Science of Surfline

How surfer Sean Collins created the surf forecasting website Surfline and how the site currently works to predict surfable waves.

 GRADES
5 - 12+

 SUBJECTS
Earth Science, Meteorology, Oceanography, Geography, Geographic Information Systems

https://education.nationalgeographic.org/resource/surfs/
Before surf-forecasting and surf-reporting websites like Surfline, surfers wasted a lot of time.

They drove from surf spot to surf spot to surf spot, trying to find the best waves in their area. They took off from work when great waves were expected . . . and got sloppy, unrideable waves instead. Worse, they were at work when a swell caused their local surf spot to look like a glossy spread of perfect waves in a surf magazine.

Things changed with the rise of Surfline, based in Huntington Beach, California. The website employs about 15 meteorologists who predict when and where good surfing waves will pop up. Surfline also has a network of 170 cameras in the U.S. that allow surfers to view the actual current conditions of the waves at their local spots. They even have a team of surf reporters to report on the waves at certain places.
Surfline’s success is due in no small part to the company’s founder, president, and chief surf forecaster, Sean Collins, who died in 2011. A surfer and sailor, Collins came up with a method of predicting upcoming surf conditions.

Initially, Collins tried to predict the waves on Mexico’s Baja Peninsula as he returned from sailing races. In the Baja desert, Collins set up equipment powered by a car battery. He then received weather forecasts from New Zealand and translated that information into future wave conditions for Baja.

In Long Beach, California, Collins further developed his way of predicting waves. He received late-night weather faxes from New Zealand and visited the National Weather Service Library in Los Angeles.

“People started calling me,” he said. “‘You don’t know me,’ they’d say. ‘I’m a friend of a friend, but what do you think Mexico’s gonna be like next week?’”

**Swell Forecasting**

Early versions of Surfline allowed surfers to get surf forecasts by fax or a $1 phone call. Surfline moved to the Internet in 1995, and in 1999, its forecasters refined how they predict waves with a swell model nicknamed LOLA.

Mark Willis, Surfline’s global forecast development manager and Atlantic forecast chief, explains by email how he and other meteorologists use current information to predict waves in the future:

“The most important thing to do when starting any weather-related forecast, not just a surf forecast, is to build situational awareness. You have to do that...
not just a surf forecast, is to build situational awareness. You have to do that by first looking at the current state of the atmosphere and ocean through observations. Without a solid understanding of what is happening and what occurred in the recent past, it is very difficult to produce a valuable forecast for the future. To facilitate this process, we analyze local and distant observed surface winds, waves, and weather patterns through things like satellites, buoys, and, of course, surf reports and surf cameras.

“After that, we have to determine why the observations are what they are by asking things like: ‘What weather systems made the wind or waves what they are right now?’” he says. “We also have to determine how well the computer models are depicting the current state of the atmosphere and ocean, and then we are off to the races with making the forecast. That’s where experience really kicks in as we combine our knowledge of weather, wind, and surf across the world with real observations and several different computer model forecasts.”

Geographic features of a coastline have a great impact on how good the waves are, Willis notes.

“Beach exposure is incredibly important,” he says. “For example, if a beach faces west, then that beach isn’t going to get swell from the east. Knowing the way the land faces and any obstructions between the land and a swell’s origin are very important. For example, in South Florida, you have the Bahamas that block nearly all swell from the east, so we have to take things like that into account when we make surf forecasts.”

Willis suggests that surfers need to go even deeper to understand the places
where the best waves are going to break. They need to go as deep as knowing about the ocean floor.

“Most great waves around the planet have something unique going on underneath them, or what we call bathymetry,” he says. “Bathymetry is the study of the underwater depth of the ocean floor. The way the bottom changes between water that is deep and shallow can do some amazing things to how waves grow and break at a particular location.”

SURFER Magazine editor Brendon Thomas believes Surfline and other surf forecasting websites have transformed surfing.

“On a high level, it’s allowed for a quantum leap in surfing progression,” he says from the magazine’s office in San Clemente, California. “Big-wave surfers can track storms around the world and be at the place where the waves are the biggest and best with just a few days’ notice. The result is surfers have ridden bigger waves than we ever thought possible.”

Thomas notes that the technology has also changed the way non-professional surfers live their lives.

“Obviously, it’s given the average surfer the ability to be at the beach when the surf is at its best,” he says. “It’s also allowed for surfers to live normal lives. We can have jobs and families and still be surfers. It’s allowed us to plan surf sessions like regular people would a round of golf or a trip to the cinema.

“I’m not saying that’s necessarily a good thing, but it’s true.”
FAST FACT

L-O-L-A, LOLA

LOLA is Surfline's sophisticated swell model. What does LOLA stand for? Founder Sean Collins explained in 2008: Lots Of Lip Action! No really, just a cool, sexy name. . . . Kind of a take off from the movie *2001: A Space Odyssey* where HAL was the computer that took over the ship. We launched LOLA in 2001 kind of as HAL's sister who makes a return to take over all surf forecasting on Earth. . . . There are also some other nicknames for LOLA. Our wave model developer Bill O'Reilly always called it Lots of Lousy Arithmetic or if he was feeling benevolent, Lots of Linux Arithmetic. . . . We had another Spanish saying which meant for the love of waves. It went something like *Las Olas Lamor* . . . something.

FAST FACT

Surf Market

Surfline CEO Jonno Wells says because conditions change so much more rapidly and they matter so much for surfing, it [Surfline's website] tends to be checked a lot. People check that data like the stock market.

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