1953 Report of the Chief of the Weather Bureau

(Reprint from 41st Annual Report of the Secretary of Commerce)

For more than 80 years it has been the foremost duty of the Weather Bureau to give warnings of storms. In the years before the national weather service was set up, news of disasters on the seacoasts and the Great Lakes headlined the daily papers. In 1869 nearly 2,000 vessels were wrecked or sunk in storms on the Great Lakes alone. The following year Congress established the new weather service and called on it to take observations and give "advance notice of the approach and force of storms."

It was soon clear that the complex nature of atmospheric currents and the great variety of storms and their capricious nature would prove to be bewildering. Before adequate measures could be developed to deal with West Indian hurricanes, one of these great storms skirted the Atlantic seaboard in 1873 and sank or wrecked 1,200 ships. The desperate need to deal with these monsters of the atmosphere caused the weather service to adopt every new means of observing and reporting the indications as quickly as possible.

In the years that followed, the warning service improved and losses of men and ships steadily declined. Beginning with the storms on the Great Lakes, along the sea coasts, and in the shipping lanes on the high seas, progress in issuing timely warnings has extended slowly but steadily to the smallest, most elusive, and most furious storm of all, the tornado. Today this intensive effort continues in the development of tornado observing and warning techniques and in the acquisition of observing equipment.

During these years, working under congressional directive to prevent loss of life and property from floods in the rivers, the Weather Bureau has succeeded in preventing annual losses estimated at $50 million. In the flood-warning service there remains one final problem of giving advance notice of flash floods in the remote headwaters where the waters rise almost as fast as heavy rains fall. Even on this difficult front there is progress.

In the last few years losses of life from hurricanes have been reduced to less than two for every 100 who died a quarter of century ago. Warnings of blizzards and destructive cold waves and ice storms have improved steadily. Weather Bureau advices protect life and property and enable stockmen, horticulturists, and truck growers to save many millions of dollars in crops and livestock. In these activities military assistance in the air has been used with amazing effectiveness to reconnoiter hurricane centers, and for "operation haylift" when successive blizzards maroon livestock.

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

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Studying the Climate

In the early years of the Bureau the most urgent duty, next to storm forecasting, was the gathering and study of records of the climate. Eighty years ago Americans were moving westward to establish homes in little-known regions and needed detailed information on local climate in addition to a knowledge of storms, blizzards, and floods. Our pioneers wanted to know what to look for in the way of heat and cold, rain and snow, and the ordinary run of the weather. Congress asked the Bureau to "establish the climate," thinking perhaps that a record of 20 or 30 years would show climatic conditions presumed to be more or less permanently fixed.

Now that the country is settled in all areas, climatic data are needed in even more detail for air conditioning, design of drainage systems, construction of dams and reservoirs, and many other purposes.

The passage of time has demonstrated that climate is not fixed. Some parts of the country have been growing warmer slowly, although irregularly, ever since the weather service was established. In most regions there are long-term fluctuations or trends in the weather. The "normals" of climate established by the records of 50 years ago no longer apply. With the knowledge that the climate is changeable, the need for advance information in regard to temporary but large-scale variations from wet to dry and cold to warm weather, and vice versa, becomes more and more urgent for sound national planning.

Although no reliable methods have been discovered to extend weather outlooks more than 30 days into the future, it is the Bureau's policy to put maximum emphasis on this research. In short, the mandate from Congress to study the climate has come to have a new and vital meaning.

Tornado Warnings

In line with these general policies all offices of the Bureau must contribute directly or indirectly to these two main objectives: To observe, measure, report, and keep records of the weather and climate for use in forecasting and estimating conditions likely to occur in the future; and to issue timely warnings of conditions likely to prove dangerous to life and property.

During the 1953 fiscal year the Bureau continued to direct its main efforts toward an even greater alertness and competence in dealing with storms, floods, and other conditions potentially dangerous to life and property, in the preservation of forests from weather-influenced fires, and in safety of travel by land, sea, and air. The greatest emphasis was put on the study and prediction of tornadoes. Thousands of observers have been recruited on a voluntary basis to telephone reports as soon as a tornado is sighted so that immediate warnings can be sent out by radio. Special instruments have

been installed in areas where tornadoes are most frequent.

Of the instruments needed, the most important and most costly are radars used for storm detection. The Bureau has developed inexpensive means of converting surplus and obsolescent airplane-detection radar equipment for weather observation use on the ground and has managed to double their range from 50 to 100 miles. In several Texas communities the conversion is being done at the expense of the cities where the sets will be located, thus providing at almost no expense to the Government a small network of instruments which would cost millions of dollars if bought new. These instruments show the movement of severe local storms with which tornadoes usually are associated.

When conditions indicate that tornadoes are likely, bulletins are sent out notifying weather officers and voluntary observers to be on the alert. Thereafter, with many people on the lookout, a tornado is likely to be seen as it approaches a community, and emergency warnings by radio give time for the people to reach places of safety. To insure the success of this tornado-warning program, informative material, including safety rules, has been widely distributed in the last year through cooperation of press, radio, television, civil organizations, and Federal, State, and municipal agencies.

Automatic Instruments

In conjunction with the Weather Bureau's warning program, research and investigation have been pursued intensely to learn more about the conditions in the upper atmosphere which cause the growth of severe local storms and contribute to their destructiveness.

Work on design of new instruments was continued, mainly to perfect automatic observing and reporting instruments to be installed in remote sections where observers are not available. Attention was given also to the automatic distribution of forecasts and warnings in densely populated areas. A recent installation was completed at Chicago to service the dense air traffic at airports in that area. One of the most important developments was the design of an unattended station which takes observations and automatically sends the reports on the teletype, doing the work of a group of observers and communicators.

For safety of aviation, especially in approach and landing at busy airports, intensive studies were continued on turbulence, end-of-runway conditions, and other weather factors. Other subjects of special research were hail occurrence, numerical weather forecasting, and effects of A-bomb explosions on the weather and atmospheric pollution.

There was continued progress in compiling climatic data by modern machine methods in order to provide convenient access to the information

needed and assist studies of short- and long-term changes in weather and climate.

Training of Bureau personnel to improve their abilities to deal with difficult scientific problems involved in the weather analysis, forecasting, and warning services was continued on a broad scale in cooperation with universities and by taking advantage of courses available elsewhere. Approximately 600 Bureau employees were taking university correspondence courses during the year.

On the administrative side, the Weather Bureau made continuous and vigorous efforts to economize in all its operations. By adjustments in field staffs it was able to preserve the essential elements of its storm-warning services for the protection of life and property, for preservation of crops, forests, and other resources, and for safety of transportation on land and sea and in the air.