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2021 Hurricane Outlook and Review of 2020 Hurricane Season

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The potential for widespread storm destruction to the United States underscores the value of timely tropical cyclone forecasts. The National Oceanic and Atmospheric Administration (NOAA) is responsible for issuing tropical cyclone forecasts, including track, intensity, storm surge, and rainfall.

NOAA defines a *tropical cyclone* as a "rotating, organized system of clouds and thunderstorms that originates over tropical or subtropical waters and has a closed low-level circulation." According to NOAA, tropical cyclones include

- Tropical depressions—maximum sustained winds of ≤ 38 miles per hour (mph).
- Tropical storms—maximum sustained winds of 39-73 mph. NOAA typically names a storm once it reaches this strength.
- Hurricanes—maximum sustained winds of ≥ 74 mph, corresponding to a category 1 or 2 on the Saffir-Simpson Hurricane Wind Scale. Hurricanes are called *typhoons* or *cyclones* in other parts of the world.
- Major hurricanes—maximum sustained winds of ≥111 mph, corresponding to a category 3, 4, or 5.

NOAA releases seasonal hurricane outlooks relevant to the United States, including the north Atlantic, eastern Pacific, and central Pacific oceans, before each hurricane season begins. Although outlook titles refer to hurricanes, outlooks include information on potential named storms, hurricanes, and major hurricanes. The Atlantic and central Pacific seasons run from June 1 through November 30; the eastern Pacific season begins May 15. Tropical cyclones, however, may form outside of these timeframes. In August, NOAA typically updates the Atlantic outlook but not the Pacific outlooks. Multiple nonfederal entities also publish outlooks. These forecasts rely, in part, on NOAA's collected and shared information.

2021 Hurricane Season Outlooks

In May 2021, NOAA issued its initial 2021 Atlantic hurricane outlook (**Table 1**), indicating a 60% likelihood of an above-normal season rather than a near- (30%) or below-normal season (10%). The predicted number of named storms, hurricanes, and major hurricanes was similar to the number initially predicted for the 2020 Atlantic hurricane season, but NOAA forecasters did not expect 2021 to be as

"busy" as 2020. In its August 2021 update, NOAA increased the likelihood of an above-average season to 65% and adjusted the ranges of expected named storms and hurricanes but retained its original number of major hurricanes (**Table 1**). El Niño-Southern Oscillation conditions are currently in the neutral phase, with the possibility of La Niña later in the season, according to NOAA; both phases support high hurricane activity.

Table 1. 2021 Atlantic Hurricane Season: 1991-2020 Annual Averages and 2021 Outlooks

	1991-2020 Annual Averages	NOAA May 2021 Outlook	NOAA August 2021 Outlook
Named Storms	14	13-20	15-21
Hurricanes	7	6-10	7-10
Major Hurricanes	3	3-5	3-5

Sources: NOAA, "Background Information: North Atlantic Hurricane Season" (hereinafter, NOAA, "Background"); NOAA, "NOAA Predicts Another Active Atlantic Hurricane Season," May 20, 2021 (hereinafter, NOAA, May 2021 predictions); NOAA, "Atlantic Hurricane Season Shows No Signs of Slowing," August 4, 2021.

NOAA released its 2021 outlooks for the eastern (**Table 2**) and central Pacific hurricane seasons in May 2021. NOAA anticipated both regions likely would experience below-normal seasons (45%) rather than near- (35%) or above-normal seasons (20%).

Table 2. 2021 Eastern Pacific Hurricane Season: 1991-2020 Annual Averages and 2021 Outlook

	1991-2020 Annual Averages	NOAA May 2021 Outlook
Named Storms	15	12-18
Hurricanes	8	5-10
Major Hurricanes	4	2-5

Sources: NOAA, "Background"; NOAA, May 2021 predictions.

NOAA predicted the central Pacific would experience two to five tropical cyclones in 2021. The central Pacific basin averaged four to five tropical cyclones per year between 1991 and 2020.

2020 Hurricane Season

In May 2020, NOAA issued its initial 2020 Atlantic hurricane season outlook (**Table 3**), indicating an above-normal season (60%). Its August 2020 outlook increased the likelihood of an above-normal season to 85%.

Table 3. 2020 Atlantic Hurricane Season: Outlooks and Actual Amounts

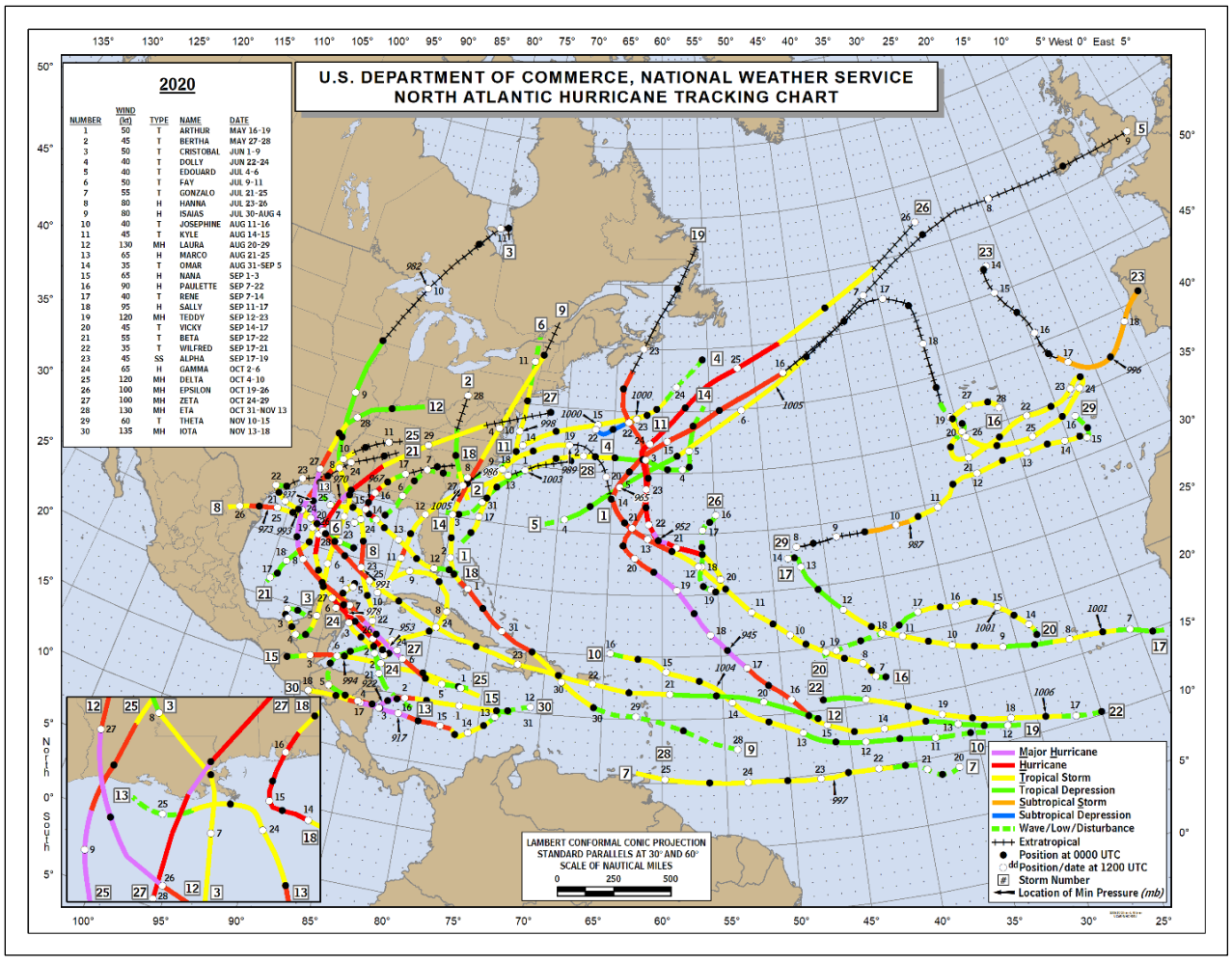
	NOAA May 2020 Outlook	NOAA August 2020 Outlook	2020 Actual
Named Storms	13-19	19-25	30
Hurricanes	6-10	7-11	14
Major Hurricanes	3-6	3-6	7

Sources: NOAA, "Busy Atlantic Hurricane Season Predicted for 2020," May 21, 2020; NOAA, "'Extremely Active Hurricane Season Possible for Atlantic Basin," August 6, 2020; NOAA, "Record-Breaking Atlantic Hurricane Season Draws to an End," updated June 10, 2021.

Since 2016, a tropical cyclone has formed before the June 1 start of the hurricane season (e.g., tropical storms Arthur and Bertha formed in May 2020). The 2020 Atlantic hurricane season (**Figure 1**) was noteworthy for the

- most named storms (30),
- second-highest number of hurricanes (14),
- most number of landfalling named storms (11), with 4 coming ashore in Louisiana,
- second-ever use of the Greek alphabet to supplement the 21-name Atlantic storm list, and
- fifth consecutive year with an above-normal Atlantic hurricane season, totaling 18 above-normal seasons in the past 26 seasons. NOAA attributed the increased hurricane activity to the warm phase of the Atlantic Multidecadal Oscillation, which began in 1995. Such active eras in the Atlantic basin historically have lasted 25-40 years.

Figure 1. 2020 Atlantic Tropical Cyclone Tracks



Note: Major hurricanes (Laura, Teddy, Delta, Epsilon, Zeta, Eta, Iota) denoted in purple.

NOAA released its 2020 eastern Pacific (**Table 4**) and central Pacific hurricane outlooks in May 2020, anticipating these regions likely would experience near- (40%) to below-normal (35%) seasons, with above-normal seasons less likely to occur (25%).

Table 4. 2020 Eastern Pacific Hurricane Season: Outlook and Actual Amounts

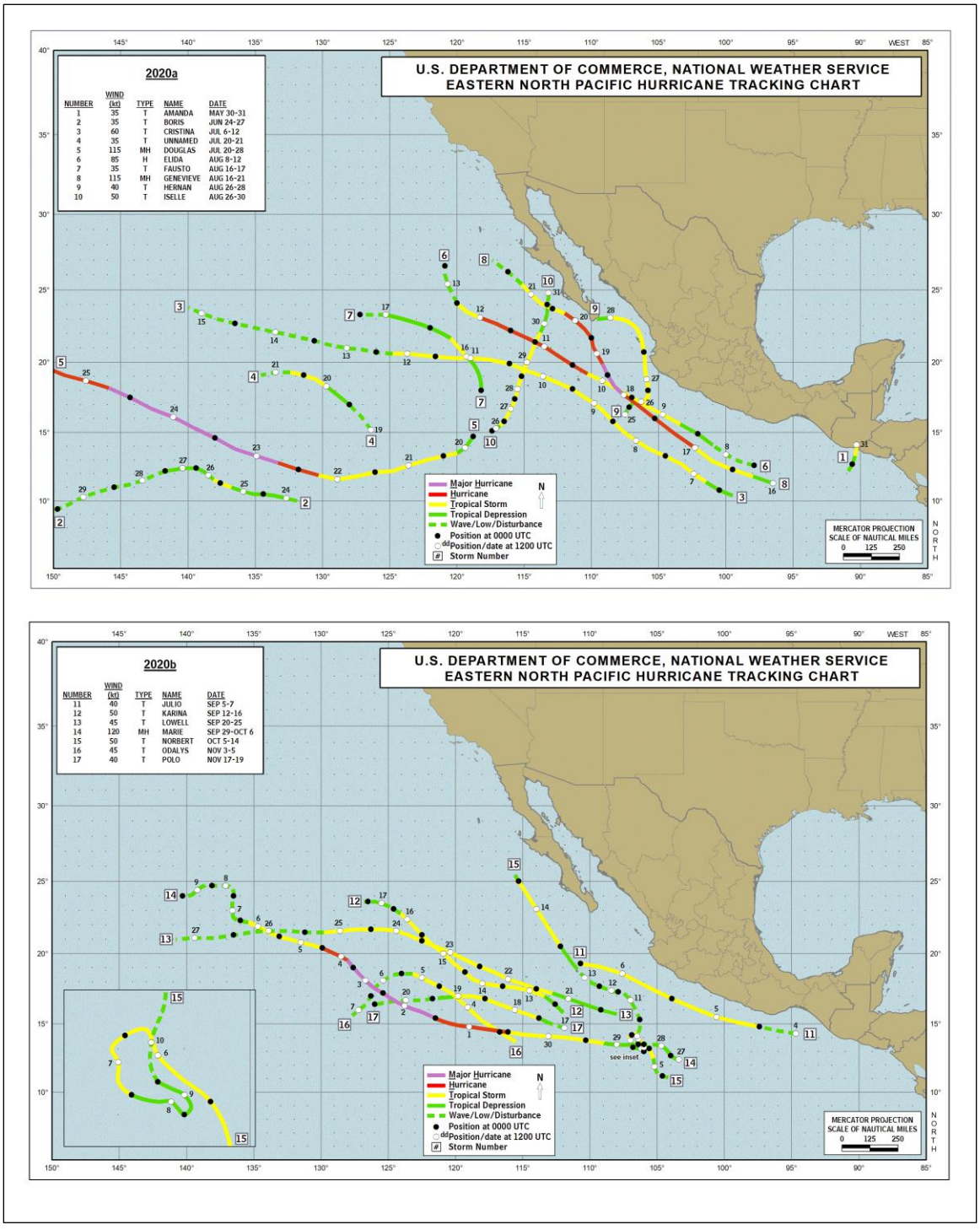
	NOAA May 2020 Outlook	2020 Actual
Named Storms	11-18	17
Hurricanes	5-10	4
Major Hurricanes	1-5	3

Sources: NOAA, "NOAA 2020 Eastern Pacific Hurricane Season Outlook," May 21, 2020; NOAA, "Eastern North Pacific Hurricane Season Summary Table."

The 2020 eastern Pacific hurricane season began when Tropical Depression One-E formed in April—the earliest tropical cyclone to form since the satellite record began in 1966. The season featured three major hurricanes: Douglas, Genevieve, and Marie.

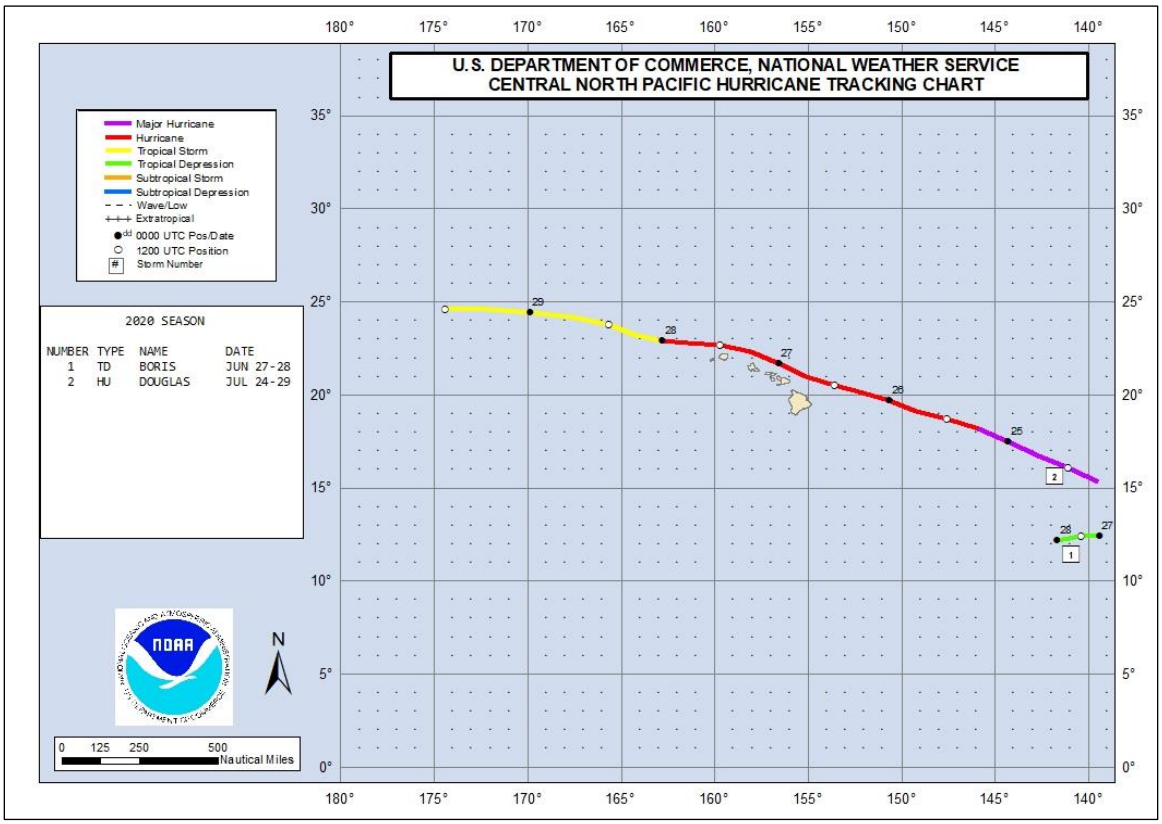
NOAA predicted two to six tropical cyclones in the central Pacific during the 2020 hurricane season. The actual 2020 central Pacific season included two tropical cyclones in the basin: Boris and Douglas (**Figure 3**).

Figure 2. 2020 Eastern Pacific Tropical Cyclone Tracks



Note: Major hurricanes (Douglas, Genevieve, Marie) denoted in purple.

Figure 3. 2020 Central Pacific Tropical Cyclone Tracks



Note: Major Hurricane Douglas denoted in purple.

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