

Hawaii

Climate Indicators Summary

September 2021

PMNM Climate Change Working Group

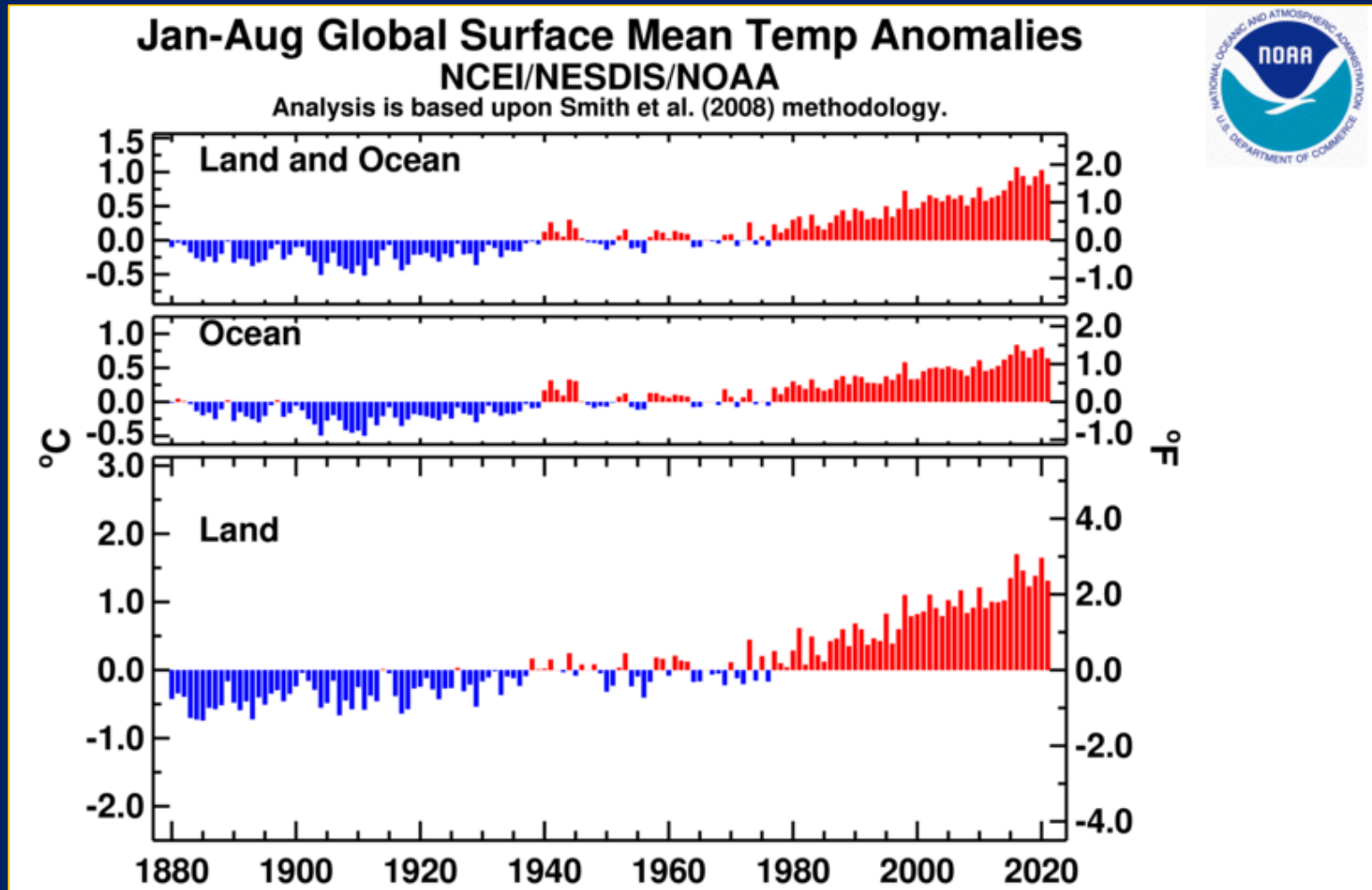
Dan A. Polhemus

U. S. Fish & Wildlife Service

Honolulu, HI

2020 basically tied 2016 as the hottest year on record

Finishes off the hottest decade ever observed since records began in the late 19th Century

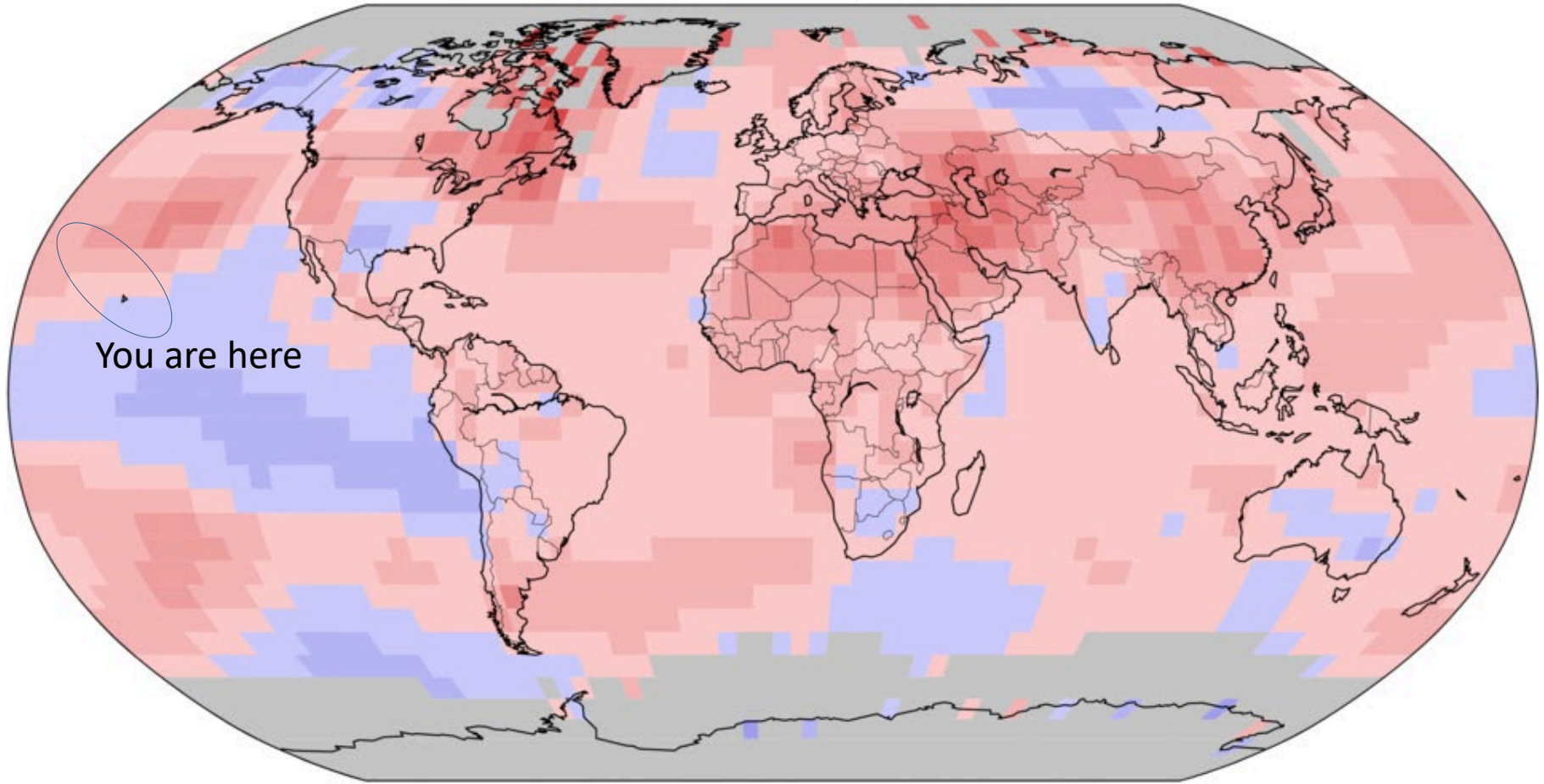


And 2021 could still be in the running...

NOAA confirms that July 2021 was the hottest month ever in 142 years of record keeping

Land & Ocean Temperature Departure from Average Jan–Aug 2021 (with respect to a 1981–2010 base period)

Data Source: NOAA GlobalTemp v5.0.0–20210908



Degrees Celsius



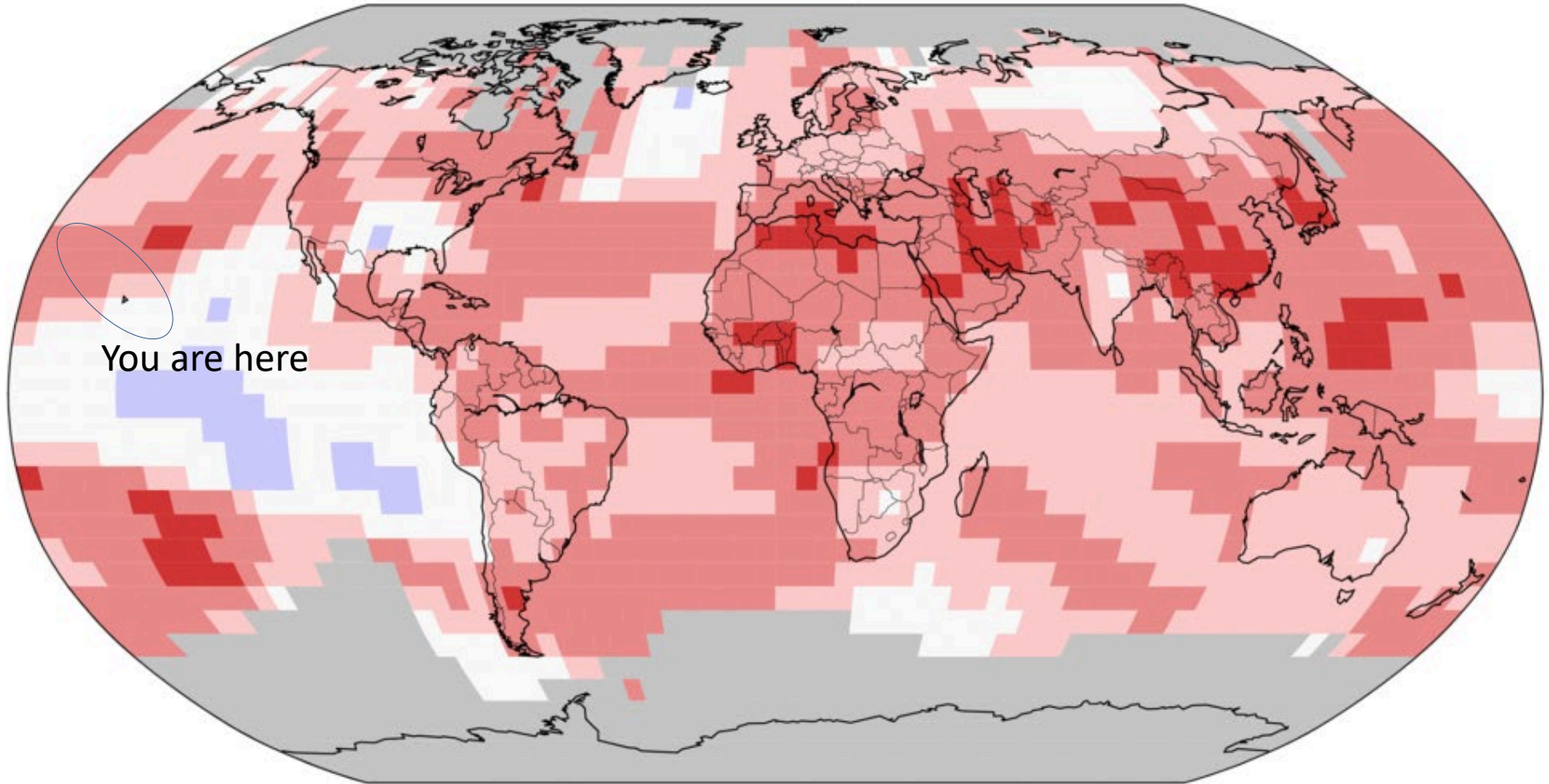
National Centers for Environmental Information
GHCNM v4.0.1.20210907.qfe

Please Note: Gray areas represent missing data
Map Projection: Robinson

Land & Ocean Temperature Percentiles Jan–Aug 2021

NOAA's National Centers for Environmental Information


Data Source: NOAA GlobalTemp v5.0.0–20210908




You are here


Record
Coldest


Much
Cooler than
Average


Cooler than
Average


Near
Average


Warmer than
Average

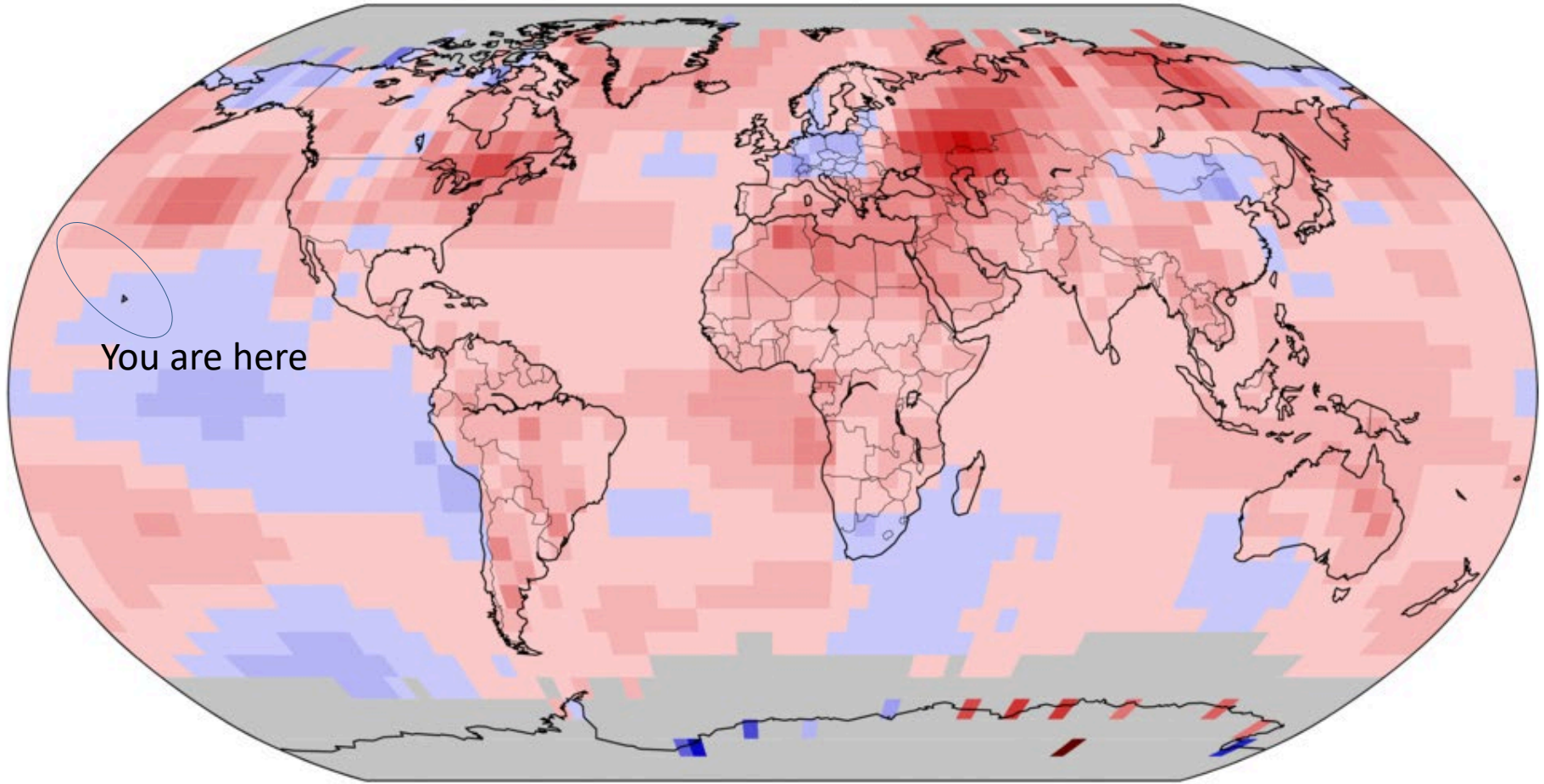

Much
Warmer than
Average


Record
Warmest



Land & Ocean Temperature Departure from Average Aug 2021 (with respect to a 1981–2010 base period)

Data Source: NOAA GlobalTemp v5.0.0–20210908



Degrees Celsius



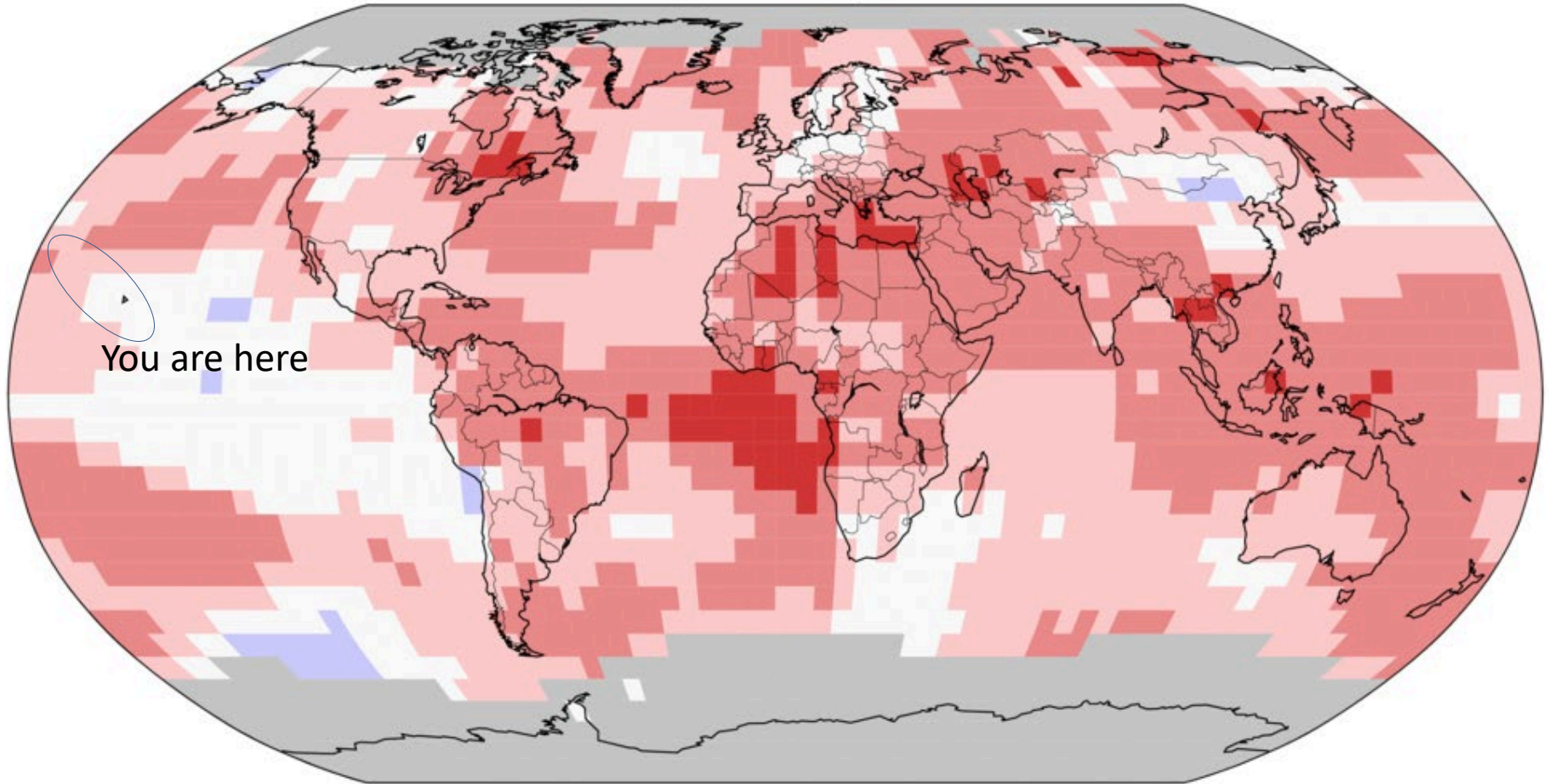
National Centers for Environmental Information
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Please Note: Gray areas represent missing data
Map Projection: Robinson

Land & Ocean Temperature Percentiles Aug 2021

NOAA's National Centers for Environmental Information

Data Source: NOAA GlobalTemp v5.0.0-20210908



You are here



Record Coldest



Much Cooler than Average



Cooler than Average



Near Average



Warmer than Average



Much Warmer than Average

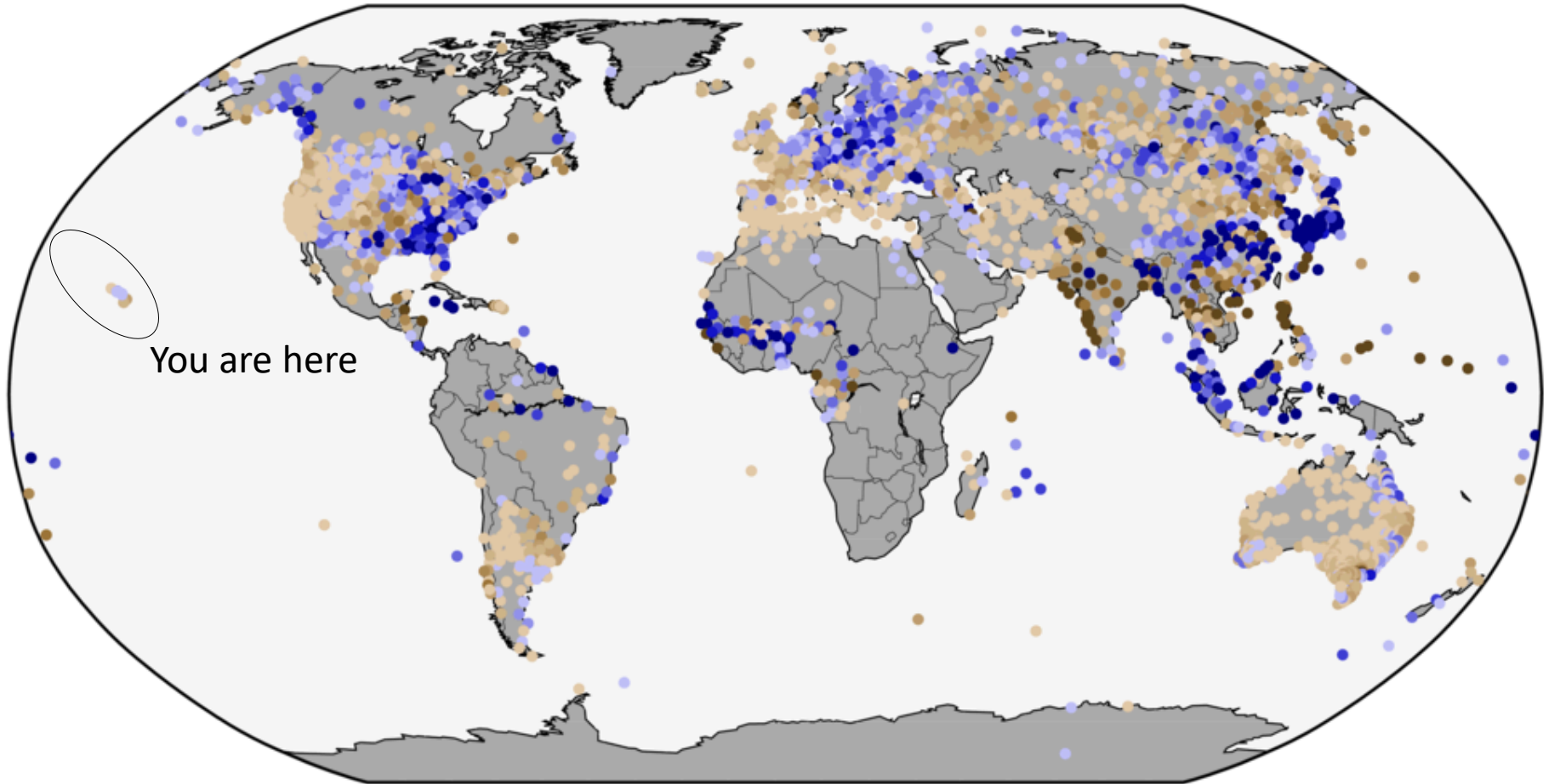


Record Warmest

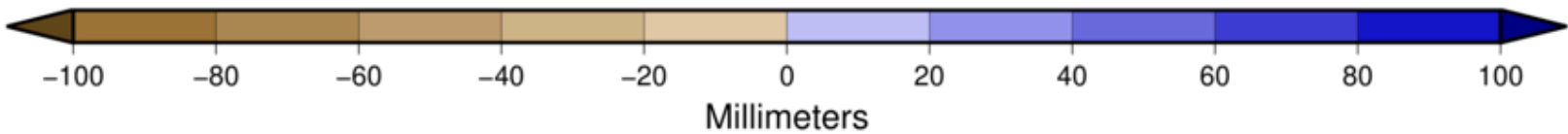


Land-Only Precipitation Anomalies Aug 2021 (with respect to a 1961–1990 base period)

Data Source: GHCN-M version 4beta



You are here



National Centers for Environmental Information

Please Note: Gray areas represent missing data
Map Projection: Robinson

Digression #1

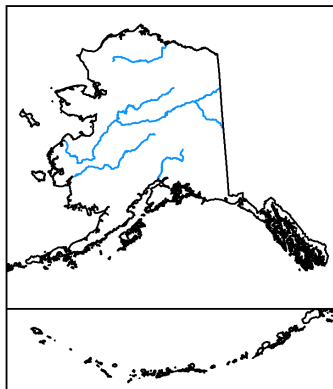
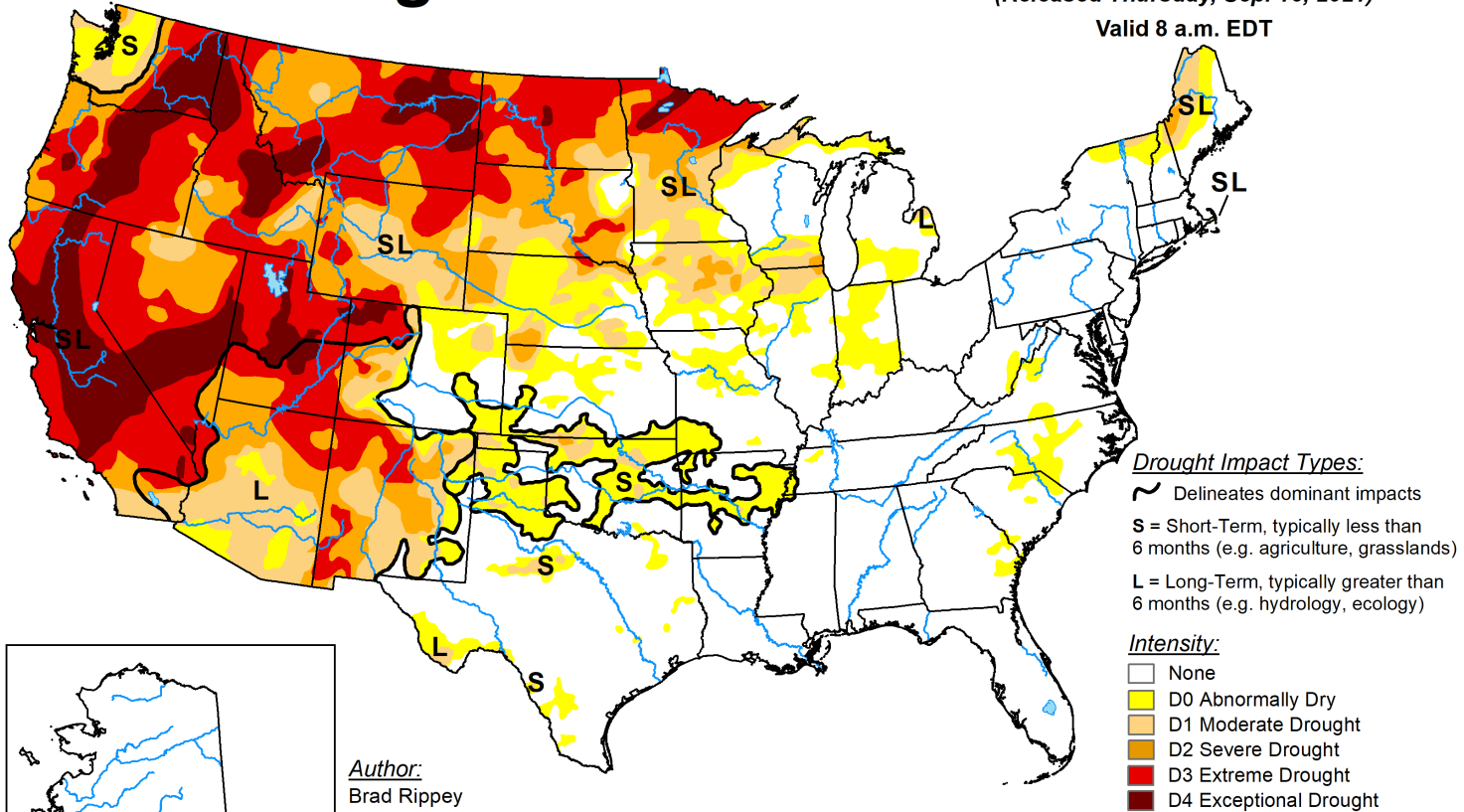
Megadrought continues in the southwestern US

U.S. Drought Monitor

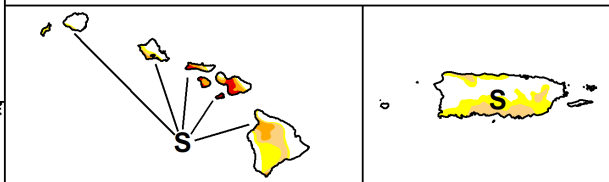
September 14, 2021

(Released Thursday, Sep. 16, 2021)

Valid 8 a.m. EDT



Author:
Brad Rippey
U.S. Department of Agriculture



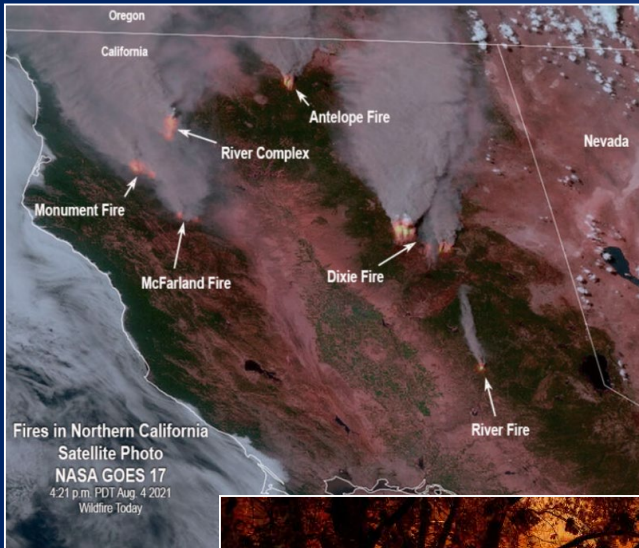
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>



droughtmonitor.unl.edu

This has impacts on terrestrial ecology

5 of the largest 6 wildfires in California history have occurred in the past 5 years



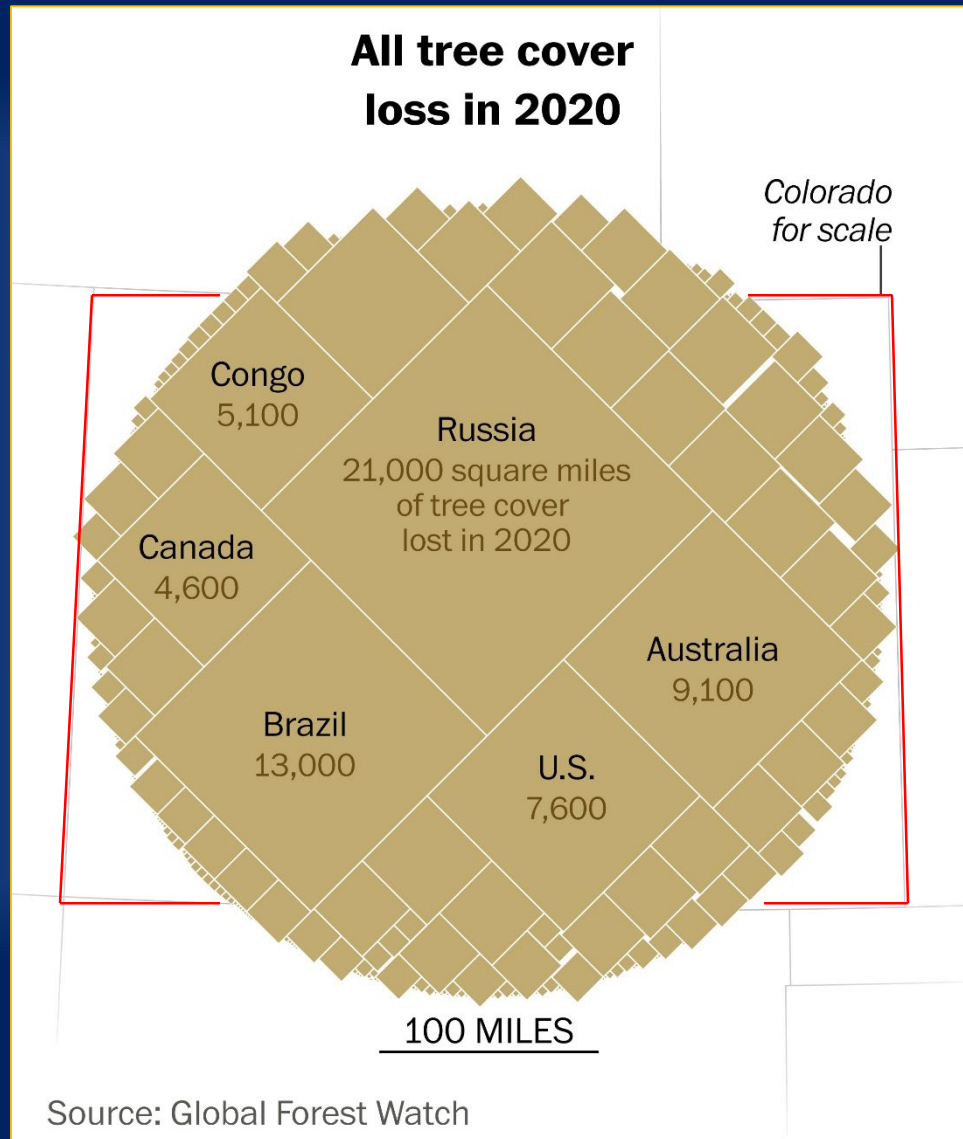
The Dixie Fire, the second largest in California history, is burning at this moment

Similar fires have been burning in Siberia, Turkey, and Greece

Sequoia National Park is currently threatened

Significant loss of forest cover in the temperate zone

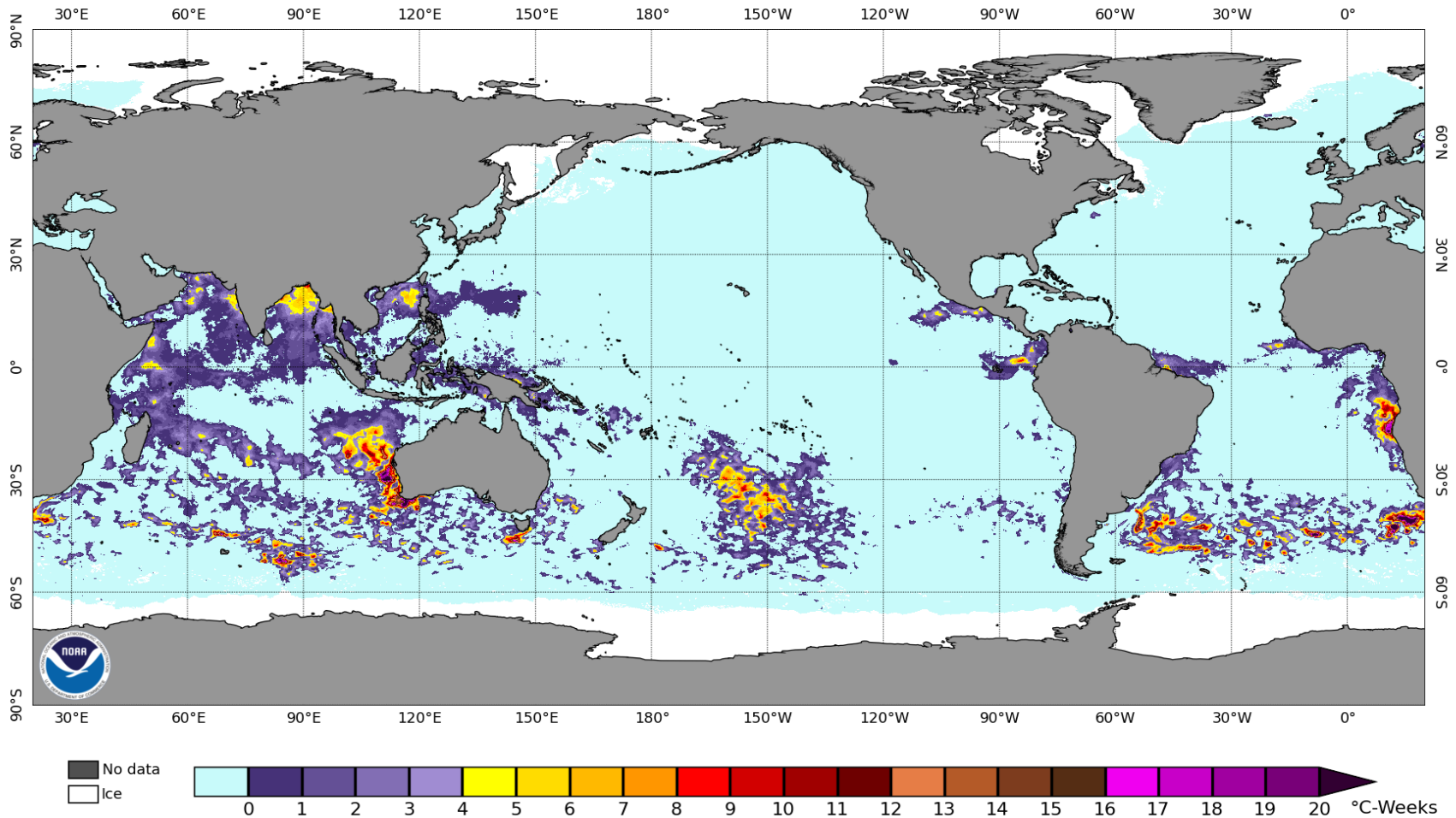
This is not just tropical forest problem anymore



Tree cover losses in Russia, Australia, the US and Canada exceed those in the Congo and Brazil

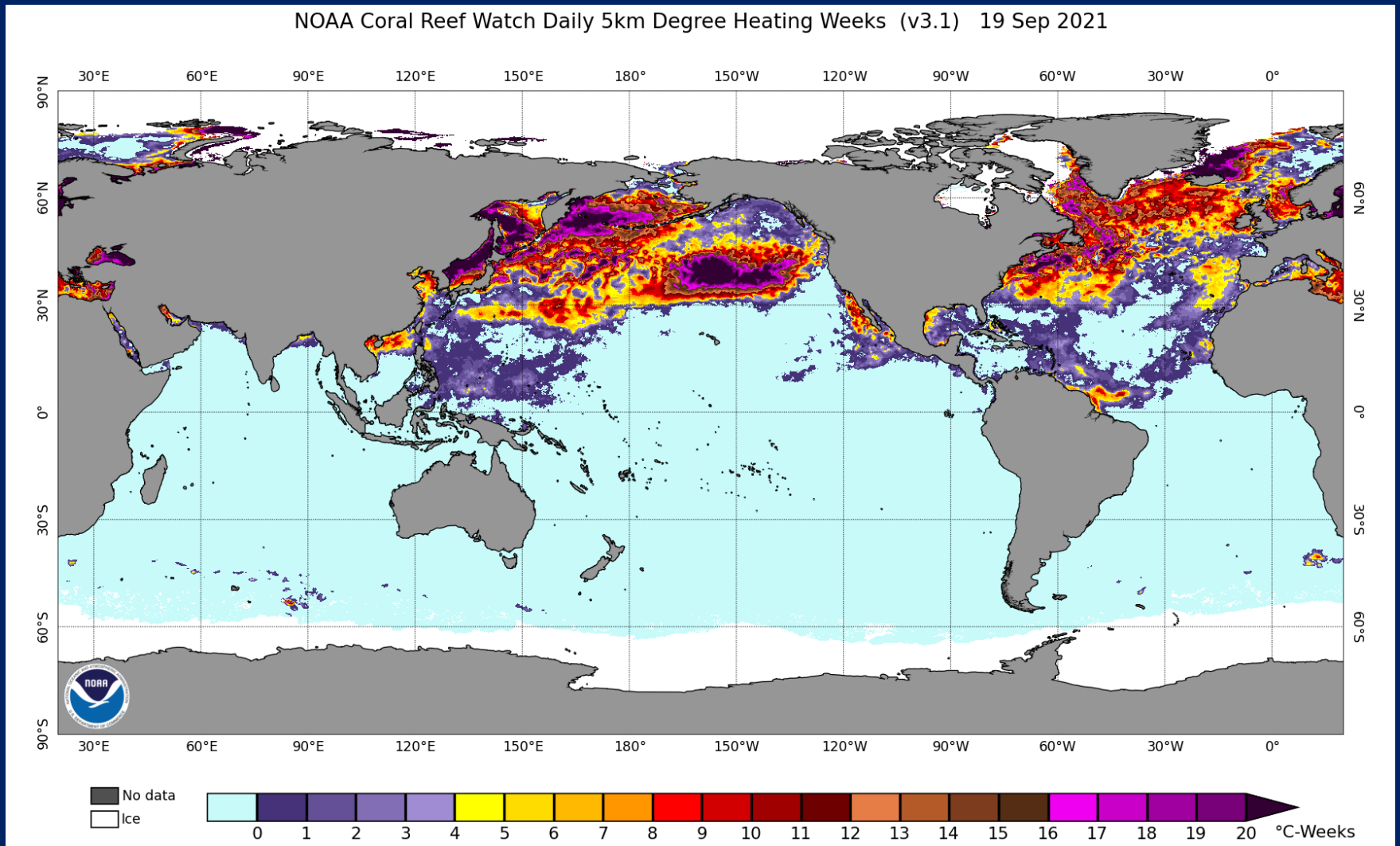
Degree Heating Weeks – 13 June 2021

NOAA Coral Reef Watch Daily 5km Degree Heating Weeks (v3.1) 13 Jun 2021



In June, the waters in the Monument had not yet accumulated excess heat at depth this year

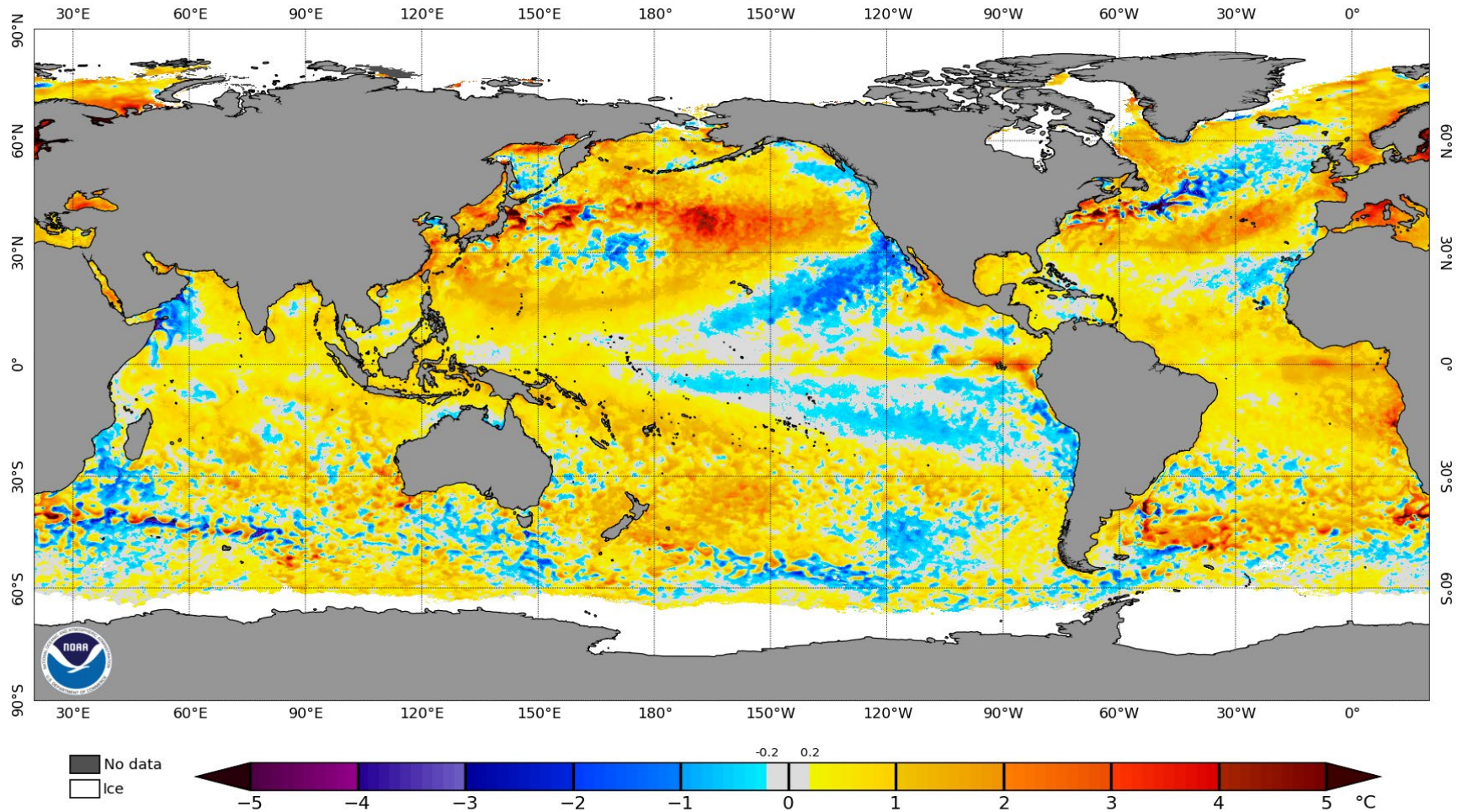
Degree Heating Weeks – 19 September 2021



Significant heat did eventually accumulate during the summer,
but in the ocean sector north of the Monument

Global Sea Surface Temperature Anomaly – 13 June 2021

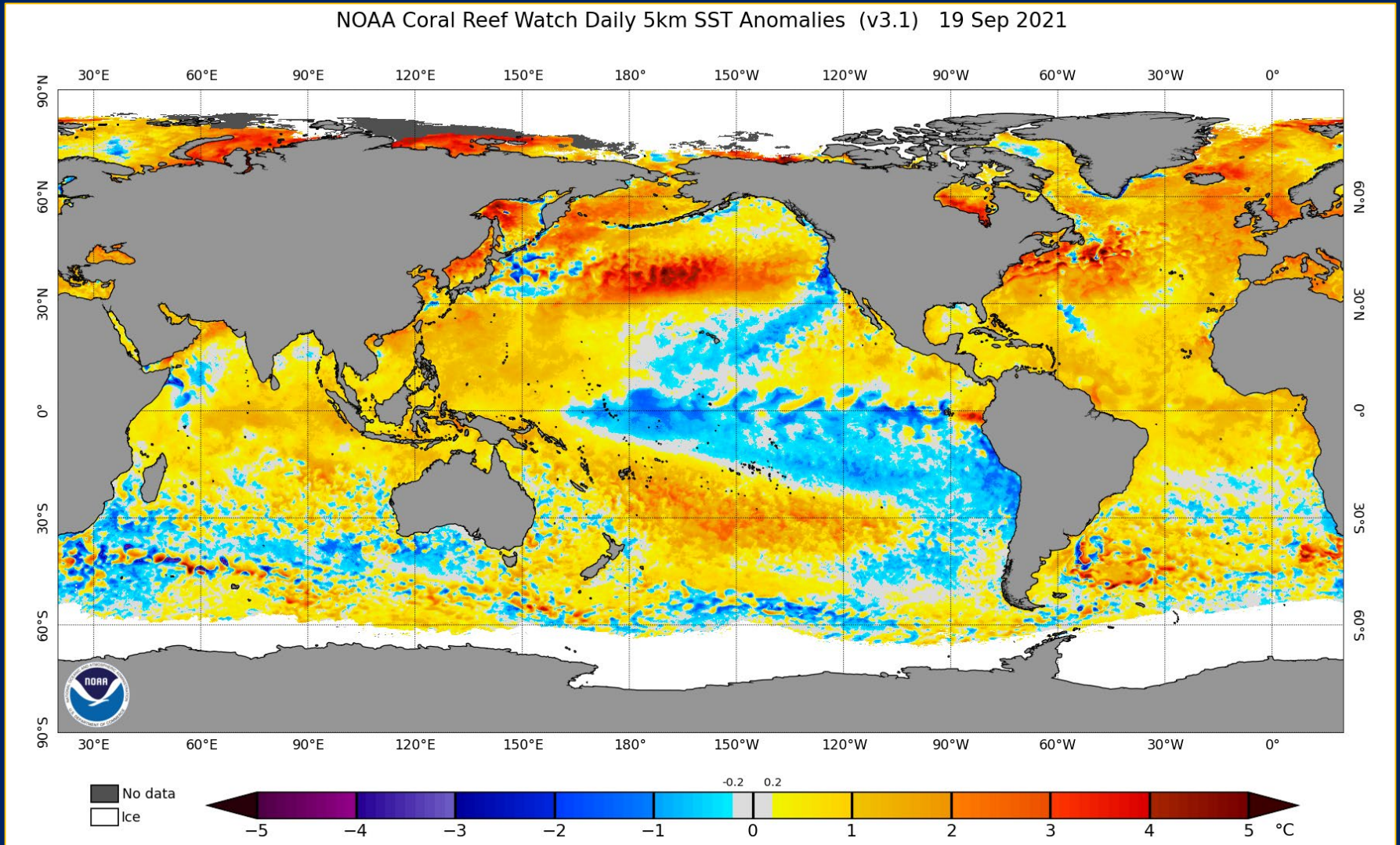
NOAA Coral Reef Watch Daily 5km SST Anomalies (v3.1) 13 Jun 2021



An area of warmer than average surface water northeast of Hawaii had persisted through the winter
This raised some concerns for late summer conditions, particularly near Midway

Heat builds to the north

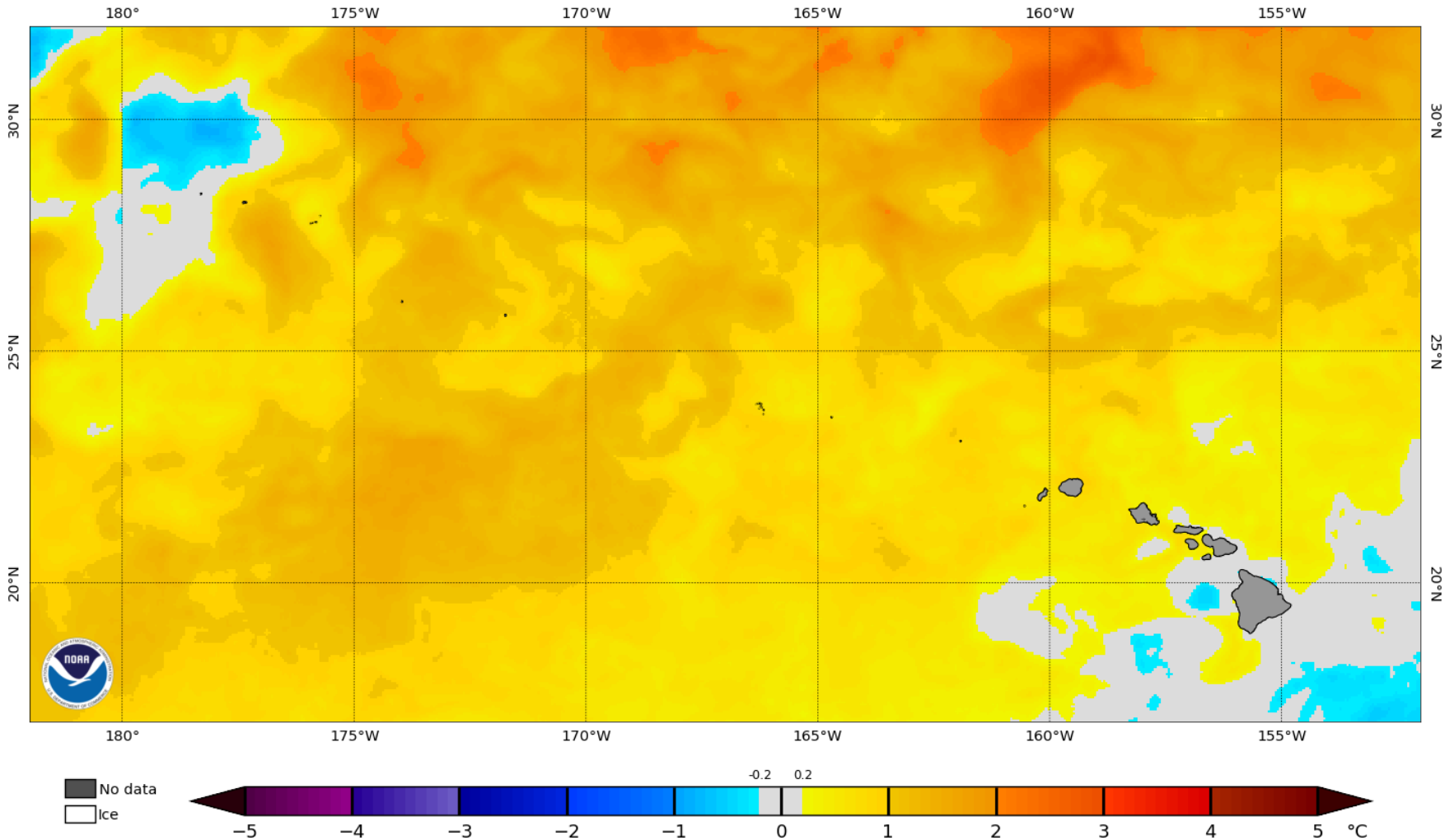
Global Sea Surface Temperature Anomaly – 19 September 2021



The warm water remained, but stayed further north, so Monument reefs were not impacted

Sea Surface Temperature Anomaly, Hawaii Sector – 13 June 2021

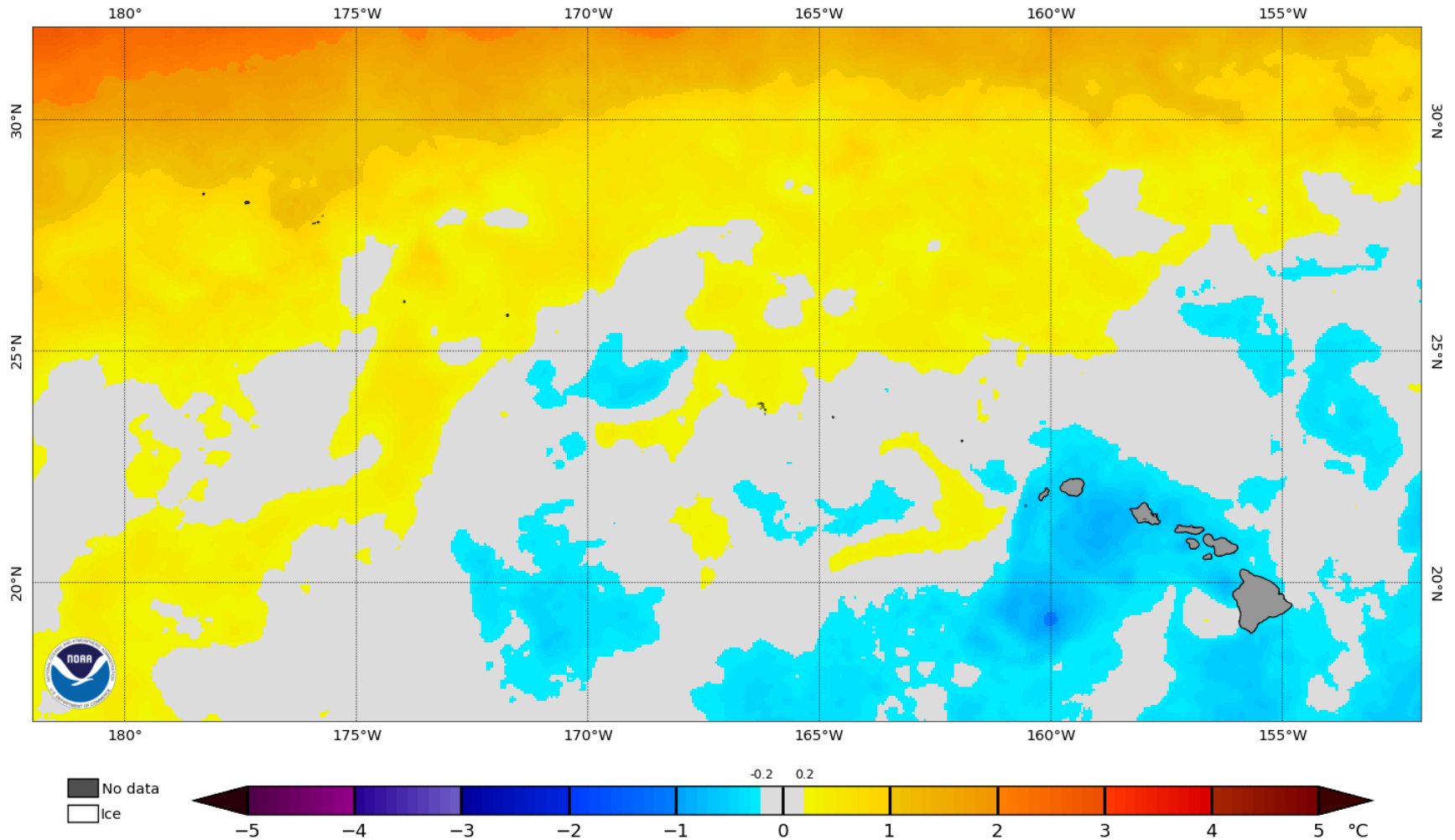
NOAA Coral Reef Watch Daily 5km SST Anomalies (v3.1) 13 Jun 2021



In this local plot from June, heat still lurks to the north

Sea Surface Temperature Anomaly, Hawaii Sector – xxxx

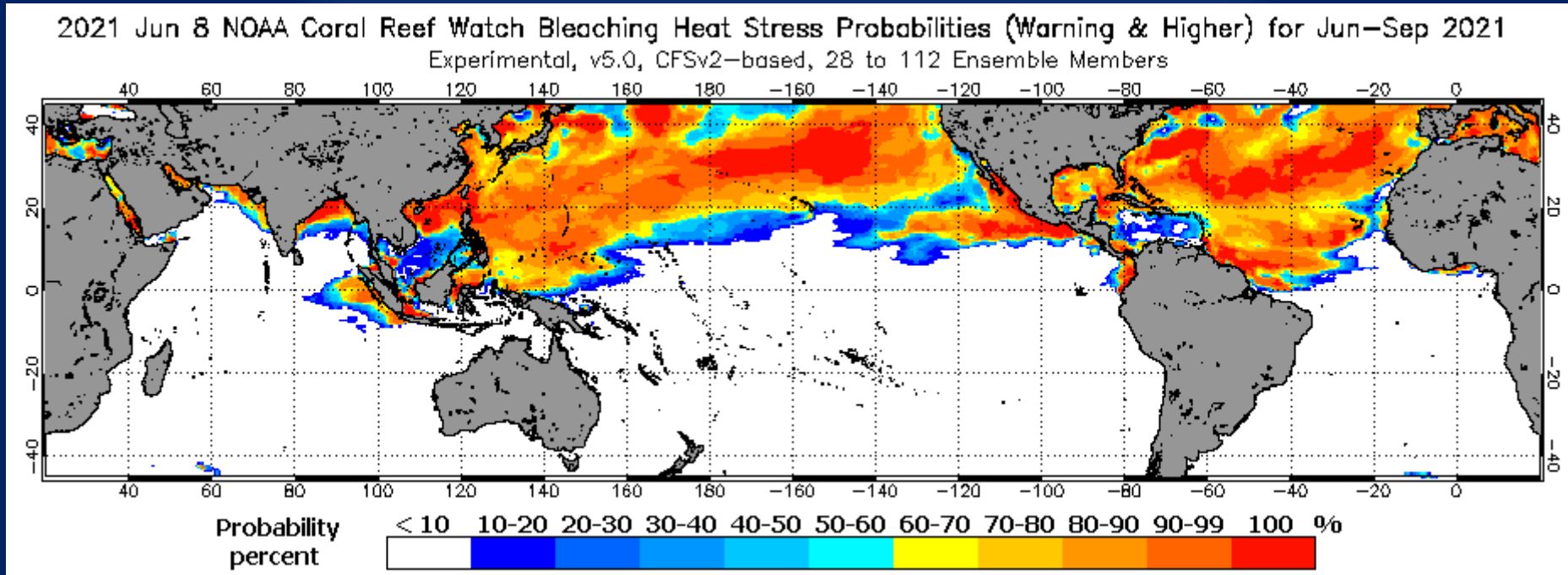
NOAA Coral Reef Watch Daily 5km SST Anomalies (v3.1) 19 Sep 2021



By September, waters in the Monument had trended back toward long-term mean temperatures
And the Main Hawaiian Islands have actually been cooler than average

Bleaching Stress Probability – June-September 2021

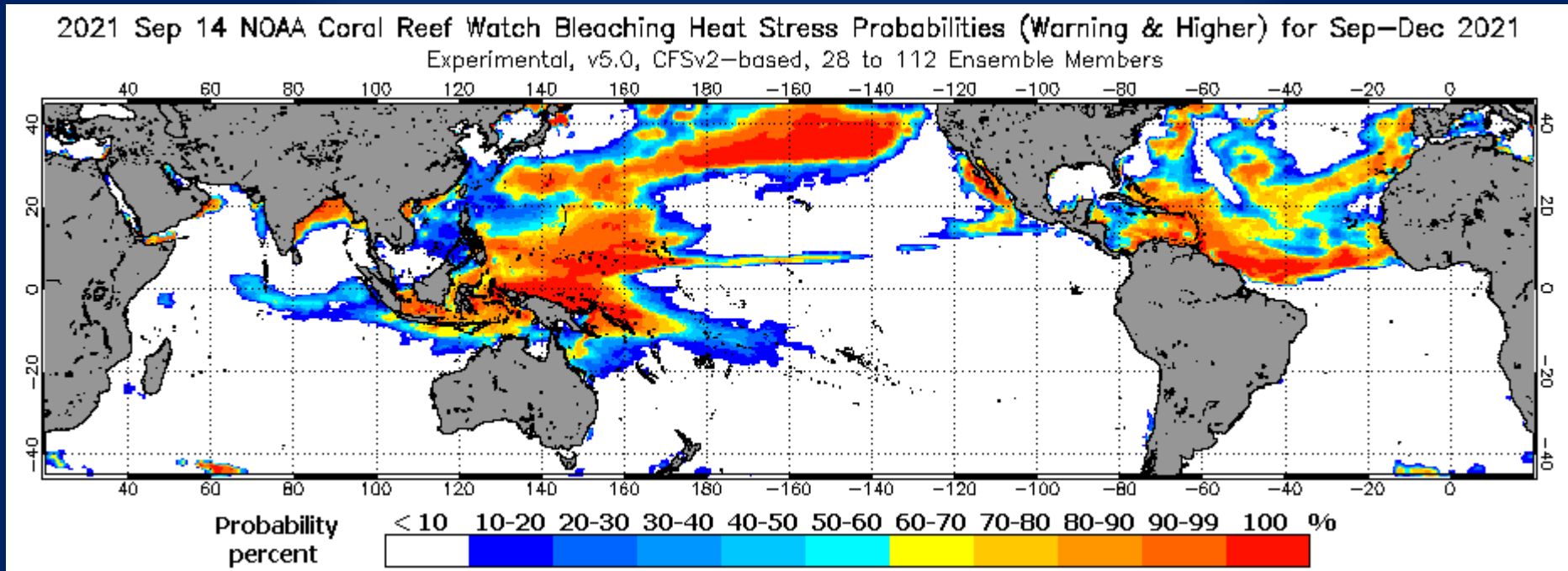
Prediction as of 8 June 2021



In June, the output from the NOAA experimental tool indicated a strong probability of reaching bleaching warning conditions or higher across the entire Hawaiian archipelago by September of this year

Bleaching Stress Probability – September-December 2021

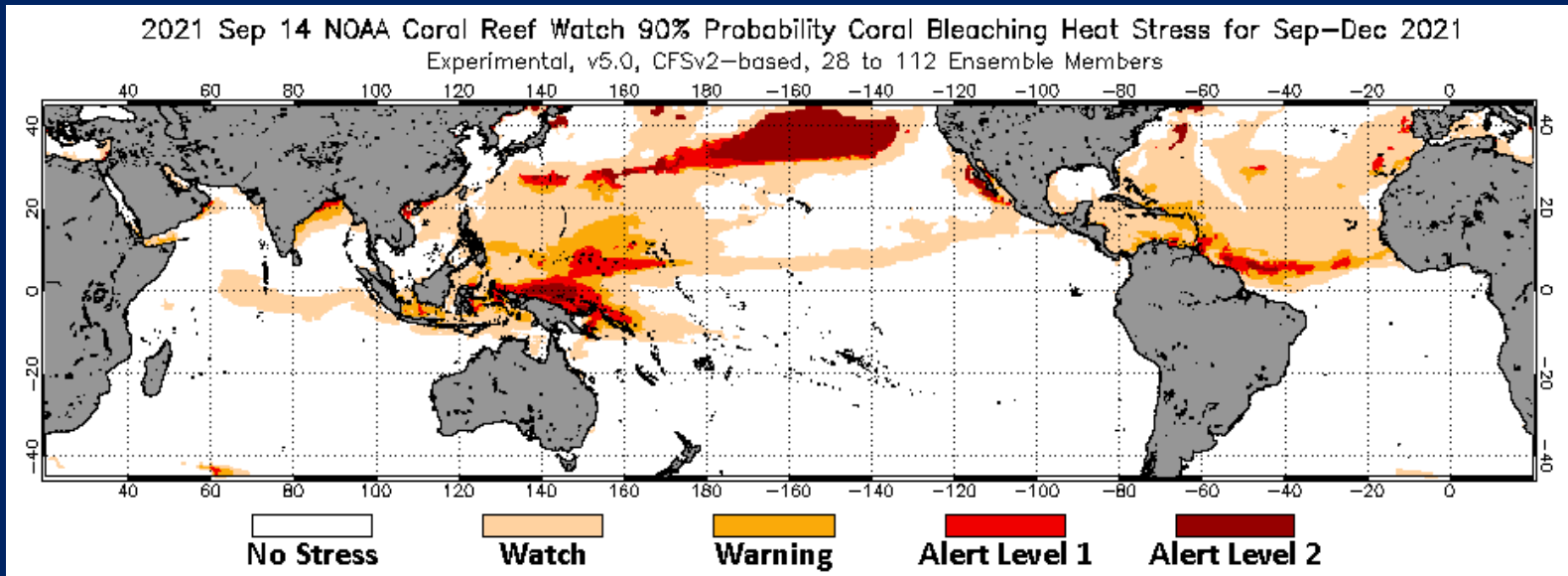
Prediction as of 14 September 2021



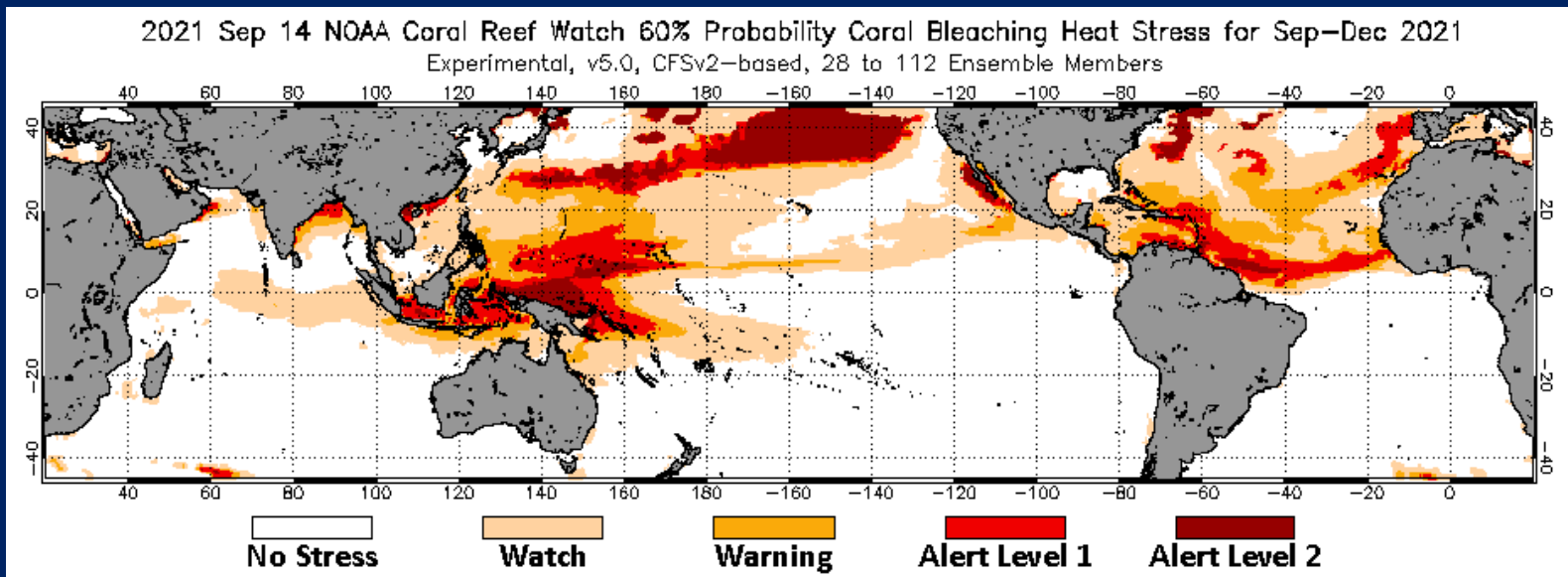
This prediction was not realized

The threat has now receded, and there is little likelihood of bleaching in the Monument this year

90% Stress Level Probability – September-December 2021



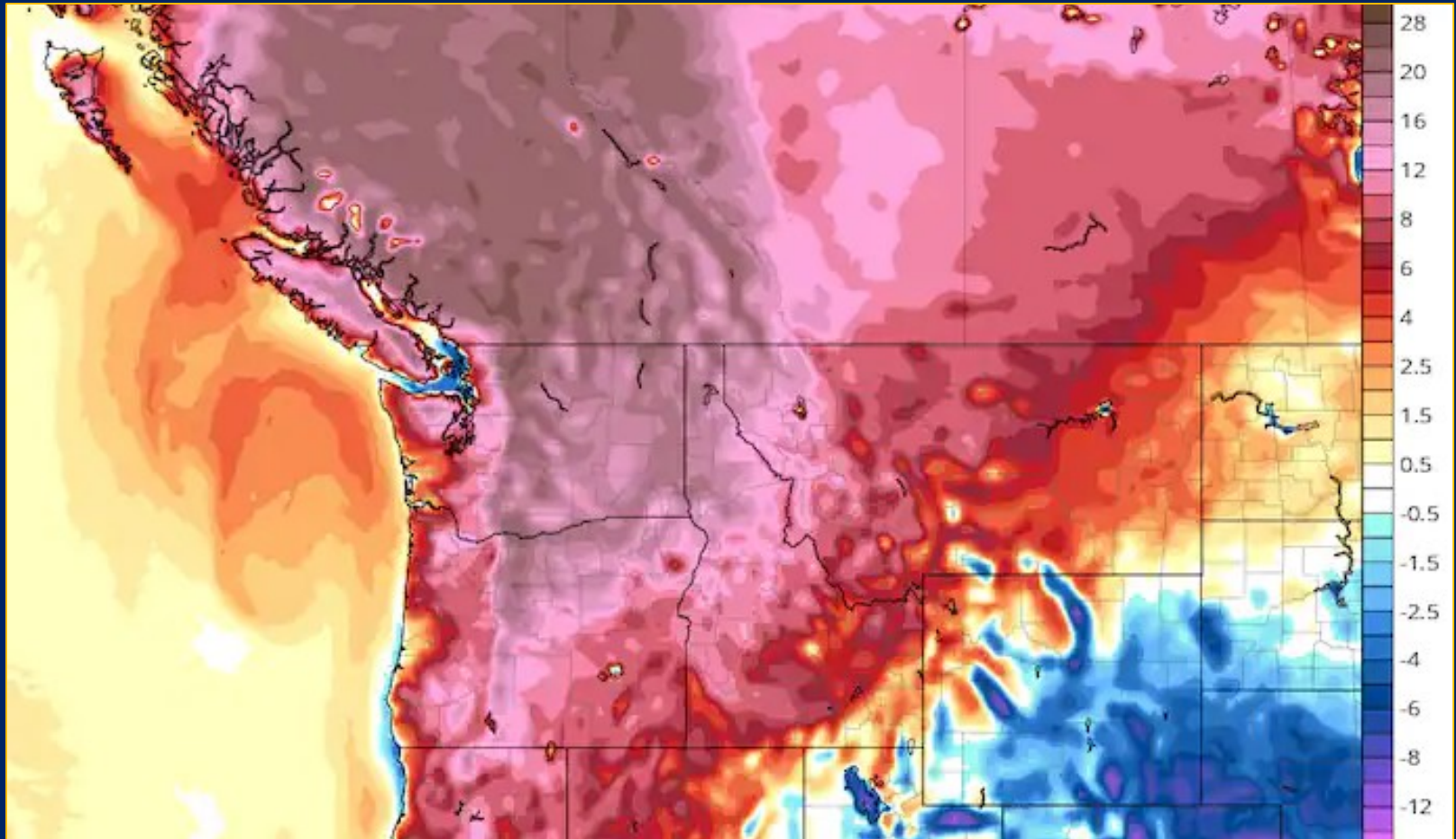
60% Stress Level Probability – September-December 2021



Only sixty percent probability of even reaching Bleaching Watch levels in the Monument this fall

Digression #2

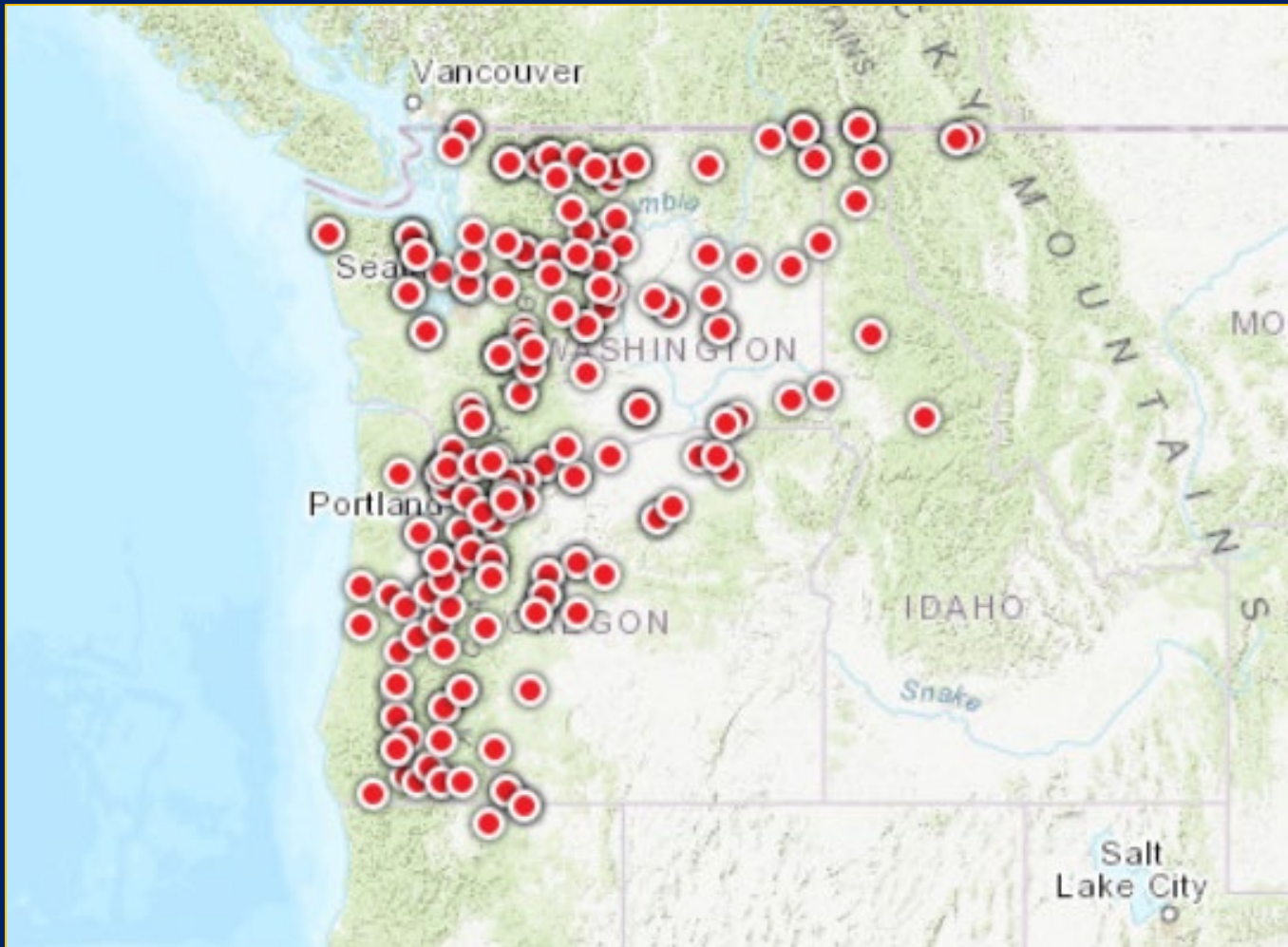
The Pacific Northwest bakes in June



Pacific Northwest temperature anomaly on 30 June 2021
20-30 degrees above long-term averages

Digression #2

175 all time records set from 27-30 June 2021

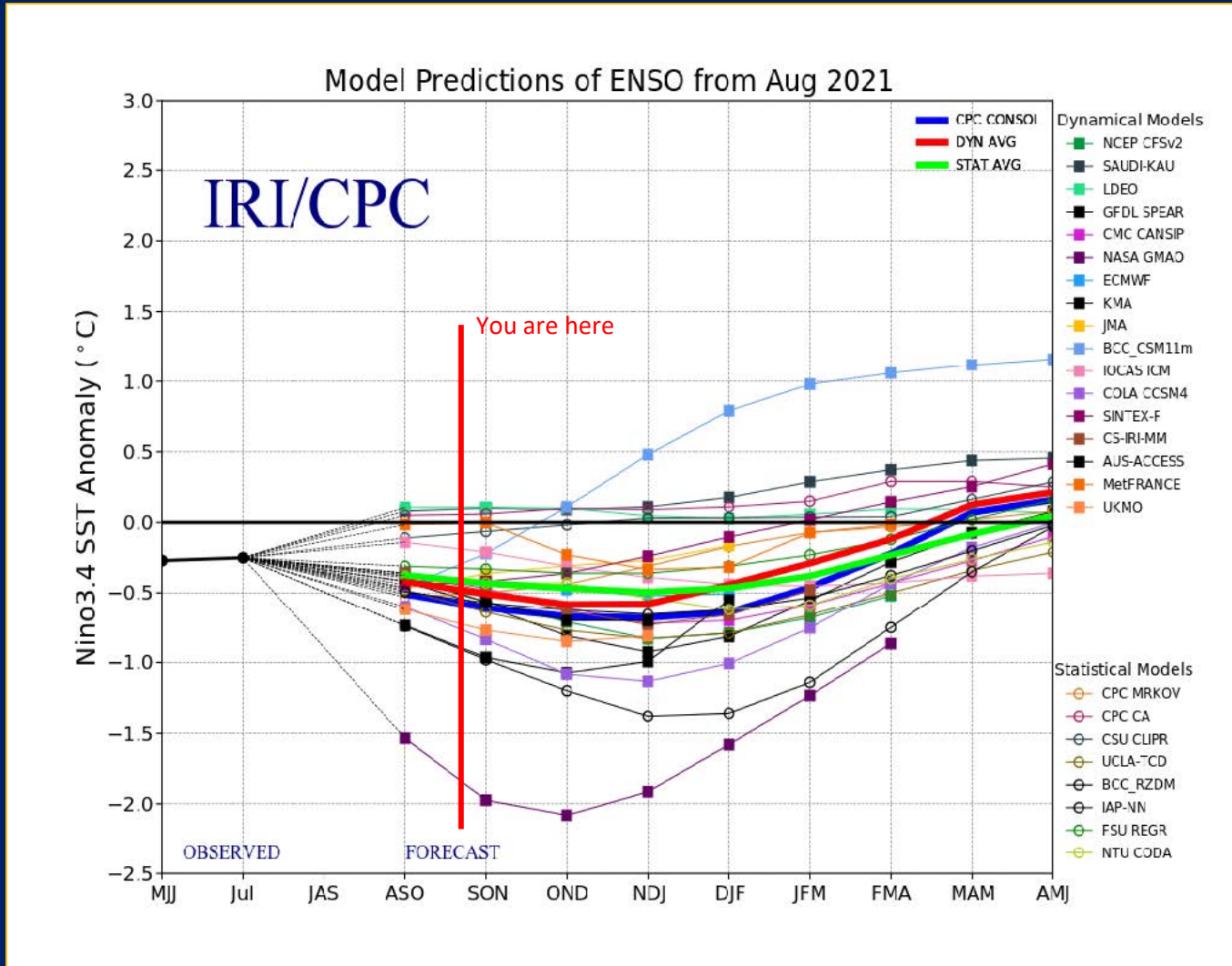


Portland at 116 degrees was nearly as hot as Death Valley – in summer

This is not normal

Looking Forward

An ensemble of 27 climate models predicts ENSO-neutral, trending into **La Niña** conditions from now through the end of 2021



The range of model predictions is for the most part closely aligned

Conclusions

2021 has begun cooler than record-hot 2020, due to a displaced polar vortex pattern in the late winter and spring, but summer was still record hot

The Northern Pacific Ocean carried excess heat content through winter, but this heat remained to the northeast of the Monument

ENSO-neutral conditions are waning, and a transition to **La Niña** is underway
ENSO-neutral conditions should continue through the fall, with La Niña developing in the early winter months

There is low likelihood of any thermal stress to Monument coral reefs this year, except possibly in the Midway-Kure sector

The next major period of thermal risk will come in late 2022, during the transition out of La Niña into the next potential El Niño episode

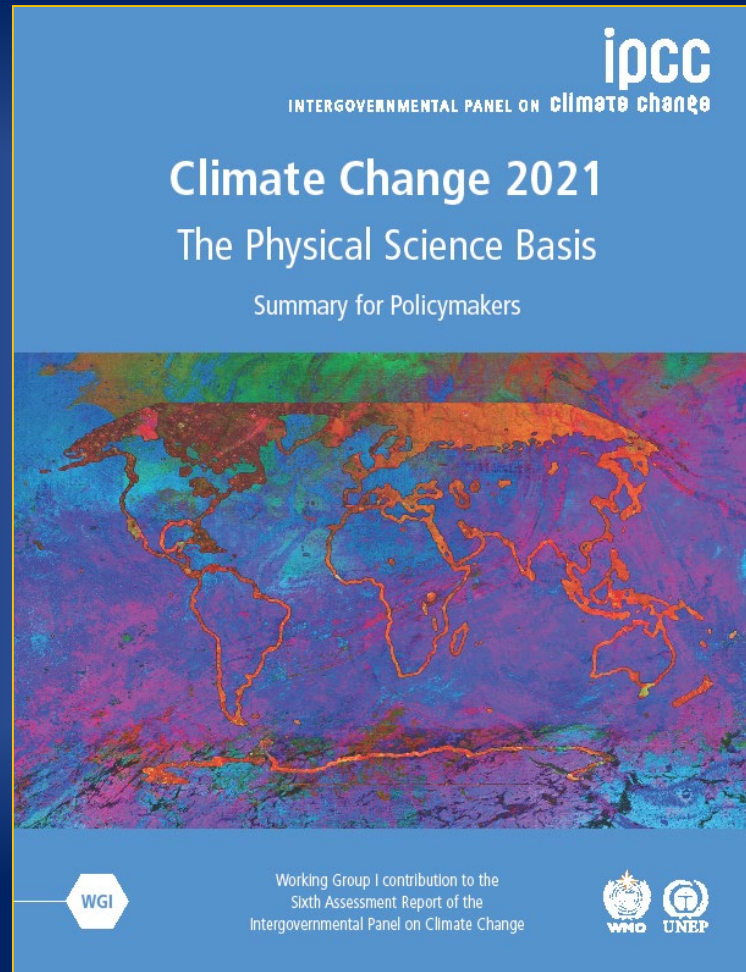
Tropical cyclone formation is generally low during ENSO-neutral regimes, and not heavily favored during the La Niña that is now starting to develop

Only remnant systems have passed through the Hawaiian Islands so far this year

Sea level continues to rise at 3-5 mm per year, and this trend is increasing

Inundation is a long-term problem that will not go away, and may increase over time depending on future melting trends in Greenland and Antarctica

Want more background?
See the recent IPCC report



Released in August, so a good synopsis of current climate science

Questions?

