



By Matt Smith

## Trying to reason with hurricane-season forecasts

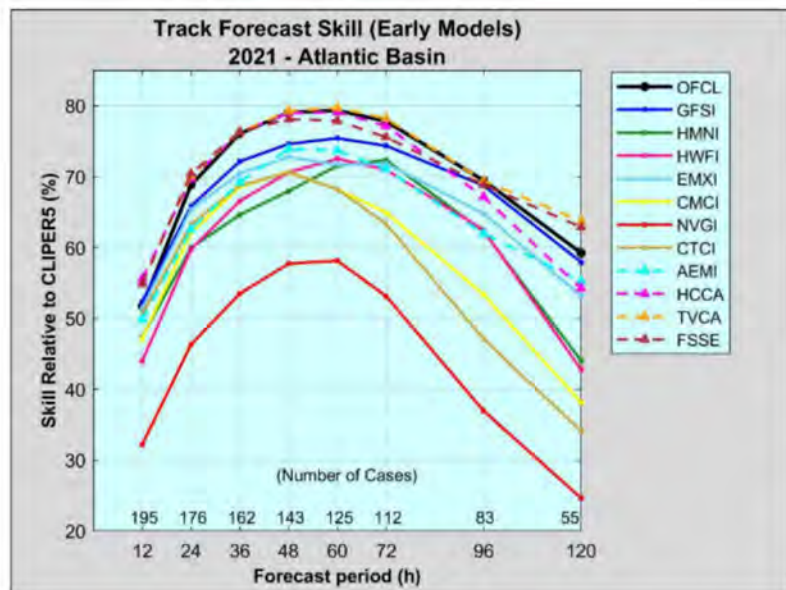
It's September in Florida, which means two things: the start to the latest "rebuilding year" for Florida football and the traditional peak of hurricane season.

It was in September of 2017 that Hurricane Irma cut just about the worst path imaginable for Florida's citrus growers. Along with causing physical damage to groves, Irma also contributed to disease outbreaks, including likely furthering

fingerprints, you'd think the best course of action would be to ignore the NHC and do it yourself. However, I'm here to tell you to listen to the NHC.

First, let's look at the Irma track forecast. Originally slated to travel up the east coast like 2016's Hurricane Matthew, the forecast instead veered to the west coast as the storm made land-fall in the Keys. When the storm hit the mainland near Marco Island, it went north instead of northwest, and the eye never touched the Gulf of Mexico again.

To a Floridian, missing Fort Lauderdale for Fort Myers feels like quite a leap, but this represents only about 100 miles. During the whole life of the storm, the five-day track forecast error remained less than 140 miles, which is about the distance from Jacksonville to Cape Canaveral. If a storm were correctly predicted five days out to hit perpendicular to the coast between Jacksonville and Cape Canaveral, that would be seen as a great success. It's only because of the angle that Irma hit that it was perceived as being so off.



**Figure 1.** Comparison for selected Atlantic basin early track models for 2021 and the official NHC forecast vs. a theoretical "no-skill" model called CLIPER5

the spread of citrus black spot (see [citrusindustry.net/2022/03/07/irma-will-haunt-us-regarding-citrus-black-spot](https://citrusindustry.net/2022/03/07/irma-will-haunt-us-regarding-citrus-black-spot)). Part of the reason Irma left growers frustrated was the National Hurricane Center's (NHC) track forecast, which seemed to switch from the east coast to the west coast without a moment's notice.

Five years since Hurricane Irma, growers and non-growers alike now have more access to raw weather data than ever before. Several websites show individual track and intensity model runs, spaghetti models, real-time sea surface temperatures and more. With all that data at your

### VERIFICATION REPORTS

Since 2005, the NHC has issued an annual verification report, a sort of report card on how the agency is doing regarding the accuracy and skill of its forecasts. It has also gone back into its records and generated verification reports for all years since 1968.

In 2021, the best-performing track forecast was far and away the human-issued NHC forecast. In Figure 1, the black solid bar is the official NHC forecast, while the colored solid lines represent the models that hurricane forecasters use to predict storm direction. These are compared to a theoretical "no-skill" model called CLIPER5, which assumes that a storm will not change direction or speed. This is often true for storms during a short period, which is why all models rank relatively low in the 12-hour forecast period.

The best-performing model in 2021 was the



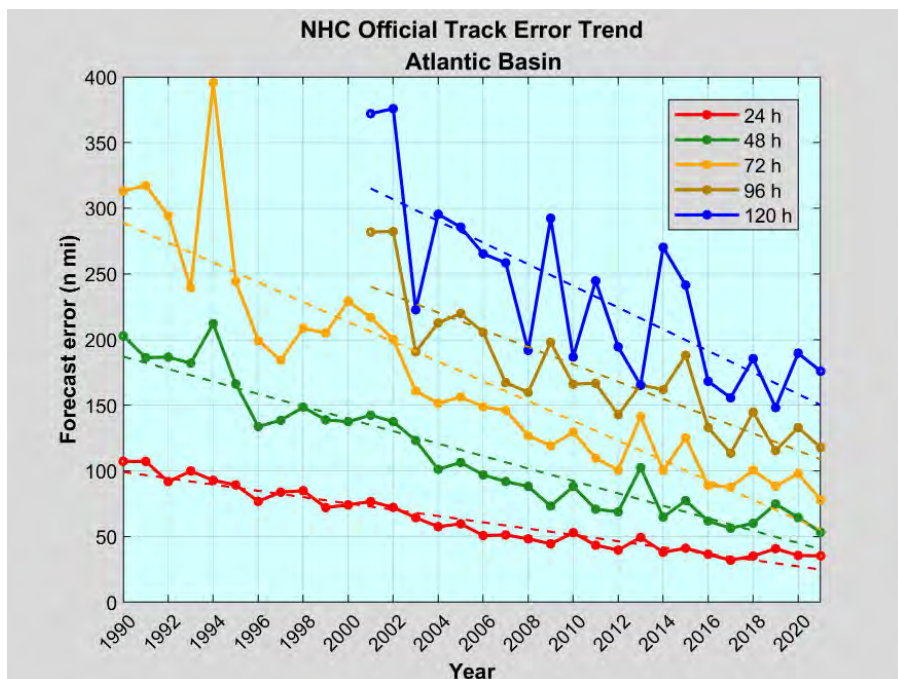


Figure 2. Annual average official track errors for Atlantic basin tropical cyclones for the period 1990-2021, with trend lines added

latest version the National Oceanic and Atmospheric Administration’s (NOAA) flagship weather model, the GFSI Global Forecast System, which debuted in 2019. This was followed closely by the EMXI model from the European Centre for Medium-Range Weather Forecasts, which is often simply referred to as the Euro model.

### CONSENSUS MODELS

The dashed lines (see Figure 2) surrounding the NHC forecast represent consensus models, which are models that are created by averaging together the results of three or more models. Consensus models tend to be more accurate than individual models.

Individual model improvement leads to consensus model improvement, and better consensus models lead to more accurate human forecasts. NHC forecasts achieved record performance in 2021 for track predictions at 48 and 72 hours and beat out all models, including consensus models, at 12 to 36 hours and at 72 hours. Human beings who are experts in their field are really good at connecting the dots between multiple sources of information and drawing sound conclusions.

NHC track forecasts have improved

*In 2021, the best-performing track forecast was far and away the human-issued NHC forecast.*

dramatically over the past 30 years. So, if you’re a weather nerd like myself and enjoy pouring through all the data, by all means keep it up. But if you’re trying to decide if you should implement your grove’s hurricane plan, all evidence says your best bet is to make the call based on the NHC forecast. 🍊

**Sources:** NOAA’s National Hurricane Center and Central Pacific Hurricane Center; Yale Climate Connections

*Matt Smith is a University of Florida Institute of Food and Agricultural Sciences (UF/IFAS) Extension sustainable agriculture and food systems agent in Bushnell.*

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