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Report to Secretary, Department of Commerce; by Henry Eschwege, Director, Community and Economic Development Div.

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A survey was conducted of the activities of the National Weather Service (NWS), with particular attention paid to local weather forecasts, routine weather briefings provided to general aviation pilots, and operation of weather observation stations. Findings/Conclusions: About 170 of the 209 Weather Service Offices issue local forecasts for their immediate areas which are adaptations of larger zone forecasts and cover the same time period. The need for local weather forecasts in certain areas is questionable. If local forecasts were discontinued except in the Western Region, about $2 million could be saved annually. Both the NWS and the Federal Aviation Administration (FAA) provide route weather briefings for general aviation pilots. As much as $3.3 million of NWS staff resources could be made available for other purposes if this duplication in services were removed. NWS's substation network needs improvement; a comprehensive evaluation is needed of the climatology and hydrology substation networks. Recommendations: The Secretary of Commerce should: reevaluate the need for Weather Service Offices to routinely provide local forecasts to the Eastern, Central, and Southern Regions, and discontinue this practice where no clearly useful purpose is served by local forecasts; and determine which Western Region offices should discontinue local forecasts. In consultation with the FAA, the Secretary should reevaluate the need for maintaining duplicative weather briefing services for general aviation pilots, and reevaluate the justification for the number and location of existing substations. (RRS)

UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

COMMUNITY AND ECONOMIC
DEVELOPMENT DIVISION

B-133202

The Honorable
The Secretary of Commerce

MAR 9 1977

Dear Madam Secretary:

This is a report on the results of our recent survey of the activities of the National Oceanic and Atmospheric Administration's (NOAA's) National Weather Service (NWS). The primary purpose of the survey was to obtain an overview of the agency's basic responsibilities and objectives. However, we gave particular attention to

--local weather forecasts,

--routine weather briefings provided to general aviation pilots, and

--operations of weather observation stations.

Our survey was made at NWS headquarters in Silver Spring, Maryland, and at selected Weather Service Forecast Offices, River Forecast Offices, Weather Service Offices, and Weather Service Observation Stations throughout the country.

QUESTIONABLE NEED FOR LOCAL WEATHER FORECASTS IN CERTAIN AREAS

The routine refinement of zone weather forecasts into local forecasts by Weather Service Offices appears to serve little useful purpose in certain areas of the country. We believe that discontinuance of this service should be considered.

NWS is responsible for observing and reporting weather in the United States and for issuing warnings to safeguard the public. Weather forecasts are issued to the general public by both Weather Service Forecast Offices and Weather Service Offices. The forecasting network of NWS includes the following:

1. The National Meteorological Center--Located in Maryland, the National Meteorological Center is the center of NWS's forecasting organization. It prepares atmospheric analyses and long-range forecasts

based on weather observations collected throughout the country, from ships at sea, and aircraft aloft. It also uses global weather observations and other data collected by the Department of Defense, and satellite data from the National Environmental Satellite Service, an NOAA organization. The atmospheric analyses and long-range forecasts prepared by the National Meteorological Center are used by the Weather Service Forecast Offices and the Weather Service Offices.

2. Weather Service Forecast Offices--There are 52 Weather Service Forecast Offices, about one per State, which are principally staffed by meteorologists and technicians. Among other things these offices prepare zone forecasts which usually cover specific geographic areas within a State.

3. Weather Service Offices--There are 209 Weather Service Offices in the 48 contiguous States which are generally staffed with meteorological technicians. These offices take weather observations, issue severe weather warnings, brief pilots, and perform other functions, such as issuing local forecasts.

Based on data transmitted by the National Meteorological Center, Weather Service Forecast Offices prepare and issue zone forecasts to the general public at least three times daily, covering periods of up to 48 hours. A zone forecast generally includes a narrative of expected weather conditions, maximum and minimum temperatures, wind speed and direction, and probability of precipitation. A zone is a relatively large area with sufficient meteorological similarity so that one forecast for that area can be used as the local forecast for any community within the zone.

Of the 209 Weather Service Offices, about 170 issue local forecasts for the immediate area where each is located. Local forecasts are adaptations of the zone forecasts and cover the same time periods. They are issued about the same time and generally include the same type of information as the zone forecasts.

In a comparison of 478 local forecasts prepared by Weather Service Offices with the related zone forecasts prepared by Weather Service Forecast Offices, we found only five instances where significant changes had been made to

the zone forecasts by the Weather Service Offices in the Eastern, Southern, and Central Regions of the country. In the Western Region, however, we found that significant changes had been made to zone forecasts up to 29 percent of the time.

In March 1975, the Eastern Regional Director issued an advisory memorandum to the weather service officials of 16 States in the region. The memorandum stated that the local adaptations were not significantly improving the zone forecasts and suggested that field personnel spend less time preparing routine forecasts. Although the effectiveness of adapting zone forecasts was mentioned, there was no requirement to discontinue this practice and the memorandum had little or no impact.

In discussing the utility of local forecasts with the Director of NWS, he told us that, except in unusual circumstances, Weather Service Offices should not routinely make local forecasts in the Eastern, Southern, and Central Regions. He said that the terrain in the Western Region, however, has more effect on the weather and that there probably is a need for Weather Service Offices to prepare local forecasts in some locations.

NWS officials told us that about 11 percent of Weather Service Offices' total time is spent adapting and distributing local forecasts. Applying this factor to total adjusted Weather Service Offices' salary costs, we estimate that about $2.6 million in staff resources is spent annually to prepare local forecasts in the 48 contiguous States. Excluding the Western Region, about $2 million is spent. If this practice were discontinued, these resources could be redirected to more productive functions, such as NWS's weather radio and community preparedness programs.

Recommendation to the Secretary of Commerce

We recommend that the Secretary of Commerce direct the Administrator of NOAA to (1) reevaluate the need for Weather Service Offices to routinely provide local forecasts in the Eastern, Central, and Southern Regions and to discontinue this practice where no clearly useful purpose is served by such forecasts and (2) determine which Western Region Service Offices should discontinue providing local forecasts.

DUPLICATIVE RESPONSIBILITIES FOR ROUTINE WEATHER BRIEFINGS FOR PILOTS

Both NWS and the Federal Aviation Administration (FAA), Department of Transportation, provide routine weather briefings to general aviation pilots. We believe that as much as $3.3 million of NWS staff resources could be made available for use in other programs if the present duplication in services were eliminated.

The Weather Service Forecast Offices of NWS prepare the forecasts which are used by NWS's Weather Service Offices and FAA's flight service stations to brief domestic aviation pilots on the weather. A weather briefing can include information on the weather conditions at the airport of departure or arrival, existing and forecasted weather along the proposed flight route, wind speed and direction at the anticipated flight altitude, and weather conditions for alternate airports along the expected flight route.

FAA provides most of the civilian pilot weather briefings in the United States. FAA operates a system of 292 staffed flight service stations that help insure the safe and efficient use of the Nation's airspace. Under the terms of a 1965 agreement with NOAA, FAA assumed responsibility for providing routine weather briefings to domestic aviation pilots and now provides about 90 percent of all civilian pilot briefings in the United States.

Currently, about 95 percent of the FAA stations' communications with pilots are handled by telephone and radio transmitter. Before takeoff, pilots are briefed and they file their flight plans by telephoning the nearest station. In flight they receive weather reports and other services by radio. Routine weather briefings are also furnished by NWS's Weather Service Offices, and these offices are contacted by pilots for routine weather information about 10 percent of the time.

The Director, NWS, told us that Weather Service Offices spend about 14 percent of their time on pilot briefing and related matters. Applying this factor to total adjusted Weather Service Offices' salary costs, we estimate that in the 48 contiguous States, these offices annually spend about $3.3 million of staff resources to brief pilots.

The Director, NWS, acknowledged that FAA has responsibility for providing routine pilot briefings and said that this should be done by FAA wherever possible. He stated, however, that NWS should continue to provide FAA with the meteorological data needed to brief pilots and should also provide professional meteorological consultation when requested by FAA.

FAA officials told us that its low activity flight service stations could absorb most of the pilot briefings presently being given by NWS with no increase in staffing. FAA officials explained, however, that FAA is currently streamlining and automating its flight service station program and plans to phase out low activity stations. The agency's long-range plans call for closing about 30 low activity stations each year for the next 5 years. Eventually flight service stations will be satellited to about 20 central hub stations. Also, tied to those central stations will be some 3,000 pilot self-briefing terminals at 2,500 airports. FAA officials said that this system will be capable of absorbing the pilot briefings now being given by NWS, and that FAA could absorb the pilot briefings presently being given by NWS, without an increase in staffing, provided that FAA has the discretion to decide which flight service stations will absorb the NWS workload.

Recommendation to the Secretary of Commerce

We recommend that the Secretary of Commerce direct the Administrator, NOAA, to reevaluate, in cooperation and consultation with FAA, the need for maintaining duplicative weather briefing services for general aviation pilots. Consideration should be given to reducing NWS's role in providing pilot weather briefings in light of FAA's present general responsibility for furnishing this service.

NEED TO IMPROVE SUBSTATION NETWORK

NWS's substation network appears to need improvement. We believe NWS should (1) reevaluate the number of climatology and hydrology substations needed and adequacy of its location and (2) divest itself of those local service substations that provide little or no benefit to the agency.

NWS maintains a network of more than 12,000 cooperative weather observation stations, called substations, that provide weather data for climatology, hydrology, and local service programs. Equipment at substations vary. While a number of these substations are fully automated, most are manually operated. At such substations weather observations are normally taken by cooperative observers--private citizens who perform the service for free or who are paid a small fee for their efforts--and called in to a Weather Service Office. The total substation program cost to NWS is relatively small, about $3 million, which includes about $1 million for salaries for about 60 full-time NWS personnel devoted to the program. The substation program is important, however, because the substation network provides input to the information systems of several NWS programs.

NWS classifies substations into the following networks:

Network	Organization
A	The basic climatic network which provides a sample of the climate on a macroscale; it includes only designated stations which record daily maximum and minimum temperatures and precipitation data.
B	The basic hydrology network; it provides information, such as river stages, rainfall, and soil moisture which is used for various hydrologic purposes, including flood forecasting.
AB	This network includes substations which serve both climatic and hydrologic purposes.
C	This network includes substations which serve special needs, such as local community interests, and agricultural forecasting and research.

Climatology substation network

The climatology network is comprised of 1,400 "A" substations that accumulate temperature and precipitation data. The network is designed to provide an adequate sample of weather data to statistically chart the Nation's climate.

According to NWS this network should ordinarily contain one substation per 600 square miles.

We noted many instances, however, where there were more than one "A" or "AB" (climatology/hydrology) substations within an area of 600 square miles. Headquarters officials were unable to identify the organizational unit responsible for the "A" network, to identify the number of substations needed, or to provide justification for their present location. We were told that the "A" network was formerly administered under the State climatology program. Under this program NWS personnel established technical requirements and standards for climatology substations in the States. However, in 1973 the program was discontinued and these responsibilities were not assumed by any other organizational unit.

Hydrology substation network

The hydrology substation network is designed to monitor the distribution and circulation of water on the land's surface and subsurface. Nationwide, the network includes over 10,000 hydrology ("B") and climatology/hydrology ("AB") substations that accumulate precipitation, evaporation, and river stage data. Data from selected substations is used to prepare river forecasts and provide the basis for issuing flood warnings.

According to the most recent draft of National Weather Service Office of Hydrology Program Development Plan, the hydrology network does not provide adequate coverage. The plan, which outlines hydrology program goals and needed improvements, points out that data is not available from many areas where floods originate. Additional substations and automation of others were recommended to improve the accuracy and timeliness of flood forecasting.

The justification for some hydrology substations is questionable. Many do not have clearly defined location criteria and may not be serving the purposes for which they were established. For example, one NWS region has identified 335 substations that should be closed, but, as of July 1976, 221 were still operating. It should be noted that data obtained from many of the substations is not used for river and flood forecasting or published by the National Climatic Center, the NOAA organization responsible for storing and periodically publishing historical weather data.

Public service substations

The public service network is comprised of more than 600 "C" substations which measure temperature and precipitation. These substations include those that serve local community interests, are used for agricultural forecasting and research, and some "long record" stations which have been gathering data for over 50 years.

Although NWS maintains and inspects these substations, it does not use most of the observational data; the data is usually sent to the National Climatic Center for storage. In the past it has been difficult for NWS to divest itself of public service substations. We were told that many public service substations remain open because of local political considerations, and it is much easier to discuss closing these stations than to actually close them.

Efforts to identify unneeded substations

The Director of NWS agreed with us that there was a need for a comprehensive evaluation of the climatology and hydrology substation networks.

In September 1974, in an effort to improve substation management, NWS established the position of Substation Network Coordinator. In December 1974, the coordinator undertook a review of the substation network and sent the regions a listing of about 3,000 hydrology and public service substations. Regional personnel were instructed, among other things, to assess the need for these substations and to determine if they should be closed. Although interim responses were received from the regions, final data was not submitted. As a result it was not known how many substations were closed.

In June 1976, we discussed this matter with NWS headquarters officials. The officials said that the study was not completed because the Substation Network Coordinator position was abolished in September 1975. The officials agreed that further action should be taken on this matter.

Accordingly, on June 24, 1976, NWS headquarters officials sent a letter to the regions requesting them to update the action taken on the 3,000 "B" and "C" substations identified in September 1974 for consideration of possible closure.

In addition, on July 1, 1976, the officials sent a listing to the regions that identified over 500 stations that would be considered closed, unless their need could be justified.

NWS headquarters officials told us on January 27, 1977, that, as a result of the aforementioned NWS actions, 484 "B" and "C" substations have been closed. We were told other substations may also have been closed and have not yet been reported as closed to NWS headquarters. The officials said that they have requested the regions to continue reevaluating and justifying the need for those substations that remain active.

Recommendation to the Secretary of Commerce

We recommend that the Secretary of Commerce direct the Administrator, NOAA, to continue to reevaluate the justification for the number and location of existing substations to assure that only needed stations are retained and that areas needing additional stations are included in current action plans.

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As you know, section 236 of the Legislative Reorganization Act of 1970 requires you to submit a written statement on actions taken on our recommendations to the House Committee on Government Operations and the Senate Committee on Governmental Affairs not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

We appreciate the cooperation received during our survey. We would be happy to discuss this report with you or your staff if you wish.

We are sending copies of this report to the Director, Office of Management and Budget; the Chairman, House Committee on Government Operations; the Chairman, Senate Committee on Governmental Affairs; the Chairman, House Committee on Appropriations; the Chairman, Senate Subcommittee on State, Justice, Commerce, and the Judiciary, Committee on Appropriations; the Secretary of Transportation; your Assistant Secretary

for Administration; the Administrator, National Oceanic and Atmospheric Administration; the Director, National Weather Service; and the Director, Office of Audits.

Sincerely yours,

Henry Eschwege

Henry Eschwege
Director