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The Congress Should Clearly Define the National Weather Service's Role To Provide Specialized Weather Services. CED-78-77; B-133202. March 29, 1978. 12 pp. + 6 appendices (29 pp.).

Report to Rep. Olin E. Teague, Chairman, House Committee on Science and Technology; by Elmer B. Staats, Comptroller General.

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Authority: OMB Circular A-62. H.R. 8763 (95th Cong.).

The National Weather Service's basic mission is to provide meteorological services to meet public needs or the common needs of Federal agencies. It also provides special services for specialized users including: agricultural, aviation, marine, and forestry weather; environmental air quality; and weather conditions affecting such activities as space flight operations and energy development. The Service's total fiscal year 1978 budget is about $185 million, with about $32 million alloted for specialized weather services. Findings/Conclusions: The most recent statement of policies affecting specialized weather service is contained in Office of Management and Budget Circular A-62 which provides for the Department of Commerce to keep a current plan, including specialized weather services. However, plans have been developed only for forestry and agriculture weather, and even these are out of date. Effective weather services for aviation, air pollution, and marine activities have been hampered by lack of specific formal plans between the Service and the agencies. Although there is now cooperation in developing plans, the Service believes that the demands of the basic mission and budgetary limitations will limit its ability to effectively provide additional services. Increasing demands for basic services have resulted in reduction of the specialized services. Recommendations: The Congress should clearly define the Service's role and responsibilities for providing specialized weather services to user agencies and assure that resources available to the Service are adequate to carry out the responsibilities. The Secretary of Commerce should assure that specific operational plans for specialized weather services are formally agreed to by it and the user agencies. The Secretary, together with user agencies and in consideration of other progras priorities, should provide such services through

reallocation of existing resources. (Author/HTW)

REPORT BY THE

Comptroller General

OF THE UNITED STATES

The Congress Should Clearly Define The National Weather Service's Role To Provide Specialized Weather Services

In response to a request from the Chairman, House Committee on Science and Technology, GAO compiled information on the specialized weather service programs of the Department of Commerce's National Weather Service to support the work of other Federal agencies.

The report is in two parts. The first deals with specialized services in general and points out that they will not meet expanding needs of the Federal agencies. The second contains detailed information on the status of and plans to expand each specialized weather service program. (See apps. I to VI.)

The report includes recommendations to the Congress and to the National Weather Service to improve specialized weather services.

CED-78-77
MARCH 29, 1978

COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-133202

The Honorable Olin E. Teague
Chairman, Committee on Science
and Technology
House of Representatives

Dear Mr. Chairman:

Pursuant to your October 19, 1977, request and subsequent discussions with your office, we have compiled information on the specialized weather service programs of the Department of Commerce's National Weather Service to support missions of other Federal agencies.

As your office requested, we did not take additional time to obtain agency comments on matters discussed in the report. However, its contents were discussed informally with officials of the Service, and their comments are included where appropriate.

As arranged with your office, we are sending copies of this report to the Chairman of your Subcommittee on Transportation, Aviation and Weather; Acting Director, Office of Management and Budget; Secretaries of Commerce, Defense, Transportation, Agriculture, Energy, and the Interior; Administrators of the National Oceanic and Atmospheric Administration, Environmental Protection Agency, and National Aeronautics and Space Administration; and Director, National Weather Service. Copies will be made available to other interested parties who request them.

Sincerely yours,

Comptroller General
of the United States

REPORT BY THE
COMPTROLLER GENERAL
OF THE UNITED STATES

THE CONGRESS SHOULD CLEARLY DEFINE THE NATIONAL WEATHER SERVICE'S ROLE IN PROVIDING SPECIALIZED WEATHER SERVICES

D I G E S T

The National Weather Service's role and responsibilities for providing specialized weather services to Federal agencies need to be clearly defined. Higher priorities have been placed on the Service's more clearly defined responsibilities. The commitment to planning and supporting specialized weather services has not been adequate, and it appears unlikely that the need for expanded services will be met. (See p. 4.)

The Service's basic mission is to provide meteorological services to meet public needs or the common needs of Federal agencies. It also provides specialized services--including the facilities, products, and distribution mechanisms--for servicing the meteorological needs of specialized users.

These services include agricultural weather, aviation weather, marine weather, forestry weather, environmental air quality, and weather conditions affecting activities, such as space flight operations and energy development, including atomic testing.

The Service's total fiscal year 1978 budget is about $185 million. About $32 million is for specialized weather services.

The most recent statement of policies affecting specialized weather services is contained in Office of Management and Budget Circular A-62. Although the circular provides some guidance, a specific congressional mandate would help make specialized weather services adequate to meet expanding needs.

A bill to improve operational weather programs and to affirm the Federal responsibility for providing effective weather and

related services (H.R. 8763) has been introduced in the Ninety-fifth Congress. The bill stresses that specialized weather services and better coordination are needed.

SPECIALIZED WEATHER SERVICES PLANS ARE INADEQUATE

Although the Office of Management and Budget circular provides that "the Department of Commerce will prepare and keep current a plan" which includes specialized weather services, plans have been developed only for forestry and agriculture weather. Even these, prepared in 1967 and 1971, are out of date as a result of expanding needs. (See p. 5.)

Effective specialized weather services for aviation, air pollution, and marine activities have been hampered by lack of specific formal plans between the National Weather Service and the agencies.

Although the Service and user agencies are now cooperating in developing plans, the Service has indicated that the demands placed on its resources by its basic meteorological mission and an austere budget will limit its ability to effectively provide the additional services delineated in such plans.

SPECIALIZED WEATHER SERVICES NOT ADEQUATELY SUPPORTED

The Service has not had an appreciable increase in financial support during the past 10 years. Specialized services probably cannot be significantly increased without reallocating existing resources or providing additional resources. To meet increasing demands for basic services, the Service has reduced its specialized services. (See p. 8.)

Both the Service and the user agencies acknowledge that staff is not available to provide the expanded services which the agencies need.

A number of actions (taken or planned) by the Department of Commerce and the National

Weather Service could identify resources which could be reallocated to this purpose. However, increasing needs for basic weather services and potential budget reductions make it unlikely that specialized weather services will realize increased support.

AGENCY COMMENTS

As the Chairman, House Committee on Science and Technology, requested, GAO did not take additional time to obtain agency comments on matters discussed in this report. However, its contents were discussed informally with officials of the National Weather Service. These officials concurred with GAO's recommendations.

RECOMMENDATIONS

The Congress should (1) clearly define the National Weather Service's role and responsibilities for providing specialized weather services to user agencies and (2) assure that resources available to the Service are adequate to carry out the responsibilities.

The Secretary of Commerce should assure that specific operational plans for specialized weather services are formally agreed to by it and the user agencies. GAO also recommends that the Secretary, together with user agencies and in consideration of other program priorities, provide such services through reallocation of existing resources. (See p. 12.)

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ABBREVIATIONS

FAA	Federal Aviation Administration
GAO	General Accounting Office
NWS	National Weather Service
OMB	Office of Management and Budget

CHAPTER 1

INTRODUCTION

The Chairman, House Committee on Science and Technology, requested that we compile information on the specialized weather service programs of the Department of Commerce's National Oceanic and Atmospheric Administration's National Weather Service (NWS) to support the missions of other Federal agencies.

NWS' MISSION

NWS' mission is to contribute to the safety, health, welfare, comfort, and convenience of the general public with respect to weather conditions, including conditions involving natural disasters, and to meet the needs of the various segments of the national economy for weathe information. NWS provides two types of meteorological services, basic and specialized.

The basic services are designed to meet public needs and the common needs of other agencies and constitute the foundation for disaster warnings and the specialized services. Basic services include:

--Acquiring raw data through observing current weather conditions.

--Communicating weather data and information.

--Preparing basic analyses and forecasts.

--Issuing and disseminating products, including warnings and forecasts, to users.

--Archiving weather information for ready retrieval.

NWS also provides specialized services, including the facilities, products, and distribution mechanisms for servicing the needs of specialized users. Such services are provided to support the basic missions of other Federal agencies and include:

--Agricultural weather, including soil moisture and temperature, leaf wetness, evaporation, drying conditions, and other factors affecting farming and ranching.

--Aviation weather, including terminal and en route weather advisories principally detailing type of

precipitation; cloud amounts and heights; visibility; wind factors; and other significant en route aviation hazards, such as aircraft icing, turbulence, and thunderstorm activity.

--Marine weather, including coastal tides and currents, hazards to navigation on the high seas, conditions for pleasure boating, and lake ice and other factors affecting inland marine navigation.

--Forestry weather, including weather conditions needed for forestry and range measurement and conditions affecting wildfire control.

--Environmental air quality, including air stagnation conditions or expressions of the atmosphere's ability to dilute and dispense pollutants.

--Weather conditions affecting special activities, such as space flight operations and energy development, including atomic testing.

NWS' total fiscal year 1978 budget is about $185 million, of which about $32 million is for specialized weather services.

SCOPE OF REVIEW

We reviewed specialized weather service program plans of NWS and the needs of each user agency, as well as their plans to meet those needs. (See apps. I to VI.) Discussions concerning such programs were held with officials of the:

--Department of Commerce.

--National Oceanic and Atmospheric Administration.

--NWS.

--Office of Management and Budget (OMB).

--Department of Agriculture.

--Federal Aviation Administration (FAA).

--Coast Guard.

--Department of the Interior.

--Environmental Protection Agency.

--Department of Energy.

--National Aeronautics and Space Administration.

--Department of Defense.

CHAPTER 2

SPECIALIZED WEATHER SERVICES WILL NOT MEET EXPANDING NEEDS OF USER AGENCIES

NWS' role and responsibilities for providing specialized weather services to user agencies need to be clearly defined. Because higher priorities have been placed on more clearly defined responsibilities, the commitment to planning and supporting specialized weather services has not been adequate and it appears unlikely that the need for expanded services will be met.

NEED TO DEFINE NWS' SPECIALIZED SERVICES MISSION

The Congress has not specifically mandated the extent to which NWS should provide specialized weather services to user agencies. Such services have historically evolved from specialized interests. In 1870 the Weather Bureau (now NWS) was formally established as a military unit in the War Department. An Act of October 1, 1890, transferred the Weather Bureau from the War Department to the Department of Agriculture, where services to agricultural interests were emphasized. With the expansion of air travel during the 1920s, the Bureau shifted emphasis to meteorological support to aviation. The Bureau was transferred to the Department of Commerce on June 30, 1940.

The most recent statement of policies affecting NWS specialized weather services is contained in OMB Circular A-62. The circular reaffirms Commerce's central role to provide basic meteorological services and supporting research needed to meet the requirements of the general public or the common requirements of user agencies.

While not specifically addressing Commerce's role in providing specialized services, the circular does provide that the Department "will, to the extent consistent with effective and economical use of resources, conduct the specialized services that support the mission requirements of user agencies." The circular also designates Commerce as responsible for preparing plans which serve as a basis for effectively establishing basic and specialized services. The Federal Coordinator for Meteorological Services and Supporting Research in Commerce is responsible for preparing such plans. Although the circular provides some guidance, the lack of specific congressional mandate has led to services which are not adequate to meet expanding needs.

House bill 8763, a bill to improve the operational weather programs of the National Oceanic and Atmospheric Administation; to affirm the Federal responsibility for providing effective weather and related services; and to assure to the maximum extent that all available Federal resources are coordinated for weather-related research, development, and technology and for other purposes; was introduced in the Ninety-fifth Congress. The bill, which has been referred to the House Committee on Science and Technology, points out that specialized weather services and better coordination of them are needed.

SPECIALIZED WEATHER SERVICES PLANS ARE INADEQUATE

Although OMB Circular A-62 provides that "the Department of Commerce will prepare and keep current a plan" which includes specialized weather services, specific plans have been developed for only two of the services--forestry and agriculture weather. Even these plans, prepared during 1967 and 1971, respectively, are outdated as a result of expanding user needs.

The Federal plan for a National Agricultural Weather Service is centered around the outdated concept of advisory agricultural meteorologists, while the current system is based on Environmental Studies Service Centers. The Agricultural Weather Services Program provides, in about one-third of the country, specialized local observations for farming areas, technical studies in weather-crop relationships, advisories to extension services and agribusinessmen, and weather forecasts tailored to current farming operations. Plans call for expanding such services nationwide through establishing additional Environmental Studies Service Centers.

The Secretary of Agriculture, in an April 5, 1977, letter to the Secretary of Commerce, highlighted the need for improved meteorological and climatological support. He stated, in part, that:

> "However, more data and information are needed on a meso (localized) scale that is directed to the specific short run, information needs of farmers as well as probability analyses to provide a basis for making judgements. This information is essential in our field programs now underway and planned to help farmers in drought areas adjust cropping patterns, seeding rates, fertilizer applications, irrigation practices, stocking rates, tillage and pest control practices to varying drought conditions. It will provide

improved technical information for staff of this Department working with farmers to vastly improve decisions on water utilization and tailor production practices to minimize the effects of drought. Over the longer run, improved climatological data forecasts provide tremendous potential for increasing the efficiency of agricultural production and reducing risks associated with weather."

Several actions have been taken as part of the effort to improve weather support of agricultural programs and farming activities. The Department of Agriculture has established a committee to define needed meteorological and climatological services, and the Department plans to work with the National Oceanic and Atmospheric Administration to obtain services defined by the committee. An updated National Agricultural Weather Services Plan has been drafted, but has not been agreed to by Agriculture and Commerce. The Extension Service, Department of Agriculture, and NWS in November 1977 signed a memorandum of agreement which specifies policies and administrative arrangements designed to provide more effective support to farmers and agribusiness.

The Federal Plan for a National [Forestry] Fire-Weather Service was published in 1967. Because the plan is outdated by expanding needs of forestry managers, the agencies began to prepare a new plan during 1974. The new plan has not been approved.

Forestry agencies, in developing this plan, identified about 100 offices needing specialized weather support. However, officials of the Forest Service and the Bureau of Land Management advised us that the draft plan does not contain a commitment from NWS to provide specific services to these offices.

Effective implementation of specialized weather services for aviation, air pollution, and marine activities has been hampered by the lack of specific formal plans between NWS and user agencies. For example, although NWS provides a broad range of products to support aviation, the weather services needed by aviation have not been incorporated in a plan acceptable to FAA and NWS. It was not until June 1977 that recognizing the need to improve aviation weather services, FAA's Associate Administrator for Air Traffic and Airways Facilities created an ad hoc team, which included representatives from FAA, NWS, and industry, to evaluate the aviation weather support needed by users of the National Airspace System. On the basis of the team's findings, a draft Aviation Weather System Program Plan has been developed.

The plan contains recommendations to alleviate inadequacies in the aviation weather system and to upgrade the weather support to the National Airspace System of the 1980s.

The draft plan points out that

"Aviation weather data are initially collected by an observing network that is inadequate in size and scope. Hazardous weather areas are poorly identified, tracked and forecast. The distribution of vital weather information to the ultimate user, the pilot, is slow, inaccurate or not delivered at all."

The draft plan states that the aviation weather system can be improved by:

--Increasing the number, frequency, quality, and availability of surface observation.

--Improving severe weather detection and tracking by radar.

--Reducing the time required to deliver critical weather information to users, particularly general aviation, air carriers, and military pilots.

--Improving the accuracy of aviation weather forecasting through automation and increased quality control.

--Tailoring weather information to render it more operationally meaningful to the pilot and controller and more suitable for direct application in their decision-making.

--Providing reliable real-time hazardous weather avoidance capability to the pilot.

The draft plan provides that the major focal point for real-time collection, monitoring, interpretation, and dissemination of hazardous weather information will be weather center facilities staffed by NWS meteorologists at FAA's air route traffic control centers. Although the draft plan contains significant suggestions for improvements, it has not yet been agreed to by NWS and FAA and weather services to aviation remain inadequate. Benefits to be derived from new plans, even if approved, appear questionable because NWS indicated that the demands placed on its resources by its basic meteorological mission and an austere budget will limit its ability to effectively provide the additional services delineated in such plans.

SPECIALIZED WEATHER SERVICES NOT ADEQUATELY SUPPORTED

NWS has not had an appreciable increase in support during the past 10 years, as reflected in the following table. Apparently, specialized services cannot be significantly increased without reallocation of existing resources or additional resources.

NWS Resource Trend 1967-77

FY	Number of full-time employees	Actual budget (thousands)	Budget in terms of FY 1967 dollars (note a)
1967	5,022	91,592	91,592
1968	4,980	95,546	93,216
1969	4,936	101,929	95,708
1970	5,035	113,364	102,685
1971	5,189	131,951	115,746
1972	5,197	113,730	95,491
1973	5,140	124,672	92,555
1974	5,162	134,505	84,013
1975	5,044	145,458	83,166
1976	4,995	174,968	95,611
19[illegible]	5,015	179,916	91,654

a/ Wholesale Price Index used; e.g., 1967 - 100
1974 - 150.1
1977 - 196.3

NWS informed us that to meet the increasing demands for improved basic services, it has reduced support for specialized services. In addition to reducing support in real terms, NWS has reduced dedicated support through its policy of cross-utilization of staff. Through this policy, staff which were specialists in a particular service have been assigned additional responsibilities in the basic meterological mission and other specialized services. As a result, the specialist has become a generalist, who spends time on many services but is not dedicated to any one specialty.

As an example, the 1977 budget shows that 787 positions support the aviation weather program, although only 33 field positions actually are totally dedicated to the program. The forestry weather program provides another good example where needs are increasing and weather support from NWS is decreasing. The needs of forest managers have increased from a

seasonal concern for wildfire suppression to an almost year-round demand for weather information to support a multitude of forestry activities. During fiscal year 1967 the budgetary support of the program was 103 positions and $1.3 million, while in fiscal year 1977 the program's support was 71 positions and $1.9 million. The 71 positions are also part of the cross-utilization policy and are not totally dedicated to the forestry weather program.

The decrease in budget support has affected NWS' ability to provide necessary services. In a 1976 letter to the Director, NWS, the Deputy Chief, Forest Service, stated:

> "The 50 State Foresters are responsible for protecting 700 million acres of State and private land from fire, and have developed excellent fire fighting forces. Their effectiveness, however, requires accurate forecasting of key weather variables. This has been provided in the past by a very able group of NWS fire weather forecasters. Developments in recent years indicate that the timeliness and quality of this service is in jeopardy."

The user agencies, including the Bureau of Land Management, the Forest Service, FAA, and the Environmental Protection Agency, contend that the lack of staff dedicated to the specialized services has lowered the quality of NWS services. The Director, NWS, stated that cross-utilization improves NWS by increasing the overall economy and efficiency of activities. As an example, before cross-utilization the availability of many specialized services was often limited to the 8-hour workday of the specialist. Through cross-utilization, offices staffed with generalists also trained in specialized services provide such services 24 hours per day. The Director noted, however, that cross-utilization, to work effectively, requires a level of training support that has not generally been available to NWS.

Both NWS and the user agencies acknowledge that staff is not available to provide the expanded services which user agencies need. To illustrate, both NWS and FAA agreed on a priority need to establish weather facilities in each of the 20 air route traffic control centers responsible for controlling air traffic in the contiguous United States. NWS said ideally the program should include 7 meteorologists, providing service 24 hours per day, in each center, or a total of 140. However, primarily because of staffing considerations, FAA and NWS initially agreed to establish such facilities in only 16 centers manned by 4 meteorologists

providing service 16 hours, rather than 24 hours, per day. In addition, NWS said weather service forecast offices need about 22 more staffers to improve aviation weather forecasts originating there.

According to NWS, ideally the meteorological staff for the centers should be supported through Commerce's budget. This has been proposed to OMB and rejected. OMB agrees the program is needed but believes FAA can provide budget support for the staff through reallocation of present resources. On January 27, 1978, NWS informed us that FAA had approved plans to provide budget support for NWS to put 3 meteorologists in each of 13 air route traffic control centers beginning in the spring of 1978.

In another instance, both NWS and the Extension Service requested additional funds in their fiscal year 1978 budget requests to expand the Agricultural Weather Service Program nationwide. NWS said that to accomplish this, 58 new positions would be required. Twenty-eight of these are needed to establish 7 additional Environmental Studies Service Centers for full nationwide agricultural weather coverage. Twenty-three positions are required to assign an agricultural meteorologist at weather service forecast offices. These meteorologists, as well as those assigned to the Service Centers, would be NWS' agricultural focal point for interface with the Extension Service at the State level. This interface is to have (1) State Extension Service officials advising NWS of the crop situation and the required weather elements needed in the forecasts and (2) NWS providing the crop-specific and site-specific weather information necessary for effective decisionmaking on weather dependent farming operations. Two positions were requested by NWS for a limited research and development effort to develop techniques for routine operational forecasts on a county basis, and five positions were requested for overall guidance, coordination, and training related to the expanded program.

The Extension Service requested funding and positions for 52 State extension agricultural weather specialists. The Extension Service also requested a position for a program leader and secretarial staff.

OMB denied their requests and asked that an assessment be made of how the proposed expanded services rank in importance and probable success as compared to ongoing weather services and agricultural research efforts. The Department of Agriculture established a committee to review and prioritize departmental weather support needs and will continue to work with NWS to obtain needed services.

Additional resources for specialized services is uncertain

Although additional demands for specialized services are highly likely as a result of the ongoing cooperative efforts of NWS and user agencies in developing and revising plans, the likelihood of NWS devoting additional resources to specialized services is very doubtful unless (1) its responsibilities in this area are clearly defined and (2) existing resources are reallocated or additional resources are made available.

A number of actions taken or planned by Commerce and NWS could identify resources which could be reallocated to the specialized services. These include:

--Establishment of a program by NWS to automate routine tasks that are conducted at field offices (Automation of Field Operations and Services Program). NWS estimates that as the program is implemented, savings will accrue which will allow reallocation of staff. However, the biggest effect will be on technical support staff.

--Initiation of an assessment by Commerce of usefulness of NWS products and services and the system used to provide them. This assessment was prompted, in part, by a March 9, 1977, GAO report to the Secretary of Commerce which identified potential manpower savings through discontinuing some routine practices of weather service offices.

--The possible closing of 19 weather service offices during fiscal year 1979.

--An NWS study of requirements for observation stations which could lead to improved data needed for NWS' total program, including specialized weather services. This study was also prompted by our March 9, 1977, report, which commented on the need for NWS to improve its overall observation network.

However, according to NWS, increasing needs for basic weather services and potential budget reductions make it unlikely that specialized weather services will realize increased support. For example, we were advised that the National Oceanic and Atmospheric Administration's Weather Radio program will require between 80 and 150 additional staff-years. At the same time NWS has been instructed to plan for a 10-percent reduction in its fiscal year 1980 budget. The

Director, NWS, stated that the most practical area to absorb such a reduction would be specialized weather services.

CONCLUSIONS AND RECOMMENDATIONS

NWS' role and responsibilities for providing specialized weather services to user agencies need to be clearly defined. Because higher priorities have been placed on more clearly defined responsibilities, the commitment to planning and supporting specialized weather services has not been adequate and it appears unlikely that the need for expanded services will be met.

We recommend that the Congress (1) clearly define NWS' role and responsibilities for providing specialized weather services to user agencies and (2) assure that resources available to NWS are adequate to carry out the responsibilities.

We recommend that the Secretary of Commerce assure that specific operational plans for specialized weather services are formally agreed to by it and the user agencies. We also recommend that the Secretary, together with user agencies and in consideration of other program priorities, provide such services through reallocation of existing resources.

APPENDIX I

AGRICULTURAL WEATHER SERVICES

The Agricultural Weather Services Program is sponsored by the Departments of Commerce and Agriculture. Within Commerce, NWS manages and operates agricultural weather forecasting and advisory services. Agriculture supports the program by research and cooperative release of agricultural weather information to farmers and other agribusiness interests. Commerce funding for this program is about $2.6 million annually.

The objectives of NWS' agricultural weather services are to give users weather information to help increase food and fiber production; reduce costs of agricultural production; reduce weather-related agricultural losses; minimize land, water, and air pollution caused by agricultural operations; and minimize energy requirements for agricultural operations. The program prepares and disseminates detailed agricultural weather forecasts tailored to current agricultural activities and interpretative statements or advisories relating meteorological events and climatological data to agricultural activities.

Recognizing the need for improved weather forecasting for farmers, a survey to determine necessary steps to improve agricultural weather services was performed in 1955. The resulting report pointed out the need for expanded agricultural weather services. A pilot project to determine the best procedure for serving the interests of an important agricultural area was started during 1958 in the Mississippi Delta. This was the beginning of the current Agricultural Weather Services Program.

During the 1960s, advisory agricultural meteorologists were located at many agricultural universities and colleges to work directly with agricultural researchers and local farmers. In 1971, pursuant to OMB Circular A-62, a Federal Plan for a National Agricultural Weather Service was developed. The plan set forth the roles and responsibilities of Agriculture and Commerce and provided for expansion of the advisory agricultural meteorologists program.

However, in 1973, because of a lack of interest and funding for the advisory agricultural meteorologist program within NWS, the first Environmental Studies Service Center was established at Auburn, Alabama, to provide agricultural weather service for Alabama, Florida, and Georgia. The

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Environmental Studies Service Center Plan combines the advisory agricultural meteorologists from several States into one center with the objective of decreasing duplication of service and increasing weather expertise. Environmental Studies Service Centers have also been established at Stoneville, Mississippi, covering Arkansas, Louisiana, Mississippi, and Tennessee; College Station, Texas, covering New Mexico, Oklahoma, and Texas; and West Lafayette, Indiana, covering Illinois, Indiana, Kentucky, Michigan, Ohio, and southeast Missouri.

IMPROVEMENTS PLANNED

Only about one-third of the continental United States receives full agricultural weather services. The remaining States have limited or no agricultural weather services.

A new plan for agricultural weather services to replace the 1971 plan which centers around the outdated concept of the advisory agricultural meteorologists has been drafted. The draft plan provides that the Agricultural Weather Services Program be centered around the Environmental Studies Service Centers, which would be expanded to cover the continental United States, Hawaii, and Alaska.

The draft plan addresses the need for improvements in each of the subfunctions of the agricultural weather service, as follows:

--Data collection.

--Forecasting and interpretation.

--Dissemination.

--Climatological support.

These are discussed in more detail below.

Data collection

An important element of the agricultural weather service is an adequate network of observing stations to provide data on elements that characterize the physical environment of the agricultural area. Such data includes temperature and humidity of the air, air motion, sunshine and radiation, soil temperature and moisture, hydrometers, and other water balance factors. NWS uses from 20 to 40 cooperative observing

stations in each State served by agricultural weather services. Such stations, as far as practical, are part of NWS' basic observation network.

Agricultural weather observations of these stations are telephoned to the nearest weather service office, where they are placed on a teleprinter network for dissemination. These observations aid the preparation and verification of agricultural forecasts and provide data for preparing technical studies developing improved forecasting techniques.

As part of the effort to improve agricultural weather services, NWS and the Department of Agriculture's Extension Service recently initiated a pilot project in one State to obtain better observations in agricultural areas. The Extension Service recruited and trained volunteer observers. NWS supplied a toll-free number which the volunteer can dial and touch-tone directly into an NWS computer. Currently, 12 additional States have agreed to cooperate in an expansion of this project.

The draft plan points out that additional special agriculture observing sites are needed to augument existing networks.

Forecasts and interpretations

Weather service forecast offices prepare basic agricultural weather forecasts using guidance products received from the National Meteorological Center and special observations received from the agricultural cooperative observers. The Environmental Studies Service Centers prepare interpretations for agricultural advisories.

Weather service forecast offices preparing agricultural forecasts are concerned primarily with generation of general agricultural forecasts covering a 2-day period (with an outlock for the third, fourth, and fifth days). Forecasts are issued twice daily and include expected cloudiness, percentage of area which will have rain, wind speed and direction, dew duration and intensity, and range of high and low temperatures. Additionally, forecasts may include predictions of sunshine, drying rates, evaporation amounts, soil temperature, high and low humidity, ground-level temperature, and harvest/haying conditions.

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The Environmental Studies Service Centers issue agricultural interpretations of the 5-day outlook issued by the weather service forecast office. Additionally, joint specialized agricultural advisories are prepared to support farming operations, such as planting, pest control, irrigation, and harvesting. In each case, the advisory is tailored to evaluate the effects of past, present, and expected weather factors on agricultural operations, permitting the agricultural user to minimize loss from adverse conditions or to gain advantage of favorable conditions.

As previously pointed out these specialized agricultural weather services are available in only about a third of the country. The draft plan calls for expanding these services nationwide and specifies these responsibilities for the Environmental Studies Service Centers:

--Issuing daily advisories which describe how the recent and forecast weather events will affect current agricultural operations.

--Cooperating with Federal and State agricultural specialists on technical studies relevant to agriculture-weather relationships and on applying these relationships to improvement of agricultural weather services.

--Issuing joint releases on agricultural interpretations of the daily and other meteorological forecasts in cooperation with State and Federal research and extension personnel.

--Cooperating with the weather service forecast office in promoting the maximum distribution of weather data, forecasts, and outlooks by the various means of mass news dissemination.

--Acquainting the forecasters with the requirements of agriculture for weather data and forecasts.

--Coordinating with weather service forecast offices within the area and with field aides in establishing a network of representative agricultural-weather-observing stations.

--Maintaining liaison with mass news disseminators and with all segments of agriculture in the area.

--Cooperating with river forecast centers and river district offices to obtain maximum application of hydrologic services to agricultural operations and to prevent duplication of effort.

NWS estimates that to accomplish this expanded service, 5[illegible] positions are required. Twenty-eight of these are n[illegible]d to establish 7 additional Environmental Studies Service Centers for nationwide coverage. Twenty-three are required to assign an agricultural meteorologist at weather service forecast offices. These meteorologists and those assigned to Environmental Studies Service Centers would be NWS' agricultural focal point for interface with the Extension Service officials advising NWS of the crop situation and the required weather elements needed in the forecasts and NWS providing the crop-specific and site-specific weather information necessary for effective decisionmaking on weather dependent farming operations. NWS also wants two positions for a limited research and development effort to develop techniques for routine operational forecasts on a county basis and five positions for overall guidance, coordination, and training related to the expanded program.

The Extension Service estimates 52 State extension agricultural weather specialists are needed to:

--Incorporate agricultural weather information into Extension Service programs with farmers, which will help make better use of increasingly improved NWS information to minimize risks caused by weather.

--Serve on interdisciplinary teams to provide agricultural meteorology and climatology information needed in developing programs dealing with production systems, economic outlook, and production practices.

--Work with NWS field offices to establish a two-way flow of information. NWS will supply weather data and forecasts of effects of weather on crop moisture supplies and the weather-related factors, and the Extension Service will relay weather information needs of farmers.

--Cooperate with NWS in establishing State agricultural weather networks to provide special localized data needed by Agriculture and the Extension Service on a timely basis.

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The Extension Service also wants a position for a program leader and secretarial staff.

Dissemination

Agricultural weather forecasts, advisories, bulletins, and observational data are disseminated by NWS through telephone announcements; National Oceanic and Atmospheric Administration Weather Radio broadcasts; commercial radio; and a group of special local agricultural area and teletypewriter networks, including the National Oceanic and Atmospheric Administration's Weather Wire Service. Each network connects the weather service forecast office preparing basic agricultural forecasts and the Environmental Studies Service Center and certain weather service offices with the news media and other agricultural information disseminators.

Additionally NWS and the Department of Agriculture cooperate in the weekly publication of crop reports. These are released each Monday and describe the weather and crop conditions during the previous week.

Dissemination of specialized agricultural weather information is limited because only one-third of the country receives complete agricultural weather services.

Climatological support

The National Oceanic and Atmospheric Administration's Environmental Data Service is the focal point for climatic assessment information and provides consultant services and products to agencies concerned with the impact of the environment on agriculture and socioeconomic programs.

The Environmental Data Service and NWS provide information from climatological studies that relate long-term probabilities of weather elements to agricultural practices. The information is useful in seasonal operations (such as planting) and in long-term planning, such as determining the capacity required of irrigation system.

The Environmental Data Service also manages the Center for Climatic and Environmental Assessment, which provides consultant services to Federal agencies on the impact of the environment on agricultural and socioeconomic program policies.

APPENDIX I

STATUS OF PROPOSED IMPROVEMENTS

In an April 5, 1977, letter to the Secretary of Commerce, the Secretary of Agriculture highlighted the need for improved meteorological and climatological support and stated:

> "However, more data and information are needed on a meso (localized) scale that is directed to the specific short run, information needs of farmers as well as probability analysis to provide a basis for making judgements. This information is essential in our field programs now underway and planned to help farmers in drought areas adjust cropping patterns, seeding rates, fertilizer applications, irrigation practices, stocking rates, tillage and pest control practices to varying drought conditions. It will provide improved technical information for staff of this Department working with farmers to vastly improve decisions on water utilization and tailor production practices to minimize the effects of drought.
>
> Over the longer run, improved climatological data forecasts provide tremendous potential for increasing the efficiency of agricultural production and reducing risks associated with weather."

As part of the effort to improve weather support of agricultural programs and farming activities, Agriculture has established a committee to define needed meteorological and climatological service. As needs are defined and prioritized, the Department will continue to work with the National Oceanic and Atmospheric Administration to obtain needed services.

Both NWS and the Extension Service asked for additional funds in supplemental fiscal year 1977 and fiscal year 1978 budget requests to expand the agricultural weather program nationwide. OMB denied both requests and asked that an assessment be made of how the proposed expanded services rank in importance and probable success as compared to ongoing weather services and agricultural research.

Subsequently, in November 1977, NWS and the Extension Service signed a memorandum of agreement which specifies policies and administrative arrangements to provide more effective and coordinated agricultural weather support to farmers and the agribusiness community.

APPENDIX I

Plans call for again submitting budgetary requests to OMB to expand the Agriculture Weather Services Program nationwide.

APPENDIX II

AVIATION WEATHER SERVICES

The objective of NWS' Aviation Weather Services Program is to furnish weather information for safe, efficient aircraft operations and management of the National Airspace System, as recommended by the Department of Transportation's FAA under the Federal Aviation Act of 1958. FAA's primary mission, as given in the Federal Aviation Act of 1958, is to promote safety in and to insure efficient use of airspace. Promotion of aviation safety includes providing aviation weather information for use in the National Airspace System.

NWS' aviation weather program costs about $21.6 million to operate and provides a broad range of products to support the aviation community. NWS furnishes specialized weather observations, forecasts, warnings, advisories, and pilot weather briefings.

Fifty-two weather service forecast offices prepare airport terminal forecasts three times per day with amendments as needed for 481 terminals in the 50 States and in the Caribbean. NWS offices also produce about 300 individual route-orientation forecasts three times per day for the 48 States. Twelve offices prepare area forecasts twice a day covering the entire country. These same offices issue advisories for inflight aircraft alerting them of any significant weather changes expected. These advisories consist of (1) significant meteorological information, which concerns weather phenomena of such severity as to be potentially hazardous to all aircraft and (2) airman's meteorological information, which concerns weather phenomena that may be potentially hazardous to light aircraft and in some cases to all aircraft.

IMPROVEMENTS PLANNED

Although weather contributes to about 35 to 40 percent of all aircraft accidents, today's Aviation Weather Services Program fails to provide timely and accurate meteorological support to the National Airspace System.

Recognizing the need to improve the aviation weather system, FAA's Associate Administrator for Air Traffic and Airways Facilities in June 1977 created an ad hoc team, which includes representatives from FAA, NWS, and industry, to evaluate the aviation weather support to users of the National Airspace System. The team reviewed existing operating conditions and procedures, as well as programs

and plans for National Airspace System aviation weather support through the 1980s. On the basis of their findings, a draft Aviation Weather System Program Plan has been developed. The plan contains recommendations to alleviate inadequacies in the current aviation weather system and upgrade the weather support to the National Airspace System of the 1980s.

The draft plan says that:

"Aviation weather data are initially collected by an observing network that is inadequate in size and scope. Hazardous weather areas are poorly identified, tracked and forecast. The distribution of vital weather information to the ultimate user, the pilot, is slow, inaccurate or not delivered at all."

The draft plan points out that the aviation weather system can be improved by:

--Increasing the number, frequency, quality, and availability of surface observations.

--Improving severe weather detection and tracking by radar.

--Reducing the time required to deliver operationally critical weather information to users, particularly general aviation, air carriers, and military pilots.

--Improving the accuracy of aviation weather forecasting through automation and increased quality control.

--Tailoring weather information to render it more operationally meaningful to the pilot and controller and more suitable for direct application in their decisionmaking.

--Providing reliable real-time weather avoidance capability to the pilot.

The plan provides that the major focal point for real-time collection, monitoring, interpretation, and dissemination of hazardous weather information will be concentrated in a weather center staffed by NWS meteorologists at FAA's air route traffic control centers.

APPENDIX II

The draft plan deals with and addresses the need for improvements in each of the following subfunctions of the aviation weather service:

--Acquiring weather data.

--Communicating observed data.

--Processing meteorological data into forecasts and nowcasts (current weather).

--Presenting data to the pilot.

These are discussed in the following sections.

Acquiring data

Most meteorological data is collected by NWS, FAA, the Air Force's Air Weather Service, air carriers, and contract observers. This includes surface observations, upper air soundings, and radar. Pilots also report hazardous as well as inflight weather information.

Need to increase number of surface observations through automation

Aviators' need for surface observations, such as ceiling visibility and other phenomena necessary for safe operations, has long been recognized, but there are still serious problems with surface observations. Numerous airports in the United States which have approved standard instrument approach procedures do not receive weather observations. The primary reason for the lack of weather observations at these sites is economic. Up until now the cost of providing weather observations has been prohibitively expensive for individual small communities. FAA and NWS agree that automation of surface observations might solve this problem.

The plan calls for increasing the number and frequency of surface observations through automation. An automated low-cost weather observation system has been designed for use at airports with approved instrument approaches which currently do not have observations, and a semiautomated weather observation system has been designed for use at air traffic control towers where controllers take observations. Users groups have suggested, and FAA and NWS are considering, the possibility of using moneys in the airport and airways trust fund to make these improvements.

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Need to improve radar

Adequate information on thunderstorm activity or severe turbulence for pilot or controller assistance in hazardous weather avoidance is not provided in today's system. The radar in use today cannot detect actual turbulence. Turbulence must be inferred from reflectivity data and cell movement. A number of research programs have concluded that very useful information about hazardous turbulence can be derived through doppler processing. Therefore a joint agency evaluation is being conducted to develop a doppler radar to replace existing networks' radar.

Ineffective use of pilot weather reports

Pilot weather reports provide an accurate real-time source of information about the weather and particularly about hazardous weather. Real-time information about thunderstorm severity, height, area extent, presence of hail, etc., is often obtained only from pilot weather reports. They also provide the best information on icing levels and the presence of wind shear at terminals. These kinds of hazardous weather are subject to rapid changes. Thus pilot weather reports should be rapidly disseminated. In today's system the majority of pilot weather reports passed to air traffic control facilities are not disseminated beyond the facility. Those passed on within the system are not real time and therefore are not of much use.

A uniform format has been established for pilot weather reports so that they can be processed automatically using computer techniques. Improvements are needed, however, in the data communications and data processing (forecast preparation) system so that pilot weather reports can be more effectively used. The draft plan includes programs to address the issue. These matters are discussed in the sections that follow.

Communications system

The communications system is nonresponsive to real-time air traffic control requirements primarily because of heavily loaded low-speed communications networks. The nucleus of the aviation weather information distribution system is a low-speed 100 word per minute teletypewriter distribution network. In addition, weather graphic information is distributed nationwide by NWS via facsmile, which is both costly and slow. Weather information is communicated between facilities either by word of mouth or by posting paper. Controller access to current weather information is limited.

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Both NWS and FAA are improving the communications systems. NWS is implementing a system called automation of field operations and services, which will take advantage of electronic displays and minicomputers interfaced with high-speed communications to rapidly move weather data around the system. Implementation of the automation of field operations and services will begin in 1978 and should be completed by 1981.

FAA is committed to providing automation to its flight service system. FAA maintains about 292 manned flight service stations within the continental United States. Functions of the stations include providing weather and aeronautical information breifings; contacts for weather and flight plan information; acquisition and distribution of weather observations, including pilot reports; and the origination and distribution of notices to airmen. The final system will most likely be a combination of several automated devices, including voice response systems and pilot self-briefing terminals.

NWS and FAA are working closely to insure interface between NWS' automation of field operations and services system and the planned FAA modernization programs.

Processing and presenting weather data

Pilots and controllers need accurate and timely information on weather which may affect the aircraft they are flying and controlling. There is essentially no capability in today's system that is pointed directly at real-time air traffic control operations. FAA pointed out that there is a need in the aviation weather program for both forecasts (future weather past 4 hours), for flight planning, and nowcasts (current weather--0 to 4 hours) for flight execution.

The air route traffic control centers are a major part of FAA's aircraft safety control system. Twenty centers operate in the contiguous United States to control and maintain separation of aircraft. The air traffic controller at his console can call up a selected number of current weather observations for airports in his sector, but has no direct access to other weather information, except that given verbally by the flow controllers and by pilots with whom he is in contact. Before assuming his control duties, the controller reviews posted weather information and consults with personnel of the previous shift. Each controller must interpret the weather data for himself and determine the significance of the situation for his control position.

Both NWS and FAA agree that there is a priority need to establish center weather facilities in each air route traffic control center. Such facilities would be staffed with meteorologists dedicated to constantly monitoring the weather situation throughout the center's area of responsibility and using this information to advise controllers of current weather.

The weather facilities would:

--Brief controllers on expected weather before their starting shift and keep them advised of significant weather at all times, emphasizing potentially hazardous conditions.

--Ensure efficient collection and distribution of pilot reports from aircraft within the air route traffic control center and solicit pilot reports from areas with potentially hazardous conditions.

--Advise approach controllers and nearby flight service stations of impending significant weather changes, particularly potentially hazardous weather conditions.

--Coordinate with appropriate weather service forecast offices to ensure aviation forecasts are current and accurate, and pass hazardous weather information to the responsible forecast offices on a priority basis.

--Prepare short-term aviation forecasts (nowcasts).

--Conduct weather training sessions for controllers.

Such center weather facilities have been successfully tested at the New York and Kansas City Air Route Traffic Control Centers. The tests verified the value of and need to extend this service to other centers. Tests show that the critical factor is to have the meteorologist onsite with adequate information to provide real-time advice to controllers and pilots that will contribute to their making the right decisions in critical weather situations.

NWS officials informed us that ideally the program should include 7 meteorologists, providing service 24 hours per day, in each of the 20 air route traffic control centers, or a staff totaling 140. However, FAA and NWS agree that as a start such center weather facilities should be established in 16 air route traffic control centers and manned by four meteorologists providing service 16 hours per day. In

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addition, such facilities would require specialized equipment, including automation of field operations and services equipment.

Costs for this initial program are estimated by NWS as follows:

	Amount (thousands)
Personnel:	
64 positions (16 GS-12's and 48 GS-11's)	$2,335
9 electronic technicians (GS-10's) plus installation costs of automated equipment	2,621
4 training positions (1 GS-12 and 3 GS-11's)	
1 headquarters official (GS-13)	156
Total 78 positions	$5,112
Equipment:	
Remote radar receiver	$1,000
Radar view displays	1,000
Satellite sectornizer readout	100
Total	$2,100

In addition, NWS said weather service forecast offices need about 22 more staffers to improve aviation weather forecasts originating there.

STATUS OF PROPOSED IMPROVEMENTS

NWS and FAA agree that there is a priority need to establish center weather facilities in each air route traffic control center. NWS informed us that ideally the meteorological staff for the centers should be supported through the Department of Commerce's budget. This has been proposed to OMB and rejected. OMB agrees the program is needed, but believes FAA can provide budget support for the staff

through reallocation of present resources. On January 27, 1978, NWS informed us that FAA had approved plans to provide budget support for NWS to put 3 meteorologists in each of 13 air route traffic control centers beginning in the spring of 1978.

MARINE WEATHER SERVICES

The basic objectives of NWS' Marine Weather Services Program are increasing the safety of life and property and improving the efficiency of operations on the high seas; along the coasts; on the Great Lakes; and on other inland waterways, such as rivers, lakes, and reservoirs.

Principal products include small craft advisories; gale, storm, and hurricane warnings; storm surge warnings; sea and swell forecasts; sea and lake ice advisories; and other advisories concerning the marine atmosphere.

Analyses and forecast guidance is provided by the National Meteorological Center to 24 weather service forecast offices which have marine and Great Lakes forecast responsibility. On the basis of the guidance materials, the forecast offices prepare marine forecasts adapted to regional needs.

Marine forecasts are generally issued twice or four times daily; special warnings and bulletins are issued whenever required. Nationally an average of 2,800 to 3,200 marine advisories and warnings are issued each month.

The marine products are disseminated by Coast Guard, Navy, and commercial radiotelegraph stations; Coast Guard and commercial high seas radiotelephone stations; and National Oceanic and Atmospheric Administration Weather Radio stations.

Budget support of the marine weather program is about $4.6 million and about 81 staff-years. Of the total, about 73 staff-years and $3 million are directed to basic analyses, forecasts, and warning services and about 8 staff-years and $1.6 million support the basic marine observations necessary to provide the forecasts.

IMPROVEMENTS PLANNED

According to the program director, plans developed by NWS point out that the Marine Weather Services Program needs strengthening in the observational network for collecting and reporting basic marine data and in the operational aspects of forecast preparation and dissemination.

APPENDIX III

Data collection and reporting

The marine weather program lacks sufficient observational data upon which to base forecasts. NWS receives surface observations from the Navy, the Coast Guard, and cooperative ships. NWS does not receive subsurface observations. Subsurface observations include parameters such as water temperatures below the surface, currents at ocean dumpsites, and bottom temperatures at fishing grounds, which users are requesting NWS to include in marine weather services.

With regard to surface observations, the program director informed us the data received along principal shipping lanes is adequate during daylight hours, but along these same lanes during darkness, the input diminishes to a few scattered reports. Regions outside the principal shipping lanes are deficient in observations at all times. Also less than half the ship-report observations ever reach the marine forecasters. Messages are not transmitted or received because of restricted radio watch hours on the ships; inability to contact the shore radio stations accepting and relaying weather observations; breakdown of, delays in, or inadequate communications between relay stations and the National Meteorological Center; and ship officers' lack of understanding of NWS' need for their observations. The lack of data is particularly critical in the heavily used nearshore zones where precise physical measurements are needed. Thus, one step needed to improve the timeliness and accuracy of marine weather is to improve both the surface and subsurface data observation networks.

Forecast preparation and dissemination

NWS plans to improve the operational aspects of the marine weather program by placing dedicated marine weather specialists in marine service centers.

Currently the program is staffed by forecasters at weather service offices who are generalists and have duties other than the marine weather forecast programs. For example, in the Cleveland Weather Service Forecast Office, the marine forecaster works a 6-day shift on marine weather and then rotates to other shifts before coming back to marine weather about once every 5-weeks. This cross-utilized person is expected to perform as a marine specialist again.

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NWS plans to establish eight marine service centers--in seven major U.S. ports and one for the Great Lakes. The centers would be staffed with marine weather specialists and would operate around the clock. In addition to improving the marine forecasts, the centers would promote user-to-forecaster interaction and feedback.

STATUS OF PROPOSED IMPROVEMENTS

NWS estimates that a total program as described above would require about 200 staff-years and cost about $10 million. Although plans for such a program have not been finalized, the program has been proposed to OMB for consideration. It has not been approved.

APPENDIX IV

FORESTRY WEATHER SERVICES

Fifty-one NWS offices provide specialized weather information for protecting and managing forest and range lands. Additionally, NWS employs 20 mobile units, one of which is air portable, in the far western United States to provide onsite support services for large wildfires.

Historically, the program has been directed to providing forecasts and advisories for suppressing wildfires on a seasonal basis. During the fire season, NWS provides:

--Routine fire weather forecasts daily or twice daily.

--Localized short-term spot forecasts.

--"Red Flag" warnings and special statements relating to hazardous fire weather conditions.

--Forecasts and briefings for large wildfires.

--Long-range forecasts and outlooks for presuppression planning.

In recent years, the forestry community's needs for weather services has expanded from a seasonal concern for wildfire suppression to an almost year-round demand for weather support for a multitude of forestry operations. Consequently, NWS also provides forecasts and advisories for prescribed burning, disease and insect control, various silvaculture operations, and smoke management.

Program officials informed us that Federal and State agencies share responsibility for protecting natural resources from fire and using controlled fires for land management. The Federal agencies include the Forest Service in the Department of Agriculture and the Bureau of Land Management, National Park Service, Bureau of Indian Affairs, and Fish and Wildlife Service in the Department of the Interior.

The State agencies responsible for protection of both State and private lands not protected by the Federal agencies are generally under the direction of the State Foresters.

The Forest Service protects about 189 million acres of National forest lands, plus about 25 million acres of private lands in or near the National forests. Department of the

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Interior agencies protect about 350 million acres, including 220 million acres in Alaska. The State Foresters protect about 630 million acres of forested and watershed lands plus about 420 million acres of rural croplands, orchards, and homesteads. All agencies participate in maintaining a network of fire weather data collection stations to augment basic NWS weather data systems and also take weather observations at the site of weather sensitive forestry and land management operations.

The Forest Service, the Bureau of Land Management and NWS cooperated in developing a Federal Plan for a National [Forestry] Fire-Weather Service, published in 1967. Because the plan is outdated, the agencies began in 1974 to prepare a new plan. As of 1977, the new plan had not been approved by the agencies.

IMPROVEMENTS PLANNED

NWS' Forestry Weather Services Program is not providing adequate meteorological support to forestry agencies. Although forestry requirements for weather services have increased, the program has actually decreased during the last 10 years. During fiscal year 1967 the program was supported by 103 positions and about $1.3 million. During fiscal year 1977, budget support was 71 positions and about $1.9 million. The decrease in support has affected the ability of NWS to provide necessary services. In a 1976 letter to the Director, NWS, the Deputy Chief, Forest Service, stated:

> "The 50 State Foresters are responsible for protecting 700 million acres of State and private land from fire, and have developed excellent fire fighting forces. Their effectiveness, however, requires accurate forecasting of key weather variables. This has been provided in the past by a very able group of NWS fire weather forecasters. Developments in recent years indicate that the timeliness and quality of this service is in jeopardy."

During 1977 the president of the National Association of State Foresters echoed similar concerns. In a letter to the Director, NWS, he stated:

> "We are aware of the increasing demands made on you for weather service, and the budgeting

constraints within which you must operate. However, the weather's role in the protection of the nation's forests is so vital that we must take this opportunity to urge you to raise the level of support you are giving to forest meteorology."

As part of the effort to revise the Federal Plan for a National [Forestry] Fire-Weather Service, Federal forestry agencies have identified about 100 offices needing specialized forestry weather support. These agencies have identified general needs for forestry weather services, including:

--Climatic analysis of events that lead to broad-scale fire situation problems for use by fire managers in preseason and long-range (30- to 60-day) planning of the fire organizations.

--Routine 24- to 72-hour fire weather forecasts for immediate adjustment and deployment of fire suppression forces to areas of highest probable fire danger.

--Routine 12- to 24-hour forecasts for fire suppression force callup, standby, and other operations.

--Rapid response localized fire weather forecasts (spot forecasts) near the times of fire detection and approximating the scale of the particular geographic area of the fire.

--Regular input to fire behavior forecasts for major fires in the form of localized 12- to 24-hour forecasts with updates provided as needed.

--A severe storm-warning system to alert user agencies of the probability of dry lighting and severe winds and other severe fire weather conditions.

--A system to alert the public of developing fires.

--Centralized computer analyses of the fire weather and fuel parameters.

--Integrated communications networks to all NWS fire weather forecasters and user groups.

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--Research and technology for extreme fire behavior conditions.

Additionally, officials of the Bureau of Land Management and Forest Service stated that the meteorological support should be provided by staff dedicated to the Forestry Weather Services Program. Currently the program is staffed by forecasters who are generalists and have forecast duties in addition to those under the Forestry Weather Services Program.

NWS estimates that program increases needed to provide improved services to agencies include:

--An additional 25 forecast positions for weather service forecast offices.

--An additional eight positions to expand the program to a number of Environmental Studies Service Centers, which will provide a greater range of weather services over a multistate area.

--Two technique development positions to provide continuing modernization of special forecast techniques.

--A full-time manager in NWS headquarters to support field services.

--Resources and an instructor to prepare and present a course in forestry/fire weather.

--Improved communications between NWS offices and forestry operations sites, including satellite communications, and 14 air portable mobile field communication units and 6 air portable base station communication units.

STATUS OF PROPOSED IMPROVEMENTS

NWS intends to submit requests to OMB for increased support when a new plan for the forestry weather program is completed.

APPENDIX V

AIR QUALITY WEATHER SERVICES

NWS' air quality weather products are aimed at serving the meteorological needs of the various State and local air pollution control agencies. Products furnished vary in form and complexity but can be generalized as:

--Observation data.

--Daily dispersion outlooks.

--Air stagnation advisories and special dispersion statements.

--Air stagnation discussions and narratives.

--Assistance to control agencies in selecting control.

--Agriculture and forestry smoke control support in the Far West.

In the mid 1960s air pollution weather efforts consisted mainly of local efforts in cities, such as Los Angeles and New York, plus a limited nationwide project that issued large-area short-range advisories. As national concern rose the program expanded. The Clean Air Act, as amended, charged the National Oceanic and Atmospheric Administration with providing meteorological support to efforts to clean the Nation's air. At the height of the program in 1972, NWS provided the following services:

--A dedicated section at the National Meteorological Center provided large-scale national guidance.

--Environmental meteorological support units provided support to 18 large cities. Each unit was staffed by a meteorologist and several technicians. The unit sampled the lower atmosphere by means of low-level soundings from several locations in a metropolitan area and provided air stagnation and dispersion information to local control agencies and the public.

--Smoke management support to areas of the Far West.

Since 1973 budgetary actions have resulted in a reduced NWS air pollution program. The following table shows actual funding for the program in fiscal yeaars 1972 and 1977.

FY	Positions	Amount (millions)
1972	68	1.5
1977	51	1.4

All the environmental meteorological support units have been eliminated. Air pollution weather support is now the responsibility of 55 NWS offices. Dedicated budgeted air pollution weather support has been reduced to 7 low-level sounding sites and air pollution meteorologist focal point support at 18 stations nationwide.

Although 51 positions are allocated to this program, 51 staff-years of effort are not provided, due to cross-utilization of staff.

IMPROVEMENTS PLANNED

Pollution abatement measures and favorable weather conditions have drastically reduced the number of air pollution episodes that caused public concern in the 1960s. However, a change in the beneficial nonstagnant weather patterns of recent years and an increase in emitted pollutants which may result from a return to the use of coal could easily return the Nation to frequent and serious air pollution problems. Under these circumstances effective air pollution control strategies would depend heavily upon strong meteorological support.

The Environmental Protection Agency has noted a decline in air quality services provided by NWS. The decline is attributed by the Environmental Protection Agency to the lack of personnel dedicated to the program.

NWS estimates that to improve the program increases are needed in staff, equipment, training, and communications. Needs include:

--Additional air pollution focal points at five air pollution prone areas without dedicated support--Cleveland, Boston, Detroit, Atlanta, and Houston.

--Remote sensing equipment to replace equipment at 7 low-level sounding sites and to install equipment at 13 air pollution prone areas without low-level sounding service.

--Training support.

--Support to improve communications between NWS and local air pollution control agencies in areas susceptible to air pollution.

STATUS OF PROPOSED IMPROVEMENTS

NWS intends to submit requests to OMB for increased support when plans to improve the Air Quality Weather Program are completed.

APPENDIX VI

OTHER SPECIALIZED WEATHER SERVICES

NWS provides certain specialized weather services on a reimbursable basis for the National Aeronautics and Space Administration and the Department of Energy. Although NWS has provided specialized weather services on a reimbursable basis to support certain Department of Defense civil works and research and development projects, NWS is currently doing no reimbursable work for the Department of Defense. The National Aeronautics and Space Administration and Department of Energy services are briefly described below.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

This agency relies heavily on NWS to provide forecasting and staff support for its space operations. Support is provided at the Johnson, Kennedy, and Goddard Space Flight Centers; the Wallops Flight Center; and the Jet Proplusion Laboratory, as follows:

	Staff-years	Funding (thousands)
Johnson Space Center	5.5	$ 254.0
Kennedy Space Center	3.0	163.0
Goddard Space Flight Center	2.0	99.5
Wallops Flight Center	16.0	665.0
Jet Proplusion Laboratory	1.0	40.0
Total	27.5	$1,221.5

In addition, the National Aeronautics and Space Administration gets weather support for its space and missile activities at the Eastern Test Range from the Air Force's Air Weather Service. The Air Force also provides certain support for the National Aeronautics and Space Administration's unmanned launches at the Kennedy Space Center.

DEPARTMENT OF ENERGY

NWS provides specialized weather services in support of the Department's programs to evaluate the safety aspects of transport and storage of nuclear power systems used on space missions and to provide radiation exposure dose prediction capabilities in support of nuclear test activities. The reimbursable support to the Department for its nuclear

testing activities is provided from Las Vegas. The program includes 41 staff-years of effort at a cost of $1,523,000. In addition, Department officials informed us that NWS has cooperated on numerous occasions in providing special weather forecasts in support of Department field experiments, the most recent being a pollutant transport and fate study in Indiana in October 1977. It has also worked closely with the Department in establishing isolation and wind measurement sites across the country in support of solar and windpower research and development.

POTENTIAL NEW PROGRAM NEEDS AND PROBLEMS

While funds to support these specialized weather services are budgeted by the National Aeronautics and Space Administration and the Department of Energy, positions and ceiling points are budgeted by NWS. This may pose problems particularly where additional staff will be needed to support new programs, such as the National Aeronautics and Space Administration's Space Shuttle Programs. NWS informed us that if current employment ceilings remain fixed over the next several years, there is a real possibility it will not be able to provide the additional staff needed.

Because of employment ceilings NWS asked National Aeronautics and Space Administration officials, in the fall of 1977, if it might be feasible for them to contract with the private sector for weather support to the Wallops program. The National Aeronautics and Space Administration replied that it felt the current arrangement with NWS is the most cost effective and urged NWS to continue providing the support. In its reply the National Aeronautics and Space Administration said:

> "The National Weather Service (NWS) has provided meteorological services for Wallops Flight Center (WFC) activities since 1960. These services are required for almost all WFC activities and are very vital to the mission of WFC. The nature of the tasks to be performed, the working environment between WFC and NWS personnel, and the quality of the service provided by the NWS have contributed to a mutually beneficial and productive working arrangement."

Thus NWS is continuing to supply weather support services to the Wallops Center.

Department of Energy officials also said there are areas where future close cooperation between the Department and NWS will be extremely useful. This could take the form of specialized forecasts of meteorological variables which would have strong impacts on fuel use strategies.

STATUS OF PROPOSED IMPROVEMENTS

Although the need for NWS' specialized weather support to the National Aeronautics and Space Adminstration and the Department of Energy is expected to increase, it is too early to define such anticipated increases. Therefore, no requests have been made to OMB to obtain additional resources.

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