because that product is priceless for an emergency manager.

**[Mark Peterson]** Yeah. That's really remarkable. And you mentioned storm surgeon there. Um, I think the public generally understands the Safir Simpson sale. The scale, right when we're talking about wind speed, right?

**[Ken Graham]** Exactly.

**[Mark Peterson]** Okay, good. So, um, how do you get the public to understand the potential for storm surge in the same way that they understand that scale?

**[Ken Graham]** And it's, it's such a huge point because, you know, we started in our messaging and our outreach, we're starting to talk about, you know, it really isn't necessarily about the category. It really truly is about those impacts. And, and we see it, I can think of hurricanes where there's examples where you have a, you know, Wilma that you know, you have a Charlie and different examples of that. Charlie was a small storm. So when was the big threat? He'd go back to Hurricane Isaac just to category one, very difficult to get people to prepare because it was just a category one.

**[Ken Graham]** The problem. Isaac was larger in geography than Katrina. Isaac was very slow and as a result, the storm surge was 12 foot from a cat one and you had torrential rainfall. There was more water in Lake Pontchartrain from Isaac than Katrina. These are the stats, this is the science behind it, and this isn't necessarily about that category. Truly is about those impacts. And that's why we now have the storm surge watching warning why 50 percent of fatalities in a tropical system is from the storm surge. Twenty five percent is actually from the inland rain. And if you add up the offshore fatalities, 90 percent of fatalities in tropical systems is water. We have to talk about water every, every podcast, every interview, everywhere we go in our training and education. We've got to continue to talk about water and have more conversations about the dangers of water.

**[Mark Peterson]** you know, and, and those you're kind of hitting on some of the water issues along the coast, but we've seen, we've seen some hurricanes, like I'm thinking Irene and Harvey where we saw massive rainfall further inland. So is the hurricane center also a sort of communicating the preparedness that needs to take place further inland?

**[Ken Graham]** Yeah, it's a, it's a big point because you look at the inland flooding, you know, 25 percent of the fatalities. Here's a stat I got to go far back to, to talk about it, but if you look at Hurricane Camille, very historic hurricane, there were more fatalities inland than on the coast to cat five.

**[Mark Peterson]** And I assume that it's attributed to river surge.

**[Ken Graham]** Absolutely. Well, inland all the way across the eastern part of the United States. So there's all sorts of proof that that's been a danger for a long time. So yeah, we're looking at it and I think we got some new products in an incredibly increased partnership with our weather prediction center, um, that, that issue is those, those quantitative precipitation forecasts and basically what that is, is how much weight am I going to get?

**[Ken Graham]** So they create the maps of how much rain you saw that in Charlie with the Bulls eyes of all the rainfall. So we're talking back and forth, we're going to put their products on our website. We're doing a lot internally behind the scenes to be a better messaging this stuff together and be able to collaborate better to be able to get the information on. Because every stat I've ever seen a collaborated similar message saves lives. And that's why you've seen local offices across this country. The weather service forecast offices that we have something called an integrated warning team. We bring federal, state, local in a room with media, bring them in a room. Everybody puts her cell phone aside, no tweeting allowed. No. Uh, nothing. Everything in that room stays in that room. And we talk issues, we talk about communication challenges and how that benefits and we've seen the benefit in a lot of areas.

**[Ken Graham]** We communicate the same message that saves lives. We have to be together.

**[Mark Peterson]** I'd really be missing when you're talking about partnerships. The National Hurricane Center also has a partnership internationally. Right?

**[Ken Graham]** That has been striking, you know, after getting this job. I've been traveling ever since. I got the job by the way and, and several have been international trips and we have this hurricane awareness toward that. We're on now and we have. We've had the stops in the United States, but two weeks ago we had the international stops. We went to Mexico, Panama, Jamaica. And you know the territory that with Puerto Rico, I mean to go all these different places. We're responsible to hurricane center for those watches and warnings and those forecast. And it was fascinating to me to go meet the people there that have the same issues we did. It's about the water. They have challenges with the heavy rain and the landslides and the flooding.

**[Ken Graham]** But the kids are the same. We have kids here today. You can hear him in the background. They're visiting the plane, they're all excited. They're the same in Mexico. They're the same in Panama. They were the same and all the other locations and that international responsibility has been, it has been pretty amazing. This is stop number nine for us and I think really looking back at that and this one, they are also similarly all the excited kids, all the people and it was amazing that the countries are dealing with the same problem as a hurricane really doesn't need a visa to travel countries. They don't have international borders. These hurricanes go wherever they want to. So we have common challenges and to be at the hurricane center to be able to talk to international and domestic about the same problems is amazing.

**[Mark Peterson]** Let's talk a little bit about this tour because this is a really remarkable event. I mean, you’re bringing the hurricane hunters here, uh, who is, who. There's two teams, there's the air force team, and then there's the NOAA team to tell me about the hurricane hunters and how they feed into the prediction models that you made

**[Ken Graham]** It's two different planes. So the hurricane hunters with the air force, they're the ones that fly up 10,000 feet right through the hurricane, right through the eye, and they give us all sorts of data about the storm and the storm, the NOAA team, it's amazing. They go above the storm, around the store and they look at the, really the data around it, what's going to steer the storm, what's the environment? All those, the collection of data that goes into the models and it looks the more better data you can get into a model, the better the model is simple as that good end, good out. So the better the accuracy we have in the models, the better job we can do with the forecast.

**[Mark Peterson]** Um, Administrative Brock Long of FEMA has set forth a couple of priorities and the most striking one - I think it is instilling a culture of preparedness in the nation. And so this tour is part of that, but what other tools does the hurricane center have to help people get prepared and sort of foster that culture of preparedness.

**[Ken Graham]** And that's what's so amazing with, with NOAA and all the aspects of NOAA and you know, we're talking bullies were talking satellite, we're talking hurricane center were so tight with FEMA and with such a great partnership with FEMA and we're right aligned with that and some of the tools that we have is the best job that we can do to help that is make sure people have information and, and some of the preparedness we talk about this week and I've been really open with some of the interviews this week when people are asking, you know, you got to have a plan, you've got to have a plan.

**[Ken Graham]** Well I'm not sure everybody knows how to how to do that. So I think step one, we've been backing up one step and saying, what is your risk? I mean, it, it, it starts with what I've done with my own family. You need to walk around your house. Are there any big trees that could hit my house? I might near a creek, a Bayou, a river, am I in a low area that typically floods? Those are the types of things people need to do a risk analysis and then start looking at their plan based on that. So we're, we're, you know, the hurricane center were so dedicated to make sure that we give the right, you know, a good forecast of course, and, and be able to do those briefings for FEMA and all the way down to the local parish or city, local county to have that information to make those big decisions.

**[Ken Graham]** Because if you think about it, it's all about that big decision and there's science behind it. So we want to provide that science.

**[Mark Peterson]** Um, so hurricane season, June first is uh, right around the corner. What do people along the coasts need to know now and what are you, what's the main message for them?

**[Ken Graham]** So here, here in Montgomery, at the today I look up in the sky is blue, just as blue as you can be as nice and warm. Now's the time to plan. I mean it, you know, if there's a hurricane in the Gulf, had it for the Gulf coast, you know, it's too stressful, it's too late, you know, you can do the planning if you want to and you need to, you have to because you got to know where to go and if you're an evacuation zone, knowing all that, but it's so difficult to do that when, when, you know the hurricanes had it for you. So you need to do it now. You need to start talking about that risk analysis and that planning well ahead of time and the indirect fate. Dallies has to be a conversation as well. When we look at indirect fatalities with a hurricane. And uh, the number one reason is cardiac arrest. It's stress, it's stress of not having a plan and stress of where do I get fuel, where do I go if I'm evacuated, listen to those local officials, officials. And that's when you need to evacuate at the tell you too, but you got to have a plan. Where are you going to go on the other end? So it's after the fact as well. So I think it's playing now and be prepared. There's all sorts of information out there. Um, you know, you look at the websites from anywhere from FEMA to ours to the Red Cross. I mean, there's just so much information out there and get it now, understand the risk and be ready.

**[Mark Peterson]** Director Graham, we wish you much luck in, um, in your new role and thank you so much for sitting down with us.

**[Ken Graham]** Thank you for taking the time to do this. This is helpful. And, uh, we just appreciate the partnership with FEMA.

**[Mark Peterson]** Thank you.

**[Mark Peterson]** We've linked to this episode on our FEMA Facebook page and we invite you to join the conversation in the comments. If you have ideas for future topics, send us an email@FEMA-podcastatFEMAdotdhs.gov. If you would like to learn more about this episode or other topics, visit FEMA.gov/podcast.