Signal Service observations began in November 1870, with the Weather Bureau taking over in July 1891. The first two offices were on G Street, while the next two were on M Street. Forecasts for the entire U.S. were initially made from this particular office, then district offices were created to assume forecast responsibility. The district forecast office was relocated from the Central Office building to Washington National Airport in June 1941. The office also was responsible for hurricane forecasting for the entire Atlantic and Gulf of Mexico regions from 1902 until 1935, at which point it only covered areas north of 35°N and shared that responsibility with the Boston office; this responsibility was transferred to the National Hurricane Center in 1966, but dissemination of hurricane warnings and statements for this region remained in place until 1980. The forecast center itself was moved to Suitland, MD, in 1967.

The first airport office was at Bolling Field in Anacostia in August 1929. It was moved across the Potomac River to Washington-Hoover Airport in July 1931, and Washington National Airport in June 1941. Upper-air observations began at this site in 1941, and were transferred to Dulles Airport in 1960. A Flight Advisory Weather Service office was opened in 1944. A WSR-57 radar was installed in 1960; this was moved to Patuxent River, MD, in 1970, and the office became a contract meteorological observatory at this time.

A River Forecast Unit was established in Washington to provide basic river and flood forecasts to the River District Offices in Washington and Richmond, VA. It was closed in 1971, when its functions were transferred to the RFC in Harrisburg, PA.

The Weather Bureau Analysis Center (forerunner of the Weather Prediction Center) was created March 5, 1942, and was also located in “Old Main” (home of the Weather Bureau central office). It consolidated with similar analysis centers operated by the Air Force and Navy in June 1947 and changed its name to Weather Bureau-Air Force-Navy Analysis Center. In 1955, it was moved to the Federal Complex in Suitland and renamed the National Weather Analysis Center.