TRANSCRIPT

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Kate (operator):

Welcome and thank you for standing by. Your lines are in listen-only mode until today's question and answer session. If you would like to join the queue to ask a question, you may do so by pressing star one. Today's conference is being recorded. If you have any objection, you may disconnect at this time. I would now like to turn the call over to John Bateman. You may begin.

John Bateman:

All right, thanks so much, Kate. Good morning and thank all of you for joining this monthly climate update call, part of the suite of climate services that NOAA provides to government, business, academia, the media, and the public for informed decision-making. I'm John Bateman with NOAA Communications and I'll be facilitating the call today. If you have any additional questions after the conclusion of today's call, my colleague John Leslie and I can both be reached by email and I will spell it for you. That is N-E-S-D-I-S.P-A@N-O-A-A.G-O-V. That is nesdis.pa, as in public affairs, at noaa.gov. Today's update will feature three short presentations followed by an operator-assisted question and answer session, and the copy of the presentation our speakers will follow, can be downloaded from the link in the media advisory. And with that, I will introduce our speakers.

Our first presenter is Karin Gleason monitoring section sheet from NOAA's National Centers for Environmental Information who will provide a summary of the April 2024 US and global climate report, as well as the latest Drought Monitor update. Our second presenter is Derek Manzello, coordinator of NOAA's Coral Reef Watch who will provide the latest update on the global coral bleaching event confirmed in April 2024. And our third presenter is Dan Collins, a meteorologist with NOAA's Climate Prediction Center who will review the latest El Niño, La Niña update and provide the US temperature, precipitation, and drought outlooks for June, July, and August. Our first speaker will be Karin Gleason from NOAA NCEI. Karin?

Karin Gleason:

Thank you, John, and thanks to everyone for joining the call today. Let's begin by looking at the global temperature data for April of 2024 on slide number two. We see that the global surface temperature anomaly was 1.32 degrees Celsius or 2.3238 degrees Fahrenheit above the 20th century average, making this the warmest April on record by 0.18 degrees Celsius above both April of 2020 and April of 2016. This is

the 11th consecutive month of record warm global temperatures. Global land only temperatures ranked warmest on record at 1.97 degrees Celsius or 3.55 degrees Fahrenheit above average. Ocean-only temperatures also ranked warmest on record for April with 1.03 degrees Celsius or 1.85 degrees Fahrenheit above average. This is 0.17 degrees Celsius warmer than the second-warmest ocean temperatures set just last year and is the 13th consecutive month for record warm global oceans.

Looking at the temperature departure map on the left and the corresponding percentiles in the map on the right, we see that temperatures were much above average across much of North America, South America, Africa, much of Europe, and eastern Asia. Record warm temperatures were concentrated around northern and central South America, the Horn of Africa, Eastern Europe, and portions of eastern Asia. Sea surface temperatures were above average across much of the northern, western, and equatorial Pacific Ocean as well as a large portion of the Indian Ocean. Much of the central Atlantic Ocean continues to be record warm during the month of April. Near to cooler than average temperatures during April were observed across portions of Greenland, Iceland, Scandinavia and Northwest Russia, as well as eastern Iran, Afghanistan, and Pakistan, and portions of East Africa, Australia, and eastern Antarctica. Sea surface temperatures were below average over parts of the southeastern Pacific and Southern Ocean.

Looking at continental temperature ranks, we saw South America was warmest on record for April, Europe and North America were second warmest. Asia was third warmest and Africa fourth-warmest. Record warm temperatures which can be seen in the dark red areas in the percentiles map on the right covered approximately 14.7% of the world's surface this month, which is the highest percentage for April and is the second-highest record warm coverage for any month since records began in 1951. The record was set in September of 2023 with 15%.

Shifting our attention now to slide number three, we see the January to April 2024 global temperature percentiles map. The year-to-date plots for the 10 warmest years on record, as well as the annual temperature ranking outlook for the year. The January to April global surface temperature ranked warmest on record in the 175 years of record keeping at 1.34 degrees Celsius or 2.41 degrees Fahrenheit above the long-term average. January to April was characterized by widespread much warmer than average and record warm conditions across most of South America as well as Western and Southern Europe, much warmer than average and record warm temperatures covered much of Africa, southern Asia and a significant portion of Australia and eastern North America. Cooler than average temperatures were widespread across the Antarctica.

Sea surface temperatures were much warmer than average across a large portion of the northern and equatorial Pacific as well as the southwest Pacific Ocean. Record warm sea surface temperature stretch from the Caribbean Sea across the tropical Atlantic into the northeastern Atlantic Ocean. Record warm temperatures also affected large parts of the Indian Ocean, southern Atlantic, and parts of the southwestern Pacific Ocean. The most widespread areas of cooler than average sea surface temperatures occurred in the southeastern Pacific and parts of the Southern Ocean. Looking at the time series plot of the year-to-date temperature anomalies for the 10 warmest years on record, we see that the January through April 2024 year-to-date anomaly value as depicted by the black bar on the upper left-hand side of the plot is indeed the warmest January through April period among the warmest 10 years on record and according to NCEI's annual temperature ranking outlook statistical analysis, as depicted in the bar plot on the bottom part of the slide, there is a 61% chance that 2024 will end as the warmest year on record and 100% chance of a top five warm year.

Turning our attention now to slide number four, we see April temperatures across the contiguous US and they averaged 53.8 degrees Fahrenheit or 2.7 degrees Fahrenheit above the long-term average. This translates to a rank of 12 warmest. Looking at the temperature ranks map on the left, we see that in general temperatures were above to much above average across much of the lower 48 states with West Virginia and Virginia ranking fifth-warmest on record. Precipitation for the month averaged 2.77 inches, which was a quarter of an inch above average, and that translates to a ranking in the upper third of the historical distribution, which is an above average month. Looking at the precipitation map on the right, we can see that precipitation was above average from the northern plains to the Great Lakes and into the Northeast as well as in parts of the Deep South. Indiana and Pennsylvania ranked fifth [inaudible 00:08:53]

on record for this month. Conversely, precipitation was below average across portions of the West and Mid-Atlantic states, North Carolina ranked 13th driest on record for April.

Now, looking at slide number five, we see temperature and precipitation ranks for the January through April year-to-date period across the contiguous US. Temperatures averaged 43 degrees Fahrenheit, which were 3.8 degrees Fahrenheit above average, and that translates to a ranking of the fifth-warmest such year-to-date period on record. Looking at the temperature rankings map on the left, we see that the entire lower 48 was above average during this period with Wisconsin, Michigan, New York, Maine, Vermont, and New Hampshire, each ranking second-warmest on record, and an additional 22 states ranking among their 10 warmest such January through April periods on record. Precipitation for this year-to-date averaged 10.95 inches, which was 1.48 inches above average, which is 11th wettest for this period. Wetter than average conditions were present across much of the west, northern and southern plains, the Great Lakes, Northeast, and portions of the South and Southeast. Pennsylvania ranked second-wettest on record for this four-month period, and no state ranked below average for precipitation during this time.

Turning our attention now to slide number six and the latest US Drought Monitor map released just this morning, we see that approximately 14% of the contiguous US is currently in drought. This is down nearly 4% when compared with early April, and this is the smallest contiguous US drought footprint since the week of May 24th of 2020, which is 217 weeks and a little more than four years ago. Drought conditions lessened in intensity across the Northern Rockies and diminished in size across much of the Great Lakes as well as the Midwest. Drought conditions intensified and expanded across the central plains and emerged across portions of Central Florida. Outside of the contiguous US, drought coverage contracted and diminished in intensity across the Hawaiian Islands and was eliminated across Puerto Rico. And with that I'll turn the presentation over to Derek.

Derek Manzello:

Thank you so much, Karin. I now want to turn our attention to slide number seven. On April 15th, NOAA and the International Coral Reef Initiative made the announcement that we are in the midst of the world's fourth global bleaching event. Now, before we dive into discussion of the global event, I want to briefly orient you to Coral Reef Watch's new bleaching alert that were released in December of last year. Now, the impetus for these new categories is because the heat stress across the wider Caribbean in 2023 was so severe that we had to add additional bleaching alert levels to appropriately categorize just how hot it was. We started with the upper bound of the most extreme heat stress ever documented on reefs. There have been four instances in the literature when Degree Heating Weeks have exceeded 20, and in those examples there was between 89 to 99% coral mortality.

So for an alert level five, we are estimating that approximately 80% or more of corals on a particular reef may die. This is analogous to a category five hurricane or cyclone. At an alert level four, we estimate that more than half of the corals on a particular reef are at risk of dying. Alert level three simply represents the intermediary step between the risk of a mass mortality event and the start of mortality in sensitive taxa. Alert level two conditions should still be viewed seriously because this can cause severe mortality in heat-sensitive species and genotypes, or when a reef experiences its first bleaching event.

I'd like to now turn you to slide number eight. This figure shows you the maximum bleaching alert level achieved around the globe since the start of 2023 and the white stars show you where on the planet bleaching has been confirmed. Last bleaching has occurred in at least 62 countries and territories since February 2023 spanning both the Northern and Southern Hemispheres of all ocean basins. It is worthwhile noting that since the global bleaching announcement was made on April 15th, there have been an additional nine countries and territories that have reported severe bleaching, notably into the India, Sri Lanka, and the Chagos Archipelago. This illustrates that this event is still growing in size and impacts.

Next slide, number nine, please. Just over a week ago, we discovered that Thailand had closed down Pling Island at Phuket to tourists in hopes of reducing any additional stress on the corals that are bleaching in that location. This is one example of an action that can be taken in attempt to minimize bleaching impacts. Next, I'll go to slide 10. Now, Degree Heating Weeks are the metric we use to predict bleaching, and this

figure shows you the difference between the maximum Degree Heating Weeks that have been achieved since the start of 2023 relative to the previous maximum in the entire satellite record. So simply, this is showing us where the heat stress has been record setting and by how much.

The Atlantic Ocean is experiencing the most anomalous heat stress impacts during this event. There has also been record-setting heat stress on the Southern Great Barrier Reef in the Seychelles in the Indian Ocean as well as the west, central, equatorial Pacific, particularly around American and Western Samoa. But pulling back we can see that the heat stress accumulation has been most unprecedented and extreme in the Atlantic Ocean. Our colleagues in Brazil are currently documenting the impacts of their worst bleaching event on record as we speak.

Next, I'll be turning to slide 11. So this is the fourth global bleaching event on record. What you see here is the percentage of the total reef area on the planet that has experienced bleaching level heat stress within a 365-day window. As you can see, this has increased with each subsequent global bleaching event. We have broken the previous record and are currently sitting at 60.5% of the world's reef area has experienced bleaching level heat stress in the past year. Nearly every single coral reef area in the Atlantic Ocean has experienced bleaching level heat stress, and this is a new record. We know that approximately 8% of the world's coral died from the 1998 event, whereas there was a further 14% loss from 2009 to 2018.

Now I will turn to slide 12. Coral Reef Watch produces a Four-Month Coral Bleaching Outlook product, and this is showing us that the heat stress is predicted to persist and intensify in the northern Indian Ocean. The central, western Pacific Ocean, South China Sea, Taiwan, and Okinawa are all expected to experience bleaching level heat stress in the next few months. The Southern Caribbean is expected to hit bleaching level heat stress by the end of June and the Mesoamerican Barrier Reef off of Brazil and Mexico. Excuse me, not Brazil. Off of Belize and Mexico, which is the second-largest barrier reef in the world, is likely to experience bleaching level heat stress by July. By August, much of the Lesser and Greater Antilles and the Caribbean are predicted to experience bleaching level heat stress as well as Florida and the Flower Garden Banks.

I'll now turn you to slide 13. So what is concerning at the moment is that we are already seeing heat stress accumulate in the Southern Caribbean. So on the left figure, all the yellows in that hot spot figure show you where the bleaching threshold has already been breached and heat stress is accumulating in the Caribbean. This is alarming because this has never happened so early in the year before, and to say that is alarming because last year we experienced the same thing in that heat stress developed much earlier than ever before for many locations. So unfortunately, we are already starting to see a repeat of unprecedented anomalously accumulating heat stress in the Caribbean.

Now I want to quickly show you some data from the Southern Caribbean. These plots show you daily average sea surface temperatures on the top and the accumulation of Degree Heating Weeks on the bottom for the entirety of the satellite record for these four locations. Now these are Caribbean side of Panama, the Caribbean side of Costa Rica, as well as Nicaragua and the Columbia... Excuse me, the Caribbean side of Columbia. The black lines are 2024, and the gray lines are 2023. As you can see, 2023 was record-setting for all these locations. But what is really concerning is that we are already accumulating Degree Heating Weeks in all these locations and you can see that it is weeks earlier than has ever occurred before. Recall that last year in many locations we saw heat stress develop earlier than ever before, and now in 2024, we are unfortunately starting to see the same pattern play out again.

I will now turn you to slide 15. In summary, the world is experiencing its fourth global bleaching event. Since February of 2023, at least 62 countries and territories, and every ocean basin has experienced mass bleaching. We've already broken a record in that this event has impacted more reef area within a 365-day window than any prior event, and we're approaching nearly two-thirds of the world's coral reefs experiencing bleaching-level heat stress in the past year. The impacts from this event will take time to understand. In some locations like the Caribbean in particular, corals can survive heat stress but will go out to die over the next one to two years from coral disease outbreaks or aggregations of coral predators.

We do know that the impacts to the Elkhorn and Staghorn corals in the Caribbean have been severe, and

the first publication from this event that has appeared is from the Mexican Pacific where they documented 50 to 93% mortality on the Huatulco reef [inaudible 00:19:30] off of Oaxaca, Mexico. This area experienced alert level four conditions in 2023. El Niño is dissipating, but the ocean is still so anomalously hot that it won't take much additional seasonal warming to push temperatures past the bleaching threshold, particularly in the Caribbean where bleaching thresholds are already being breached at the earliest point in time in the historical satellite records. Once La Niña develops, the percentage of reef areas experiencing bleaching should start to decline. However, at this point it is becoming increasingly likely that the wider Caribbean and Florida may once again experience another severe bleaching event this summer. Thank you very much. And now I'd like to turn it over to Dan Collins.

Dan Collins:

Thank you, Derek. This is Dan Collins of the NOAA Climate Prediction Center, and I will now provide the latest El Niño and La Niña update as well as the climate outlooks for the next three months. I will begin on slide 16 with the current conditions in the tropical Pacific Ocean and the forecast of the El Niño-Southern Oscillation or ENSO. Sea surface temperature anomalies averaged the last four weeks as shown in the map on the left. Above normal sea surface temperatures continued across much of the Pacific Ocean. However, negative anomalies have recently emerged in the Eastern Pacific Ocean near the equator. Both ocean and atmospheric conditions are quickly changing from El Niño to what is known as an ENSO-neutral climate state.

The figure on the right shows the probability of El Niño or warmer than normal tropical Pacific Ocean temperatures in red bars, neutral conditions in gray bars, and the probabilities of cooler than normal temperatures or La Niña conditions with blue bars. A La Niña watch has been issued by the NOAA Climate Prediction Center as the probability of La Niña exceeds 50% for several overlapping seasons. El Niño is expected to quickly transition to neutral conditions in the spring, and then as sea surface temperature is cool, La Niña is likely to be in place either in summer or autumn and is expected to continue into next winter.

Turning to the next slide, slide number 17. The temperature and precipitation outlooks for the month of June are shown in the maps on the left and on the right respectively. In the map on the left, shades of orange and red are where above normal temperatures are more likely to occur, and shades of blue are where below normal temperatures are more likely. Above normal temperatures are most likely for eastern areas of Alaska and parts of the Western US, from the Pacific Northwest across the central Rockies into the Southwest. Above normal temperatures are also likely across the southern plains into the Southeast. Below normal temperatures are more likely for a small area in Southern California.

In the map on the right shades of brown show where below normal precipitation is more likely and shades of green indicate where above normal precipitation is more likely. Above normal precipitation is more likely for eastern areas of Alaska's interior. Above normal precipitation is also more likely from the central plains eastward into the Ohio Valley and the Mid-Atlantic region. Below normal precipitation is favored for parts of the Pacific Northwest as well as for parts of the Southwest and southern plains indicating a potential delay in the monsoon rains.

Turning now to slide number 18, the average temperature and precipitation outlooks for the three months of June, July and August are shown in the maps on the left and on the right. Above normal seasonal mean temperatures are more likely across most of the US as well as Alaska. However, below normal temperatures are favored for southwestern coastal areas of Alaska to in part to colder than average sea surface temperatures in the coastal waters. The highest probabilities for above normal temperatures exceed 60% in the Southwest for the Four Corners region and West Texas related to long-term multi-decadal climate trends or climate change. Above and below normal temperatures are equally likely in the northern Central US where multi-decadal trends are weaker and models predict a higher chance of below normal temperatures possibly during the season. Above normal temperatures are also likely over the Northeast where multi-decadal trends are stronger.

Looking at the map on the right above normal precipitation is favored for most of Alaska, excluding the

western Aleutians and Southeast Alaska. Early impacts of La Niña would favor above normal precipitation as computer models predict. Below normal precipitation is favored for much of the Western US, excluding areas with drier seasonal climates such as California. Above normal precipitation is more likely across much of the Eastern US, from the Gulf Coast northeastward across the Southeast, the Ohio Valley, the Mid-Atlantic, and southern New England. These patterns of precipitation are generally consistent with the impacts of La Niña as well as consistent with multi-decadal climate change.

Turning now to slide 19, the drought outlook for the end of May into June, July and August is shown. The map indicates expected changes in drought conditions by the end of August relative to the Drought Monitor shown earlier in the presentation on slide six and including the next couple of weeks of May. Areas of persistent drought where it is already present are indicated in brown, areas of predicted drought development are in yellow, expected drought improvement is shown in gray, and areas of expected drought removal are green.

Drought is expected to worsen or persist in much of the Western US as well as for Hawaii and Southeast Alaska. The drought outlook is related to forecasts of below normal precipitation and above normal temperatures in these areas. Forecasts of temperature and precipitation for the end of May are also considered in the drought outlook as changes are predicted from the current drought conditions through the end of August. Drought is expected to improve or be removed in areas where dry conditions are in place from the Mississippi Valley across the Eastern US, including Florida, due to seasonal above normal precipitation in most areas, but also typical precipitation amounts for the climate of different regions also contribute to drought improvement. That concludes our look at the climate outlooks and I will now turn the call back over to John.

John Bateman:

Thanks so much, Dan. We will now take questions from the call participants. Please be sure to identify who you would like to answer the question if possible. And Kate, could you please remind the call participants how they can ask a question and then please queue up the first question. A couple of questions in the queue. If you guys don't mind holding on just for a few more seconds, we will get Kate back on the line and get your questions answered by our experts. Please hang in there.

Kate (operator):

I am here. I do apologize for that. As a reminder, it is star one to ask a question and our first question is from Rachel Ramirez with CNN. Your line is open.

Rachel Ramirez CNN:

Hi. Thank you so much. So my first question is for Derek, would you say that this is the fastest mass bleaching on record and is this current event on track to be the worst mass bleaching event on record? And do we have any sense of how long it'll last? Dan talked about La Niña developing and so just giving us a timeline maybe in terms of the observation. Thank you.

Derek Manzello:

So the 2014... The third Global Coral... This is Derek Manzello, I think I'm supposed to identify myself, sorry. The third global coral bleaching event took place from 2014-2017. So that event currently impacted more reef area cumulatively over those three years than what we currently are sitting at. But again, that cumulative reef area impact is increasing for this event. So currently, the third global coral bleaching event is still the most severe event on record in terms of just how long it lasted as well as the cumulative percentage of reef areas that were impacted. How this event is unique is that the magnitude of the heat stress has just been so extreme in certain locations. In particular, the entirety of the Atlantic Ocean has just been literally off the charts, unprecedented heat stress. I hate that I have to keep using that word unprecedented, but again, we are seeing unprecedented patterns again this year. So this event is... I would say it's not yet quite as severe as the third global bleaching event was just because that one went on for

three years.

In terms of the future, will this this event surpass the third global bleaching event? It's unclear. It is very good news that El Niño is going away and La Niña is developing. So it's my hope that once La Niña really sets up and develops in the eastern Pacific that we will start seeing that percentage of reef areas impacted start coming down. Again, that's my hope. I'm not Nostradamus, I can't predict the future. I am concerned just because the entirety of the world's oceans are so anomalously hot right now. So even though La Niña is developing and that's a potentially good thing, I still am very worried about the state of the world's coral reefs just because we're seeing things play out right now that are just very unexpected and extreme in nature. Like I said, the global ocean is just so much hotter than average right now. La Niña is a good thing, but time will tell if this event ends up surpassing the third global bleaching event, but I don't think we're there yet.

And in terms of impacts to the reefs themselves, as I said in the presentation, it's going to take at least a couple years to really document at what these impacts have been at the global scale. We're still working on documenting the impacts that happened in Florida and the wider Caribbean last summer, and now we're starting to approach a potential new bleaching season and other bleaching event. So again, it takes time to really document what happened. I'm very comfortable in saying that this is the second most severe global bleaching event on record, and we may surpass the third global bleaching event, but we're just not there yet.

Rachel Ramirez CNN:

Can I ask just a quick follow-up? How far back do records go when it comes to the coral bleaching? Just a little clarification there.

Derek Manzello:

Scientists have been studying corals for well over 100 years. Charles Darwin studied coral reefs and then published some real seminal papers on coral reef development in particular. So in terms of mass coral bleaching that's due to elevated sea surface temperature, these events started in the 1980s, in particular during the extreme El Niño of 1982-'83, there was mass coral bleaching across pretty much the entirety of the eastern, tropical Pacific, so Costa Rica, Panama, Colombia, Galapagos Islands. So that was the first event of mass coral bleaching that was due only as a result of elevated sea surface temperatures. Coral bleaching as a stress response has been known for well over 100 years. If you hit a coral with low salinity water or very high light levels or sedimentation, they'll bleach. It's a stress response. But all previous bleaching events before the 1980s were very, very localized.

So I think the first mass bleaching event on record occurred in Jamaica in the early 1960s. And this was because I believe it was Hurricane Flora came through and just dump torrential rains in the Discovery Bay and all this fresh water funneled out onto the reef and it caused a mass bleaching of that reef. Now, that reef completely recovered from that event, which clearly highlights that corals, they're well adapted to survive and recover from normal stressors. So every once in a while, yeah, they get smacked with some low salinity water, they bleach, they get stressed, but they recover.

So the mass bleaching due to elevated sea surface temperature really began in the early 1980s, and we have an unbelievable amount of confidence in that because corals and the reef itself is laying down a geologic record through time. So we can go back in history and see how they have behaved in the past. On the Great Barrier Reef, they have coral growth records going back 600 years and there's no precedent for what's happened in the last 25 years in the Great Barrier Reef going back 600 years. And then if you go back even farther in the geologic record, it's the same thing. There's really no precedent for what's happening right now around the world.

Kate (operator):

Our next question is from Barbara Moran. Your line is open.

Barbara Moran:

Hi there. This is Barbara Moran from WBUR in Boston, and I had sort of two questions about the sea surface temperatures. One is it looks like El Niño is definitely contributing to the globally-high temperatures, but I'm wondering if what else is contributing and if you have any sense that once the El Niño develops, if the sea surface temperatures will drop globally. So if you could just talk about some of the other factors in there. And then my second question is more specifically about New England and the Gulf of Maine, which doesn't seem to be as affected by this as a lot of the rest of the Atlantic, and I'm wondering if you have any reasons for that. Thanks.

Dan Collins:

This is Dan Collins from the Climate Prediction Center. I think I'll take this question. In regards to the impact of El Niño and La Niña and global temperatures, it's known that there is a relationship between the warmer Pacific Ocean, which characterizes El Niño, and warmer global temperatures and cooler tropical Pacific Ocean or La Niña leading to cooler global temperatures. However, those are correlated, but simultaneously, the global oceans have been warming over recent decades. The effect of the El Niño-Southern Oscillation is essentially to release heat from the tropical Pacific Ocean during El Niño and to absorb heat during La Niña. However, simultaneously the global temperatures of both the ocean and the atmosphere have been increasing over time.

So it's hard to say exactly regionally what will occur with a change towards La Niña that will lead to some decrease in global temperatures potentially, that would be the expectation. However, given the decadal signal, the decadal changes, I would still expect [inaudible 00:36:19] temperatures. I'm sorry, but in regards to the Gulf of Maine, I don't have specific information on what the conditions and forecast would be for the Gulf of Maine. So perhaps we can get you someone else to answer that question.

Barbara Moran:

Great. Can I just ask one quick follow-up? The jump in sea surface temperature seem to be extreme from beginning last year. So what I mean just is it just the ocean absorbing global heat or is there other factors that you guys think might be involved with that?

Dan Collins:

Okay, yeah, [inaudible 00:37:02]. Go ahead.

Derek Manzello:

I don't mean to step over you, Dan. You can finish your thought. I can jump in after.

Dan Collins:

Oh, okay. I was going to note that we haven't had an El Niño in several years and we've had repeated La Niña conditions for several years. It's possible that effectively the global warming signal as we term it, the long-term the decadal changes, that it was masked a bit over those recent years and then emerged as the El Niño emerged. Doesn't mean that we'll go back to the temperatures that we had in the La Niña years that preceded it, but it's possible that jump is partly related to that shift to El Niño in the most recent year. But I don't have further comment on this. This is Dan Collins. Derek, that you were going to-

Derek Manzello:

Yeah. Hey, this is Derek Manzello again. So this is really an excellent question that I think has been on the minds of anybody that stares at ocean temperatures all day. There's been a couple hypotheses out there for why the magnitude of this spike and temperature has been so great. Because it has exceeded expectations for climate change and El Niño. The magnitude of the increase in ocean temperature has been much higher than anticipated. And there's a couple of hypotheses for why that is. The first one that I

think probably has gained the most momentum is that the volcanic eruption in Tonga in 2022. So normally when you have big volcanic eruptions on planet earth, this leads to global cooling trends. So Mount Pinatubo in I think 1981 in the Philippines erupted, and that led to several years of cooler than average temperatures. And then going all the way back to the 1800s, Krakatoa in Indonesia led to a period of global cooling.

Now, what made the Tonga eruption unique was that it was submarine, which means it blew up under the ocean. So what happened was it ejected all this water vapor into the upper atmosphere. And water vapor acts in the same way as greenhouse gases. So it's hypothesized that the injection of all that water vapor into the atmosphere has amplified basically the warming signal. And based on what I've read, again, I'm a coral biologist, so if anybody has further information about this, please step in. But based on what I've read, the estimates are that if this is what is happening on planet earth right now, this could potentially persist for about five years before we would see that impact from that water vapor dissipate.

The other factor that's been hypothesized is that there were new international regulations on marine fuels that came about in the last, I forget the exact date, but in the last couple of years. So these new laws basically banned sulfur compounds from marine fuels that were horrific for human health and everything else. But ironically, these sulfur compounds and the marine fuels acted as cloud condensation nuclei. So you can go back in time and look at satellite imagery and see these little cloud tracks from ships in the ocean. More clouds means less solar radiation reaching the planet and bouncing back into space. So cleaning up marine fuels and making them better for humans basically may have had the unintended consequence of causing a little spike in ocean warming.

So those are the two big hypotheses I've seen put out about why things have just gone crazy haywire with ocean temperatures in the last year. But again, I'm not really aware of where those hypotheses are in terms of being tested and validated. That's just what I've heard in terms of potential causes for this crazy jump in ocean temperatures that we've seen.

Barbara Moran:

Super, thank you.

Kate (operator):

As a reminder, if you would like to join the queue to ask a question, you may press star one to do so. Our next question is from Rebecca Hersher with NPR. Your line is open.

Rebecca Hersher:

Hi, thanks for doing this. My question is for Karin. At last month's call, you very hopefully put the streak that we're experiencing in context, and I wonder if you could just remind us of those numbers, how bad basically in context is an eleven-month consecutive peak for global temperatures, and then the same for the ocean streak.

Karin Gleason:

Yes. This is Karin Gleason at NCEI. I think if I heard the question correctly, if I could just restate something from last month, but update it with a month regarding the streak of record ocean temperatures as well as record global temperatures. As I mentioned in this particular presentation for combined land and ocean, so overall global temperatures, we are at record levels for 11 consecutive months now, so since last June through April, and we're still counting of course. The record streak for combined land and the ocean is 13 months, and that was from May of 2015 through May of 2016. So that was the previous warmest year on record, May 2016, prior to last year, and also super strong El Niño year 2015 going into 2016. So there are a lot of parallels between 2015, 2016 as well as '23 going into '24.

Looking at ocean-only temperatures, we started our current record streak of 13 months back in April of last year. So April of '23 through April of '24. And of course we're still counting there and anticipate that likely to continue. And the record's length for that streak is March 2015 to August 2016, which is 18

consecutive months. Again, the same event 2015, 2016.

And one of the characteristics that I've noticed between looking at record global temperatures and then looking at global oceans, we know oceans take longer to warm and cool compared to land. And so the global temperature includes lands. And so when the oceans reach record level, they seem to get there a little ahead of the overall global temperatures. And when the global temperature streaks and the record oceans tend to lag a few months as well. So there is this lag of oceans warming and cooling.

So certainly we would anticipate the global ocean record to continue even with some cooling if we were to go into La Niña into the summer or fall. That is good news. I agree with Eric on that point. We want to see that happen. But the impacts and the effects of that may take some time to be realized in the climate system. So I wouldn't anticipate a whole lot of cooling in the next several months. Overall, record streaks probably likely to continue for a little while, and we'll certainly keep you posted if we break either of these records going forward in the next several months.

Rebecca Hersher:

Thank you.

Kate (operator):

Thank you. Our next question is from Emilee Speck, your line is open.

Emilee Speck:

Hi, thanks for taking my question. My question is two parts and it's for Derek. So last summer we saw a lot of the marine labs taking in coral to save them from the then unprecedented sea surface temperatures and the bleaching events. Are you seeing more of those actions this year already happening in advance? You mentioned Thailand closing off a dive area. Are there any other examples of some things that labs and organizations are doing in advance of what we saw last summer? And then just to follow up on that with hopefully La Niña helping will hurricane season have any contributing factor to hopefully dropping some sea surface temperatures in the coming months? Thank you.

Derek Manzello:

Great questions. Derek Manzello here again. So yes, the restoration community and pretty much the entire coral reef science and management community are anticipating and preparing for another bad bleaching year. So I've been communicating with the Florida Keys National Marine Sanctuary, and just telling them what my thoughts are for the summer because for some of the interventions they do, like for instance, one intervention they're planning on doing is moving corals to deeper water. There seems to be a sweet spot in how long the corals do well in deep water. So they're trying to identify the perfect time to do these actions. There's a lot of preparation taking place, especially in Florida, again to do all these interventions. But again, in terms of specifics around that, I'm definitely not the best person to talk to. I can happily put you in touch with people that are on the ground dealing with that challenge right now if you'd like further information.

In terms of your second question. Yeah, during La Niña, we expect a very active Atlantic hurricane season. Obviously no one is hoping or praying for any hurricanes, but we do know that hurricanes can actually be very beneficial to corals, specifically when corals are bleaching and thermally stressed. If a reef gets hit dead on dead center by a bad hurricane, then that can cause really bad damage to the reef. But the impacts from hurricanes and cyclones and typhoons, they're all the same thing, it's basically limited to within about 30 to 90 kilometers of the storm center, whereas the cooling footprints of a hurricane can extend outwards of 700 kilometers, 400 to 700 kilometers from the storm center.

So when you have a hurricane event, that can end up cooling a lot more reef area than it negatively impacts. So obviously in the United States, we're very worried now about a potential for a record-setting hurricane season, but for the corals, there may actually be some places that will benefit if there are a lot of storms, and that could act as a feedback mechanism to help some reefs during what is potentially another

bleaching year.

Hi there, Kate.

Kate (operator):

Our next question is from Seth Borenstein with The Associated Press, your line is open.

Seth Borenstein:

Yes, thank you. These are for Derek. Derek, just you've got on slide 11 the global bleaching event index of with a number 60.5%, which is larger than the third event, and that's the maximum peak reef area impacted in one year versus the accumulation. First off, is that why that number is bigger, even though you consider the third event's stronger? So in other words, have we ever seen anything this far at 60%? And given all this, I know you don't have actual calculations yet of what percentage of the world's coral died in '98 now, but since you do have percentages based on previous events, is there an estimate of what you're expecting from this one? Do you expect it to be bigger than the 8% and the 14%? And then finally, you mentioned all these good explanations for why the water is warmer, but I also just want to make sure, do you also consider what's happening a symptom of climate change? I know you probably do, but I just need to ask.

Derek Manzello:

All right. Yeah, so this is Derek Manzello again, a lot of questions there. So yeah, absolutely this wouldn't be happening without climate change. That's basically the cornerstone of all the ocean warming we're seeing and El Niño just adds as a little, I don't want to say a little Lego piece on top of that climate warming, but the El Niño-Southern Oscillation just provides that kind of variability plus and minus around that global warming signal. So yeah, absolutely, this is not something that would be happening without climate change. The thing is, from what I've read, we've gotten really good at predicting climate patterns with supercomputers, and our climate models are really, really good these days. So the fact that we just saw this unexpected huge spike in the magnitude of ocean heat content and anomalous ocean temperatures, that's why folks are hypothesizing that there might be something else contributing to that.

In terms of the ranking global bleaching events... To put numbers on this, as of April 10th, if you look at the cumulative percentage of reef area around the planet that's experienced bleaching level heat stress during this event, it's currently sitting at 62.9%. So the record for that number was 65.7% over the span of 2014 to 2017. So we're starting to get close, very close to hitting that cumulative record as well as the record within any 365-day period. Now, in terms of impacts to this event, like I said, it's way too early to know what the global patterns of impacts are going to look like. I can tell you that the impacts in the Caribbean are... They're going to be severe, especially for the Elkhorn and the Staghorn corals. We already know the impacts there are very, very severe.

But there has been some marked survival of some of the massive and boulder corals. But again, it's still too early to raise the victory flag because we know from past bleaching events that disease outbreaks take place for upwards of one to two years after the bleaching stops. So we're not going to really know the full fate of the Caribbean reefs for... If it bleaches again this year, then that pushes that down the road again, another two years basically. So it's going to be a year or two before we really have a full idea of just how bad this event was for the Caribbean.

In terms of the globe, again, right now we're just dealing with qualitative bleaching observations. Basically what people are seeing. We're not looking at any hard data, so we really can't make any claims if this event, in terms of ecological impact to the corals and the reefs, it's going to be worse or better or worse than the previous events because... There's a lot of things that go into play in terms of the impact to a given reef in a given area. So it's still way too early, way too early to tell. What I can say is we know there's going to be bad impacts. We just don't know how bad and where they're going to be... We can tell you where the heat stress has been most severe, and that's most likely where the impacts are going to be most severe. But again, in terms of kind of ranking the impacts, it's still too early to say.

Seth Borenstein:

Thank you.

Kate (operator):

Our next question is from [inaudible 00:54:26], your line is open, with the Washington Post that is.

Speaker 11:

Hi, thank you so much for taking the time to do this today. My question was similar to somebody else's about what does the overactive hurricane season mean for the corals? I know you talked... I know there's the effects of bringing cool water in, which could be a huge relief to some of these corals which have been experiencing these bleaching events. But is there any idea of the the severity of hurricanes that could just be damaging, considering these corals are already weakened due to this prolonged bleaching event?

Derek Manzello:

So this is Derek again. So hurricane impacts on reefs are incredibly, incredibly variable. You can have the eye of a storm go over an area and everything look totally fine, and then you can go two kilometers upstream or downstream or away and have a reef that just got pummeled and leveled and it is completely dead. So the impacts from hurricanes are extremely variable from reef to reef and location to location. Like I said, the most severe impacts generally occur within 30 to 90 kilometers of a storm center, but there are examples of severe impacts, hundreds of kilometers away due to big waves and things like that.

In terms of compounding impacts from hurricanes, yeah, if an area does experience the brunt of, say, a category 3, 4, 5 hurricane directly, then yeah, that's going to probably cause severe damage to that specific reef area. But again, it's really, I don't want to say impossible to predict, but the impacts from storms are so incredibly variable. To give you an example, Hurricane Irma, when it came through Florida Keys in 2017, it came ashore right around Big Pine Key, which is in the lower Florida Keys, and I had a bunch of experiments set up about 30, 40 miles northeast of there.

So again, when was I was evacuating and the storm was coming through, I just assumed my experiments were just going to be destroyed. And there's a CO_2 buoy we have out there. I figured the CO_2 buoy was going to end up in New Orleans or something. But what was crazy is that we went back and there was no impact on the experiment. The CO_2 buoy was totally fine. However, a couple of reefs here and there had gigantic coral colonies that had just been tipped over and died. So again, it's incredibly variable, the impacts from hurricanes.

The other thing you got to remember is that corals and coral reefs, they're well adapted to deal with hurricane impacts. They've been dealing with them forever. So the main reef builder in the Atlantic, the Elkhorn corals have been the primary reef builder for the last 500,000 years. Again, when you compare naturally-occurring disturbances like hurricanes, coral reefs are going to be fine. They're going to bounce back from those things. They can be really, really damaging, but it's a pulse event. And even though a reef... Say you get a reef that gets hit really, really bad by one hurricane, the likelihood of that reef getting hit by another hurricane is very, very low for like hundreds of years basically.

We're living in strange days, I think as we all know, and in these strange days, hurricanes and cyclones are now essentially good things for coral reefs. We've seen this play out. And the Great Barrier Reef in 2016, the Southern Great Barrier Reef was not impacted at all. And that's because there was a well-timed cyclone that came through and cooled things off. Last year in the Caribbean, everywhere in the Caribbean saw extreme record-setting heat stress except for Bermuda. And the reason Bermuda did not see record-setting heat stress last year was because hurricanes Franklin and [inaudible 00:58:50] both spun up that way and cooled things off right at the exact time to benefit those corals. So yeah, hurricanes can be devastating for reefs, but in the grand scheme of things, and given the current situation we are in on planet Earth, they're now a good thing essentially, which is mind-blowing.

Speaker 11:

And so to follow up really quick, so the corals due to having this prolonged bleaching event aren't in any way weakened, they'll still be able to have that natural protective barrier, and they're not going to be more susceptible to breakage or things with this overactive hurricane season?

Derek Manzello:

Basically once a coral dies, it immediately starts getting subjected to biological and physical erosion. So there's constantly physical and biological forces breaking down that calcium carbonate. It's insidious, all the time. When the corals are alive, they can withstand wave damage and things like that really, really well. The problem is once they die, then it only takes a couple years before they basically start getting broken down into rubble and things like that. As long as the corals survived last year, they should be okay.

But another interesting thing that happens in the Caribbean is you get this phenomenon of partial mortality, and what that means is the entire coral doesn't die, only part of the coral dies. So when you have partial mortality, that opens up space for bioeroders, which are organisms that bore into the coral skeleton, just like a beetle does into a tree or a termite. There's a lot of ocean termites, if you will, that bore into coral skeletons, and that's when they start weakening it. So if you have corals that have experienced a lot of partial mortality last year, their bases and their structures may have been weakened by bioerosions. There could potentially be a cumulative impact in those cases. But again, it's really hard to say at this point.

Kate (operator):

Thank you. Our next question is from James Dinneen with New Scientist Magazine. Your line is open.

James Dinneen:

Thanks very much. My question is for Dan. There was a lot of discussion in 2023 about whether this El Niño event would be historic in terms of its strength. I'm curious now that it's ending what we can say about how this El Niño compares to past strong El Niños. I'm also curious if this projected rapid transition to neutral and then La Niña conditions is notable or irregular in any way compared to past transitions.

Dan Collins:

This is Dan Collins. Let me take a quick look at some information that I have at hand. It was not a record setting El Niño in the sense of what we saw in 2015-2016. For 2015-2016, the peak anomaly in the eastern Pacific Ocean was 2.6 degrees Celsius above the long-term average. The peak anomaly in the 2023-2024 event was 2.0 degrees Celsius above the long-term average, which is a strong event and sometimes they're classified... The El Niños, we classify them as weak if they're just 0.5 Degrees Celsius above average, 1 degree above average is moderate, and 1.5 is strong. Some, though this is unofficial, say above 2 is a super El Niño. So just barely hit the 2-degree threshold, but that's arbitrary really. The 2015-2016 event was more of a record-setting event, more than half a degree warmer than that for several seasons in a row, in fact.

And then the other part of your question was the transition from El Niño to La Niña, and whether this was in some sense a record or... It's actually fairly typical that El Niño transitions into La Niña the follow year. This is not true for La Niña, which sometimes can persist for two or three years, but when we have a strong El Niño event, it's often followed by a La Niña event or even a moderate La Niña event or greater. So that expectation is not surprising. Looking through the record, there were other instances where we went from El Niño in the winter months and we had La Niña by the May, June, July period. I'm looking right now and can see that in 2010 that occurred.

In the 2015-2016 event, La Niña began in the July, August, September, which is when the probabilities in this forecast start to amp up is in the July, August, September. They're 50/50 in June, July, August. So yeah, so it looks like to me, you just scanning through the record, not particularly unprecedented. The stronger El Niño event, like I said, the more chance it actually rebounds towards the La Niña event in the following year.

James Dinneen:

Just to ask a follow-up there, Karin had said that there's a 61% chance that 2024 ends up as the hottest year on record. Is the speed at which La Niña develops the key uncertainty there?

Dan Collins:

That may be better answered by Karin. This is Dan Collins once again. There is some uncertainty, certainly in the outlook for La Niña at the moment. It does rise to greater an 80% chance that we'll have a La Niña that first occurs in September, October, November, but before that it may not quite get there. In terms of how that contributes to global temperatures, I don't know if Karin has a better answer.

Karin Gleason:

Yeah, this is Karin Gleason, great question. The statistical annual temperature outlook tool is not really based on computer models and looking forward, it actually looks retrospectively at the historical global climate record. And so if the past is any indication of what might happen here in the near future, we do know, and I think I already alluded to the fact that there's lag in these changes. So even if a La Niña were to take hold, say late summer or early fall and potentially ramp up, think the most aggressive cooling kind of a situation, and really get going before fall or something like that, there's still going to be lag in the climate system and certainly with the global oceans. And so it's going to take some time for this massive heat to dissipate.

And to the question will it dissipate, we anticipate with any emerging La Niña that there would be some cooling of the overall climate system over time. But this particular tool looks at these events that Dan's referring to. In particular, there is a pattern of having stronger El Niños followed by La Niñas the following winter season. Looking at former records, we have seen like the 2015-2016 for instance, 2016 was the record warmest year for a long time until we came across last year. And 2024 is in a similar position to 2016 in that it's coming off of an El Niño, although that particular El Niño was much stronger than this particular one. But still, the latter year ended up being the year of record.

And so this is purely looking at simulation, thousands of simulations and permutations of what possible combinations could happen. And so the statistics of it being 61% chance of warmest year, it's actually we have a 95% confidence that it's either warmest or second warmest. So we're feeling pretty good that it's going to be one or two at the end of the year. And right now we're just so far above all of the previous years, even with some cooling. It could be a photo finish with '23 towards the end. If you look back on slide number three, you'll see how 2023, since about mid-year to the end of the year, that accumulative year-to-date horse race, as we call it, the heating built. The anomaly value, the departure from average over the subsequent year-to-date period it built. Whereas the normal signal it settles down and the anomaly becomes less, the magnitude becomes... It grows smaller.

So we'll have to see if there is a strong signal to maintain that heat. The question's going to be how long can the heat persist if a La Niña does develop. If a strong La Niña gets going, when does it get going and how quickly can it work on those global oceans to bring them down a little bit? Again, we're going to watch this super closely and do what we can each month to give an update and see how these numbers change. We're not even halfway through the year. 61% chance for warmest years is a pretty high percentage. We'll see how the numbers play out and we'll see if we do see some cooling in the next few months, but it probably will take a while before we see significant cooling of the ocean. So yeah, hope that helps.

James Dinneen:

Yeah, thanks very much.

Kate (operator):

Our next question is from Chris Ruffin with Health and Human Services. Your line is now open.

Chris Ruffin:

I think you actually just answered the question from the last caller, but I'll ask it again just in case. Directing attention to slide 18, I'm curious, I was having a little difficulty understanding what the slide was trying to communicate. Are you sharing that the statistical model is only 50/50 accurate and predicting La Niña through June, July, and August, or what exactly are you trying to share with this data?

Dan Collins:

Sure. Excuse me. Just you can imagine that as we have a transition in the overall El Niño-Southern Oscillation and the climate state that we are not certain about exactly when we will cross over into a threshold that's established... We have a very specific threshold over an area in the eastern Pacific Ocean, which when it is positive 0.5 degrees Celsius, we say that we have El Niño. And when it is negative 0.5 degrees Celsius or lower, we say we have La Niña. And in between those two, nearer to zero degrees Celsius, nearer to the long-term average, then we say it's neutral. So we just cannot forecast precisely when that'll occur. However, it's clear from all of our models and such that we are tending towards La Niña and there is a high chance that we will have La Niña say by next winter. And as noted in autumn, it exceeds 80% chance.

So in terms of accuracy, I guess you could say that what we're saying is for this precise season, the June, July, August for the temperature averages, the sea surface temperature averages in the east, central Pacific Ocean in this box that we use, that it's a flip of a coin whether we'll cross that threshold, that essentially we're very close to that threshold in the forecast, the negative 0.5 degrees Celsius. And so it would be hard to say, but the threshold in a sense, I will note, the threshold is a little bit arbitrary. And initially if La Niña is weaker at the start, then it'll have less global impacts. And as it increases, as the anomalies in the Pacific Ocean increase, or that is increase in magnitude become more negative, it'll have more of a global impact. So it's a little bit arbitrary to think about when exactly you cross over to La Niña.

Chris Ruffin:

Okay. But so on slide 18, how reliable are you that these state temperatures and state precipitations will be realized?

Dan Collins:

Sure. So our forecasts are what we consider to be statistically reliable. So on the map for temperature, you see probabilities exceeding 50% in much of the West and in the Northeast, and you see even 60% in parts of the Southwest. So what that means is that we're suggesting that we would have an expectation based on past outlooks that there is greater than a 50% chance that this is what will occur above normal temperatures in those regions. I want to clarify, if it wasn't clear, that our outlooks are divided into three categories technically. We don't usually put an area of confident near normal on the map. So we look at the period from... This is a World Meteorological Organization standard. We look at the period from 1991 to 2020, and we classify years as below normal temperatures, near normal temperatures, and above normal temperatures, three categories.

So by pure chance there is an equal likelihood of any of those three categories, but we're saying in all of these orange areas on the temperature map that there is a greater chance of above normal temperatures, and in some areas exceeding 40%, but then in other areas even exceeding 50% and 60%. And as I said, these are statistically reliable, meaning that greater than 50% means that greater than 50% of the time when we make such a forecast, that's the category of three categories that will occur. For precipitation, you'll note that there is a leaning towards above normal precipitation in the East and the leaning towards below normal precipitation in the West, but the probabilities are terribly high. So it means that some of that area will likely miss and only part of that area will likely occur as above normal, it is [inaudible 01:14:48] below normal. It's possible that it'll do rather well, but in the long term, precipitation has lower [inaudible 01:14:56].

Chris Ruffin:

Thank you.

Kate (operator):

Our next question is from Rachel Ramirez with CNN. Your line is open.

Rachel Ramirez CNN:

Hi, thank you so much. My question is for Derek again, I'm just trying to get more details and more of a sense of how this current mass bleaching event stacks up from the third. Can you speak more on the speed at which it's unfolding? How would you describe the speed this time around compared to the last one? Thank you.

Derek Manzello:

Derek Manzello again, in terms of the speed, it's hard to say. I'm not sure if there's really anything anomalous about the speed at which this is developed. The big things that makes this anomalous is that we've just seen such greater magnitude of accumulated heat stress, particularly in the Atlantic Ocean. That is really the defining characteristic of this event relative to the previous events, is just the heat stress has just been far in excess of anything that's ever been experienced in both the north and south Atlantic Ocean reef areas.

But yeah, I mean in terms of the speed, I don't think it's really... Basically the way these bleaching global events develop is as the planet rotates between Northern and Southern and Hemisphere summers, you see that heat follows suit. So right now we're in a transition period where the Southern Hemisphere is cooling off and the equatorial regions are heating up and then the Northern Hemisphere is starting to heat up. So I don't think the speed of this event is really anything different than normal. It's just the magnitude of the heat stress in certain locations, in particular the Atlantic Ocean, has really just been very unprecedented.

Rachel Ramirez CNN:

Thank you. And just to clarify that stat you gave, I believe it was Seth who asked the question earlier on how much area was affected during 2014 to 2017? It was 65.7% and you said we're coming close to that [inaudible 01:17:16]. I just want to clarify that.

Derek Manzello:

Yeah, definitely. So the cumulative percent of reef areas impacted in the 2014 to 2017 event was 65.7%. That's right. For this event, we're currently sitting at the cumulative area impacted at 62.9%.

Rachel Ramirez CNN:

Okay. Thank you.

Kate (operator):

And we have no other questions at this time.

John Bateman:

Okay. Thanks so much, Kate. If there are no further questions, I will wrap up the call. First, I'd like to thank all of our speakers for their time and everyone else for participating in this conference call. I will end by reminding you all though to mark your calendar for a few upcoming events. NOAA's 2024 hurricane outlook news conference will be held May 23rd at 10:00 A.M. Eastern Time. Again, that is May 23rd at 10:00 A.M. Eastern Time. Also, the release of the May 2024 US climate report and billion-dollar disaster summary is scheduled for June 10th. The release of the May 2024 global climate report is scheduled for

June 13th and our monthly media climate call will be held next month on June 20th. Lastly, an audio file of this call will be posted on the noaa.gov media advisory site later today. And if you have any further informational needs, please feel free to email me, John Bateman. My contact information is available at the top of the media advisory. Thank you.

Kate (operator):

This concludes today's conference. Thank you for your attendance. You may disconnect at this time.