

UNITED STATES DEPARTMENT OF COMMERCE

Jesse H. Jones, Secretary

U.S. WEATHER BUREAU • F. W. Reichelderfer, Chief

[administrative]
Report of the

CHIEF of the WEATHER
BUREAU

1942

LIBRARY

MAY 24 2007

National Oceanic &
Atmospheric Administration
U.S. Dept. of Commerce



Report of the Thirtieth Annual Report of the
Secretary of Commerce, 1942

RARE BOOK

OC

983

.564

1942

UNITED STATES GOVERNMENT PRINTING OFFICE

WASHINGTON : 1943

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

ERRATA NOTICE

One or more conditions of the original document may affect the quality of the image, such as:

Discolored pages
Faded or light ink
Binding intrudes into the text

This has been a co-operative project between the NOAA Central Library and the Climate Database Modernization Program, National Climate Data Center (NCDC). To view the original document contact the NOAA Central Library in Silver Spring, MD at (301) 713-2607 x124 or Library.Reference@noaa.gov.

HOV Services
Imaging Contractor
12200 Kiln Court
Beltsville, MD 20704-1387
December 13, 2007

Weather Bureau

Since the Weather Bureau, like other war agencies, is engaged in many activities classified as secret, much of the information that would normally be submitted in its annual report must be withheld until after the war. Only certain general features of the year's work can be given. During the first 5 months of the fiscal year meteorological organization and preparations under the national defense program were carried forward rapidly. Following declaration of war the Bureau's facilities were quickly converted to wartime service and the plans prepared through the work of the Defense Meteorological Committee were placed in effect.

On December 26, Executive Order No. 8991 was issued providing for coordination of meteorological facilities in the prosecution of the war. As the national meteorological organization of this country, the Weather Bureau is responsible for basic synoptic observations and for general weather reports and services for all national interests, especially for aeronautics, agriculture, and commerce. The basic synoptic reports carry the data for current weather maps for all purposes, military as well as civil. Besides its authority and responsibility for the basic meteorological and climatological services of the country, the Bureau is charged with fundamental research and investigations in these sciences. In order to furnish special military weather information and interpret local conditions in active theaters of war, the Army and Navy have their own meteorological units operating with their field forces. Thus, while essential coordination and continuity of basic meteorological functions are provided through the Weather Bureau, the military need for flexibility and unity of command is satisfied through the supplementary meteorological units of the Army and Navy integrated with the armed forces in the field and at sea.

In wartime, military meteorological units are increased in number and many meteorologists must be recruited from civilian life. To assist in providing meteorologists for the armed forces, the Weather Bureau had released 279 employees by July 1, 1942—70 as officers and 209 as enlisted men. Release of men for military duty continues as rapidly as replacements can be trained for positions essential in the basic wartime service. Meteorologists not eligible for military service, including newly trained women graduates, are being taken into the civilian service to carry on essential meteorological work. The Bureau assisted in organizing comprehensive meteorological training for civilian and military students. Graduate meteorologists from the Weather Bureau were loaned to serve as instructors; curricula were planned in conference with Army, Navy, and university representatives; and the Bureau has facilitated meteorological training in other ways.

In war, the influence of weather on military tactics is comparable to that of the terrain on which a battle is fought—a factor that cannot be controlled but one that must be known in advance so plans can be made to suit. Clouds, fog, and rain determine whether aircraft pilots can see their targets, whether warships can find the enemy, or tanks and artillery can move swiftly, and how the several specialized arms of the fighting forces must be timed and coordinated to attain the objective quickly.

The war has increased emphasis upon the necessity for extending the time-range of weather forecasts. This problem has challenged scientists and amateurs for hundreds of years, and the various attempts at its solution have been numerous. Public interest in it is attested by the continued popularity of many forms of climatological "forecasts" and other experimental prognostications, which even Benjamin Franklin published in "Poor Richard's Almanac"—not because he thought them reliable but because his readers liked them so well that he found it difficult to discontinue them. Some progress in this field is being made but it falls far short of the needs. The reason is obvious. Weather is one of the most complex of natural phenomena. Unlike the movements of the planets, the weather does not behave according to precise laws so far known to physicists, mathematicians, or meteorologists. It is generally believed that there must be more exact knowledge of the general circulation of the atmosphere before the meteorologist can give in more detail the information of weather, past, present, and future, needed in the modern world. Recent extension of meteorological observations into the upper air and over new regions of the globe is an important step toward comprehension of atmospheric processes. Although handicapped by incomplete data, imperfect techniques, and shortage of technicians, progress in meteorological science in the last decade has been considerable and expansion in applied meteorology in recent years has been rapid considering the handicaps. Growth has been orderly and sound; too rapid expansion with its dangers of disorganization and waste have been avoided.

It is pertinent to emphasize also that while the present pressure for improvements in weather forecasting, particularly in the long-range forecasting field, is mainly military, the need is by no means limited to war purposes. The enormous benefits to be derived from real progress in this field justify whatever scientific effort can be made toward a solution. The need for long-range forecasts is not the only problem with which meteorology is confronted. Modern technological progress, particularly in aeronautics, calls for parallel improvements and expansion in meteorology far beyond the present technical capacity to supply it. In air transport and many other fields, successful operations are more or less dependent upon atmospheric conditions, and improvements in meteorological service are necessary to efficiency in operations. The horizon for applications of weather science has been extended greatly, and entirely new uses and values have appeared for applied meteorology. The Weather Bureau's program of modernization during the last decade has been designed to advance the science and enable the synoptic meteorologist to match technological developments in other fields.

SERVICE ACTIVITIES

The activities of the Bureau, now adapted to current war needs, include service to a long list of war industries as well as special observations, new and enlarged forecast services and studies, and reports for the military branches. Besides the primary job of organizing civil meteorological activities for war purposes, some of the general features of the Bureau's work during the last year are summarized under the following headings:

1. Assistance in the coordination of meteorological stations through consolidation of offices and establishment of weather centrals where applicable. The Weather Bureau has been able to assist in many ways in the planning and organizing of interrelated meteorological services for war purposes.

2. Decentralization of the general administration of the Weather Bureau into seven field regions to provide closer contact with and supervision of Weather Bureau service throughout the country. Extension of the program for all regular observing stations throughout the country, including hydrologic and climatological substations. The installation of new hydrologic stations in accordance with the long-term plan has been slowed down temporarily by the war.

3. Collaboration with the military services and the Office of Censorship in the administration of wartime security measures involving restrictions in the dissemination of meteorological information and related matters. The handling of meteorological information under these restrictions entails planning and multiplies the Bureau's daily work in synoptic meteorology.

4. Expanded in-service training program for meteorologists to provide higher professional standards in all groups, including observers as well as regular professional personnel. Conducted in-service training in observational procedures and indoctrination in fundamentals of air navigation for airways weather forecasters.

5. Organization of a central weather analysis unit ("AMAFA") at Washington to provide comprehensive analyses of the current synoptic situation for prompt dissemination in the United States and collaborating countries as an aid to high standards in weather maps and to facilitate the work of weather forecasting. (See *Aviation Weather Service*, below.)

6. Encouragement in the extension of synoptic services and other meteorological developments in neighboring countries in which the United States is interested. Assistance has been given in meteorological training courses for Latin American meteorologists. Where legally authorized and desirable, aid has been given in establishing meteorological facilities and scheduling reports of benefit in this country. Aeronautical expansion has, more than ever, made applied meteorology an international cooperative undertaking.

7. Preparation of many technical reports covering special meteorological projects and research investigations.

REGIONAL MANAGEMENT OF FIELD SERVICE

The rapid development of the national weather service during the last decade has been due primarily to two influences—the phenomenal expansion in aeronautics and the modern 3-dimensional or air-mass concept in meteorology. These influences are to some extent interdependent. Aviation needs comprehensive reports and forecasts of weather with particular reference to conditions of the upper air; modern technique in the air-mass method of forecasting depends much upon observations of the atmosphere at higher levels. Aviation's influence on meteorological practice has been of far-reaching value to many activities besides aviation, particularly to agriculture, engineering (hydroelectric, heating, etc.) marketing (fuels and perishables), and transportation. Better weather service in these fields has been long needed. It has always been true, and still is, that the public demand for weather service far exceeds the capacity of the Bureau's facilities. The pressing needs of aviation have helped greatly in bringing about modern extensions of the service.

These developments have been accompanied by increases in the number of observing stations and forecast centers and have necessitated two important administrative adjustments within the Bureau. The first of these, accomplished last year, reorganized the directive functions in Washington to coordinate all related service functions and facilitate administration; the second, accomplished this year, decentralizes field-service management and places it largely in seven regional offices. The regional divisions of the Weather Bureau are made in a manner to coordinate the numerous and varied field services. Regional offices are located at La Guardia Field, N. Y. (Region No. 1); Atlanta, Ga. (Region No. 2); Chicago, Ill. (Region No. 3); Fort Worth, Tex. (Region No. 4); Kansas City, Mo. (Region No. 5); San Francisco, Calif. (Region No. 6); and Seattle, Wash. (Region No. 7). An eighth region is to be established in Alaska.

Broadly speaking, the functions of the regional offices are to manage the field activities of the Weather Bureau under the general direction of the central office in Washington. The regional directors give special attention to supervision and inspection of field offices for the purpose of solving local problems, encouraging the best use of available facilities, and ascertaining that the highest standards of accuracy are applied in observations, reports, and records, and the best technical practices maintained in all phases of meteorological and climatological work. As a result of closer relation to field activities and enlarged responsibility, the regional organization has already proved its efficiency in meeting unprecedented weather-service demands of the war program. These advantages will continue into future peacetime activities and are consistent with efficient and progressive administration.

CONTINUING REGULAR SERVICES

National censorship of weather information, which limits public issues to (a) special warnings, and (b) forecasts in generalized terms over 26-hour periods, has made it necessary to adopt new distribution practices for getting essential meteorological information to war industries. This requires the use of direct and individual service

to public utilities, manufacturers of war material, State and municipal authorities, transportation companies, and others engaged in the war effort. In the interest of over-all war effort, the military authorities have approved a clearance system to permit the general broadcast of warnings of severe conditions, such as cold waves, hurricanes, severe local storms, and heavy snows. The issue of operating forecasts containing meteorological information that might be useful to the enemy have been displaced in many places by specific operating advices for construction contractors, farmers, growers, shippers of perishables, etc.

The work of the general weather service has been reviewed in previous annual reports and it need not be repeated here. The importance of comprehensive hemispherical weather reports, including adequate sampling of the upper air by pilot balloons and radiosondes, has already been stressed as the probable key to adequate understanding of atmospheric processes and more rapid progress in applied meteorology. Synoptic meteorology is an international science and frequent exchange of reports of observations and air-mass analyses between countries that are meteorologically interdependent is essential to the operation of general weather service of the kind that is needed by aeronautics, agriculture, commerce, and industry.

AVIATION WEATHER SERVICE

In the 5 months preceding Pearl Harbor three major plans were developed for improvement of service to peacetime aviation. Under these plans (1) terminal forecasts issued every 6 hours were to be increased in number and issued in more specific terms for use by pilots and air-carrier operations personnel; (2) facsimile reproduction of weather maps would have made copies of the latest maps promptly available; and (3) cross-sectional atmospheric diagrams indicating expected weather conditions along specified routes would have been issued with the latest weather map. For security and operational reasons, these projects were suspended in December.

Under the security requirements requested by the military services, necessary readjustments were made in the methods of providing essential weather information for flying operations. Basically, these arrangements include personal identification of aviation personnel applying for such information on the ground, and the radio transmission in code of data necessary for landing or other operational uses by aircraft in flight.

An important step in providing weather service to aviation, both military and civil, was taken in the establishment at Washington of a central analysis unit during March. This is the partial realization of a long-planned method for placing the daily weather analysis, after preparation by a staff of experts, promptly in the hands of local meteorological offices throughout the country. Facsimile reproduction, a part of the plan, is expected to be adopted eventually. While the immediate objective of this central analysis unit is to serve aviation, its benefits extend incidentally to all forms of weather-forecasting services; it represents in fact a milestone in establishing modern meteorological practice at the hundreds of airport stations throughout the country and promotes high standards and proficiency in weather-map analysis. It makes available to all airports in the United States (by means of direct transmittal over the "C" teletype circuits) compre-

hensive analyses of current surface and upper-air weather reports. In addition to relieving overburdened field staffs of a large amount of map plotting, these transmitted analyses will answer the need for uniform presentation of weather data upon which current forecasts are based, with direct benefits of speed and coordination in interpretation and the assurance of better forecasts for all purposes.

FRUIT FROST WARNING SERVICE

Wartime restrictions in the use of radio have necessitated the establishment of telephone relay channels in cooperation with county agricultural agents, growers' organizations, and others, to distribute the protective warnings of this service. Omitting detailed description of weather conditions, these warnings are now issued in the form of advices specifying the kinds of protection needed and measures for its accomplishment. During the year the effectiveness of this branch of the service was again demonstrated in the value of citrus fruit crops saved from destruction through the use of its forecasts. The saving is estimated by citrus interests at several millions of dollars this year.

HURRICANE-WARNING SERVICE

This service in the past has depended largely upon ship reports from coastal, Gulf, and Caribbean waters. In face of the handicap of wartime radio silence, arrangements have been devised for collecting essential hurricane information by other means, and the service, long a vital economic and social safeguard in the southern coastal areas, is expected to be an important safeguard for wartime shipping, manufacturing, and military activities in the Gulf, Caribbean, and adjacent areas. Estimated value of this special service for the year, in terms of property saved through safety measures based on hurricane warnings, is more than \$15,000,000, exclusive of shipping.

FIRE-WEATHER WARNING SERVICE

Improvements in the Fire-Weather Warning Service during the year include the coordination of all such work in the Western States under the direction of a fire-weather coordinator at San Francisco. New fire-weather districts have been organized under Kansas City's direction in Missouri, Illinois, and Iowa, under Chicago in southern Indiana, under New Orleans in northern Louisiana and southern Arkansas, under Denver in the Black Hills and in Colorado, and under Philadelphia in New Jersey and Pennsylvania—all in cooperation with the respective State forestry agencies, and with almost no additional expense to the Federal Government except for telegraphing reports and forecasts. Existing services were also improved by better forecasting techniques and addition of mobile equipment at Boise, Portland, Mount Shasta, and Missoula; and a special service was inaugurated to assist the Grazing Service of the Department of the Interior in the fire protection of extensive grazing areas.

To provide detailed data for improvement of forecasts and extensions of the fire-weather service to new areas, a WPA project was instituted at San Francisco for the summarization of all past fire-weather records.

As with other services operated by the Weather Bureau, it has been necessary under wartime security restrictions to devise special methods

and to utilize new channels for the distribution and exchange of fire-weather reports and forecasts.

RIVER AND FLOOD SERVICE

This service, already covering most of the navigable rivers, organized new districts at Lake Charles, La., and Austin, Tex., and instituted closer and more systematic engineering collaboration under a specialist hydrologic engineer assigned to each of the seven regional offices. Serious floods occurred during the year in the Trinity, Kansas, Arkansas, Missouri, and Sacramento Rivers, and in smaller streams in eastern Pennsylvania, Michigan, and Wisconsin. Previous high-water records in all of these areas were broken and considerable damage resulted from flooding. Warnings were of added value this year in safeguarding property and personnel in military establishments and in plants and factories engaged in the production of war materials. The Nation-wide value of property saved through the aid of Weather Bureau flood warnings was estimated at more than \$7,500,000.

A special report on this service, presenting a review of progress since 1891 and a master plan for future improvements, was submitted to the Secretary early in the fiscal year.

HYDROMETEOROLOGICAL SECTION

This section continued its development of techniques for estimating maximum possible precipitation and quantities of run-off for the flood-control programs of the Departments of War and Agriculture. A noteworthy project this year was the report "Maximum Possible Precipitation Over the Sacramento Basin of California," which is being reproduced by the Waterways Experiment Station of the U. S. Engineer Corps at Vicksburg, Miss. In addition, much of the basic work on a hydrometeorological report for the Panama Canal Third Locks was completed, and work was started on a similar report for the Pecos River basin in Texas and New Mexico.

Storm studies of the U. S. Engineer Corps were reviewed throughout the year and are filed in the section along with reviews of mass curves, basic data, and discussions. Progress was made also in the storm-classification program; studies were begun on thunderstorms as an important flood-producing storm type; and five brief reports on basin-storms were made for the Flood Control Advisory Committee of the Department of Agriculture.

HURRICANE TRAINING CLASS

A class for training students from Latin American Republics bordering the Caribbean was organized at New Orleans in the latter part of February in collaboration with the Department of State and continued through June with schedule for adjournment at the end of July after a 10-day visit to the central office at Washington. The students were instructed in the general principles of meteorology, with particular stress on tropical conditions, including hurricanes and synoptic work.

The program was notably successful, not only from the professional standpoint but also in cultivating United States-Latin American understanding in meteorology. This exchange of professional views and extension of meteorological training is important in the development of meteorological service in the Latin American countries, a worth-

while program in air transportation and other Western Hemisphere interests.

Some of the adjustments to wartime weather service are indicated in the foregoing. It is pertinent to include in this report an expression of the Weather Bureau's appreciation for the invaluable cooperation of the military services, of other agencies with which the Weather Bureau has worked, and of the public generally. The Bureau's services are unusually inclusive in their contacts, touching the interests and operations of nearly all classes of people. In many instances curtailments have been necessary in services that have operated for public benefit for half a century. The elimination of references to weather from radio broadcasts, and to a large extent also from the press, has caused an inconvenience of national scope. Restrictions on the teletype distributions of reports have handicapped aviation training schools and other operations. Chambers of commerce, brokerage agencies, and railroads have been requested to discontinue the publication and posting of weather information for advertising purposes. Many of these public services, such as weather information by radio broadcast, had been built up by the Bureau after years of effort. Their curtailment was accepted as a necessary wartime security measure and their restoration is planned immediately upon return of peace. The cooperation of the American press, the radio networks, and the Office of Censorship, has aided greatly in these necessary measures to safeguard national security and give maximum cooperation in the war effort.

The organization of the field service as of June 30, 1942, and the funds available for the Bureau's operations for the fiscal year were as follows:

<i>Field stations</i>	
First-order stations (commissioned personnel)	296
General forecasting centers	14
Airway forecasting centers	22
Regional offices	8
River district centers	76
Climatological section centers	43
Marine service activities in 16 port offices.	
Checking units for hydrologic data (3 located at regional offices)	7
Special stations (meteorological, hurricane, frost and fruit)	55
Airway stations (105 in Alaska)	235
Cooperative airway stations (15 in Alaska)	90
Off-airway stations (20 in Alaska)	140
CAA cooperative airway stations (14 in Alaska)	275
Storm-warning display stations	307
Weather and crop reporting stations—1,700 unpaid	2, 085
River, rainfall (for river work), snowfall, winter sports, evaporation, and special reporting stations—496 unpaid	1, 778
Hydrologic stations—1,333 unpaid	2, 025
Climatological stations (non-crop reporting)—unpaid	4, 260
<i>Funds available to the Weather Bureau, fiscal year 1942</i>	
Regular appropriations, "Salaries and expenses"	\$7, 984, 730
Allotments to the Weather Bureau by the Secretary of Commerce	139, 000
Funds advanced or transferred from other Government agencies	471, 326
Emergency Relief funds	73, 576
Grand total	8, 668, 632