Working Together to Save Lives

National Weather Service Strategic Plan

for 2005-2010

Final – January 3, 2005

Preface

The National Oceanic and Atmospheric Administration (NOAA) Strategic Plan (http://www.spo.noaa.gov/) is the guiding document of an improved planning and management system and is focused on requirements for a broader range of environmental information services. NOAA's National Weather Service (NWS) Strategic Plan focuses on what the NWS needs to "execute" the mission. NOAA's planning, programming, budgeting and execution cycle links program plans, annual operating plans, and the entire NOAA budget to the NOAA strategic plan. This NWS plan identifies external forces for change and the main focus of our response. It also conforms with the NOAA Plan, so that all NWS programs and budgets trace to the NOAA Strategic Plan. Ultimately, all members of our workforce will understand their roles in meeting these agency priorities and themes.

The NWS plays an important role in all NOAA goals and cross-cutting priorities. The NOAA strategic plan adopts four mission goals and one mission support goal to organize activities of the entire agency. The NOAA plan also adopts five cross-cutting priorities to describe thematic underpinnings, which facilitate NOAA's delivery of services, enable effective operations, and promote creativity throughout the organization. The NWS plan addresses the specifics of our roles within NOAA, following the structure of the NOAA Strategic Plan. NOAA has forty-four official programs – all working to meet the outcomes of the goals and cross cuts (see NOAA Strategic Plan Appendix B for details about NOAA Programs). The NWS plan describes the NWS role, priorities and direction to enable the NWS to fulfill its mission responsibilities, contribute to NOAA team success, and attain the outcomes described in the NOAA Strategic Plan. For each goal, a table includes those parts of NOAA strategies relevant to NWS activities, color-coded to link to those strategies, and a list of partners helping us with our activities. An appendix provides metrics NWS uses to measure and target performance over the life of the Plan.

The term "weather, water, and climate" is used throughout this plan. NWS has responsibilities for both fresh water (i.e. rivers, lakes, streams) and for salt water (i.e. oceans and estuaries) and intends "water" to be understood in this broad sense. Similarly, "weather" includes NWS space weather and air quality programs in addition to traditional weather services. Use of the term "climate" in the NWS plan reflects our primary role in seasonal to interannual prediction and also our role in climate services, which includes "climate" broadly defined. The term "we" in this document is used to reflect the men and women of the National Weather Service.

Foreword

From our beginnings in the 19th Century, the men and women of NOAA's National Weather Service (NWS) have depended on our employees, partnerships, advances in scientific understanding, and improvements in technology to carry out our mission – issuing forecasts and warnings to minimize loss of life property and enhance the Nation's economy. As we look forward into the 21st Century, we are making fundamental changes to our business processes, but dependence on our employees, partnerships, science, and technology continues. Today, partners extend beyond the volunteer cooperative observers of the 19th Century, to government agencies at all levels, private sector companies, academic and research institutions, and sectors of the economy unknown when the Weather Bureau, precursor agency of today's NWS, was established in 1890. We will work closely with our existing and new partners to leverage the national environmental infrastructure (both public and private) in weather, water, and climate to better meet the public's needs. Advances in science and technology offer extraordinary opportunities to continue improving our services as we work together with our partners to meet America's needs.

The American people deserve and will continue to demand a responsive and efficient Government. This plan is our guide to make the National Weather Service meet this expectation and continue to deliver great value to the taxpayers we serve. As a public agency, we also have a special responsibility to be open in planning and carrying out our role in the weather, water, and climate enterprise we share with the public, academic and private sectors. Our commitment to openness derives in part from the ideal of a more transparent government. But we also know our mutual success depends on how well our partners can count on us to carry out the plans we make and deliver the information we promise. Consistent with our commitment to openness, the NWS Strategic Plan is available for public comment and will be subject to a review and update cycle coordinated with a similar cycle for the NOAA Plan.

Today's NWS was built by our workforce – employees and contractors. At its best, this plan will inspire our workforce to build on the good foundation we already have to structure the NWS of the 21st Century.

David L. Johnson,

Assistant Administrator for Weather Services

Table of Contents

Introduction

The National Oceanic and Atmospheric Administration's (NOAA's) National Weather Service (NWS) serves the people of the United States every day. We are the sole U.S. official voice for issuing warnings during life-threatening weather situations. We provide weather, water, and climate forecasts and warnings for the United States, its territories, adjacent waters and ocean areas, to protect life and property and enhance the national economy. Weather services cost each American about $5 a year — roughly the cost of a fast food meal. This investment allows NWS forecasters to issue climate, public, aviation, marine, fire weather, air quality, space weather, river and flood forecasts and warnings every day.

We have about 4,700 employees in 122 weather forecast offices, 13 river forecast centers, 9 national centers and other support offices around the country. Our annual budget of approximately $825 million in 2004 supports a national infrastructure to gather and process data worldwide from the land, sea, and air. This infrastructure includes collecting data from technology such as Doppler weather radars, satellites operated by NOAA's National Environmental Satellite, Data, and Information Service (NESDIS), data buoys for marine observations, surface observing systems, and instruments for monitoring space weather and air quality. These data feed sophisticated computer models running on high-speed supercomputers. Our highly trained and skilled workforce uses powerful workstations to analyze all of these data and issue forecasts and warnings. High-speed communications tie all this information infrastructure together and disseminate forecasts and warnings to the public.

NWS staff also use trained community volunteers to enhance weather service operations. Cooperative observers collect weather data that become part of the Nation's climate records and citizen storm spotters provide us with visual confirmation of severe weather events. As environmental information becomes more sophisticated, complete, and available to all, the environmental literacy of the public becomes more important. Our outreach and education activities are aimed at making sure the public understands the information we provide and can use it effectively in the decisions they make.

The Nation's weather, water, and climate enterprise is conducted by many parties whose contributions complement and at times overlap. These parties are typically grouped into three sectors – government, private, and academic and research – and include non-governmental organizations, private citizens, and others. This three-sector system has led to an extensive and flourishing set of services of great benefit to the public and the economy. We work closely with our partners in all aspects of the forecast process – from research, to observation collection, to forecast dissemination, to warning the public when hazards threaten. Partners count on us for reliable delivery of high-quality information and access to our databases is essential to the roles they play in the enterprise. We rely on these effective partnerships to better understand and apply technology and science, continue our record of forecast improvements, and meet expanding needs for high quality weather, water, and climate services. We are committed to foster the growth of this complex and diverse enterprise as a whole to serve the public interest.

Our Mission

The National Weather Service 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.

And

NWS data and products form a national information data base and infrastructure which can be used by other government agencies, the private sector, and the global community.

Our Vision: 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

We Value:

- Service to our customers and partners
- Respect and trust of others
- Open exchange of information and ideas, and the scientific approach to our mission
- High standards for integrity, teamwork, and self-improvement
- A diverse, innovative, and empowered work-force

This strategic plan lays out the path we will take to accomplish our mission, advance our vision, and integrate our core values throughout NWS.

Serving Society's Needs in Changing Times

Forces for Change

America's vulnerability to weather, water, and climate variability is rising as more of the population moves into harm's way and national and global economies become more complex. Since 1980, extreme weather and water events cause about $17 billion in damages annually and over 90 percent of Presidential disaster declarations. National and global economies are so complex and interdependent that disruptions anywhere lead to costs and delays in other parts of the Nation or world. Our advancing economy and heightened security concerns drive emerging service needs undreamed of by our 19th century founders, such as ecosystem, air quality and space weather prediction. Recognizing the need for agility to respond to our rapidly changing world, we expect the following major forces for change to shape the context for the NWS over the life of this plan:

- *Continuing advances in numerical models* will improve the accuracy, geographic detail, and lead time of forecasts and produce modeling systems which operate over a wider range of time and space scales, and employ a common modeling infrastructure for both operational and research use.

- *Expanding sources of observational data* will add to our understanding of the state of oceans, land, space, and atmosphere on global, regional, and local scales. It will also add to the burden on data assimilation methods, processing systems, and our forecasters to quality control, integrate, and use these observations to produce meaningful information.

- *Continued integration of environmental sciences* will add scope to the environmental modeling systems operated by NWS and others and add new kinds of data to these modeling systems. Traditional weather models will grow to include chemical and biological components and expand to encompass space, ocean, and land processes. To succeed in this environment, we will have to develop expertise in new disciplines and work closely with other organizations – not to supplant their missions but to find ways to work together to serve the country's needs.

- *Growing use of Internet technologies for information delivery* will increase the ability of our customers to integrate information from many sources and locations and deliver it to the desktop (or palm top or driver seat or …) of anyone, anywhere. This will enable NWS information to reach people regardless of physical location – theirs or ours.

- *Growing population; increasing vulnerabilities to disruption by natural and technological hazards; and increasing concerns for homeland security* will increase demands for NWS warnings and response, and will require closer coordination with emergency management officials at all levels of government to provide more personalized services at the local level to state, local, and regional government agencies.

- *Advances in science and technology* will offer opportunities to provide NWS forecasters with new tools to improve services and necessitates a commitment to continuous education and training of our workforce to use the tools effectively.

- *Requirements for a broader range of environmental information services from NWS, and more broadly from NOAA* including:

    - *Expanded climate information* – in all meanings of the term, i.e. retrospective studies of past and current climate; seasonal and longer forecasts of climate variations; and improved long range predictions of climate change.

    - *Expanded water information* – initially as part of the Advanced Hydrologic Prediction Service initiative already underway, but ultimately expanded to include a wider range of environmental information such as soil moisture and water quality forecasts for fresh water, estuaries, and the coastal zone.

    - *Expanded ocean information* – not just weather over the oceans and surface temperatures, but forecasts of the ocean state, driven in large part by the report of U.S. Commission on Ocean Policy, but also by the growing importance of the oceans to commerce, fisheries, and ecosystem health.

    - *Expanded demands for public health services* will begin with our existing forecasts of the hazards of temperature extremes and air quality forecasts of surface ozone, but expand into new parameters and a wide range of public health impacts of climate, weather, and water conditions.

    - *True "ecosystem" forecasts including biological, chemical, and physical conditions.*

    - *Expanded digital services* – allow communication of forecast information with greater resolution in time and space and facilitates the integration of data in all service program areas.

    - *An overall push, affecting all NWS service programs, to provide more explicit and more useful measures of forecast certainty.*

- *Improved tools for and forecaster experience with collaborative forecasting* will make collaboration across NWS offices and with others outside NWS more commonplace and effective.

- *Continued demands for a more responsive and effective government,* will continue the importance of cost efficiency for the NWS.

Responding to Society's Needs

We are an agency always striving for new heights of accuracy, timeliness and service. Predicting the weather for even a day was once an act of faith – tomorrow's NWS will extend the limits of skill in weather, water, and climate forecasting to days, weeks, and seasons and will work with other components of our parent agency, the National Oceanic and Atmospheric Administration (NOAA), and our partners to meet America's expanding needs for seamless services across multiple timescales. Weather forecasting once stopped at the ocean's surface – today's NWS includes oceanography as an integral part of our predictions of the coupled

ocean/atmosphere system, and extends the forecast domain to space weather. Forecast products were once limited by what could be typed in a limited area – tomorrow's products will further evolve into improved digital formats, which can better communicate the details of NWS forecasts. River forecasts were once based solely on observed rain and snow – tomorrow's NWS will continue to integrate weather and climate predictions into longer-range and more-accurate predictions of fresh water supplies, flood threats, and the health of ecosystems. A basic sense of human curiosity drove our 19th century forebears to maintain quality observations and archive them for posterity – tomorrow's NWS will build on this observational legacy with a full recognition of the value of environmental observations to critical issues facing humankind.

Rapid science and technological advances in the 21st century promise significant improvements to public safety and economic well being. In the last decade, we increased the lead time for tornado warnings from 6 minutes to thirteen minutes. Today, our four-day weather forecasts are as accurate as our two-day forecasts were two decades ago. However, weather- and water-related deaths still occur; weather-related transportation incidents cost this nation billions of dollars annually; and droughts and floods impact the Nation in many areas. Growing understanding of the complex physical, chemical, and biological interactions of the global ecosystem and their implications for public health has already moved the NWS into air quality forecasting – tomorrow's NWS will extend the scope of our information to serve the public in new ways. We will accelerate science advances into operations to meet changing customer needs for improved weather, water, and climate prediction services.

The total infrastructure of the NWS – our observing systems, processing systems, models, dissemination systems, facilities, and the people that run them – is a national resource that can serve public interests in ways broader than the mission of the NWS. Broader use of our infrastructure is already underway: The NOAA Weather Radio system, originally designed to deliver warnings and other NWS information directly to the public, now serves the Department of Homeland Security and local public safety officials as an all-hazards system capable of direct delivery of Amber alerts and other public safety information. We already work with the Environmental Protection Agency to further EPA's mission by providing forecasts of air quality and ultraviolet radiation. We expect calls for mission support of this kind for other environmental, public health, and public safety agencies, and will answer this call by recognizing all we do and all our assets are supported by the taxpayers and are there to serve the public interest**.**

Our Commitments to Work Together

This new plan sets the mark for continued advancements in the 21st century. Change is part of our everyday work in NWS and is essential to meet the changing needs of the public we serve. As we work together to provide products and services vital for the safety, health and welfare of our society, we will be guided by the following major themes:

- *Improved Partnerships.* We will work with our sister agencies in NOAA, other Federal, state and local, agencies, the academic and research community and the diverse and growing private sector. We recognize the decisions we make affect others, and we will seek an open

dialogue to ensure the American people continue to receive the best weather services in the world.

- *Improved Services Focused on Customer Needs.* As we focus on improving our services and expanding their scope, we will consult effectively with all who are affected by our services and be guided by our customer's needs. We will work with the weather, water, and climate enterprise to investigate, develop, and expand the use of new technologies in data management and information systems, such as new internet-based standards and Geographic Information Systems (GIS), to accelerate development and implementation of appropriate NWS and NOAA products and services and to integrate these services in ways that are meaningful to our customers. We will work to ensure NOAA customers and partners receive an integrated service meeting their needs for information across all time and space scales – whether the information is produced by the NWS or another NOAA element, and whether the initial point of contact is an NWS office or some other NOAA element.

- *Improved Observations.* NWS owns and operates important components of the Nation's environmental observing capability – radars, data buoys, upper air observing systems, and surface observing systems, including mesonets and data collection and distribution systems – which provide real time data and contribute to the nation's climate record. We are committed to improvements in these systems, but we are also committed to improving environmental observations in a larger sense – to integrate observations from our NOAA partners and others in this country and globally. Our approach to observing systems will explicitly recognize the multi-party, multi-disciplinary, multi-platform, and multi-purpose nature of environmental observations and seek to maximize the effectiveness of all participants through the Global Earth Observing System of Systems (GEOSS).

- *World-Class Models.* NWS will accelerate modeling and predictive advances in all time ranges – from tomorrow through weeks and seasons and help create a world class environmental prediction center, which will provide improved data assimilation and modeling and move toward a unified global forecast system – a single global forecast system model that unifies weather and short-term climate predictions and incorporates land, ocean, and atmospheric processes.

- *Safe, Reliable Infrastructure.* We depend on our infrastructure – facilities and information technology – to deliver the services our customers depend on. Environmental compliance, safety and health, fault-tolerant information technology, and attention to physical and information technology security are an essential part of our job. The best forecast is worthless unless we can safely communicate it, despite the challenges to security in the information age.

- *Orderly Management of Changes.* Change in NWS systems, work processes, technology -- virtually everything we do -- is essential to meet our strategic goals and serve our customer's changing needs. We are committed to making necessary changes with minimal disruption to our customers, partners, and workforce. We will demonstrate the effectiveness of improvements in our science and technology before implementing them. We will consult with those affected by changes in our services before changing them. We will pay attention to continuity of the observational record as we change observing systems.

Supporting NOAA Goals

Everything we do contributes to NOAA's Mission and furthers NOAA's Vision.

NOAA VISION: *An informed society that uses a comprehensive understanding of the role of the oceans, coasts, and atmosphere in the global ecosystem to make the best social and economic decisions*

NOAA MISSION: *To understand and predict changes in Earth's environment and conserve and manage coastal and marine resources to meet our Nation's economic, social, and environmental needs*

The NOAA Strategic Plan for 2005-2010 describes NOAA Mission Goals and Outcomes and the Strategies to attain them. This NWS Strategic Plan describes how our activities will meet NOAA's Goals. Each section describes a NOAA Mission Goal, introduced by a table that links NOAA's Outcomes and Strategies with NWS Activities. **NOTE: The tables are color-coded to show how each "NWS Activity" links to specific "NOAA Strategies Employed by the NWS."**

Protect, Restore, and Manage the Use of Coastal and Ocean Resources Through an Ecosystem Approach to Management

We view NOAA's mission responsibilities for weather, water, and climate information as complementary to NOAA's mission responsibilities for ecosystems, i.e., fisheries, protected species, and ocean, coastal, and Great Lakes resources. Advances in understanding physical, chemical, and biological cycles of earth's ecosystems requires greater cooperation among previously distinct scientific disciplines and improved coordination among NOAA's earth science missions. We will put greater emphasis on contributions of our weather, water, air quality, and climate observations and forecasts for ecosystem forecasting to enhance an ecosystem approach to management. This requires a greater attention to using our observations and forecasts of atmospheric, surface, riverine, estuarine, and oceanographic conditions to aid fisheries, coastal, ocean, and other resource managers; and greater attention to

the potential to cross-utilize observing platforms, e.g. to observe underwater conditions from platforms used for surface conditions today. We will work with our sister agencies -- National Ocean Service and National Marine Fisheries Service -- to help make this happen. We will take advantage of recent scientific advances and the availability of new data to update national precipitation frequency standards.

Protect, Restore, and Manage the Use of Coastal and Ocean Resources through an Ecosystem Approach to Management

NOAA Outcomes	**NOAA Strategies Employed by NWS**	***NWS Activities***	**NWS Partners**
Healthy and productive coastal and marine ecosystems that benefit society A well informed public that acts as a steward of coastal and marine ecosystems	Manage uses of ecosystems by applying scientifically sound observations, assessments, and research findings to ensure the sustainable use of resources and to balance competing uses of coastal and marine ecosystems	Numerical Weather and Climate Climate Prediction Models Hydrologic models and services Marine/ocean/coastal program Marine/ocean observation network (buoys; voluntary shipboard observations; Coastal-Marine Automated Network)	National Ocean Service (NOS); National Marine Fisheries Service (NMFS); National Environmental Satellite, Data, and Information Service (NESDIS); Office of Oceanic and Atmospheric Research (OAR) Academic and research Institutions Marine industry (boating, fishing and shipping) Other Federal Agencies State and local government agencies Interstate agencies Private data providers Regional and state climatologists
	Improve resource management by advancing our understanding of ecosystems through better simulation and predictive models. Build and advance the capabilities of an ecological component of the NOAA global environmental observing system to monitor, assess, and predict national and regional ecosystem health, as well as to gather information consistent with established social and economic indicators	Cooperative observer program Regional ocean observing systems Radars River model research (sediment, pollutant transport, etc.)	

		Develop coordinated regional and national outreach and education efforts to improve public understanding and involvement in stewardship of coastal and marine ecosystems.				

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, and growing climate expertise at local NWS forecast offices will enhance regional specificity and explanation of climate forecasts for local customers and partners. We will take advantage of technological advances in climate modeling capabilities and will move proven research results about climate variability into routine operations. Forecasts will be more precise in describing uncertainty and more closely coupled to impacts on segments of society and the economy, aiding, for example, emergency managers, farmers, health industries, and energy providers with their resource allocation decisions. We will continue to expand coverage and capabilities of our water prediction capabilities and use the Advanced Hydrologic Prediction Service (AHPS) to translate improved climate predictions to impacts on the Nation's fresh water system, hydroelectric power, and flood control.

We will work toward creating a world-class environmental prediction center and provide the required human resources and expertise for model development and data assimilation tasks and focus additional resources on a single medium range global forecasting system. These actions will accelerate the rate of forecast skill improvement and provide the world's best prediction system for climate variability. This will foster improved data assimilation and modeling and develop a unified global forecast system to advance predictive skill and use the same modeling system as used in the 1-14 day predictions**.**

We recognize our responsibility to future generations who will use the climate and oceanographic data we collect. We recognize the importance of gathering quality observations to produce a climate record and will ensure climate needs are incorporated into weather and ocean observing systems whenever possible. We will invest resources to modernize the Cooperative Observer Program.

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

NOAA Outcomes	NOAA Strategies Employed by NWS	*NWS Activities*	*NWS Partners*
A predictive understanding of the global climate system on time scales of weeks to decades with quantified uncertainties sufficient for making informed and reasoned decisions Climate-sensitive sectors and a climate-literate public effectively incorporating NOAA's climate products into their plans and decisions	Improve the quality of climate observations, analyses, interpretation, and archiving by maintaining a consistent climate record and by improving our ability to determine why changes are taking place.	Surface (Automated Surface Observation System (ASOS), cooperative observer program (COOP))	National Environmental Satellite Data and Information Service (NESDIS), Office of Oceanic and Atmospheric Research (OAR), Office of Global Programs NASA, DOE, DOD (Air Force Weather Agency, Naval Oceanographic Office, Fleet Numerical Meteorology and Oceanography Center), DOT (FAA, FWSA), US Geological Survey (USGS), US Department of Agriculture (USDA), US Coast Guard, US Army Corps of Engineers, Bureau of Reclamation, Federal Emergency Management Agency and other Federal agencies State and local governments (e.g., State DOTs) Mesonet owners International partners International climate community National Meteorological Services (NMSs) Commercial weather sector and
		Upper Air (incl. stratosphere; radiosonde, automated aircraft observations, Alaska profilers)	
	Advance sub-seasonal to inter-annual climate predictions and climate change projections by improving analysis of the climate system, using ensembles of multiple, high-end climate and Earth system models.	Marine/ocean observation network (buoys; voluntary shipboard observations; Coastal-Marine Automated Network)	
		Radar	
	Develop the ability to predict the consequences of climate change on ecosystems by monitoring changes in coastal and marine ecosystems, conducting research on climate-ecosystem linkages, and incorporating climate information into physical-biological models.	Global Climate Observing System (GCOS) and GCOS Upper Air Network	
		Radiosonde Replacement System	
		Training program	
	Work with customers in order to deliver climate services and information products involving health, safety, environmental, economic, and community planning that increase the effective application of this information.	Advanced Hydrologic Prediction System (AHPS)	
	Coordinate among NOAA Line Offices the transition from investigator-driven research projects to operational facilities, capabilities, and products.	Numerical Weather Prediction model development; model testbed; seasonal/ interannual climate models	
		Joint Center for Satellite Data Assimilation	

	Support educational efforts to create a more climate-literate public by developing climate educational materials, involving teachers in the research process, and generating tools to allow climate information to be used in decisions.		(JCSDA)	private data providers
			Common modeling infrastructures (e.g., Environmental Systems Modeling Framework (ESMF))	Regional and state climatologists/ centers
			Research and development/verification methods	World Meteorological Organization (WMO)
	Develop and contribute to routine state-of-the-science assessments of the climate system for informed decision-making.		International data rescue	Academic and research institutions
			Modernized Precipitation Frequency Standards	Atmospheric Observation Panel for Climate
			Climate Prediction Activities: - Global/Regional Climate Models - Local analysis - Reanalysis - AHPS - seasonal/interannual climate prediction (precipitation/ temperature)	Weather risk sector Media
			Education/Outreach	
			Customer Service (Climate Services Program)	
			National, regional, and local climate services programs	
			Pacific Environmental Advocacy Center	

Serve Society's Needs for Weather and Water Information

More and more sectors of the economy recognize the impacts of weather (including space weather and air quality) and water on their businesses and are becoming more sophisticated at using weather and water information to improve performance. Concern for public safety drives us to improve the timeliness and accuracy of warnings of all weather- and water-related hazards and to better communicate information to the public. To maintain efficiency, operational concepts must be reviewed and opportunities for

efficiencies identified periodically. Evolving societal demands are pushing us to develop new capabilities and move into a new direction of forecasts, including air and water quality prediction, and expand beyond traditional weather and water products to predicting and warning of events that may affect human health. We will strive to provide the highest value to taxpayers by ensuring our operations maximize the contribution of science and technology to guarantee the highest quality and most efficiently delivered services.

To meet these expanding requirements, our weather, space weather, air quality and water predictions and the information we disseminate need to be at the limits of the skill which science, technology, and a highly-trained workforce can provide. We are committed to expand these limits by enhancing observing capabilities; by improving data assimilation to use effectively all the relevant data we and others collect; by improving collaboration with the research community through creative approaches like community modeling (e.g., establish an Earth System Model Framework); by quickly transforming scientific advances in modeling into improved operational products; by improving the techniques used by our expert forecasters; by evolving our services from a text-based paradigm to one based on making NWS and NOAA information available quickly, efficiently, and in convenient and understandable forms (e.g., National Digital Forecast Database and GIS); by including information on forecast uncertainty to enhance customer decision processes; by taking advantage of existing and emerging technologies to disseminate this information; by expanding our outreach and education efforts to better meet the needs of a more diverse population; and by maintaining an up-to-date technology base and a workforce trained to use all of these tools to maximum effect.

The world-class environmental prediction center, as described in the previous goal, will also foster improved data assimilation and the unified global forecast system will advance predictive skill out to two weeks and accelerate the rate of improvement in this time range.

The entire weather, water, and climate enterprise is larger than the NWS – today and tomorrow we depend on partners in the private, academic, and public sectors to acquire data, conduct research, provide education and training, and most importantly, help disseminate critical environmental information and provide advice to make best use of NWS information. We 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 honor our commitment to excellent customer service.

Serve Society's Needs for Weather and Water Information

NOAA Outcomes	**NOAA Strategies Employed by NWS**	*NWS Activities*	*NWS Partners*
Reduced loss of life, injury, and damage to the economy Better, quicker, and more valuable weather and water information to support improved decisions Increased customer satisfaction with weather and water information and services	Improve the reliability, lead-time, and understanding of weather and water information and services that predict changes in environmental conditions. Integrate an information enterprise that incorporates all stages from research to delivery, seeks better coordination of employee skills and training, and engages customers.	Upper Air (radiosonde, automated aircraft observations, Alaska profilers) Radar Surface (Automated Surface Observation System (ASOS), cooperative observer program (COOP), Hydrometeorological Automated Data System (HADS) Marine/ocean observation network (buoys; voluntary shipboard observations; Coastal-Marine Snow survey Air quality observations Integrated Flood Observing and Warning System (IFLOWS) Targeted observations Storm Spotter Program Tsunami network (incl. Deep-Ocean Assessment and Reporting of Tsunamis (DART))	National Environmental Satellite Data and Information Service (NESDIS), Office of Oceanic and Atmospheric Research (OAR), NOAA Marine and Aviation Operations, National Ocean Service (NOS) Department of Homeland Security (DHS), DOT (FAA, FHWA), US Coast Guard (USCG), DOD(Air Force Weather Agency, Naval Oceanographic Office, Fleet Numerical Meteorology and Oceanography Center), NASA, Minerals Management Service, US Army Corps of Engineers, US Geological Survey (USGS), Bureau of Land Management (BLM), Environmental Protection Agency (EPA), National Resources Conservation Service (NRCS), and other Federal Agencies State DOTs Stream gauging program (USCG) State, local, regional, and tribal agencies Airlines Mesonet, Automated Flood Warning System owners/operators

			Fire and soil observations	GOES Data Collection Platform owners/ operators NOS cooperative observers Storm spotters Commercial providers of observations International agencies (WMO) and National Meteorological Services (NMSs) European Organization for the Exploitation of Meteorological Satellites (EUMETSAT) Academia and research institutions (e.g., UCAR) National Science Foundation Incorporated Research Institutions for Seismology (IRIS) Regional and state climatologists European Centre for Medium Range Weather Forecasting (ECMWF) U. S. Weather Research Program (USWRP) partners Commercial Weather Sector (e.g., media) Water Management Agencies Intergovernmental Oceanographic
		Develop and infuse research results and new technologies more efficiently to improve products and services, to streamline dissemination, and to communicate vital information more effectively.	Regional Ocean Observing Systems (e.g., Gulf of Maine network)	
			Volcanic ash observation	
			Global Climate Observing System	
			International data rescue	
		Build a broad-based and coordinated education and outreach program by engaging individuals in continuous learning toward a greater understanding of the impacts of weather and water on their lives.	Numerical Weather/Ocean Prediction Models (Global, Regional, Local, Ensembles, Geomagnetic, Ionospheric); model testbeds	
			Statistical forecast models (e.g., MOS)	
			Collaborative/Common modeling infrastructures (e.g., WRF, Distributed Modeling Intercomparison Project DMIP)	
			Joint Hurricane Testbed	
			COMET/CSTAR Grants	
		Employ scientific and emerging technological capabilities to advance decision support services and to educate stakeholders.	Hydrologic research (e.g., VAR)	
			Forecast applications research	
			Techniques development	

	Work with private industry, universities, and national and international agencies to create and leverage partnerships that foster more effective information services.		Commission (IOC) American Red Cross National Safety Council Primary/Secondary schools Emergency Management Community Regional Intergovernmental Organizations (SOPAC, SPREP) Community-based organizations
		High Performance Computing	
		Visualization and verification	
		Instrument development (ASOS, NEXRAD, upper air, COOP)	
		Collaborative forecasting	
		Training	
		Service Programs (Public warnings and forecasts, Fire Weather, Tropical, Hydrology (water level, water supply, snow), Tsunami, Space Weather, Air Quality, Volcanic Ash)	
		Joint Center for Satellite Data Assimilation (JCSDA)	
		Advanced Hydrologic Prediction Service (AHPS)	
		Interactive Forecast Preparation System (IFPS)	

					(IFPS)	
					IT Infrastructure (AWIPS, High performance computers)	
					Customer Service	
					Education/Outreach	
					StormReady	
					Customer/Partner workshops	
					Dissemination (currently NOAA Weather Radio, EMWIN, NWWS, Internet, FOS, NWSTG/ NOAAPORT)	
					National Digital Forecast Database (NDFD)	
					International Satellite Communications System (ISCS)	
					Social science studies	

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 $825 billion per year transportation and public utility sector is almost entirely weather and climate dependent[1]. At least $4 billion is lost annually through economic inefficiencies as a result of weather-related air-traffic delays. Improved and more detailed surface weather forecasts, warnings, and observations could reduce the 7,000 weather-related fatalities and 800,000 injuries annually from vehicle crashes. The injuries, loss of life, and property damage from weather-related crashes cost an average of $42 billion annually. We are committed to work with our weather enterprise partners to continue to improve weather information services to support all modes of transportation. Improved aviation forecasts will help mitigate air traffic delays and reduce weather-related aviation accidents and facilitate use by the FAA, dispatchers, and pilots for traffic management. Improved snow, precipitation, and water forecasting will reduce disruption and improve efficiency of surface transportation systems. Improved ocean and wind forecasting will aid sea-borne transport from the high seas to our coasts and in the Great Lakes.

[1]Dutton, Bulletin of the American Meteorological Society, September 2002, page 1303, 1307 using calendar year 2000 Gross Domestic Product.

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

NOAA Outcomes	**NOAA Strategies Employed by NWS**	*NWS Activities*	*NWS Partners*
Safe, secure, and seamless movement of goods and people in the U.S. transportation system Environmentally sound development and use of the U.S. transportation system	Expand and enhance advanced technology monitoring and observing systems, such as weather and oceanographic observations, ice forecasts and nowcasts, hydrographic surveys, and precise positioning coordinates, to provide accurate, up-to-date information.	Radar Automated Surface Observing System (ASOS), Hydrometeorological Automated Data System (HADS)	National Environmental Satellite Data and Information Service (NESDIS), Office of Oceanic and Atmospheric Research (OAR), NOAA Marine and Aviation Operations, National Ocean Service (NOS) DOT(FAA, FHWA), DOD, DHS and other federal agencies State DOTs Marine industry (shipping, fishing, boating) Aviation industry Surface transportation industry Recreation and tourism industries Private sector (meteorological and technological) Regional and state climatologists International agencies (WMO and National Meteorological Services (NMSs) Academic and research institutions Media
	Develop and apply new technologies, methods, and models to increase the capabilities, efficiencies, and accuracy of transportation-related products and services.	Cooperative Observer Program (COOP) Upper Air (radiosonde, automated aircraft observations, Alaska profilers)	
	Develop and implement sophisticated assessment and prediction techniques, products, and services to support decisions on aviation, marine, and surface navigation efficiencies; coastal resource management; and transportation system management, operations, and planning.	Marine/ocean observation network (buoys, voluntary shipboard observations, Coastal-Marine Automated Network) Regional Ocean Observing Systems (e.g., GoMOOS)	
	Build public understanding of the technology involved and the role of the environment in commerce and transportation through outreach, education, and industry collaboration.	Public, Aviation, Marine/Coastal/Ocean, Volcanic Ash, Ice, Surface Weather, and Space Weather Programs	
		Marine Observation Network Testbed Joint Hurricane Testbed	

				Statistical forecast models (e.g., MOS)	
				Advanced Hydrologic Prediction Service (AHPS)	
				Training Program	
				Modernized Precipitation Frequency Standards	

Provide Critical Support for NOAA's Mission

A sound, robust infrastructure is needed to maintain NWS operations and services. Facilities; operating and maintaining equipment in a high state of readiness; information technology systems; administrative support; workplace safety and security – all are essential to provide the environment and infrastructure our people need to get the job done. Our facilities management strategic plan will ensure our work is performed in locations and with equipment that promote longevity, efficiency, safety, and effective use of both human and natural resources. Attention to an integrated architecture for information technology will guide cost-effective decisions. Improved budget, financial and cost management systems focus on cost-effective mission delivery of products and services to our customers and partners. We are committed to providing the infrastructure and tools our employees need to do their job.

Provide Critical Support for NOAA's Mission

NOAA Outcomes	**NOAA Strategies Employed by NWS**	*NWS Activities*	*NWS Partners*
A safe operating environment with efficient and effective financial, administrative, and support services A sustainable and strategic facilities master planning process with a 5 to 10 year planning horizon NOAA Homeland Security-related capabilities are fully integrated into national planning and available at all times Secure, reliable, and robust information flows within NOAA and out to the public	Adopt a functional management model to deliver administrative and financial services that will establish direct lines of accountability from headquarters business line managers to all NOAA financial and administrative staff located in the field. Employ a planning, programming, budgeting, and execution system to enhance NOAA's capabilities and to guarantee effective delivery of needed products and services. Improve the efficiency, accountability, and transparency of administrative programs and services through process optimization and customer satisfaction assessment. Plan for, construct, and maintain facilities, including co-locating facilities among NOAA entities and external partners to allow for consolidation of services. Lead agency-wide efforts in education and outreach, public affairs, legislative affairs, international affairs, and legal affairs. Develop and maintain an Information Technology Enterprise that fully supports the life cycle of NOAA's programs, is secure, reliable, cost-effective, encourages information sharing, and complies with all applicable policies.	Education/outreach Training Diversity Program Minority Serving Institution outreach Social science activities NOAA Weather Radio Air quality forecasting, StormReady Continuity of Operations Water-borne dispersion forecasting,	NOAA's Office of Education and Sustainable Development (ESD) and other NOAA line/staff offices U.S. Army Soldier Biological Chemical Command; DHS; DOE; Defense Threat Reduction Agency, Office of Personnel Management (OPM) and other Federal agencies State, local, and tribal agencies American Meteorological Society (AMS), National Weather Association (NWA), and other professional societies Media Private sector (weather and technological) Universities (education) Minority serving institutions Non-profits (HACU, SACNAS, AISES) Community-based organizations Emergency management community National Weather Service Employees Organization (NWSEO)

		Implement a strategic approach that attracts and maintains a competent and diverse workforce and creates an environment that develops, encourages, and sustains employees as they work to accomplish NOAA's strategic goals.			Dam/levee failure flood forecasting	
					Radar	
					Occupational safety and health	
		Coordinate NOAA's homeland security-related plans, programs, and policies to enhance NOAA-wide program response, risk management, continuity of operations, and other contingency planning, and program infrastructure.			Physical security	
					Facilities	
		Provide timely and accurate policy, guidance, and information on safety issues affecting NOAA, its customers, and its contractors.			Systems operations and maintenance	
					Information technology (High Performance Computing, AWIPS, NWSNET)	
					Human capital	
					Environmental compliance	
					Budget/financial/cost management	
					NOAA SFA	
					Employee exit interviews	

Contributions to NOAA Cross-cutting Priorities:

Developing, Valuing, and Sustaining a World-Class Workforce

The NWS workforce is our heart and soul and the starting point for our commitment to organizational excellence. Our human resource strategic plan and management practices reflect this commitment and embody our vision and core values. We are committed to recruit, retain, and develop the diverse, highly trained, and customer-service-oriented people we need to embrace change, value individual differences, and promote teamwork in serving our customers and partners. Developing and maintaining a comprehensive training program for all employees will enable us to capitalize on its strong workforce and develop tomorrow's leaders.

Integrating Global Environmental Observations and Data Management

Integrated, improved and an increased number of observations are key to improving our understanding, analysis, and prediction of the earth's environment – from space to the atmosphere to water**.** Working with local, regional, national, and international partners, we will work with its sister agencies – NOS and NESDIS -- to establish an integrated, user-friendly global to local observational system that provides more timely and accurate monitoring of the coupled ocean-atmosphere-land system to increase the efficiency and effectiveness of observations in environmental operations and research. We will address gaps in the observing architecture to ensure continuity of observations; establish cost effective approaches for future integrated observing capability, and meet NOAA's Global Environmental Observing System of Systems (GEOSS) commitments. We are committed to high quality and reliable observations from systems managed by NWS , including Next Generation Radar improvements, upper-air network (e.g., wind profilers), , lightning data network, Deep Ocean Assessment and Reporting of Tsunami (DART) buoys, and the Cooperative Observer (COOP) Network other government radar assets. Supporting GEOSS, NWS will support Integrated Surface Observing System (ISOS) through the Cooperative Observer Network Modernization/ National Mesonet program which continues efforts to improve the density, frequency and reliability of surface observations through modernizing the COOP network and incorporating high quality mesonet data from around the country. We will expand the use of NOAA's marine observing network and incorporate regional observations through partnerships. We are also committed to effective use of information from observing systems operated by others – our sister agencies in NOAA, private sector assets, and other government agencies at the federal, state, local, regional and international levels.

Ensuring Sound, State-of-the-Art Research

Sound, reliable state-of-the-art research will generate integrated scientific approaches that better align the agency to provide solutions to environmental, economic, and public safety problems. NOAA, primarily the Office of Oceanic and Atmospheric Research, carries out scientific research and enables others to carry out research by making data/ information available. NWS will foster research efforts on hydrology, weather, climate, and integrating oceanic prediction into the operational prediction suite. We will support other organizations, both in government and in academia, to develop new techniques, technologies and prediction capabilities; to form an integrated understanding of the changing earth; to underpin environmental analysis, prediction, and management missions and capabilities; and to help ensure integration into operations to help provide a vibrant basis for new products and services required by the Nation and the world.

Promoting Environmental Literacy

To help us meet our mission to protect life and property and enhance the national economy, educating our users about our products and services is essential, with the goals of improving their response to natural hazards, aiding state and local management of natural resources; ensuring decision makers not only have access to environmental and hazard information, but also comprehend it and are knowledgeable of appropriate actions to take; and helping all users respond as needed. We will focus on an expanded customer education and outreach effort to better meet the needs of a more diverse population. We will continue to support education in the environmental sciences and particularly encourage young people to pursue science educational opportunities, with a special focus on minority serving institutions to increase participation of under-represented groups in environmental sciences.

Leading International Activities

Working with our international partners will foster a two-way exchange of information, technology and training to promote U.S. policies and interests beyond our national borders in earth observation, and weather, water and climate forecasting. Global coverage of observations is important to understanding the Earth's climate and developing models that benefit forecasts for this country, from seasonal climate forecasts to winter and tropical storms. The U.S. public will benefit from these relationships by improved economic and social/political development and scientific understanding.

Appendix A

National Weather Service Performance Measures

NWS is recognized as a "best practice' leader within the US Government in using meaningful metrics and focusing on performance to improve services. NWS is committed to continued leadership in performance based management. This appendix presents NWS performance measures reported under the Government Performance and Results Act (GPRA). These metrics will be reviewed as part of our annual planning cycle – improved metrics will be introduced when they are more useful to our customers and/or more accurately represent NWS performance. The NWS performance measures support NOAA Strategic Plan Performance Objectives and Outcomes (see NOAA Strategic Plan at http://www.spo.noaa.gov/), which are also shown in the table.

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

Outcomes	Strategic Plan Performance Objectives	NOAA Performance Measures	FY 2003 Baseline	FY 2010 Estimated Target
A predictive understanding of the global climate system with quantified uncertainties sufficient for making informed and reasoned decisions on time scales of weeks to decades Climate-sensitive sectors and a climate-literate public effectively incorporating NOAA's climate products into their plans and decisions	Improve climate predictive capability from weeks to decades, with an increased range of applicability for management and policy decisions	US temperature forecasts (cumulative skill score computed over the regions where predictions are made) (GPRA)	17	***25***

Serve Society's Needs for Weather and Water Information

Outcomes	Strategic Plan Performance Objectives	NOAA Performance Measures		FY 2003 Baseline	FY 2010 Estimated Target
Reduced loss of life, injury, and damage to the economy Better, quicker, and more trusted weather and water information to support improved decisions Increased satisfaction with quality of weather and water information and services	Increase lead time and accuracy for weather and water warnings and forecasts Improve predictability of the onset, duration, and impact of hazardous and severe weather and water events Increase application and accessibility of weather and water information as the foundation for creating and leveraging public (i.e., Federal, state, local, tribal), private, and academic partnerships Increase development, application, and transition of advanced science and technology to operations and services Increase coordination of weather and water information and services with integration of local, regional, and global observation systems	Lead time (minutes), accuracy (%), and false alarm rate (FAR, %) for severe weather warnings tornadoes (GPRA)	Lead Time	13	16
			Accuracy	79%[1]	78%[1]
			FAR	76%	70%
		Lead time (min) and accuracy (%) for severe weather warnings for flash floods (GPRA)	Lead Time	41	54
			Accuracy	89%	91%
		Hurricane forecast track error (48 hour) (GPRA)	Nautical Miles	107[1]	124[1]
		Accuracy (%) (threat score) of Day 1 precipitation forecasts (GPRA)		29	30
		Lead time (hours) and accuracy (%) for winter storm warnings (GPRA)	Lead Time	14	17
			Accuracy	90%	92%

[1] NOAA currently uses annual measures, which have significant year-to-year variability due to weather and climate. The FY 2003 baseline shows annual performance, in a few cases, significantly better than the long-term trends in performance.

Support The Nation's Commerce with Information for Safe, Efficient, and Environmentally Sound Transportation

Outcomes	Strategic Plan Performance Objectives	NOAA Performance Measures		FY 2003 Baseline	FY 2010 Estimated Target
Safe, secure, efficient, and seamless movement of goods and people in the US transportation system Environmentally sound development and use of the US transportation system	Enhance navigational safety and efficiency by improving information products and services Reduce weather-related transportation crashes and delays Reduce human risk, environmental and economic consequences resulting from natural or human-induced emergencies	Accuracy (%) and false alarm rate (FAR) (%) of forecasts of ceiling and visibility (3miles/1000 ft.) (GPRA)	Accuracy (%)	48%	57%
			FAR (%)	64%	63%
		Accuracy (%) of forecast for winds and waves (GPRA)	Wind Speed	57%	69%
			Wave Height	71%	82%

Appendix B

Glossary

AFWA	Air Force Weather Agency
AFWS	Automated Flood Warning System
AHPS	Advanced Hydrologic Prediction Service
AISES	American Indian Science and Engineering Society
AMS	American Meteorological Society
AOPC	Atmospheric Observation Panel for Climate
ASOS	Automated Surface Observing System
AWIPS	Advanced Weather Interactive Processing System; workstation and communications infrastructure used by NWS field offices
BLM	Bureau of Land Management
C-MAN	Coastal-Marine Automated Network
COMET	Cooperative Program for Operational Meteorology, Education, and Training
Continuity of Operations	Program to ensure that NWS can sustain all essential operations in the event of a disaster or emergency
COOP	Cooperative Observer Program; non-NWS individuals voluntary providing observations to NWS
CSTAR	Collaborative Science Technology and Applied Research Program
DART	Deep-ocean Assessment and Reporting of Tsunamis
DHS	U.S. Department of Homeland Security
DMIP	Distributed Modeling Intercomparison Project
DoC	United States Department of Commerce
DoD	United States Department of Defense
DoE	United States Department of Energy
DoT	United States Department of Transportation
ECMWF	European Centre for Medium-Range Weather Forecasting
EEO	Equal Employment Opportunity
EMWIN	Emergency Manager Weather Information Network
Ensembles	Collection of two or more forecasts that verify at the same time
EPA	Environmental Protection Agency
ESD	NOAA's Office of Education and Sustainable Development
ESMF	Environmental Systems Modeling Framework (a common modeling infrastructure for global and climate models)
EUMETSAT	European Organization for the Exploitation of Meteorological Satellites
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FNMOC	Fleet Numerical Meteorology and Oceanography Center
FOS	Family of Services; an NWS dissemination network
GCOS	Global Climate Observing System

GEOSS	Global Earth Observing System of Systems
GIS	Geographic Information System
GOES DCP	Geostationary Operational Environmental Satellite Data Collection Platform
GoMOOS	Gulf of Maine Ocean Observation System
GUAN	GCOS Upper-Air Network
HACU	Hispanic Association of Colleges and Universities
HADS	Hydrometeorological Automated Data System
IFLOWS	Integrated Flood Observing and Warning System
IFPS	Interactive Forecast Preparation System
IOC	Intergovernmental Oceanographic Commission
IRIS	Incorporated Research Institutions for Seismology
ISCS	International Satellite Communications System
ISOS	Integrated Surface Observing System
IT	Information technology
JCSDA	Joint Center for Satellite Data Assimilation
Mesonet	any small-scale network of observations
MMS	Minerals Management Service
MOS	Model Output Statistics
NASA	National Aeronautics and Space Administration
NAVOCEANO	Naval Oceanographic Office
NCEP	National Centers for Environmental Prediction
NDFD	NWS National Digital Forecast Database
NESDIS	NOAA's National Environmental Satellite, Data, and Information Service
NEXRAD	Next Generation Radar; the Weather Surveillance Radar (WSR) 1988-Doppler
NMAO	NOAA Marine and Aviation Operations
NMFS	NOAA's National Marine Fisheries Service
NMS	National Meteorological Service
NOAA	National Oceanic and Atmospheric Administration
NOAAPORT	Broadcast system providing one-way broadcast communication of NOAA environmental data and information in near-real time to NOAA and external users
NOS	NOAA's National Ocean Service
NRCS	Natural Resources Conservation Service
NSF	National Science Foundation
NWA	National Weather Association
NWP	Numerical weather prediction
NWR	NOAA Weather Radio
NWS	NOAA's National Weather Service
NWSNET	NWS Network
NWSEO	National Weather Service Employees Organization
NWSTG	National Weather Service Telecommunications Gateway
NWWS	NOAA Weather Wire Service
OAR	NOAA's Office of Oceanic and Atmospheric Research

OGP	NOAA's Office of Global Program
OPM	Office of Personnel Management
Profiler	Type of radar which is designed to measure vertical wind and/or temperature structure of the atmosphere
RFC	River Forecast Center
RRS	Radiosonde Replacement System
SACNAS	Society for the Advancement for Chicanos and Native Americans
SFA	Survey, Feedback, Action
SOPAC	South Pacific Applied Geoscience Commission
SPREP	South Pacific Regional Environmental Programme
StormReady	NWS outreach program to educate communities on preparedness for severe weather
Targeted Observations	"Opportunity-driven" observations taken for an actively chosen location, time, and/or variable in order to optimize the quality of NWP guidance
UCAR	University Corporation for Atmospheric Research
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USCG	United States Coast Guard
USGS	United States Geological Survey
USWRP	United States Weather Research Program
VAR	Variational Analysis
WFO	Weather Forecast Office
WMO	World Meteorological Organization
WRF	Weather Research and Forecast (community forecast model infrastructure and process)