

Chapter One:

Introduction, History of Weather Forecasting

Weather Proverbs Since the science of meteorology was relatively undeveloped during the late 1800s, considerable emphasis was placed on folklore. Listed are the many rules of thumb and folklore which could be used by forecasters. The list was compiled from Signal Service forecasters and observers across the United States. Listed below is a selection of the weather proverbs. ¹

1. A red sun has water in his eye.
2. When the walls are more than unusually damp, rain is expected.
3. Hark! I hear the asses bray, We shall have some rain today.
4. The further the sight, the nearer the rain.
5. Clear moon, Frost soon.
6. When deer are in gray coat in October, expect a severe winter.
7. Much noise made by rats and mice indicates rain.
8. Anvil-shaped clouds are very likely to be followed by a gale of wind.
9. If rain falls during an east wind, it will continue a full day.
10. A light yellow sky at sunset presages wind. A pale yellow sky at sunset presages rain.
11. Livestock wandered off into the wind.
12. Shorebirds gathered up into groups.

In the 17th and 18th centuries of the United States weather was important to the country. The early settlers to North America experienced the harshness of the weather of the New World.

Thomas Jefferson bought his first thermometer while writing the Declaration of Independence and purchased his first barometer a few days following the signing of the document. Jefferson noted that the high temperature in Philadelphia, PA on July 4, 1776 was 76 degrees. Jefferson made regular observations at Monticello from 1772-78 and participated in taking the first known simultaneous weather observations in America. George Washington also took regular observations; the last weather entry in his diary was made the day before he died.

During the mid 1800's, weather observation began to expand across the United States. By the end of 1849, 150 volunteers throughout the United States were reporting weather observations to the

¹ Hughes, P., 1970: *A Century of Weather Service*. Gordon and Breach Science Publishers, Inc., New York.

Smithsonian regularly. The telegraph was largely responsible for the advancement of meteorology during the 19th century. Daily telegraphic weather reports were reported to the Washington Evening Star.

In 1870, President Ulysses S. Grant signed a joint resolution of Congress authorizing the Secretary of War to establish a national weather service. The original weather agency operated under the War Department from 1870-1891 with headquarters in Washington, D.C., and field offices east of the Mississippi River. Within the Department of War, it was assigned to the Signal Service Corps (which was organized in 1860) under Brevet Brigadier General Albert J. Myer. General Myer gave the National Weather Service its first name: The Division of Telegrams and Reports for the Benefit of Commerce.

On November 1, 1870, at 7:35 a.m. observer-sergeants at 24 stations took the first systematized, synchronous weather observations ever taken in the U.S. were made by "observer sergeants" of the Army Signal Service.

Observations, which were transmitted by telegraph to the central office in Washington, D.C., commenced the beginning of the new division of the Signal Service. ²

The weather service work of the new organization demanded a large number of men familiar with observations, theoretic, and practical meteorology. The commissioned officers detailed to Signal Service work were required to acquire meteorological knowledge by studying the available literature and consulting with and receiving instruction from leading meteorologists. ³

Early forecasts were made for eight large districts (which covered the entire United States), three times daily and the duration of the forecasts, as well as forecast elements were determined by the forecaster. However, beginning in October 1872, predictions were made regularly for 24 hours in advance for 9 districts, and in 1874, forecasts were made for 11 districts and 4 elements, namely weather, wind, pressure, and temperature. No changes occurred until 1885 when predictions were made for 32 hours in advance, and in 1886, forecasts were made for states. In 1888, forecast were extended to 36 hours and in 1898 extended to 48 hours.

The first Signal Service weather office in Washington, D.C. also served as the central office of the country. Weather observations from across the country were compared for errors. In addition, forecasters at the office prepared maps and various weather bulletins, including forecasts, for the eastern part of the United States. In 1871, Signal Service forecasts and other weather information were posted in the Signal Service office, the post office, and at the main office of the Western Union Telegraphy Company. Maps also were posted in the principal hotels in the nation's capitol.

The first Signal Service weather office contained a printing department to print the maps and other weather information. In addition, a separate department was available to evaluate the

² Hughes, P., 1970: *A Century of Weather Service*. Gordon and Breach Science Publishers, Inc., New York.

³ Blodget, L., 1857: *Climatology of the United States*. J. B. Lippincott and Co. Philadelphia.

weather instruments, and another for checking weather observations. To support the various departments and functions of the office was a correspondence and clerical staff.⁴

Beginning in 1873, forecasts were distributed to thousands of rural post offices (by local Signal Service offices) for display as "Farmers' Bulletins" in front of post office buildings. This dissemination method continued until 1881 when local signal flags replaced the bulletins. The flags were large (for example, the cold-wave flag measured six-by-eight feet and was white with a black center of two feet square), and were displayed over post office buildings. By the end of 1886, display flags were available at 290 cities and towns.

The Signal Service's field stations grew in number from 24 in 1870 to 284 in 1878. Three times a day (usually 7:35 a.m., 4:35 p.m., and 11:35 p.m.), each station telegraphed an observation to Washington, D.C. These observations consisted of:

1. Temperature and its 24-hour change.
2. Relative humidity.
3. Wind velocity.
4. Pressure of the wind in pounds per square foot.
5. Barometric pressure
6. Amount of clouds.
7. State of the weather.

At Washington, D.C., forecasts were made from the telegraph reports. The forecasts subsequently were distributed back to the observers, to railroad stations and to available news media. Although the forecasts did not always prove correct, they greatly aided in planning daily life in the United States.

The Report of the Chief Signal Officer in 1877-1878 described the duties of the enlisted men at the weather offices:

...they are required to take, put in cipher, and furnish, to be telegraphed tri-daily on each day, at different fixed times, the results of observations made at those times, and embracing, in each case, the readings of the barometer, the thermometer, the wind-velocity and direction, the rain-gauge, the relative humidity, the character, quantity and movement of upper and lower clouds, and the condition of the weather. These observations are taken at such hours, at the different stations, as to provide the three simultaneous observations, taken daily at three fixed moments of physical time (7:35 a.m., 4:35 p.m., and 11 p.m. Washington mean time) throughout the whole extent of the territory of the United States... Three other observations to be taken at the local times, 7 a.m., 2 p.m., and 9 p.m., are also taken and recorded at each station. A seventh and especial observation is taken and recorded at noon on each day. If at this observation such instrumental changes are noted as to cause anxiety, the fact is to be telegraphed to the central office at Washington.

⁴ Blodget, L., 1857: Climatology of the United States. J. B. Lippincott and Co. Philadelphia.

An eighth observation is required to be taken at the exact hour of sunset at each location. This observation, embracing the appearance of the western sky, the direction of the wind, the amount of cloudiness, the readings of the barometer, thermometer, and hydrometer, and amount of rainfall since last preceding report, is reported with the midnight report...

The average time elapsing from the time at which the readings of the instruments have been taken at the stations scattered throughout the United States, to that at which the reports based on these readings have been telegraphed to the press and to the distributing-stations, has been one hour and forty minutes.

The outfit of an inspecting officer will consist of one standard mercurial barometer, two standard thermometers, one standard compass, one jar of mercury; also the necessary blanks, stationery, barometer cisterns, clamps and screws, small screw drivers, and a tape-line.

During the early years (1870's and 1880's) of the national weather service, research studies were conducted at the central office in Washington, D.C. The first 10 years under the Signal Service with General Myer, the chief of the new agency from 1870-1880. Myer organized the agency in a effective manner. Myer stressed public service and the personnel of the weather agency knew their job was service to others. It also was becoming clear that the War Department was not enthusiastic about having oversight over the weather service. The Signal Service had been almost completely absorbed by its new mission, and should its military services ever be needed, its personnel could not be spared from their weather duties.⁵

By 1889, General Greely became convinced of the futility of attempts to reconcile opposing factions within the organization, as well as to correct admitted shortcomings within the weather service. In 1889, President Benjamin Harrison recommended transfer of the national weather service to the Department of Agriculture. Congress agreed, and on October 1, 1890, an act transferring the weather service to the Department of Agriculture was signed into law by President Benjamin Harrison.

The enlisted force of the Signal Service, excepting those hereinafter provided for shall be honorably discharged from the Army on June 30, 1891, and such portion of this entire force, including civilian employees of the Weather Bureau shall, if they so elect be transferred to the Department of Agriculture.⁶

So on July 1, 1891, the weather stations, telegraph lines, apparatus, and personnel (military people whom were honorably discharged from the War Department and were now civilians) were transferred from the Signal Corps' Division of Telegrams and Reports for the Benefit of Commerce to the Department of Agriculture's new civilian Weather Bureau.⁷

⁵ Whitnah, D.R., 1965: *A History of the United States Weather Bureau*. University of Illinois Press. Urbana.

⁶ Abbe, C., 1893: The Meteorological Work of the U. S. Signal Service, 1870 to 1891. Report of the Chicago Meteorological Congress.

⁷ Weightman, R.H., 1952: Establishment of a national weather service--Who was responsible for it? Unpublished Report. U. S. Weather Bureau.

In 1891 to 1940, The Weather Bureau became part of the Department of Agriculture had a remarkable effect on the nation's meteorological services. Between 1900 to 1910, sixty Weather Bureau Station were built throughout the US.

In 1902, Weather Bureau forecasts were sent via wireless telegraphy to ships at sea. In turn, the first wireless weather report was received from a ship at sea in 1905. Two years later, the daily exchange of weather observations with Russia and eastern Asia was inaugurated.

In 1910, the Weather Bureau began issuing weekly outlooks to aid agricultural planning. And in 1913, the first fire-weather forecast was issued. During these times, weather forecasters began using more sophisticated methods including surface weather observations; kite experiments to measure temperature, relative humidity and winds in the upper atmosphere; and later, airplane stations.

Realizing that the Weather Bureau played an important role for the aviation community, and therefore commerce, in 1940, President Franklin D. Roosevelt transferred the Weather Bureau to the Department of Commerce where it remains today. During the late 1940s, the military gave the Weather Bureau a new and valuable tool - 25 surplus radars - thus launching the network of weather surveillance radars still in use today. In 1970, the name of the Weather Bureau was changed to the National Weather Service, and the agency became a component of the Commerce Department's newly created National Oceanic and Atmospheric Administration.