
History of the Beaufort Wind Scale

National Weather Service

The Beaufort wind force scale is one of those simple things that seems to have always been around. We think we know what it is meant to tell us -- a simple numerical relationship to wind speed based on an observation of the effects of the wind. But read on!



Rear Admiral, Sir Francis Beaufort, Knight Commander of the Bath, was born in Ireland in 1774. He entered the Royal Navy at the age of 13 and was a midshipman aboard the *Aquilon*. Beaufort is said to have had an illustrious career on the seas and by 1800 had risen to the rank of Commander. In the summer of 1805 Commander Beaufort was appointed to the command of the *Woolwich*, a 44-gun man-of-war. It was at this time that he devised his wind force scale. An early surviving form of the scale is replicated below. By 1838 the Beaufort wind force scale was made mandatory for log entries in all ships of the Royal Navy. Beaufort last served as Hydrographer to the Admiralty. He died in 1857 two years after his retirement.

In examining Beaufort's scale, it catches one's attention that the scale is a force scale. There is no mention of wind speed! Given the current applications of the scale and the fact that meteorologists are generally unfamiliar with sailing ships underway, it is easy to see that Beaufort's intentions in

creating the scale may be mistaken. Beaufort's specification is essentially an association of a set of integers (0 to 12) with a description of the state and behavior of a "well-conditioned man-of-war." While the choice of numbers is quite arbitrary, as a sailor Beaufort apparently felt there were 13 levels of behavior that he could recognize in a man-of-war. Although he describes them in terms that may be vague to a modern sailor, his descriptions would certainly convey the full meaning of the force of the wind to men who shared years of sailing in ships with characteristics similar to the *Woolwich*.

The effect of the wind on an 18th-century fighting ship is at the heart of Beaufort's scale. Note that Beaufort intends that you look at the ship not at the wind! The scale was devised for a group of men who shared the same experience -- years of unremitting blockade of Europe in sailing ships, which were all quite similar in characteristics. His descriptions are couched in terms of the ship's characteristics under sail. The descriptions for Beaufort numbers 0 through 4 describe the wind in terms of the speed that it may propel the ship; those for 5 through 9 in terms of her mission and her sail carrying ability; and those for 10 through 12 in terms of her survival. So how then did Beaufort's wind force scale ever make the jump to a wind speed scale?

Special wind scales had been routinely suggested through the years but their lives were usually as short as mayflies'. What happened after 1838, when the Royal Navy made Beaufort's scale mandatory, helps to explain its incredible longevity. In one sense the story is a tale of the triumph of technology over rational thought. It begins with a couple of gadgets -- in 1837 Samuel Morse demonstrated the first practical telegraph and in 1846 T. R. Robinson invented the cup anemometer. Neither of these inventions would have saved Beaufort's scale, however, if it weren't for a catastrophe.

In 1854 the English and French were entrenched in fighting at Sevastopol. The fleets carrying almost all their winter supplies was struck by an intense, early winter storm on the morning of November 14. In 12 hours the English and French suffered losses (no less than 21 supply ships by the British alone) that exceeded the most savage fleet action that had ever been fought. In response to the losses and with the hope that there might be some way to forecast future storms, the British Admiralty and the French Marine jointly sponsored a weather network -- the ancestor of the World Meteorological Organization -- to provide storm warnings. And here then is when Sir Beaufort's scale begins its protean growth.

Since the task of forecasting storms was commissioned partly by the Royal Navy for use by mariners and they had made the use of Beaufort numbers mandatory, it "naturally" developed that Beaufort numbers would be used for a meteorological purpose. At the same time, meteorologists of the time were excited about the possibilities of the new weather net and the deployment of anemometers everywhere. And how better to code and telegraph this wealth of new wind information than Beaufort numbers!

Ah, but here the trouble begins. In central Europe a peasant who had never seen the ocean, let alone an 1805 man-of-war, observed 37 revolutions of his anemometer and, after looking up the equivalent in his conversion table, sent a Beaufort 7; his cohort in Kansas, who had never seen the ocean either, looked up the same 37 revolutions in his table and sent it as a Beaufort 5. The confusion only increased with the proliferation of more than 30 sets of wind speed equivalents by 1900 -- some disagreeing by more than 100 percent. It was no longer clear just what the old force scale meant (and few men survived who were competent to judge what the behavior of an 1805 man-of-war would be!).

In 1912 the International Commission for Weather Telegraphy sought some agreement on velocity equivalents for the Beaufort scale. A uniform set of equivalents was accepted in 1926 and revised slightly in 1946. By 1955, wind velocities in knots replaced Beaufort numbers on weather maps. But there were still a need for eyeball estimates by seamen to fill the gaps in the global observing network. Thus it became imperative to relate the seaman's guess logged in Beaufort numbers to the wind speed in knots. And so Beaufort's scale had transformed itself from a tool of the mariner to a means for the meteorologist!

Meteorologists set in motion the search to define a set of wind velocity equivalents for the Beaufort force numbers. That the numbers were ever used to transmit anemometer readings may well be one of those minor stories of history that has a much more significant affect than warranted. If 100 years ago there had been a way to extend weather observations across the oceans using only the science of meteorology, perhaps Admiral Beaufort's scale and numbers might have been buried long ago -- preferably at sea!