

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION



**BUDGET
ESTIMATES**

FISCAL YEAR 2006

CONGRESSIONAL SUBMISSION

PRIVILEGED

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**NATIONAL WEATHER SERVICE
OPERATIONS RESEARCH AND FACILITIES
FY 2006 OVERVIEW**

SUMMARIZED FINANCIAL DATA

(\$ in thousands)

Operations Research and Facilities	FY 2004 ACTUALS	FY 2005 CURRENTLY AVAILABLE	FY 2006 BASE PROGRAM	FY 2006 ESTIMATE	INCREASE / DECREASE
Operations and Research	631,504	617,189	634,277	652,287	18,010
Systems Operation & Maintenance (O&M)	91,922	86,737	89,607	92,543	2,936
TOTAL	723,426	703,926	723,884	744,830	20,946
FTE	4,649	4,600	4,597	4,597	0

For FY 2006, NOAA requests total of \$744,830,000 for the National Weather Service Operations, Research and Facilities (ORF), a net increase of \$20,946,000.

Our Mission

The National Weather Service (NWS) provides weather, water, and climate forecasts and warnings for the United States, its territories, adjacent waters, and ocean areas for the protection of life and property and the enhancement of the national economy. NWS data and products form a national information database and infrastructure, which can be used by other governmental agencies, the private sector, the public, and the global community.

Our Vision

NWS is a world-class team of professionals who are working together to provide the best weather, water, and climate information in the world by:

- Producing and delivering information you can trust when you need it
- Incorporating proven advances in science and technology
- Measuring, reporting, and evaluating our performance
- Reducing weather- and water-related fatalities
- Working with others to make the weather, water, and climate enterprise more effective

Our Goals

NWS supports several mission goals in the NOAA strategic plan. These include:

Mission Goal: Understand Climate Variability and Change to Enhance Society's Ability to Plan and Respond

Intraseasonal to interannual climate forecasts will become more accurate and more detailed. Increasing climate expertise at local NWS forecast offices will enhance regional specificity of climate forecasts for local customers and partners. NWS will take advantage of technological advances in climate modeling and will transition the results of research on climate variability into routine operations. Forecasts will describe their inherent uncertainty more carefully, and will be more closely coupled to effects on society and the economy; aiding, for example, emergency managers, farmers, and energy providers with resource allocation decisions. NWS will continue to expand the coverage and capabilities of the Advanced Hydrologic Prediction Service (AHPS) to translate improved climate predictions into effects on the Nation's fresh water system, hydroelectric power, and flood controls.

NWS recognizes its responsibility to future users of our climatological and oceanographic data we collect. NWS recognizes the importance of gathering quality observations to produce a climate record, and will ensure that climate needs are incorporated into weather and ocean observing systems whenever possible. NWS will invest resources to modernize the Cooperative Observer Program. NWS will do its part to ensure that NOAA customers and partners receive an integrated service that meets their need for information across all time and space scales – whether the information is produced by NWS or another NOAA organization, and whether the initial point of contact is an NWS office or some other NOAA organization.

Goals of NWS Climate activities

- Increased use and effectiveness of climate observations to improve long-range climate, weather, and water predictions.
- Increased use and effectiveness of climate information for decision makers and managers (e.g., for industry, natural resource and water managers, community planners, and public health professionals).
- Increased use of the knowledge of how climate variability and change affect commerce.

Mission Goal: Serve Society's Needs for Weather and Water Information

More and more sectors of the economy recognize the impacts of weather and water on their businesses, and are becoming more sophisticated at using weather and water information to improve performance. Concern for public safety drives NWS to improve the timeliness and accuracy of warnings for all weather-related hazards. To do so, NWS weather and water predictions need to be at the limits of what science, technology, and a highly trained workforce can provide. NWS is committed to expand these limits by enhancing observing capabilities and by improving data assimilation to use effectively all the relevant data NWS and others collect; by improving collaboration with the research community through creative approaches such as community modeling; by rapidly transforming scientific advances in modeling into improved operational products; by improving the techniques used by our expert forecasters; by making NWS information available quickly, efficiently, and in a useful form (e.g., the National Digital Forecast Database); by including information on forecast uncertainty to help customers make fully informed decisions; by taking advantage of emerging technologies to disseminate this information; and by maintaining an up-to-date technology base and a workforce trained to use all of these tools to maximum effect. However, the entire weather and water enterprise is larger than NWS – today and tomorrow the NWS depends on partners in the private, academic, and public sectors (starting with other line

offices within NOAA) to acquire data, conduct research, provide education and training, help disseminate critical environmental information, and provide advice to make best use of NWS information. NWS will work even more closely with existing partners, and will develop new partnerships to achieve greater public and industry satisfaction with our weather and water information and to honor our commitment to excellent customer service.

Goals of NWS Weather and Water activities

- Increased accuracy and amount of lead time for severe weather (by category of storm type, e.g. hurricanes)
- Save lives and property through more accurate and timely severe weather prediction
- Increased satisfaction with and benefits from NOAA information and warning services, as determined by surveys and analysis of emergency managers, first responders, natural resource and water managers, public health professionals, industry, government and the public.
- Increased number of observations obtained and used from partners, both international and domestic.
- Increased number of observations archived, available, and accessible.
- Increased number of new multi-use observing systems deployed.
- Improved effectiveness of NOAA's observing systems.
- Increased number of forecasters trained in the newest techniques.
- Increased volume of forecast and warning information formatted to clarify the uncertainty of an event (e.g., space weather, air quality, water and weather forecasts).
- Improved performance of NOAA's weather and water, air quality, and space weather prediction suite.
- Increased number of favorable scores on public surveys of citizen knowledge about appropriate actions under hazardous weather and water related conditions.
- Increased percentage of the public reporting timely receipt of warnings as measured by public surveys.
- Increased number of communities with plans in place to act on weather warnings and to reduce the impacts of coastal hazards.
- Increased community knowledge of, use of, and satisfaction with NOAA information that supports local air quality monitoring and forecast programs.
- Increased assistance to international partners to improve response capabilities to weather and water predictions.

Mission Goal: Support the Nation's Commerce with Information for Safe, Efficient, and Environmentally Sound Transportation

NWS services are critical to the safe and efficient transportation of people and goods by sea, air and over land. The approximately \$825B per year transportation and public utility sector is almost entirely weather and climate dependent. NWS will work to provide aviation forecast improvements to help mitigate air traffic delays and reduce weather-related aviation accidents; improve snow precipitation and water forecasting, which affects surface transportation; and improve ocean and wind forecasting, which affects sea-borne transport from the high seas to our coasts and in the Great Lakes. NWS is committed to working with our partners to continue to improve weather information services in support of all modes of transportation.

Goals of NWS Commerce and Transportation activities

- Increased safety and productivity of transportation systems.
- Increased reliability, frequency, and use of marine, aviation, and surface transportation-related observations.
- Increased accuracy and use of weather and marine forecasts to increase efficiency of all land, water and air transportation systems.

Finally, the NWS supports the NOAA Mission Support Goal to Provide Critical Support for NOAA’s Mission.

Significant Adjustments-to-Base (ATBs): NOAA requests an increase of \$33,433,000 and 0 FTE to fund adjustments to base for NWS operations. The increase will fund the estimated FY 2006 Federal pay raise of 2.3 percent and annualize the FY 2005 pay raise of 3.5 percent. The increase will also provide inflationary increases for non-labor activities, including service contracts, utilities, field office lease payments, and rent charges from the General Service Administration. Finally, it will restore rescissions taken in the FY 2005 Appropriation.

Included in the above amounts are the following transfers between line offices for a net change to NOAA of zero.

From Office	Line	To Office	Line	Amount
OAR	Climate Change Research Initiative	NWS	Local Warnings and Forecast Base	+3,200,000
NWS	Product Development, Readiness & Application	OMAO	NOAA Corps	- \$20,000
NWS	Local Warnings and Forecasts Base	Under Secretary and Associate Offices	General Counsel	-3 FTE and - \$37,000
PS	Facilities	NWS	WFO Maintenance	+7,390,000

NOAA requests an increase of \$3,200,000 to reflect the transfer of the TAO-Array from NOAA Research to the National Weather Service. Thus buoy array, located in the Pacific Ocean, provides real-time in-situ data from the tropical Pacific Ocean for monitoring, prediction, and improved understanding of El Niño. Having demonstrated its viability as a research activity, NOAA seeks to transfer the array into operations. NWS is best position to operate and maintain the array.

The \$20,000 transferred to OMAO partially funds a NOAA Corps Officer position that benefits NWS. The General Counsel FTEs are being realigned to reflect funding of these FTE through the Office of General Council within Program Support.

Finally, the \$7,390,000 transferred from Program Support restores funding for WFO Maintenance to the line in which it has been historically funded. These funds were appropriated in Program Support in FY 2005

Subactivity: Operations and Research
Line Item: Local Warnings and Forecasts

GOAL STATEMENT:

See the Overview for the National Weather Service Operations, Research, and Facilities for a discussion of our goals.

BASE DESCRIPTION:

NOAA provides around-the-clock weather and flood warning and forecast services to the general public to protect life and property, and to meet the forecasting needs of all segments of the economy. Weather services are provided primarily by a national network of 122 Weather Forecast Offices (WFOs) and 13 River Forecast Centers (RFCs), assisted by 13 Data Collection Offices (DCOs). The provision of services by the National Weather Service (NWS), described in the following pages, depends on the coordination, management, and centrally-funded support provided by NWS' national and regional headquarters. This infrastructure includes such diverse functions as the maintaining and coordinating of the NOAA Weather Radio Network, the logistics of spare parts for all NWS observing systems, testing and evaluation of new observing sensors and systems, and coordinating and funding centralized employee training. Management and support for the NWS is provided by a national headquarters, four regional headquarters offices within the continental United States, plus regional offices for Alaska and the Pacific region, the National Data Buoy Center in Bay St. Louis, MS, and the National Logistics Support Center and National Training Centers, both located in Kansas City, MO.

Weather warnings and forecasts: NWS forecasters issue local warnings of severe weather such as tornadoes, severe thunderstorms, flash floods, and extreme winter weather At 122 WFOs nationwide. WFOs prepare forecasts for zones, which are comprised of counties or portions of counties that experience similar weather. Each WFO has forecast responsibility for multiple zones. WFOs also provide the main field forecast support for the marine and aviation programs as well as guidance for the fire weather program supporting federal lands management and wildfire control.

Each county in the United States is assigned to a specific WFO for warning purposes. The WFO issues and distributes local warnings of severe weather for its assigned counties. WFOs are the recognized weather, water, and climate experts for their local areas and issue severe weather and flash flood warnings. In preparing local warnings and forecasts, WFOs use forecast guidance prepared by the National Centers for Environmental Protection (NCEP).

Beginning in FY 2004, NOAA entered the digital forecast arena. This significant step takes NOAA from a product-centered organization to a true environmental information agency. The initial digital capability includes a national digital forecast database that aggregates digital forecasts of maximum and minimum temperatures, sky cover, probability of precipitation, wind speed and direction, and significant wave height across the conterminous United States. The database allows private sector weather providers and weather-sensitive businesses to take the data and create products and services useful to themselves and their customers. In FY 2005 the following forecast elements will become operational in the database: maximum temperature, minimum

temperature, and probability of precipitation (12 hour), temperature, dew point, and weather forecast. In FY 2006, the database will be expanded to include observations. By FY 2008 and beyond the goal is to provide a true four-dimensional database including probabilistic forecast uncertainty information.

NWS' Office of Science & Technology (OST) develops techniques for predicting mesoscale phenomena (e.g., heavy precipitation, tornadoes, and severe thunderstorms). These techniques are being developed and improved to use digital data from observing systems, such as NEXRAD (Next Generation Weather Radar), and GOES 10-12 (latest geostationary satellites). OST develops models to improve hurricane tracking, hurricane probability estimates, and analyses; and storm surge models to assist in developing hurricane evacuation plans for coastal basins. Through activities, OST works to best exploit and improve the capability of weather data observing and processing systems to meet hydrologic, meteorological, and service requirements.

Aviation weather services: NWS provides a broad range of services in support of the aviation community. WFOs prepare site-specific airport terminal forecasts four times per day with amendments as needed for over 500 public use airports in the 50 states and the Caribbean. These offices also produce about 300 individual route-oriented forecasts three times per day for the 48 contiguous states. WFOs also take observations to meet local aviation requirements. The NWS is currently undertaking a seven year initiative to improve its aviation weather services. During FY 2003, the NWS began issuing new turbulence & icing forecast products, acquisition of aircraft-based water vapor sensors and use of operational satellite products for low cloud detection and volcanic ash. In FY 2004, the NWS began issuing a National Convective Weather Forecast product that indicates the onset of thunderstorms and a National Ceiling and Visibility Forecast to aid general aviation pilots. In FY 2005, the NWS expects to see continued improvement of aviation forecasts through the implementation of an improved observational sensing strategy, higher resolution forecast models, and improved guidance tools integrated into the standard NWS forecast production system. NWS will improve the Advanced Weather Interactive Processing System (AWIPS) and the Aviation Forecast Preparatory System to enable our meteorologists to focus on the site-specific airport terminal forecasts. NWS will generate a new automated National Convective Weather Forecast product indicating the onset of thunderstorms out to two hours as well as new automated products for icing, turbulence and low ceiling and visibility. In FY 2006, NWS will improve its aviation weather forecast services through increasing the number and quality of aviation weather observations; transitioning research efforts to operational products; and developing and implementing new training programs for forecasters, pilots, and controllers.

Marine weather services: Using weather analysis and forecast guidance provided by the National Centers for Environmental Prediction (NCEP), marine weather forecasters at coastal and Great Lakes WFOs issue wind, wave, weather, and ice warnings, forecasts, and other information for the population living and working along the sea coast, off-shore, on the Great Lakes and the high seas. Principal products include small craft advisories, gale, storm, tropical cyclone, and storm surge warnings; coastal, off-shore, and high seas forecasts; sea and swell forecasts; sea and lake advisories; and special weather forecasts to aid in the containment and cleanup of oil spills and other hazardous substances in the marine environment.

Fire weather services: In FY 2006, the NWS will develop advanced forecasting techniques that will both enable land management agencies to better determine where fire danger risks exist, and will serve as input to fire behavior models. The NWS will develop ensemble forecasting techniques to produce probabilistic one-to-seven-day forecasts for fire managers so that they can optimally position their assets; develop gridded fire weather element forecasts

that will provide more accurate fire danger assessments and extend the fire danger forecasts out to a week; develop a software application to produce site-specific fire weather forecasts; and develop a software application for an Incident Meteorologist to use on site. This application will supply high resolution fire weather forecast elements to land management agencies' fire behavior models.

Tsunami warnings: Tsunami watches and warnings for Pacific Ocean areas and Alaska are prepared and issued by the Richard H. Hagenmeyer Pacific Tsunami Warning Center at Ewa Beach, Hawaii, and the West Coast/Alaska Tsunami Warning Center at Palmer, Alaska. NWS collects and analyzes observational data from an international network of seismological observatories and sea level observing stations that operate on a cooperative basis. The centers use these data to prepare watches and warnings covering all U.S. territories and states bordering on the Pacific Ocean and disseminate them to WFOs, Federal and state disaster agencies, military organizations, private broadcast media, and other facilities that can furnish warning information to the public. In FY 2004, NWS assumed operational responsibility for the National Tsunami Hazard Mitigation Program. The goal of this program is to ensure adequate advance warning of tsunamis along the US west coast and appropriate community emergency response to a tsunami event. It consists of buoy and seismic detection stations, inundation modeling and mapping efforts, hazard mitigation programs, state and local tsunami response coordination efforts, and community education and outreach.

River & flood forecasts and guidance: NWS provides river flow and flood forecast services using prediction models and databases. Hydrologists and hydrometeorologists develop this forecast information at 13 RFCs; and this information is the basis for flash-flood and flood-warning programs implemented at WFOs. These services support emergency management and water resources activities. NWS is improving these services by implementing the Advanced Hydrologic Prediction Service (AHPS). AHPS applies new science, providing more accurate forecasts for flow conditions ranging from droughts to floods. AHPS provides more information in a timely and user-friendly manner, which can be posted on the web. AHPS extends existing one-to three-day river forecasts to 14-day and longer outlooks, provides greater information than prior systems and maximizes the NOAA resources to deliver more accurate and comprehensive predictions of river height and flood potential. By the end of FY 2005 AHPS will be deployed at 1,376 forecast points in the Midwest, Northeast, Middle Atlantic, Southeast, South, West and Alaska. In FY 2006, the NWS plans, within current funding levels, to continue nationwide implementation of AHPS, with deployment at an additional 308 forecast points in these areas. The FY 2006 budget also supports extramural partnerships to carry out operationally-oriented hydrologic research, deployment of new flash-flood forecasting tools, and introduction of more effective river forecasting models.

The Office of Climate, Weather, & Water Services (OCWWS) provides several centralized guidance and operational support functions to the RFCs. In addition, OCWWS provides hotline support to field users, and provides a focal point for assembling and disseminating real-time hydrologic information.

The Office of Hydrologic Development (OHD) manages the application of hydrological forecasting techniques and provides hydrologic model development for field operations. OHD also develops improved hydrologic and hydrometeorological models and procedures in support of the national flood and water resources forecasting programs including: specialized flood and flash flood forecasting procedures using linked hydrological, meteorological, and climatological models/products; improvements to the Ensemble Streamflow Prediction model and its complementary models in the NWS River Forecast System; algorithms to combine NEXRAD precipitation estimates with data from satellites and other ground based observation

systems; development of remotely-sensed (airborne and satellite) snow-water equivalent and snow cover data products in near real-time; and integration of hydrologic conditions and forecasts.

Forecast coordination: At each WFO, a Warning and Coordination Meteorologist (WCM) is responsible for the coordination of local forecast and warning information with local emergency management and other state and local officials, both leading up to and during severe weather events. This ensures the most effective dissemination of NWS forecasts and warnings, and adequate public response to weather warnings. The WCMs serve as NOAA's service representatives and work with local partners to ensure they know how best to use NOAA services, and to assess requirements for improved services.

Dissemination/communication: In order to disseminate data, forecasts, watches, and warnings, NWS relies on the following systems: NOAA Weather Wire Service, NOAA Weather Radio network, central radar data collection and distribution, Emergency Management Weather Information Network, NOAA/GOES communications, and Family of Services. The AWIPS Local Data Access and Dissemination (LDAD) capability allows two-way information exchange between WFOs and local users including emergency management leading up to and during severe weather events.

Space Weather: The Space Environment Center (SEC) in Boulder, CO, provides real-time monitoring and forecasting of solar and geophysical events, conducts research in solar-terrestrial physics, and develops techniques for forecasting solar and geophysical disturbances. SEC provides services to a broad user community of government agencies, industries, public institutions, and private individuals involved in satellite operation, space exploration, radio navigation, high-altitude polar flights, high-frequency communications, remote intelligence gathering, long-line power and data transmissions, and geophysical exploration. SEC serves many government, industry and private-sector clients, and such end-product users as the power industry the airline industry, satellite operators, and the National Aeronautics and Space Administration (NASA). SEC's research scientists study the sun's electromagnetic, particle, and plasma emissions and the processes by which they affect the near-Earth space environment. SEC takes a leading role in advocating and specifying new space-environment sensors for operational use. The SEC, with the U.S. Air Force, jointly operates the national civilian space weather operations center. Forecasts, alerts, and warnings are provided to customers interested in the environment on a 24 hour-per-day, seven day a week basis. SEC products are synthesized from over 1,400 data streams providing observations of the solar terrestrial environment, including x-ray flux, charged particles, and magnetic field changes on the sun, in interplanetary space, and at Earth.

U. S. Weather Research Program (USWRP): The goal of the USWRP is to accelerate improvement in NWS' forecasting capability for high-impact and routinely disruptive weather. The goal of this program is to improve forecasts of timing, location, and specific rainfall amounts associated with hurricane landfall and flood events that significantly affect the lives and property of U.S. population. NOAA's investment in the USWRP continues the cooperative effort among OAR, NWS, and NESDIS within NOAA, seven other USWRP agencies (The National Science Foundation (NSF), NASA, the Department of Defense, Department of Transportation (DOT), Department of Energy, Department of Agriculture (USDA), and the Environmental Protection Agency), and the university community. The USWRP conducts research and development on experimental numerical model algorithms, provides field observational support, and strives for information and technology transfer to operations and services within the USWRP agencies, in order to reach performance goals defined for the following high priority areas:

Hurricanes at Landfall: USWRP focuses on predicting hurricane track five days in advance, improving forecasts of where a hurricane will make landfall, improving forecasts of hurricane intensity at landfall, improving surface wind forecasts, and providing more precise quantitative rainfall forecasts where it could lead to inland flooding.

Optimal Mix of Observations/Quantitative Precipitation Forecasts (QPF): This effort seeks used data from advanced observing systems to improve weather prediction.

The Hemispheric Observing System Research and Predictability Experiment (THORPEX): NOAA partners with the NASA, the U.S. Navy and the NSF, as well as Canada, China, France, Germany, India, Japan, Korea, United Kingdom, the Russian Federation, and Australia in THORPEX. The goal of this program is to double the rate of improvement in 1-14 day forecasts seen over the past 20 years and to make 10-14 day forecasts as accurate as current 7-10 day forecasts.

NOAA Profiler Network (NPN): The NPN was established as a demonstration network in 1992 containing 35 stations within the Central U.S., Alaska, and New York. The NPN provides high quality wind profiles at 72 vertical levels through 53,000 feet above ground level and low level temperature profiles every 6 minutes. Wind measurements from the demonstration NPN have improved the skill and accuracy of NOAA's weather forecasts and warnings in network areas. In FY 2004, Congress directed NOAA to perform a Cost and Operational Effectiveness Analysis (COEA) for the NPN which indicated the NPN is the best alternative with respect to cost and performance for obtaining wind measurements. Based on these findings, the NPN will become an operational U.S. network in FY 2005 and part of the upper air observing system. In FY 2006, NOAA will continue to maintain and operate the current network of wind profilers. Specifically, the NPN wind data will support severe thunderstorm prediction, aviation safety, fire weather prediction, and severe weather prediction. NPN provides forecasters with improved situational awareness for improved forecasts and warning with high resolution and frequency wind data.

Air Quality Forecasts: In FY 2004, NOAA began operational production of air quality forecast guidance with the implementation of NOAA's Air Quality Forecast capability. The initial operating capability provides next-day ground-level ozone predictions, at hourly intervals and 12km grid resolution, for the northeastern US. Mid-term actions will expand the capability for ozone forecasts by FY 2007 in the continental U.S. (CONUS), and a long-term target for an initial particulate matter (PM) forecast capability by FY 2011. The new operational guidance provides state-of-the-science information to assist state and local air quality forecasters who issue health-based air quality alerts for designated cities, and will provide air quality information for people at risk across the entire nation. An integrated forecast system has been built to provide timely, reliable forecast guidance to accurately predict the onset, severity and duration of poor air quality. Real-time air chemistry observations will be incorporated into forecast models as needed, following evaluation of initial operational capabilities. Forecast products are available via the NWS Telecommunications Gateway, and NOAA's partner agency, the Environmental Protection Agency (EPA). EPA is working with state and local public and private air quality agencies that issue air quality warnings and forecasts, providing health-based interpretations. These products meet customer requirements from federal, state and local, and public sectors.

Phased development and testing will be required to extend the initial ozone-based capability nationwide by FY 2008. This activity also supports initial development and testing to extend the operational model capability to include PM forecasts.

Base activities support the objective, “Advance understanding and predict changes in the Earth’s environment to meet America’s economic, social, and environmental needs” under the Department of Commerce Strategic Goal of “Observe, protect, and manage the Earth's resources to promote environmental needs.”

PROPOSED LEGISLATION:

None.

SUMMARIZED FINANCIAL DATA

(Dollars in thousands)

Subactivity: Operations and Research	FY 2004 ACTUALS	FY 2005 CURRENTLY AVAILABLE	FY 2006 BASE PROGRAM	FY 2006 ESTIMATE	INCREASE / DECREASE
Line Item: Local Warnings and Forecasts					
Local Warnings and Forecasts Base (C)	9,767	9,938	13,519	13,519	-
Local Warnings and Forecasts Base (CT)	9,025	9,212	9,564	9,564	-
Local Warnings and Forecasts Base (WW)	529,838	503,798	517,547	521,547	4,000
Tsunami Hazard Mitigation (moved from OAR)	-	4,239	2,291	2,291	-
Pacific Ocean Monitoring Buoy Augmentation	593	-	-	-	-
Tsunami Warning & Environmental Obs for AK (TWEAK)	1,979	1,971	-	-	-
Strengthen US Tsunami Warning Network	-	-	-	5,970	5,970
Air Quality Forecasting Pilot Program	2,968	2,925	-	-	-
Air Quality Forecasting	-	1,725	4,718	5,500	782
Alaska Data Buoys	1,484	1,478	1,500	1,700	200
HI Data Buoys	-	247	-	-	-
Sustain Cooperative Observer Network	1,870	1,774	1,800	1,890	90
High Resolution Temperature Forecasting	4,155	-	-	-	-
Hurricane Mitigation Alliance (SUSF)	3,711	3,203	-	-	-
North Dakota Ag Weather Network	267	-	-	-	-
Red River Basin Institute/Decision Info Network	-	267	-	-	-
Mt. Washington Observatory	989	-	-	-	-
New England Weather Technology Initiative	495	542	-	-	-
NOAA Profiler Network	4,107	3,155	2,900	2,900	-
NC Flood Plain Mapping Pilot	593	584	-	-	-
Pacific Island Compact	3,512	3,450	3,500	3,550	50
Phased Array Radar (PAR) Engineering/Manufacturing	20	-	-	-	-
Facilities Physical Security	248	-	-	-	-
Space Environment Center (C)	-	197	200	280	80
Space Environment Center (WW)	-	6,653	6,919	6,919	-
US Weather Research Program	-	4,436	5,052	7,457	2,405

Subactivity: Operations and Research	FY 2004 ACTUALS	FY 2005 CURRENTLY AVAILABLE	FY 2006 BASE PROGRAM	FY 2006 ESTIMATE	INCREASE / DECREASE
Vermont Northeast Weather With Data Integration	-	247	-	-	-
Payment to OMAO	495	468	-	-	-
Subtotal: Local Warnings and Forecasts	576,116	560,509	569,510	583,087	13,577
Advanced Hydrological Prediction Services	5,994	5,717	5,800	6,098	298
Aviation Weather	2,473	2,366	2,400	3,500	1,100
Subtotal: Aviation Weather	2,473	2,366	2,400	3,500	1,100
WFO Maintenance	-	-	7,390	7,390	-
Weather Radio Transmitters Base	2,295	2,287	2,320	2,320	-
NOAA Weather Radio Transmitters - HI	-	197	-	-	-
Subtotal: Weather Radio Transmitters	2,295	2,484	2,320	2,320	-
TOTAL	586,878	571,076	587,420	602,395	14,975
FTE	4,168	4,119	4,116	4,116	-

PROGRAM CHANGES FOR FY 2006:

Water Resources Initiative (+0 FTE and \$4,000,000): NOAA requests 0 FTE and \$4,000,000 to develop a nationwide water resources forecasting capability for NOAA. Through this capability, NOAA will provide America with economically valuable water and soil condition forecasts via: 1) a national digital database incorporating assimilation of all available hydrometeorological data and observations; 2) a community hydrologic prediction system (CHPS) necessary to advance water prediction science. This will allow NOAA's research and development enterprise and operational service delivery infrastructure to be integrated and leveraged with other federal water agency activities to form the basis of a national backbone water information system. The initiative provides the water modeling capability to support the U.S. Commission on Ocean Policy recommendation for a national water quality monitoring and prediction system. Furthermore, the initiative enables NOAA to deliver a national database of drought analyses and predictions, and generate user friendly GIS products for monitoring drought. The initiative will provide water users – farmers, utilities, land managers, business owners, and decision makers – the ability to assess water availability in real time and make informed decisions to mitigate impacts of extreme water events, e.g., droughts.

Statement of Need

The Hydrology Program meets the basic hydrologic service needs of NOAA's customers and partners. Several improved products are being delivered via the Advanced Hydrologic Prediction Service. However, a July 2003 Government Accountability Office (GAO) Fresh Water Supply report concluded that water managers in 36 states anticipate shortages within the next 10 years. NOAA's current understanding and ability to produce a robust suite of water resources information is limited by the state of the science, analytical tools, gaps in operational observing capabilities, and accessibility of data. Several National Research Council reports support the requirement for much higher resolution water predictions at a wide range of spatial and temporal scales. The 1996 study entitled "Assessment of Hydrologic and Hydrometeorological Operations and Services" calls for the introduction of river models that make use of high resolution precipitation data and digital elevation data to produce finer spatial resolution forecasts. A 2001 report entitled "Envisioning the Agenda for Water Resources Research in the Twenty-First Century," describes a wide variety of ways water managers will benefit from enhanced information and predictions. Agricultural examples include developing improved crop varieties for use in dry land agriculture; improving the sustainability of irrigated agriculture, including more efficient management of salt balances; and planting crops for more efficient use of water. Environmental water managers need water predictions to support the enhancement and restoration of species diversity and to modify water parameters to maintain and enhance aquatic habitats. NOAA has the opportunity to provide decision makers with critical predictions and information to mitigate the Nation's evolving water crisis.

Proposed Actions

To support local and regional water managers, forecast models will be enhanced to provide high-resolution water storage and runoff information, and data assimilation will be improved for better model initialization. Furthermore, existing hydrologic and hydrometeorological observing systems will be strengthened and expanded, and new observing systems developed. These enhancements will occur through research directed to understand the behavior of hydrologic systems and the contributing weather factors across a wide range of spatial and temporal scales. Research participants include NOAA, other government agencies, and the private sector.

Efforts include:

- Hydrometeorological data assimilation of fresh water observations and analyses, \$1,000,000 (\$700,000 non-IT grants and contracts; and \$300,000 IT contracts; 3 contractors). This effort will access and assimilate hydrometeorological data for water resource forecasting. This assimilation will occur through an increase in the amount, type and accuracy of water resource information for use within NOAA and by external customers; an integration of NOAA's fresh water resource observation and analysis components, (i.e., multi-sensor precipitation estimates, snow pack analysis, and soil moisture); and collaboration with the research community in the analysis of observational data for input to high resolution hydrologic forecast models. Data from the National Integrated Drought Information System (NIDIS) and the Cooperative Observer Modernization Program will be key components of the water resources data assimilation effort. The initiative will fully leverage existing US Geological Survey, USDA, and EPA surface and ground water monitoring networks.
- Development and application of a national high resolution hydrologic modeling program with the hydrology community, \$3,000,000 (\$1,700,000 grants and contracts; and \$1,300,000 IT contracts 20 contractors). NWS will integrate water resources research and data into operations. This investment provides the Community Hydrologic Prediction System (CHPS). CHPS allows the federal and non-federal hydrologic community to

develop a common suite of tools to make water predictions. It builds on standard software packages and protocols, and open data modeling standards. CHPS is necessary to develop and infuse new science to produce a new suite of high-resolution forecasts (including estimates of uncertainty) for streamflow, soil moisture, soil temperature, and many other variables directly related to watershed conditions, via collaboration and sharing of data and algorithms with the university and private sector research groups. In addition, CHPS will support the operational implementation of advanced water quantity and quality forecast models not currently available.

This initiative is expected to provide a return of \$12 annually for each \$1 invested due to improved decisions associated with irrigation scheduling and water supply management (National Hydrologic Warning Council, May 2002). NOAA’s National Weather Service is the only federal agency positioned to lead this activity because of its unique capabilities in data acquisition and processing, existing operational water modeling infrastructure, and robust national service delivery system to provide predictions of water resource variables for forecast periods of hours to months. This information will support the commercial development of on demand risk analysis tools for managing scarce water resources.

Performance Goals and Measurement Data

This increase will support the objective, “Advance understanding and predict changes in the Earth’s environment to meet America’s economic, social, and environmental needs” under the Department of Commerce strategic goal of “Observe, protect, and manage the Earth’s resources to promote environmental needs.” Specifically, this increase supports the Weather and Water Performance Goal and the GPRA performance measures, “Improve Lead Time (Minutes) for Flash Floods.”

Performance Goal: Weather and Water	FY 2003	FY 2006 without Increase	FY 2006 with Increase	FY 2010
Performance Measure:				
River Forecast Verification (feet, absolute mean error) - Reduce river level error to improve water stewardship	0.45	0.45	0.44	0.40
Flash Flood Lead Time (minutes) – Increase warning time of flash floods	41	48	48	50
River Flood Warning Lead Time (minutes) – Increase time to minimize river flood losses	Establish Baseline in FY 2005	TBD	TBD	TBD
Water Resource Information Coverage (%) - Increases Information to Manage Water Shortages	0	0	5	34

Air Quality Forecasting (+0FTE and \$782,000): NOAA requests 0 FTE and \$782,000 restore funding requested in FY 2005 for the Air Quality Forecasting Program. This program provides air quality forecast guidance with the implementation of NOAA's Air Quality Forecast capability. The initial operating capability provides next-day ground-level ozone predictions, at hourly intervals and 12km grid resolution, for the northeastern US. This funding, combined with funding requested as part of the US Weather Research Program and detailed below, will allow for acceleration of the implementation of those forecasts.

Air Quality Forecast Capability (US Weather Research Program) (+0 FTE and \$1,290,000): NOAA requests 0 FTE and \$1,290,000 to accelerate nationwide implementation of ozone air quality (AQ) forecasting capability from FY 2009 to FY 2008 and to deliver an initial particulate matter forecasting capability by FY 2011. NWS and OAR are working closely together to develop and deliver these new capabilities. This increase, along with \$782,000 requested in the Air Quality Forecast Program will allow the NWS to accelerate the implementation of ozone and particulate matter air quality forecasts.

Statement of Need

Almost a third of the U.S. population lives in areas where air pollution levels exceed the U.S. Environmental Protection Agency's (EPA) health-based standards. It is well known that ozone and particulate matter pollution in the air we breathe can cause respiratory problems. There is now growing evidence that particulate matter can, in addition, trigger cardiac problems—often leading to premature deaths. The personal and economic consequences to the Nation are enormous (annually, an estimated 40,000 deaths and up to \$150B in costs due to air pollution health effects). For some 300 communities across the Nation, state or local air quality forecasters issue next-day warnings, some including action programs to help limit exposure or reduce pollution (e.g., ride public transit, curtail polluting activities). Air quality forecasters currently have a very limited information basis on which to issue warnings and most interpret a worst-case pollution level for the next day based on simple methods that cannot account for the many complex atmospheric interactions that control air quality, especially for the processes responsible for changing levels of ozone and particulate matter in the air we breathe.

The public needs information on the onset, severity and duration of poor air quality episodes in forecasts of ozone, particulate matter and other pollutant forecasts with enough accuracy and advance notice to take appropriate action to limit adverse effects of poor air quality (AQ). To save lives and costs associated with illness stemming from air pollution, Congress has directed NOAA to provide air quality forecast information for the Nation, beginning with the northeastern US. To make the most effective use of NOAA and EPA capabilities in a national air quality forecast capability, NOAA's strategy involves partnerships with NOAA, EPA and state and local air quality agencies, as described in a memorandum of agreement between NOAA and EPA. NOAA, in partnership with the EPA, is therefore developing a national air quality forecast capability, with an initial operational capability of next-day ground-level ozone predictions over a domain limited to the northeast US, to be deployed in September, 2004.

The initial operational capability builds on decades of research progress by NOAA. This research provided a prototype capability ozone prediction model accounting for photochemical reactive transport in the atmosphere. In FY 2003, the program completed, within cost and schedule targets, all planned development activities for an operational capability. These included: 1) adapting and integrating air quality forecast modules into NCEP's operations for twice-daily test predictions; 2) acquiring and integrating required high performance computing center processors for AQ forecasting into NCEP's

supercomputing facility; 3) developing IT and communications infrastructures needed for transmitting NWS-EPA data and model output; and 4) conducting focus group testing and developer evaluation of ozone predictions against EPA monitoring data.

The initial capability will be extended as fast as successful testing over a broader domain and resources permit. First, the domain for ozone predictions will be extended nationwide. Then, a particulates forecast capability will be implemented, beginning with an initial capability over the northeastern US and extending nationwide. The deployment for ozone nationwide will take place in stages through FY 2009 and delivery of an initial particulate matter forecasting capability will occur by FY 2011. This lag in scheduled implementation of particulates forecasting reflects the lack of effective prediction methods for particulates, despite the critical need for particulates forecasts in order to help limit loss of life. In addition to the funding requested here, \$1.7M in funding is requested for OAR to launch advances in the science needed to create and test new technologies to extend the initial operational air quality forecast capability to particulates. OAR is working closely with NWS to develop methods for forecasting particulates, set performance goals for new operational forecast capabilities and to identify and conduct the research that is required to meet those goals.

Proposal Summary

The proposed adjustment is to accelerate deployment of the AQ forecast capability, with the following objectives:

- implement nationwide ozone forecast guidance in FY08 which is as much as 1 year ahead of the current schedule
- develop a prototype for particulates forecasting available for testing prior to scheduled FY11 implementation

The following table summarizes the requested accelerated coverage of operational ozone predictions and the implementation of particulate matter forecasts:

Forecast Capacity	FY 06	FY 07	FY 08	FY 09	FY 10	FY 11
Nationwide 24-hr ozone			From FY 2009 to FY 2008			
Initial PM Capability, for Northeast US						To FY 2011

OAR and NWS will work together closely to address these goals. OAR will conduct the research required to fill forecasting knowledge gaps and to prototype air quality modeling systems with advanced capabilities to address these goals. The highest priority will be developing a forecasting system that represents the many processes that affect particulate matter formation, transport, and fate well enough to accurately predict their concentrations but that is also simple enough to be executed in time to issue forecasts. For instance, research is required to better understand how particles grow and how to include primary particle emissions from sources like dust storms or large wildfires that can affect regions more than 1,000 miles away. To address these and other requirements, NOAA will conduct laboratory research to resolve scientific uncertainties in ozone and PM models, incorporate scientific advancements in

air quality from multiple sources into prototype models, and evaluate the prototype models with observations -- including results from separately-funded comprehensive NOAA regional air quality assessments (see related increase requests in OAR's budget)

Benefits

Impact: This funding will accelerate benefits to the public. Current scheduled deployment of air quality forecasting limits the number of people who have guidance on predicted poor air quality. Accelerating deployment of particulates predictions will provide, one year earlier than currently planned, the information needed for people to take protective actions against a significant health risk—a risk that is especially harmful for those with cardiac and respiratory disease.

Socio-Economic Benefit Analysis: Accurate air quality forecast guidance, provided in time to take action, can realize significant savings. For example, if the public has advance warning of the onset of poor air quality conditions, mitigating actions can be taken, such as not jogging or engaging in other outdoor activity. As cited above, the effect of poor air quality on the national economy is estimated at \$150 billion/year from health effects alone. If air quality forecasts can lead to a reduction in health-related costs of as little as 0.5%, that would translate into savings of about \$750M a year.

Partners: The Air Quality Forecasting Program is based on strategic alliances and collaboration to deliver an end-to-end air quality forecasting capability. Close collaboration with EPA and other agencies provides critical inputs to NOAA's air quality forecasts and insures that NOAA's efforts benefit air quality forecasting and alerts at the federal, state, and local levels.

Performance Goals and Measurement Data

This increase will support the objective, "Advance understanding and predict changes in the Earth's environment to meet America's economic, social, and environmental needs" under the Department of Commerce strategic goal of "Observe, protect, and manage the Earth's resources to promote environmental needs." Specifically, this increase supports the Weather and Water performance goal.

Performance measures, based on forecast accuracy and timeliness, are:

- Operational forecast guidance accuracy will be at least 90%, as defined by predicting exceedance of critical levels correctly 90% of days. The critical level for 1-hour average ozone concentration, reached at any time during the forecast day, based on EPA's 1-hr ozone standard is 125 parts per billion (ppb).
- Operational forecast guidance will be provided on schedule at least 95% of the time

Performance measures for accelerated deployment are shown below. Particulates forecasting is a subject of active research; accuracy targets will be developed by FY 2006, following successful laboratory demonstrations of particulates forecasting prototypes.

DOC Goal 3: Observe, protect and manage the Earth's resources to promote environmental stewardship.		
NOAA Performance Goal: Goal 3: Serve society's needs for weather and water information.		
Current: ozone forecasts operational by September, 2004 for NE US	FY06- FY10 without increase	FY06 – FY10 with increase
1-day Ozone Forecast accuracy: 90% 2-day forecasts available 1-day PM forecasts available for initial domain (NE US) Forecasts delivered on time: 95%	Nationwide by FY 09 Available in FY 12 Available in FY 12 1-day forecasts for ozone only	Nationwide by FY 08 Available in FY 09 Available in FY 11 2-day forecasts for ozone+ PM forecasts for NE+SE US

Schedule/Cost:

Develop, Test, Deploy and Operate AQ Forecasting System	FY06
Model Development	2.05
Test/Verification	1.03
Communication/Outreach/O&M	1.21
NCEP-supercomputing	1.50
Subtotal	5.79
Increased Research to Support AQ Forecasting	1.0
Total Program Cost (\$K)**	6.79

The air quality program is funded in the following lines in the NWS Budget:

Budget Line	FY06
Air Quality Forecasting	5.50
USWRP	1.29
Total Program Cost (\$K)**	6.79

** An additional 0.5M funds in OAR base support research for air quality forecasting for a total of \$7.29M.

Air Quality Forecasting: Accelerated Deployment

Develop, Test, Deploy, and Operate AQ Forecasting System	FY06	FY07	FY08	FY09	FY10
Deliverables					
Operational Products					
O3 forecast guidance provided 2X daily: valid period	24-hr	24-hr	24-hr	48-hr	48-hr
O3 forecast guidance provided 2X daily: Domain	East US	CONUS	Nation	Nation	Nation
Research Demonstrations/Prototypes					
PM Forecast Model Prototype					NE US
Technology Updates: Current AQF Capability	X	X	X	X	X

US Weather Research Program (+0 FTE and \$1,115,000): NOAA Requests 0 FTE and \$1,115,000, for a total of \$7,457,000 (including the Air Quality increase discussed above) for the U.S. Weather Research Program to accelerate improvements in global weather forecasting and accelerate hurricane and other high-impact weather research activities. This increase will restore funding to the US. Weather Research Program and THORPEX requested in FY 2005. Key activities directed to hurricane forecasting and research include development, testing, and transition to operations of the hurricane weather research and forecasting (HWRF) community model that promises to significantly improve predictions of the intensity and precipitation of hurricanes at landfall. Other activities include testing and development of promising hurricane research at the Joint Hurricane Testbed, which can be adopted to improve warnings and forecasts by operations centers and numerical assimilation of tropical cyclone data for use in numerical weather prediction models.

Performance Goals and Measurement Data

This increase will support the objective, “Advance understanding and predict changes in the Earth’s environment to meet America’s economic, social, and environmental needs” under the Department of Commerce strategic goal of “Observe, protect, and manage the Earth’s resources to promote environmental needs.” Specifically, this increase supports the Weather and Water performance goal.

Advanced Hydrological Prediction Service (+0 FTE and \$298,000): NOAA requests an increase of \$298,000 and 0 FTE for a total of \$6,098,000 for the Advanced Hydrologic Prediction Service (AHPS). AHPS is NOAA’s program to modernize the river forecasting capability and expand it to new waterways and this increase will restore funds requested in FY 2005. With full funding for FY 2006, AHPS will provide enhanced river forecasts, including web accessible displays of probabilistic information, for 308 additional locations throughout the Southeast, South, and West. AHPS priorities are to sustain current hydrological services, deliver more precise forecasts with magnitude and certainty of occurrence information, leverage collaborative research to infuse new science, and provide better water information to benefit the public and the Nation’s commerce. Through AHPS, NOAA’s National

Weather Service will deliver better forecast accuracy; more specific and timely information on fast-rising floods; new types of forecast information; longer forecast horizons; easier to use products; increased, more timely, and consistent access to products and information and expanded outreach.

Aviation Weather (+0 FTE and \$1,100,000): NOAA requests an increase of 0 FTE and \$1,100,000, for a total of \$3,500,000 to continue a 10-year plan to improve U.S. aviation safety and economic efficiencies by providing state-of-the-art weather observation and forecast products responsive to aviation user needs.

Statement of Need

Today, weather accounts for 70% of all air traffic delays within the U.S. National Airspace System (NAS). The Federal Aviation Administration (FAA) indicates these delays cost the U.S. economy \$10B/year of which an estimated \$4B is avoidable. On average, 200 general aviation pilots are killed every year in weather-related accidents across the U.S. In response to these trends and the projected growth in NAS traffic volume, a Federal Aviation Administration (FAA) joint safety implementation team (JSIT) recommended the development and delivery of pilot-friendly, real-time depictions of weather hazards; a reduction in forecast errors while increasing the precision of aviation parameters; and an improvement in weather training for controllers and pilots. FAA is modernizing and consolidating its weather program, which presently spends in excess of \$500M on aviation weather. This NWS initiative leverages successful applied research efforts conducted by NOAA, NASA and FAA to accelerate the aviation weather forecast and observation portion of the FAA modernization and leverages the NWS aviation forecast infrastructure to make new aviation products and services operational.

Proposed Actions

This initiative addresses the referenced JSIT recommendations and provides a means for NWS to improve its aviation weather forecast services through three major efforts:

- 1) Increase the number and quality of aviation weather observations
- 2) Transition successful NOAA, NASA and FAA applied research efforts to operational products
- 3) Develop and implement new training programs for forecasters, pilots, and controllers

FY 2006 Deliverables (based on total funding request of \$3.5M):

New Observations (Data) (Monitor and Observe) (\$1.41M)

Expand acquisition of Aircraft-based Water Vapor Data (\$1.0M) – Procure, install and operate 50 aircraft based water vapor data systems. Costs include procurement and installation of 50 field change kits at an average unit cost of \$20K and provides for communications of data (NWS/OAR). This capability will provide forecasters with approximately 300 additional vertical moisture soundings (approximately 18,000 discrete observations per day. Note: \$1.0M of the increase requested funds this activity (the remaining \$100K restores funding requested in FY 2005).

- *Improved volcanic ash detection satellite product* (\$80K) - Operationally used at Volcanic Ash Advisory Centers and WFOs. (NESDIS)

- *Improved low cloud detection satellite product* (\$80K) - Operationally used at WFOs, AWC, and the AAWU. (NESDIS)
- *Verification* (\$200K) - Using the expanded collection of pilot reports (PIREPS) at the AWC and Forecast Systems Lab's Real Time Verification System, increases verification ability to capture and score all centralized products produced at the AWC and the AAWU. (NWS/OAR)
- *Pilot Reports (PIREPS)* (\$50K) – Obtaining and disseminating additional general aviation pilot reports will provide forecasters with approximately 3,000 additional enroute condition observations per day. (NWS/OAR)

New & Improved Forecast Products (Assess and Predict) (\$1.74M)

- *New Graphical Area Forecast Product* (\$600K) - Transition existing text-based enroute forecasts into digital format allowing easier dissemination and display. (NWS)
- *Thunderstorm Forecast Program (THOR)* (\$200K) - Funds additional research and development of short-term (0-3 hour) thunderstorm forecast product. (NWS/OAR)
- *New & improved TAF Preparation and Forecast Tools for Forecasters* (\$940K) - Continue development and improvement of TAF monitoring system(s), improve TAF specific forecast model guidance, and develop second-generation automated TAF forecast product. (NWS/OAR)

New Aviation Training (Assess and Predict) (\$350K)

- *Forecaster Training* - Provide training to 120 NWS forecasters on operational impacts of forecast products and TAF preparation. (NWS/FAA)
- *Simulator Training* - Complete development of three aviation exercises for use on the weather event simulator for NWS forecasters. (NWS)
- *Pilot and Controllers Training* - Develop and implement new training products for pilots and controllers on the interpretation of weather products. (NWS/FAA/Aviation Associations)

Schedule:

New Observations (Data):

- Water Vapor Sensing System – Begin system installation on commercial carriers 3rd Quarter FY 2006 – End FY 2010.
- PIREPS- Begin adding 2nd Quarter of FY 2003-end FY 2009
- MDCRS- Begin sensor deployment 4th Quarter of FY 2004-FY 2009
- Satellite observations FY 2003 – FY 2009
- Automated Real-Time Verification of each new product coming on-line FY 2003-FY 2009

New and Improved Operational Products:

- Forecast turbulence potential 2nd Quarter of FY 2003-4th Quarter of FY2007
- Forecast icing potential 2nd Quarter of FY 2003-4th Quarter of FY 2007
- Oceanic convection diagnosis 2nd Quarter of FY 2004-4th Quarter of FY 2009
- Graphical area forecast 2nd Quarter of FY2006
- AWIPS Aviation Forecast Prep System 4th Quarter of FY 2003 – 4th Quarter of FY 2006

- WFO forecast tactics, techniques and procedures FY 2005-FY 2009

New Aviation Training:

- Forecasting general convection for aviation 3rd Quarter of Fy2004 – 2ndQuarter 2006
- Simulator exercises for aviation criteria FY 2003-FY 2009
- Probability forecasting of aviation criteria 2nd Quarter of FY 2005-4th Quarter of FY 2007
- Pilot seminars (over 100) on understanding weather (in partnership with Aircraft Owners and Pilot Association (AOPA) FY05-FY08

Performance Goals and Measurement Data

This increase will support the objective, “Advance understanding and predict changes in the Earth’s environment to meet America’s economic, social, and environmental needs” under the Department of Commerce Strategic Goal of “Observe, protect, and manage the Earth’s resources to promote environmental needs.” Specifically, this increase supports the commerce and transportation goal in the NOAA strategic plan. This task establishes the necessary mechanisms to translate climate information from research to operationally useful products for decision makers.

The aviation program has the FY 2012 goal of a 10% reduction in National Airspace System (NAS) weather-related air traffic delays (25% of the avoidable delay), which would save \$1B annually in potential economic losses, while also reducing general aviation weather related fatalities by 25%, or 50 lives annually. This program will leverage the results of several different aviation weather research efforts and expedite the operational delivery of new forecast products tailored for improving pilot awareness and avoidance of aviation weather hazards.

Current NWS forecast accuracy performance for the four major aviation parameters are given below and fall short (especially thunderstorms) of FAA stated needs. The goal is to increase the accuracy of NWS products sufficiently to approach FAA targets for icing, turbulence, and ceiling and visibility (an 80% probability of detection for these phenomena). It is beyond the foreseeable state of the art to reach FAA targets for thunderstorm forecasts; however this initiative’s goal is to improve current forecast performance by 60 percent (to a 40% probability of detection of thunderstorms) by FY12. First year results from this program are encouraging; FY03 showed a 5% increase in ceiling and visibility forecasting skill while reducing false alarm rates by better than 10%. Much of this improvement is attributed to the training contributed by this program. The results from the first two years of this program are encouraging with accuracy goals attained in each category (indicated in table below) except for ceiling and visibility which was 0.01 below the goal for FY04. However, ceiling and visibility forecast for false alarm rates was 0.05 better than the FY04 goal--a 13% improvement over our goal. Much of this improvement is attributed to training contributed by this program as well as the development of the Aviation Forecast Preparation System (AVNFPS) which is an application on AWIPS to improve TAF performance.

The increase will affect the Commerce and Transportation goal GPRA performance measure of “Accuracy (%) and false alarm rate (FAR) (%) of forecasts of ceiling and visibility (aviation forecasts).” Safe and efficient air transportation depends on accurate, timely, and reliable forecasts of ceiling and visibility. This increase is needed to increase the accuracy of the forecasts.

Performance Goal: Commerce & Transportation

Performance Measure	FY06 without Increase	FY06 with Increase	FY07	FY08	FY09	FY10
POD (Accuracy)						
Thunderstorms	0.25	0.26	0.28	0.31	0.33	0.35
Icing	0.63	0.68	0.69	0.70	0.71	0.72
Turbulence	0.48	0.54	0.55	0.58	0.59	0.60
Ceiling and Visibility	0.46	0.48	0.50	0.52	0.55	0.57
FAR						
Ceiling and Visibility	0.68	0.68	0.67	0.66	0.65	0.63

Strengthening the U.S. Tsunami Warning Program (+0 FTE and \$5,970,000) NOAA requests an increase of 0 FTE and \$5,970,000 to strengthen the U.S. Tsunami Warning Program (an additional \$3,530,000 is requested in the Procurement, Acquisition, & Construction account and detailed in that section of the request). Funds will be used for the operating budget to continue the Administration’s commitment to expand the U.S. tsunami detection, warning and mitigation capabilities. Lessons learned from the 2004 Indian Ocean Tsunami indicate that there are three key interlocking components of an effective Tsunami Warning/Response System: (1) Tsunami Hazard Assessment (must include comprehensive coastal US risk assessments/inundation mapping); (2) Tsunami Warning Guidance (must include 24/7 tsunami detection and warning systems and the dissemination of accurate and timely tsunami forecasts and warnings (seconds literally count)); (3) Tsunami Mitigation (including community-based emergency response plans, public education/awareness (TsunamiReady communities and inundation/evacuation mapping)).

Requested funds are required to expand the current U.S. Tsunami Warning Program by accelerating activities currently underway as part of NOAA’s National Tsunami Hazard Mitigation Program (NTHMP) -- and expanding the scope of the NTHMP from the Pacific to the Atlantic and Caribbean. Under the NTHMP, NOAA has demonstrated the effectiveness of a comprehensive, modernized, high-speed seismic detection network for the states of Alaska, Washington, Oregon, and California. Under the NTHMP, the accuracy and speed in determining the location and intensity (magnitude) of potential tsunamigenic seismic events has increased dramatically. Similarly, the development, testing and initial deployment of a limited 6-station Deep-ocean Assessment and Reporting of Tsunamis (DART) buoy array (funded via the NTHMP) has proven that tsunamis can be accurately detected and

measured literally within seconds of a seismic event. Data from DARTs will also aid Tsunami forecasters in not only reaching tsunami warning decisions, but also providing detailed tsunami forecasts (inundation locations, wave heights, number of waves).

Under the NTHMP, NOAA has also demonstrated the effectiveness of community-based tsunami hazard mitigation actions including inundation flood mapping, evacuation mapping, and community-based public education/awareness/preparedness. Under the NTHMP, NOAA, in cooperation with the affected States, local communities and FEMA, has developed and begun implementation of a community-based TsunamiReady Program.

Statement of Need

In response to the 2004 Indian Ocean Tsunami, the Administration is committed to expanding the U.S. Tsunami Warning Program to protect U.S. lives and property along all coasts (Pacific, Gulf of Mexico, Atlantic and the Caribbean). In order to mitigate a similar seismic/tsunami event in the U.S., the following actions need to be accelerated: (1) the need to quickly detect and warn the public of potentially destructive tsunamis (2) the comprehensive need for community-based inundation mapping and (3) a sustained support effort at state and local levels for long-term tsunami hazard mitigation.

Proposed Actions

In FY 2006, funding will be used to complete deployment and to support operations and maintenance of the expanded tsunami warning system proposed to be initiated in FY 2005.

Specifically, in FY 2006 NOAA will expand the operational hours of its two Tsunami Warning Centers: the Richard H. Hagenmeyer Pacific Tsunami Warning Center (PTWC), Ewa Beach, Hawaii and the West Coast/Alaska Tsunami Warning Center (WC/ATWC), Palmer, Alaska to true 24/7 operations. NOAA also will expand its International Tsunami Information Center (ITIC). The role of the ITIC is to promote tsunami awareness and mitigation actions throughout the Pacific Basin. This funding increase will expand its Pacific Basin program and extend ITIC programs into the Caribbean.

In FY 2006, NOAA will also begin expansion of its current prototype 6-DART buoy array to that of a 32-buoy operational array (29 in the Pacific Basin and 7 in the Caribbean/Atlantic). Specifically, 20 DART buoys will be deployed: 13 in the Pacific Basin and 7 in the Caribbean/Atlantic. It is anticipated that these DART buoys will be procured in FY 2005. FY 2006 funds will also support next generation DART buoy research and development and support the operations and maintenance of the 38 new/upgraded near real-time tsunami sea level monitoring sensors also anticipated to be procured and deployed in FY 2005. Finally, FY 2006 funds will be used to accelerate US coastal community inundation mapping efforts and community-based tsunami mitigation education/awareness and community preparedness activities (community-based TsunamiReady Program (including the Caribbean)

In FY 2005, the tsunami warning system expansion plan calls for:

- Procuring 32 new DART Buoys (PAC)
- Procuring and install 38 new sea level monitoring/tide gauge stations (ORF)
- Providing 24/7 warning coverage at the Pacific and Alaska Tsunami Centers (ORF)

- Upgrading 20 NWS-owned seismometers used to improve Local Tsunami Warning capabilities (PAC)
- Expanding Tsunami Ready program to improve community preparedness (ORF)
- Beginning Tsunami Inundation Mapping in the Caribbean/Atlantic/Gulf of Mexico (ORF)

In FY 2006, the tsunami warning system expansion plan calls for:

- Installing 20 new DART Buoys (ORF)
- Procuring 10 spare buoys for replacement purposes (PAC)
- Procuring 3 redundant DART buoys for Alaska to insure continuity of data in harsh seas off Alaska (PAC)
- Operating and maintaining 38 new sea level monitoring/tide gauge stations (ORF)
- Completing the expansion of the PTWC Facility to accommodate 24/7 Operations (PAC)
- Providing 24/7 warning coverage at the Pacific and Alaska Tsunami Centers (ORF)
- Completing upgrade of 20 NWS-owned seismometers used to improve tsunami detection (PAC)
- Expanding Tsunami Ready program to improve community preparedness (ORF)
- Continuing Tsunami Inundation Mapping in the Caribbean/Atlantic/Gulf of Mexico (ORF)
- Expanding Tsunami Mitigation activities through the NWS/ITIC (ORF)

Performance Goal and Measurement Data

Performance Measures for Tsunami Warnings

Performance Measure	FY04	FY06 Without Increase	FY06 with Increase	FY10
Tsunami False Alarm Rate	75%	75%	0%	0%
Tsunami Warning Lead Time (minutes)				
• Local Tsunamis	• 15 - 30	• 15 - 30	• 5-15	• 5-15
• Distant Tsunamis	• 30 - 60	• 30 - 60	• 15-30	• 15-30

Local Warnings and Forecasts (Various Programs) (+0FTE and +420,000): NOAA requests an increase of 0 FTE and \$420,000 to restore funds requested in FY 2005 to several programs that carry out base operations. This amount includes increases to several programs, as follows: Alaska Data Buoys (\$200,000), Sustain Cooperative Observer Network (\$90,000), Pacific Island Compact (\$50,000), and Space Environment Center (\$80,000).

Performance Goals and Measurement Data:

These increases will support both objectives under the DOC Strategic Goal of ‘Observe, protect, and manage the Earth’s resources to promote environmental needs’, as well as Weather and Water, Climate, and Mission Support strategic plan goals.

TERMINATIONS FOR FY 2006: The following programs, or portions thereof are terminated in FY 2006: Local Warnings and Forecasts Base (\$2,328,000), Tsunami Hazard Mitigation (\$1,948,000), Tsunami Warning and Environmental Observations for Alaska (TWEAK) (\$1,971,000), Hawaii Data Buoys (\$247,000), Hurricane Mitigation Alliance (SUSF) (\$3,203,000), Red River Basin Decision Information Network (\$267,000), New England Weather Technology Initiative (\$542,000), NOAA Profiler Network (\$255,000), NC Flood Plain Mapping Pilot (\$584,000), Vermont Northeast Weather & Wind Data Integration (\$247,000), Payment to OMAO (\$468,000) and NOAA Weather Radio Transmitters - HI (\$197,000).

Subactivity: Operations and Research
Line Item: Central Forecast Guidance

GOAL STATEMENT:

See the Overview for the National Weather Service Operations, Research, and Facilities for a discussion of our goals.

BASE DESCRIPTION:

The modernized field office structure emphasizes warnings and short-range forecasts. The process by which these products are generated begins with centralized processing of weather observations, followed by the application of high-resolution computer simulations of the atmosphere on NOAA supercomputers, and adjustment by skilled National Centers for Environmental Prediction (NCEP) forecasters. The results are forwarded to local WFO forecasters, who use them as the basis for local forecast products. Typically, local forecasters add the greatest value in the shortest forecast ranges. Beyond about three days, forecasts depend almost exclusively on NCEP output. The total forecast process depends critically on both NCEP products and local forecast efforts to enhance both accuracy and uniformity of service across the country.

In addition to their role in the local WFO forecast product generation, NCEP also provides the principal means through which NOAA provides operational weather, ocean, and climate prediction services for large areas, up to and including the entire globe, to a vast assortment of domestic and international users. These services typically exceed the domain of a single WFO, and require a large supercomputer. Efficiency demands that they be generated centrally.

The NCEP consists of seven science-based, service-oriented centers that generate environmental prediction products and two central activities supporting those services. The centers provide an integrated suite of forecast guidance and specific forecast products from the short-term through seasonal, interannual, decadal, and centennial time frames. Each service center depends on the observational infrastructure, the data assimilation systems, the numeric modeling function, and the application of model output statistics to produce value-added forecast guidance products for NWS field offices and direct users.

Storm Prediction Center: The Storm Prediction Center (SPC), located in Norman, Oklahoma, focuses on hazardous weather events such as severe thunderstorms and tornadoes, ice or heavy snow, and flash floods, with emphasis on the first few hours of the forecast period. Products issued from the SPC give the WFOs specific guidance as to the probability and intensity of severe weather occurrences for regional to local geographic scales.

Hydrometeorological Prediction Center: The Hydrometeorological Prediction Center (HPC), located in Camp Springs, Maryland, is responsible for preparing quantitative precipitation forecasts (QPF) that are used by WFOs to develop local rainfall, snow, and ice forecasts and by the Regional Forecast Centers (RFC) to develop local river and flood forecasts. The HPC provides special QPFs and coordination to other federal agencies such as the Federal

Emergency Management Agency (FEMA) during major flood events. The HPC also provides an array of analysis and forecasts of frontal systems, pressure patterns, temperature, and precipitation for use by WFOs and the private weather community.

Ocean Prediction Center (OPC): The Ocean Prediction Center (OPC), located in Camp Springs, Maryland, discharges US international meteorological obligations to marine interests under the International Convention for Safety of Life at Sea, to which the US is a signatory. It provides one-stop-shopping for marine interests operating outside the domain of coastal WFOs. The HPC provides weather and sea state warnings and forecasts for the high seas of the Northern Hemisphere for planning and operational purposes. Its warnings and products go directly to ships at sea, and are vital for the protection of life and property. The MPC also provides guidance forecasts for WFOs with coastal responsibilities, which extend out to about 100 nautical miles. Coastal WFOs have responsibility for local forecasts and warnings out to that limit; for the high seas beyond, the responsibility has been centralized in the HPC.

Tropical Prediction Center/National Hurricane Center: The NCEP experts in the area of tropical meteorology are concentrated at the Tropical Prediction Center (TPC)/National Hurricane Center (NHC) in Miami, Florida. Services provided by the TPC/NHC include advisories, watches, and warnings for tropical cyclones in the north Atlantic and eastern north Pacific oceans, the Caribbean Sea, and the Gulf of Mexico, including the portions of the U.S. coastline threatened by such storms. In addition, TPC forecasters provide aviation and marine analyses and forecast products for the same areas of responsibility. The TPC/NHC functions both to provide guidance, coordination, and tropical weather expertise to WFO forecasters and to serve users of centrally generated products.

Aviation Weather Center: The Aviation Weather Center (AWC), located in Kansas City, Missouri, is the mechanism by which the US discharges its weather forecasting obligations to the aviation community under an international agreement through the International Civil Aviation Organization. The AWC provides wind, temperature, and flight hazard (e.g., icing, and turbulence) forecasts for flight planning and en route aircraft operations for the US, the north Atlantic and north Pacific routes, and some routes in the southern hemisphere. In addition to the en route weather support provided for the aviation industry, the AWC also produces guidance products for use by WFOs in support of the airport terminal forecast function. Thus, the AWC discharges large-scale, global aviation functions which can be sensibly centralized, while the WFOs discharge local aviation functions based on centralized guidance provided by the AWC.

Climate Prediction Center: The CPC, located in Camp Springs, Maryland, produces climate services consisting of operational prediction of climate variability; monitoring of the climate system and development of databases for determining current climate anomalies and trends; and analysis and assessment of their origins and linkages to the rest of the climate system. These services cover climate time scales ranging from weeks to seasons, extending into the future as far as technically feasible, and cover the domain of land, ocean and atmosphere, extending into the stratosphere. WFOs, as well as the public, private industry, and the international research community use CPC climate services.

Space Environment Center: The Space Environment Center (SEC) in Boulder, CO, provides real-time monitoring and forecasting of solar and geophysical events, conducts research in solar-terrestrial physics, and develops techniques for forecasting solar and geophysical disturbances. SEC provides services to a broad user community of government agencies, industries, public institutions, and private individuals involved in satellite operation, space exploration,

radio navigation, high-altitude polar flights, high-frequency communications, remote intelligence gathering, long-line power and data transmissions, and geophysical exploration. SEC serves many government, industry and private-sector clients, and such end-product users as the power industry and the National Aeronautics and Space Administration (NASA). SEC's research scientists study the sun's electromagnetic, particle, and magnetic-field emissions and the processes by which they affect the near-earth space environment. SEC takes a leading role in advocating and designing new space-environment sensors for operational use. The SEC, with the U.S. Air Force, operates the national civilian space weather service. Forecasts, alerts, and warnings are provided to customers interested in the environment on a 24 hour-per-day, seven day a week basis. SEC products are synthesized from over 1,400 data streams providing observations of the solar terrestrial environment, including x-ray flux, charged particles, and magnetic field changes produced by solar disturbances.

NCEP also maintains two critical support organizations to facilitate the central forecast guidance process:

NCEP Central Operations: The Central Operations (NCO) of NCEP operates the NOAA Central Computing Facility, manages the computer production suite upon which all NCEP services are based and the communications linking the several parts of NCEP, and provides operational quality assurance of incoming observations and outgoing products. NCO staff also provides central support for software development for data processing, display, interaction, and product generation. The NCO is the technical transition point between the development of numerical weather and climate prediction models and their operational use by forecasters at the NCEP and WFOs. The NCO staff also provides central support for software development for data processing, display, interaction, and product generation. The NCO consists of computing, communications, and software specialists, as well as meteorologists with special knowledge of numerical modeling operations.

Environmental Modeling Center: NCEP's Environmental Modeling Center (EMC) develops and implements complex data assimilation and numerical model systems that span the globe. The computer models and other numerical forecast products developed by the EMC provide the basic guidance that meteorologists at the NCEP and WFOs use in making weather and climate predictions. EMC serves as the integrator of numerical modeling research and development performed in universities and research laboratories. Model impact studies are conducted by the EMC to validate data sets that lead to new data requirements from observing technologies (satellites, radar, etc.).

Base activities support the objective, "Advance understanding and predict changes in the Earth's environment to meet America's economic, social, and environmental needs" under the Department of Commerce strategic goal of "Observe, protect, and manage the Earth's resources to promote environmental needs."

PROPOSED LEGISLATION:

None.

SUMMARIZED FINANCIAL DATA

(Dollars in thousands)

Subactivity: Operations and Research	FY 2004 ACTUALS	FY 2005 CURRENTLY AVAILABLE	FY 2006 BASE PROGRAM	FY 2006 ESTIMATE	INCREASE / DECREASE
Line Item: Central Forecast Guidance					
Central Forecast Guidance (C)	5,621	5,725	5,946	5,946	-
Central Forecast Guidance (CT)	2,768	2,807	2,916	2,916	-
Central Forecast Guidance (WW)	36,237	37,581	37,995	41,030	3,035
TOTAL	44,626	46,113	46,857	49,892	3,035
FTE	298	299	299	299	-

PROGRAM CHANGES FOR FY 2006:

Data Assimilation (+0 FTE and \$1,000,000): NOAA requests 0 FTE and \$1,000,000 to fund focused research, development, and testing of advanced data assimilation algorithms and techniques. Expected improvements include: development of advanced techniques in global and mesoscale atmospheric, ocean and land data assimilation systems, use of new satellite data from the National Polar-orbiting Operational Environmental Satellite System (NPOESS), the NPOESS Preparatory Project and European operational instruments, and increased use of surface and radar observations for initializing high resolution mesoscale forecasts.

Statement of Need

In order to accurately forecast weather and climate, the NWS models must start from an accurate picture of the current state of the weather. Data assimilation algorithms are the fundamental mechanism for composing an accurate, comprehensive picture of the initial state of the land-atmosphere-ocean system. Improving prediction accuracy, lead time, and resolution, requires advances in the characterization of these initial conditions. These assimilation improvements directly support DOC's Goal to observe, protect and manage the Earth's resources to promote environmental stewardship.

Current resources are generally applied to advancing assimilation of satellite data. Existing techniques were designed largely for the synoptic scale (large 300-100km), and are inadequate for complex mesoscale (small 1-300km) situations. In addition, they cannot fully use current observations. Therefore, additional resources are needed to:

- Devise techniques for the expanding volume and diversity of observed data (including surface observations),

- Accelerate work on techniques which can make more effective use of available observations and provide potential breakthroughs in storm track prediction,
- Address the complexities of weather and water processes and observations at small spatial scales.

To achieve these enhancements NWS will: improve storm track accuracy and intensity to meet the stated objectives for winter storm warning accuracy and lead time requirements (91% accuracy with 16 hour lead time by 2010). To meet fire weather forecast needs, the NWS needs improved forecast guidance in terms of accuracies, resolution and probabilities. For aviation forecasts, the NWS needs guidance with improved timing, forecast accuracies and probabilities for convection, low clouds and visibility.

Proposed Actions

The NWS proposes to improve the performance of the operational model suite to close the gaps in the stated operational need. To improve the model, NWS requires better specification of the model initial conditions and significantly improved model resolutions, along with improved physical and numerical specifications. Specifically, NWS proposes to fund scientific support for the following:

- Investments in necessary advanced techniques, including
 - Full characterization of observation and model errors in high resolution analyses,
 - More effective use of observations by estimating and balancing them with sparsely observed parameters,
 - Improved quality control of observations, and development of more accurate model representation of clouds and moisture, topographic interactions, land surface effects, and precipitation processes.
- Develop and transition the necessary data assimilation algorithms for any new parameters, or sources of data and the expanding set of surface data to be provided by the COOP Program
- Support data assimilation improvements which will be required to improve the resolution and physics in the operational North American mesoscale model suite, through the Weather and Research Forecast (WRF) Model,

Milestone	Complete
Initiate and/or support development on at least three new techniques	FY06
Continue development of new techniques; Identify most successful techniques for testing ,evaluation and transition	FY07
Deliver two techniques for implementation	FY08
Deliver four techniques for implementation	FY09
Deliver six techniques for implementation; Next Generation Data Assimilation System Implemented	FY10

Cost/Activity	FY06
Extramural Grants	300K
Visiting Scientist Program (3)	400K
Contractors	300K
Total	\$1.00M

Performance Goals and Measurement Data

This increase will support the objective, “Advance understanding and predict changes in the Earth’s environment to meet America’s economic, social, and environmental needs” under the Department of Commerce strategic goal of “Observe, protect, and manage the Earth’s resources to promote environmental needs.” Specifically, this increase supports the Weather and Water performance goal and its relevant GPR performance measures.

This increase will provide for investment in the necessary algorithms for data assimilation supporting deep and coastal ocean, land and atmospheric models. This investment has the potential to provide breakthroughs in storm track prediction performance, as well as increasing the realism of all parts of the systems and improving forecast accuracy across the board. Outcomes include improved winter storm warnings, precipitation forecasts, and lead-times for flash flood and Red Flag warnings.

Performance Goal: Weather and Water

Performance Measure	Current State	FY10 Goal Without Increase	FY10 Goal With Increase
Winter Storm Warning	88% accuracy	91%	92%
Winter Storm Warning	13h lead time	16 hours	17 Hours
Red Flag Warning	9h lead time	9 hours	12 Hours

- The program increase will have an effect on the above performance measures in FY 2010
- NOAA Services: Improves the accuracy and precision of model-based predictions for Ecosystem, Commerce and Transportation, Climate and Weather and Water Goals.
- NOAA Observing systems: Improves ROI for all of NOAA’s observing system investments.

NCEP IT Cyclic Replacement (+0 FTE and \$2,035,000): NOAA requests 0 FTE and \$2,035,000 to provide for the cyclic replacement of information technology (IT) infrastructure at the National Centers for Environmental Prediction (NCEP) in order to enable the effective use of increasing volumes of model guidance, imagery and observational data and to comply with IT security requirements and related challenges which are projected to increase through the FY06 – FY07 time frame.

Statement of Need

The volume of model output, satellite imagery and observational data is expected to increase 12 times over by the year 2010. For this valuable information produced on the NOAA Climate and Weather Supercomputer to be most effectively leveraged, the downstream information technology infrastructure at NCEP must be capable of moving, displaying, and supporting the analysis by human beings of these increasingly high volumes of data. Without an appropriate life cycle replacement program, the ability to fully use this valuable information is compromised. NCEP manages approximately \$16M in IT assets (separate from the leased supercomputer) that are responsible for the processing and distribution of model output and central forecast guidance products to commercial and government customers and the NWS Weather Forecast offices.

In addition, IT security is an integrated part of IT cyclic replacement. When IT systems are not replaced on a cyclic schedule and are retained beyond the built-in vendor support timeframe (3 to 5 years), they cannot always receive the latest operating system software security patches necessary to avert new risks. NCEP is in the process of patching all of its systems (>1600) and replacing those that cannot be patched. However there are nearly 500 systems (PCs and network servers) which cannot be upgraded or patched when vendor support expires. These systems are unsupported for various reasons: the vendor is no longer in business, the vendor no longer supplies security patches or errata, or the systems are old and cannot be upgraded (memory, disk capacity, etc, not capable of supporting the newest release of the operating system).

By FY 2006, current resources devoted to NCEP IT cyclic replacement will be insufficient to meet projected data volume demands related to the increasing reliance on ensemble model systems for weather and seasonal to interannual climate forecasts along with the expanding suite of ocean and coastal model forecasts. To place the operational portion of NCEP IT infrastructure on a 5 year cyclic replacement schedule, an additional \$2.035M per year is required. At this replacement rate, NCEP will capitalize on industry-wide IT performance improvements (Moore's Law) and related security enhancements. The non-operations portion of the NCEP IT infrastructure will not be placed on a cyclic replacement schedule.

Proposed Actions

This investment provides for the cyclical replacement of vendor unsupported IT equipment, software, and services to support the use of higher volumes of data in the NCEP forecaster and model development environments and improve NCEP's IT security. The IT cyclic replacement program for operations systems will entail replacement of PCs, workstations, servers, operating systems to meet data volume demands and ensure against interference from hackers and denial of service attacks. Replacement is necessary whenever the equipment is so old that the manufacturer no longer provides continuing maintenance services and security patch support--approximately three years for PCs and five years for servers. The upgrade program entails replacing those pieces of equipment that (due to age) are no longer supported by the manufacturer.

NCEP proposes to focus the entire investment on the operational portions of the IT infrastructure to make it fully vendor supported and securable in the shortest period of time possible. The non-operations portion of the NCEP IT infrastructure will not be placed on a cyclic replacement schedule.

Schedule/Cost

Project	FY06
IT Cyclic Replacement	
Hardware	2.015M
Software	0.2M
Total	2.035M

Performance Goals and Measurement Data

This increase will support the objective, “Advance understanding and predict changes in the Earth’s environment to meet America’s economic, social, and environmental needs” under the Department of Commerce Strategic Goal of “Observe, protect, and manage the Earth’s resources to promote environmental needs.” Specifically, this increase supports the Weather and Water Performance Goal.

Taking the proposed actions is critical to sustaining the NCEP delivery of forecast guidance to national service centers and weather forecast offices. This forecast guidance directly supports all NWS performance measures. The first measurable outcomes will not be available until FY 2007.

-All NCEP Operational IT Infrastructure fully vendor supported and on a five year life cycle replacement program by the end of 2007

Subactivity: Systems Operation & Maintenance (O&M)
Line Item: Systems Operation & Maintenance

GOAL STATEMENT:

See the Overview for the National Weather Service Operations, Research, and Facilities for a discussion of our goals.

BASE DESCRIPTION:

This subactivity reflects the costs of on-going operations and maintenance of major NWS observing and processing systems.

Next Generation Weather Radar (NEXRAD): NEXRAD is a Doppler weather radar system, which provides automated signal processing, computerized processing of data by sophisticated meteorological software algorithms, and a high-capacity, processor-driven communications capability. The system is modular in design, upgradeable, has long life-cycle expectancy, and provides its principal users with a wide array of automated weather information that will increase their capability to meet their respective operational requirements. For NWS, the system utilizes the Doppler technology and hydrometeorological processing to provide significant increases both in the functional capability and in performance compared with present radars including improved tornado and thunderstorm warnings, increased air safety, improved flash flood warnings and improved water resources management.

In FY 2006, the NWS will continue to operate and maintain the network of 123 NEXRAD systems.

Automated Surface Observing System (ASOS): ASOS provides reliable, 24-hour per day, continuous surface weather observations. Implementation of ASOS into NWS field operations provides continuous weather watch, and yields improved staff productivity. NWS operates and maintains NWS ASOS units, and under a reimbursable funding arrangement, operates and maintains FAA ASOS units.

In FY 2006 the NWS will continue operations and maintenance of 885 fielded ASOS systems.

Advanced Weather Interactive Processing System (AWIPS)/NOAAPort: AWIPS is the cornerstone of the modernized NWS. This system is required to integrate and display all hydrometeorological data at NWS field offices. AWIPS acquires and processes data from modernized sensors and local sources, provides computational and display functions at operational sites, provides an interactive communications system to interconnect NWS operational sites, and disseminates warnings and forecasts in a rapid, highly reliable manner. This system integrates satellite and radar data and provides to the local field forecaster capabilities to significantly improve forecasts and warnings. NOAA PORT offers the communications capability to provide internal and external users with open access to much of NOAA's real-time environmental data.

Base activities support the objective, “Advance understanding and predict changes in the Earth’s environment to meet America’s economic, social, and environmental needs” under the Department of Commerce strategic goal of “Observe, protect, and manage the Earth’s resources to promote environmental needs.”

In FY 2006 NWS will:

- Continue operations and maintenance of 140 fielded systems;
- Continue investments in hardware and communications capacity necessary to prevent system obsolescence.

NWS Telecommunications Gateway Backup: The NWS is establishing the National Weather Service Telecommunication Gateway (NWSTG) backup facility, which will provide backup operations for the primary NWSTG within 12 hours of a failure.

The NWSTG is the Nation’s hub for the collection and distribution of weather data and products. The NWSTG provides national and global real-time exchange services using automated communication resources to collect and distribute a wide-variety of environmental data such as observations, analysis, and forecast products. These time-perishable products are distributed as received to ensure the fastest availability of the information. Thousands of customers worldwide use data distributed by the NWSTG, and these data affect a wide-range of economic and emergency management decisions. Without this backup capability, the NWSTG is a single point of failure, vulnerable to natural disasters, human error, computer viruses, hacker attacks, and terrorism. If the NWSTG failed, more than 90 percent of the in-situ weather observations necessary for numerical weather prediction models would be lost and forecast accuracy would be degraded. The NWSTG ensures that the delivery of critical meteorological data necessary for the protection of life and property and the economic well being of the Nation continues uninterrupted, providing increased operational availability and reducing risk vulnerability in the event of lost access to the NWSTG for whatever reason.

In conjunction with the NWSTG Backup, the Legacy Replacement Project will replace the legacy NWSTG core mainframe based message switching system with current server based technology, upgrade the facility support infrastructure, and establish a technology refresh program to ensure the IT keeps up with the demand and avoids another full system replacement. The Legacy Replacement will utilize the same IT software and hardware technology demonstrated and currently being implemented in the NWSTG Backup Project. In April 2004, the NWSTG Backup and Legacy Replacement were established as a joint project to more efficiently manage the two integrated efforts and achieve economies of scale where possible. In FY 2005 and FY2006 NWS will complete and test integration of the message switching software and associated hardware and telecommunications components. Full operational capability of the Legacy Replacement is scheduled for 2nd quarter FY2006. Full operational capability of the NWSTG backup is scheduled for 1st quarter of FY2007. This schedule reflects delays in the backup system message switching software system design and implementation.

PROPOSED LEGISLATION:

None.

SUMMARIZED FINANCIAL DATA

(Dollars in thousands)

Subactivity: Systems Operation & Maintenance (O&M)	FY 2004 ACTUALS	FY 2005 CURRENTLY AVAILABLE	FY 2006 BASE PROGRAM	FY 2006 ESTIMATE	INCREASE / DECREASE
Line Item: Systems Operation & Maintenance					
NEXRAD	43,576	38,735	40,431	43,367	2,936
ASOS	8,162	8,265	8,593	8,593	-
AWIPS	37,174	36,695	37,541	37,541	-
NWSTG Backup - CIP	3,010	3,042	3,042	3,042	-
TOTAL	91,922	86,737	89,607	92,543	2,936
FTE	183	182	182	182	-

PROGRAM CHANGES FOR FY 2006:

NEXRAD (+0 FTE and +\$2,936,000): NOAA requests an increase of 0 FTE and \$2,936,000, for a total of \$43,367,000 to restore funds requested in FY 2005 for operations and maintenance of the NEXRAD system. Specifically, the requested increase will allow the NWS to implement planned retrofits to WSR-88D communications lines (copper to fiber optic) at 8 sites where deteriorating copper lines make communications unreliable, thus creating a moderate to high risk of communications failure and lost radar data (particularly during severe weather events). Furthermore, NWS will be able to perform planned radar radome and tower maintenance, eliminating the risk of catastrophic radar failure due to lack of structural integrity.

Performance Goals and Measurement Data:

This increase will support the objective: “Advance understanding and predict changes in the Earth’s environment to meet America’s economic, social, and environmental needs” under the DOC Strategic Goal of ‘Observe, protect, and manage the Earth’s resources to promote environmental needs’. Specifically, this increase supports NOAA’s Weather and Water strategic goal

TERMINATIONS FOR FY 2006: The following programs, or portions thereof, are terminated in FY 2006: ASOS (\$120,000), AWIPS (\$53,000), NWTSG Backup-CIP (\$45,000).

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Department of Commerce
National Oceanic and Atmospheric Administration
Operations Research and Facilities
Contribution to the NOAA Strategic Planning Goals and Objectives
(Dollar amounts in thousands)

National Weather Service	FY 2004 Actuals		FY 2005 Currently Available		FY 2006 Base Program		FY 2006 Estimate		Inc/Dec from Base	
	FTE	Amount	FTE	Amount	FTE	Amount	FTE	Amount	FTE	Amount
Climate										
Climate	104	17,258	128	17,634	128	21,465	128	21,635	-	170
Total C	104	17,258	128	17,634	128	21,465	128	21,635	-	170
Commerce and Transportation										
Commerce and Transportation	90	14,266	103	14,385	103	14,880	103	15,980	-	1,100
Total CT	90	14,266	103	14,385	103	14,800	103	15,980	-	1,100
Mission Support										
Mission Support	-	1,504	-	-	-	7,390	-	7,390	-	-
Total OE	-	1,504	-	-	-	7,390	-	7,390	-	-
Weather and Water										
Weather and Water	4,455	690,398	4,369	671,907	4,366	680,149	4,366	699,825	-	19,676
Total WW	4,455	690,398	4,369	671,907	4,366	680,149	4,366	699,825	-	19,676
Total National Weather Service	4,649	723,426	4,600	703,926	4,597	723,884	4,597	744,830	-	20,946

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Department of Commerce
National Oceanic and Atmospheric Administration
Operations Research and Facilities
PROGRAM AND PERFORMANCE: DIRECT OBLIGATIONS
(Dollar amounts in thousands)

Activity: National Weather Service		FY 2004		FY 2005		FY 2006		FY 2006		Inc/Dec	
		Actuals		Currently Available		Base Program		Estimate		from Base	
		Personnel	Amount	Personnel	Amount	Personnel	Amount	Personnel	Amount	Personnel	Amount
Operations and Research											
Local Warnings and Forecasts	Pos/BA	4,210	586,878	4,280	571,076	4,277	587,420	4,277	602,395	-	14,975
	FTE/OBL	4,168	588,141	4,119	572,549	4,116	587,420	4,116	602,395	-	14,975
Central Forecast Guidance	Pos/BA	316	44,626	316	46,113	316	46,857	316	49,892	-	3,035
	FTE/OBL	298	44,753	299	46,113	299	46,857	299	49,892	-	3,035
Total Operations and Research											
	Pos/BA	4,526	631,504	4,596	617,189	4,593	634,277	4,593	652,287	-	18,010
	FTE/OBL	4,466	632,894	4,418	618,662	4,415	634,277	4,415	652,287	-	18,010
Systems Operation & Maintenance (O&M)											
Systems Operation & Maintenance	Pos/BA	184	91,922	184	86,737	184	89,607	184	92,543	-	2,936
	FTE/OBL	183	91,921	182	86,899	182	89,607	182	92,543	-	2,936
Total Systems Operation & Maintenance (O&M)											
	Pos/BA	184	91,922	184	86,737	184	89,607	184	92,543	-	2,936
	FTE/OBL	183	91,921	182	86,899	182	89,607	182	92,543	-	2,936

Department of Commerce
 National Oceanic and Atmospheric Administration
 Operations Research and Facilities
PROGRAM CHANGE DETAIL BY OBJECT CLASS
 (Dollar amounts in thousands)

Activity: National Weather Service
 Subactivity: Operations and Research

	Object Class	2006 Increase
25.2	Other services	18,010
99	Total Obligations	18,010

Department of Commerce
 National Oceanic and Atmospheric Administration
 Operations Research and Facilities
PROGRAM CHANGE DETAIL BY OBJECT CLASS
 (Dollar amounts in thousands)

Activity: National Weather Service
 Subactivity: Systems Operation & Maintenance

	Object Class	2006 Increase
25.2	Other services	2,936
99	Total Obligations	2,936

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