

U. S. DEPARTMENT OF COMMERCE

CHARLES SAWYER, Secretary

WEATHER BUREAU

F. W. REICHELDERFER, Chief

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REPORT OF THE CHIEF OF WEATHER BUREAU

YEAR 1951

In fiscal 1951 Weather Bureau services rendered in support of expanding air commerce, agriculture, and industry, and to meet the demands for research and development in meteorology for civil and military requirements were at the highest level ever reached, although employment was below the wartime peak.

*WEATHER FORECASTING SERVICE*

Fiscal year 1951 marked the conclusion of the fifth consecutive 5-year period in which loss of life from hurricanes was substantially reduced. The season brought 12 storms, 11 of which reached full hurricane force. Four crossed the coast line of the United States, and caused property damage of over \$35,000,000 with loss of 19 lives.

Automatic telephone forecast service of the metropolitan type became available in the ninth United States city when facilities in Philadelphia, Pa., began operation on September 15, 1950. The popularity of this type of distribution of local forecasts continues to increase markedly. The daily averages of calls handled by such automatic systems during the calendar year 1950 were:

Baltimore .....	15,559	Milwaukee .....	26,486
Boston .....	8,915	New York .....	64,203
Chicago .....	46,983	Philadelphia .....	11,151
Cleveland .....	18,648	Washington .....	61,158
Detroit .....	51,042		

On January 29, 1951, Chicago reported a daily total of 292,082 calls.

# **National Oceanic and Atmospheric Administration Report of the Chief of the Weather Bureau**

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Plans have been developed for consolidating specialized aviation forecasting activities to secure improved service without increased personnel costs. Experimental consolidations at Boston and Washington have demonstrated the practicability of the plan, which will ultimately be put into operation at 26 centers now rendering limited flight advisory weather service.

Weather Bureau international aviation forecast offices briefed 53,500 aircraft departing from the United States, and provided in-flight forecasts for 67,700 aircraft departing from or destined for United States terminals. In briefing aircraft for international operations, the captain is given a weather map, a pictorial cross-section of the weather expected enroute, route and terminal forecasts (including alternate terminals), forecasts of direction and velocity of winds, data on icing levels and turbulence, and the latest weather reports along the flight path. The forecasts extend from the surface to 25,000 or 30,000 feet. Such briefings during 1951 represented an increase of 38 percent over service provided last year. About a third of the flight forecasts and about a fourth of the briefings were provided for foreign aircraft; the remainder were for United States civil operators and military aircraft on overseas flights.

#### **WEATHER OBSERVATIONS AND REPORTS**

The Weather Bureau, in collaboration with the Air Force and Navy, carried out a series of comparisons of their differing types of upper air sounding instruments to determine the compatibility of measurements made by the several services. This program was carried on at Oklahoma City for a period of 3 weeks during June 1951. Because of the requirement to forecast flight conditions at higher and higher levels to meet the needs of new aircraft, the average height of balloon ascents has been increased during the past year from 52,424 to 62,349 feet through the use of improved methods and materials.

On June 1, 1951, a new hourly sequence weather code became effective, with some changes in reports of sky conditions. This is designed to make reports more useful for aviation. Along with these changes the format for transmission and dissemination of the regional and terminal sections of aviation weather forecasts has been considerably simplified to make the terminal forecast section and the hourly sequence weather reports equally easy for direct use by aviation personnel.

The Weather Bureau published:

- (a) 52 issues of Weekly Weather and Crop Bulletin, 4 pages each.
- (b) 13 issues of Climatological Data, National Summary, average 40 pages each.
- (c) 585 issues of Section Climatological Data (13 for each of the 45 sections), averaging 20 pages each.

- (d) 3,096 1-page issues of monthly Station Meteorological Summaries for 258 Weather Bureau stations, and 375 issues of Annual Climatological Data, averaging 4 pages each.
- (e) 1,512 issues of monthly Supplement to Station Meteorological Summary for 126 Weather Bureau stations.

Approximately 500 special tabulations of wind direction and speed were prepared for aviation and engineering interests; there were also many special tabulations to show frequency with which various meteorological elements occur in combination. These studies were produced mostly for military and other Government agencies, but users also included a number for industrial organizations and universities, which financed the work under "trust fund" accounts.

To aid in the study of water resources of the Nation, 163,140 weighing raingage charts were evaluated and checked; hourly values were recorded and tabulated. In recording the climate of the Nation more than 10,000,000 observations of surface and upper-air meteorological data were placed on tabulating cards.

The Weather Bureau intensified its programs in the Pacific in support of the military effort in Korea. New or amplified upper-air observations were established at Wake and Midway Islands and at Hilo, T. H., during the year. A main meteorological office, serving the large number of civil and military flights over the Pacific, was established at Wake Island.

The Weather Bureau is assuming responsibility for land-line communications duties (formerly carried by personnel of the Civil Aeronautics Administration) at a considerable number of places where the CAA is integrating their control tower and communications groups. Since the communications load at these points is primarily concerned with weather report transmissions, which can be set up for automatic handling, there is but a slight addition to the work load of the Weather Bureau station. A considerable overall saving to the Government results from this cooperative adjustment of programs between the two agencies.

#### **HYDROLOGIC SERVICES**

The savings to the national economy resulting from the Nation-wide flood forecast and warning services rendered by the Weather Bureau again closely approached the 10-year annual average of 30 million dollars. Six river forecast centers and 84 river district offices were operated during the year. Arrangements were substantially complete for establishing one additional river forecast center, for the Tennessee Valley, to operate in cooperation with the Tennessee Valley Authority. A new river district office was established at Reno, Nev. Water-supply forecasts were issued for 336 forecast points, an increase of 44 over the preceding year.

The component parts of new electronic flood routing analogue machines were assembled and laboratory tested by hydrologic and instrument personnel preparatory to installation at river forecast centers.

The Bureau began active participation on various subcommittees and work groups of the Arkansas-White-Red River Basin Committee and the New England-New York Inter-Agency Committee. Hydrometeorological studies completed for other agencies included investigations for the Snake River Basin above Hells Canyon dam site; the Payette River Basin above Garden Valley dam site; determination of maximum possible winds over Lake Okeechobee, Fla.; and a report on the Determination of Snow Loads for Building Construction. Surveys of maximum station precipitation for 1, 2, 3, 6, 12, and 24 hours were completed for Utah and Idaho.

#### *RESEARCH AND DEVELOPMENT*

Cooperative research programs were carried on in the following fields: At Detroit and Cleveland atmospheric pollution studies were inaugurated; a new project was started to develop information on causes of Hawaiian rainfall; the Great Smoke Pall of September 1950 is being investigated; an analysis of the effect of cycles in rainfall, pressure, and temperature over the United States was continued. Further intensive field work for investigating the causes and effects of tornadoes and squall lines in the Midwest area continued with an expanded observational program, and there was a start on the close analysis of records obtained in this effort. A research study was completed which will permit more accurate forecasting of winter precipitation in the Washington area.

Meteorological work in cooperation with the Atomic Energy Commission at Idaho Falls, Oak Ridge, and Brookhaven, was extended through another year, with some amplification in scope. These offices do considerable research in atmospheric pollution and diffusion.

Basic research on the fundamental physical processes of condensation and precipitation of water vapor went forward in large scale laboratory tests and experiments. This work bears on the important and widely noticed problems of artificial production of rainfall. As far as means permitted, the Weather Bureau continued its effort to test results of large scale cloud seeding and nucleation activities, where carried on under conditions sufficiently definitive to permit sound evaluation. However, only a minor proportion of the vast commercial efforts put into such enterprises in the drought stricken West were conducted and reported in a manner to permit reasonable scientific examination of results. Consequently the whole question of practical value remains unsettled.

#### *INTERNATIONAL COOPERATION*

The World Meteorological Organization was established as a specialized agency of the United Nations, in March 1951, at Paris. This organization is the successor to the less formal International Meteorological Organization, which had been in existence since 1878. The member states of the WMO honored the Weather Bureau by electing the Bureau Director as the first president of the World Meteorological Organization.

A beginning was made in the program to take over from the Navy the weather observing activities in the Pacific Trust Territory.

Cooperation in training nationals of foreign governments in United States methods of weather service was continued with representation from Turkey, Ireland, Thailand, Burma, Iran, and several of the Latin-American countries. The Bureau extended meteorological assistance to Greece, Ireland, Peru, and Venezuela, and maintained a meteorological attaché at London for liaison between the Weather Bureau and various European, Middle East, and North African interests.

The operation of high Arctic weather stations, in Canada and Greenland, was continued by joint effort with the governments concerned. The hazardous nature of this enterprise was sadly illustrated by loss, in July 1950, of a Canadian airplane with all aboard, including the Chief of the Weather Bureau Section for Arctic Operations. The plane crashed on Ellesmere Island while on resupply mission to the northernmost station of the Canadian group.

#### **PLANT AND EQUIPMENT**

To provide additional and improved methods for disseminating reports and forecasts, the following facilities have been developed: Continuous automatic broadcast equipment for the New York City area; a VHF radio circuit between Burrwood and New Orleans, La., to facilitate the transmission of timely information for the hurricane forecast service; and inexpensive continuous automatic equipment which can be connected to telephone facilities to provide forecasts and other weather information to many more people than can be serviced by ordinary telephone facilities.

In a program to modernize and standardize field offices, rehabilitation was carried out at 75 main stations. A standard briefing display counter was developed and 60 units ordered for installation at field offices. With the adoption of this unit, the material needed for weather briefing will be systematically and logically arranged and pilots will find the same material similarly displayed in all Weather Bureau offices. Development of automatic means for measuring and recording weather phenomena has been emphasized in continuing efforts to reduce observer workload and thereby free more time for public service duties; and to obtain more representative measurements by placing instruments at suitable exposures remote from buildings and obstructions. Major redesign of radar storm-detection equipment has been accomplished. An automatic calibrator for testing radiosondes, which will result in both higher economy and increased accuracy, is now in use.

Other instrumental equipment has been improved as indicated by the following developments: New type bimetallic maximum and minimum thermometers overcome deficiencies of mercury and spirit thermometers. Electric motor-driven psychrometer aspirators make possible more uniform

dry and wet bulb readings and considerably decrease thermometer breakage. New calibrators for direct-reading wind equipment insure continued accuracy of this type installation. Aerological balloons were improved to carry observations to heights averaging more than 15 miles above sea level in flight tests.

#### *ORGANIZATION AND EMPLOYMENT CHANGES*

On June 30, 1951, the Bureau had 4,516 full-time employees, 3,380 part-time employees, and 8,450 cooperative observers who served entirely without pay. The number of full-time employees was five less than in 1950, while the number of cooperative and part-time observers remained nearly constant throughout the year. There were approximately 11,000 reporting stations of all kinds in operation as of June 30, 1951. Of this number 387 were primary stations manned and maintained by full-time employees.

Service to the city of Charleston, W. Va., and surrounding counties was begun by establishment in September 1950 of a weather office with complete general weather service responsibilities. During the year stations at Canton, N. Y., and Urbanna, Va., were closed.

#### *ACKNOWLEDGMENT*

The Weather Bureau acknowledges a debt of gratitude to the numerous cooperative observers and cooperating agencies, especially the CAA, the Coast Guard, and the military departments, who provide many of the weather observations used in developing daily weather forecasts and in establishing the climatic records for the United States.



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