Building Pathways for Better Science and Technology in Water Forecasts

Office of Hydrologic Development Strategic Plan For FY 2003 to 2008

Version 1.1

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FORWARD

Since our inception, the Office of Hydrologic Development (OHD) and the Hydrology Laboratory (HL) have focused on the development and delivery of critical information and scientific methodology for river forecasting. We have developed a comprehensive knowledge of the way various weather phenomena influence America's rivers. Our expertise has enabled us to become a world leader in applied hydrologic forecasting.

The imperatives of the 21st century challenge us to expand this focus to provide better information to manage water resources. Fresh water forecasting and decision tools are crucial to the national well-being and commerce. Regional estimates of drought, snow, river flow, soil moisture content, pollutant dispersion, and inflow to coastal estuaries will enhance health and safety. A new generation of user-friendly information and forecasting tools will be used by a variety of customers to help them make water wise decisions and manage our precious water resources to enhance the national economy.

This plan confirms our commitment to support the National Weather Service's (NWS) goal to be America's No Surprise Weather Service. The NWS Strategic Plan states that "tomorrow's NWS will extend the limits of skill in weather and climate forecasting to days, weeks, and seasons, and will work with other components of our parent agency, the National Oceanic and Atmospheric Administration, and our partners to meet America's expanding needs for seamless services." As a component of NWS, we affirm this responsibility and will make significant contributions toward meeting these goals.

The OHD is a talented, persistent, and decided team of world class professionals who know we can "make a difference." Our plan recognizes this dedication and sets the tone to aggressively seize the moment and constructively impact the future. This will require:

- Total devotion to customer support;
- Continued collaboration with our water program partners;
- On time delivery of valued science, software, and information;
- Recurrent strategic planning;
- Practical social science wisdom; and
- Unwavering dedication to superior performance.

PREFACE

The NOAA Strategic Plan is the guiding document of an improved planning and management system. NOAA's planning, programming, and budgeting cycle will link program plans, annual operating plans, and the entire NOAA budget to the NOAA Strategic Plan. The NWS and all other NOAA organizational elements have strategic plans, each conforming with the NOAA Plan, so that all NOAA programs, and the entire NOAA budget, are traceable to the NOAA Strategic Plan. This OHD Strategic Plan builds on the NOAA and NWS plans by showing how we contribute and linking to the elements of each plan.

To preserve the linkages with the parent plans, the OHD Strategic Plan follows the structure of the NWS Strategic Plan and presents our contributions to the NOAA Strategic Plan elements. NOAA's Plan identifies high-level Goals and Cross-Cutting Priorities and uses common mission strategies (Monitor and Observe; Understand and Describe; Assess and Predict; and Engage, Advise, and Inform) to address each goal. The NWS and OHD plans, in turn, take these same Goals and Cross-Cutting Priorities and describes our role in each. For each Goal and Priority a table includes those parts of the NOAA and NWS strategies relevant to OHD, and identifies specific OHD activities and partners critical to each NOAA and NWS strategy. An appendix provides the metrics OHD uses to measure and target performance over the life of the Plan. Other appendices provide a glossary of terms, and explanatory information and an organization chart.

This Plan is the framework document for the OHD annual operating plan (AOP). The AOP ensures the annual activities and plans continue to contribute to NOAA, NWS, and OHD strategic objectives.

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INTRODUCTION

The purpose of this document is to present the National Oceanic and Atmospheric Administration (NOAA), National Weather Service (NWS), Office of Hydrologic Development (OHD) Five Year Strategic Plan in context with the NOAA Strategic Goals and Cross-cutting Priorities and the NWS Strategic Plan. The plan was prepared by Varone Consulting Group, Inc., using a consensus process obtaining input from all of OHD management and leadership personnel, and subsequently from the entire employee and contractor staff. Our plan establishes the direction for all OHD activities for fiscal years 2003 – 2008. It will be updated yearly. In addition, all future planning activities will tie to this plan.

The NWS Strategic Plan sets the tone for our plan. The NWS plan states:

> "*America's vulnerability to weather, water, and climate variability is rising as more of the population moves into harms way and national and global economies become more complex. Approximately 40 percent of Americans—some 100 million—currently reside in areas of high risk to natural disasters, with the number climbing yearly. National and global economies are becoming so complex and interdependent that disruption in one place by weather or water events can lead to costs and delays in other parts of the Nation or world.*
>
> *The NWS serves the American public through a partnership with other Government agencies, academia, nonprofit organizations, and the private sector. We work closely with our partners in all aspects of the forecast process from research, to observation collection, to forecast dissemination.*
>
> *The 21st century is a time when rapid science and technological advances offer significant improvements to public safety and economic well being. We have made great progress in forecasting. In the last decade, we increased the lead time for tornado warnings from 6 minutes to ten minutes; in the last two decades, our four-day weather forecasts have become as accurate as our two-day forecasts. 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. The NWS and NOAA stand ready to work with our partners to better understand and apply technology and science to continue our record of forecast improvements and meet expanding needs for high quality weather, water, and climate services*."

NOAA defined the structure of the OHD Strategic Plan in their Strategic Plan. Additional structure and direction comes from NWS. Our plan elements tie directly to and support all NOAA and NWS objectives. We have taken measures to ensure that our plan articulates the full intention of support for both parent organizations. In addition, the planning process recognizes other NWS organizations and missions. This document reflects the all-encompassing goal of ensuring that OHD fits into, works with, and interacts appropriately with the entire NOAA organization.

There are ***four NOAA GOALS*** that have been defined for OHD. Our strategic plans must track to them. In addition, NOAA has defined cross-cutting priorities that span the NOAA goal spectrum. The cross-cutting priorities are meant to allow organizations to describe the "across-the-board" strategic activities that will be used to support and meet the NOAA priorities.

There are five element components of the NOAA organization mission strategy. Measures of success have been established for each. All NOAA subordinate strategic plans must adhere to this NOAA format. The definition of the five element components of the strategy is as follows:

- ***Monitor and Observe*** the land, sea, atmosphere, and space and create a data collection network to track Earth's changing systems. In our plan and tables, this element refers to the activities that result in the acquisition of data sources and data.

- ***Understand and Describe*** how natural systems work together through investigation and interpretation of information. In our plan and tables, this element refers to research, requirements analysis and definition.

- ***Assess and Predict*** the changes of natural systems, and provide information about the future. In our plan and tables, this element refers to developing and fielding products and information.

- ***Engage, Advise, and Inform*** individuals, partners, communities, and industries to facilitate information flow, assure coordination and cooperation, and provide assistance in the use, evaluation, and application of information. In our plan and tables, this element refers to social science, outreach, marketing, and training efforts including those that will make our products and information easier to understand and use.

- ***Manage*** coastal and ocean resources to optimize benefits to the environment, the economy, and public safety. In our plan and tables, this element refers to strategies to provide information to help manage coastal, ocean, and *other water resources* such as rivers, streams, lakes and ground water. In addition, the manage element is only included in NOAA Goal 1. This is reflected in the OHD plan.

MISSION/VISION

The NWS Vision is to be:

> *"America's no surprise weather service. A world-class team of professionals who*
>
> - *Produce and deliver quality information (forecasts and observations) you can trust when you need them most*
> - *Rapidly incorporate proven advances in science and technology*
> - *Measure our performance to describe our skill and improve the value of our services*
> - *Strive to eliminate weather- and water-related fatalities and improve the economic value of weather information "*

OHD has a vision statement that is displayed throughout the facility to remind employee and contractor support staff why we are here. The vision statement reflects our early direction and accomplishments. It concentrates on river and stream forecasts. The existing vision statement follows:

> *Together, we develop and deliver valued science, software and information for river and stream forecasts to save lives, property, and enhance America's economy.*

The Nation's need for fresh water resources, drought, homeland security, and environmental pressures have changed our focus from river and stream forecasts to an organization that is developing information and tools to inform the appropriate elements of Government to help manage this vital resource. In addition, the criticality of water to our national well-being also expands the OHD horizon and customers to state local government, private industry, and the general public. We consequently changed our vision statement to reflect this new, more urgent and far reaching vision. The new vision statement that supports the NWS Vision is presented below.

> *Together, we develop and deliver valued science, software and information for river and water resource forecasts to save lives and property, manage water resources, and enhance America's economy.*

The new vision statement reflects an expansion of our role and responsibilities to develop additional hydrologic-based information and tools such as drought severity and length predictions, soil moisture content, precipitation frequency, and pollutant dispersion.

The NWS mission statement is:

> *"The National Weather Service provides weather, hydrologic, 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. The NWS data and products form a national information data base and infrastructure which can be used by other governmental agencies, the private sector, the public, and the global community."

We support the NWS mission and our new vision through our **mission**, which is to:

- ***Provide information and support for our primary customers, the forecasters at National Weather Service River Forecast Centers, Weather Forecast Offices and National Centers, partners within all levels of government, and constituents from academia, the international research community, the private sector, and the public.***

- ***Conduct scientific research and software engineering to develop and maintain data processing systems, analysis, and prediction tools to support operational hydrologic models.***

- ***Obtain and process data to advance the state-of-the-art, produce more accurate river and stream forecasts, and provide valuable services to help the agencies that manage water resources, and make contributions to scientific publications and actively participate in professional societies.***

VALUES

We have established a set of values that have been adopted to foster an environment that promotes employee and contractor staff creativity, enthusiasm, and support to enable us to meet our goal. Our values clearly demonstrate the corporate commitment to our vision, mission, customers, staff, and science. ***We value*:**

- ***Service to our customers, especially NWS field offices, and ultimately the public;***

- ***Diversity, dedication, and commitment;***

- ***Advancement and application of new science;***

- ***Useful, state-of-the-art software; and***

- ***Accurate, timely, and valued information.***

OHD CUSTOMER CLASSIFICATIONS

OHD has grouped its customers into classifications to promote a better understanding of the organizations and people we serve. The classifications are as follows:

Primary Customers	NWS River Forecast Centers (RFCs)
	NWS Weather Forecast Offices (WFOs)
	Other NWS Organizations
	General Public
NOAA Collaborative	Oceanic Service
Customers	Atmospheric and Oceanic Research
	Environmental Satellite & Data Information Service
	Marine & Aviation Operations
	Fisheries
Outside Collaborative	Other Federal agencies
Customers	State & Local Government
	Educational and Research Institutes
	International Agencies
Secondary Customers	Communications Media
	Industry
	Economic Forecasters

The hierarchical classifications allow us to focus our energies without loosing sight of the fact that they are all customers. It should be noted that many of these organizations or groups may also be stakeholders. An example would be in the internal NWS organization where we provide direct information and products to the Office of Science and Technology, our customer; in contrast the Office of Climate, Weather and Water Services (OCWWS) is a major stakeholder in our mission.

OHD ORGANIZATION

OHD is a headquarters component of the NWS. As depicted in the attached organization chart, we have two components within our structure. Hydrologic Strategy, Plans, and Programs focuses on developing operating plans, defining and refining business processes, customer interface and support, and the Advanced Hydrologic Prediction Service (AHPS) Program Office. The HL, in turn, is comprised of the Data Systems Branch, the Science and Modeling Branch, and the Software Engineering Branch. The Data Systems Branch is the organization that develops and maintains the Hydrometeorological Automated Data System (HADS). HADS accepts raw real-time data and edits and processes that data into a database structure that is available to a number of NWS elements. The Data Systems Branch also runs the National Hydrologic Data System (NHDS) and manages the Hydrometeorological Design Studies Center. The Science and Modeling Branch is charged with developing and proving new hydrological hydrometeorological and climatological science to further the ability to make more accurate short and long-term predictions. The Software Engineering Branch is charged with maintaining existing and developing new software routines and systems that actually provide the predictions to our customers.

Within the framework of the NOAA Strategic Plan elements, The Software Engineering Branch focuses most of its efforts on Assess and Predict strategic activities. The Science and Modeling Branch focus is primarily on Understand and Describe strategic activities. The Data System

Branch efforts encompass the Monitor and Observe, Understand and Describe, and Assess and Predict strategic activities.

NOAA MISSION GOALS

The NOAA mission goals that all components must support are presented below. They are consciously defined at a broad level to ensure that all component mission statements remain possible.

- *Goal 1: Protect, Restore, and Manage the Use of Coastal and Ocean Resources through Ecosystem-based Management*
  - *Objective 1 - Protect and restore ocean, coastal and Great Lakes resources*
  - *Objective 2 - Recover protected species*
  - *Objective 3 - Rebuild and maintain sustainable fisheries*
- *Goal 2: Understand Climate Variability and Change to Enhance Society's Ability to Plan and Respond*
- *Goal 3: Serve Society's Needs for Weather and Water Information*
- *Goal 4: Support the Nation's Commerce with Information for Safe, Efficient, and Environmentally Sound Transportation*

NOAA CROSS-CUTTING PRIORITIES

NOAA met with stakeholders and employees to identify strategic directions for the next decade. Both groups emphasized that NOAA needs to increase its priority on improving the core capabilities that support the Agency's four mission goals. As a result, NOAA selected six essential areas of growth for the future. These are defined as cross-cutting priorities and describe the programmatic and managerial underpinnings that facilitate NOAA's delivery of services and enable effective operations. In addition to supporting NOAA's mission goals, each priority maintains a budget identity and has its own performance measures. The cross-cutting priorities are:

- Integrated Global Environmental Observation and Data Management System;
- Environmental Literacy, Outreach, and Education;
- Sound, State-of-the-art Research;
- International Cooperation and Collaboration;
- Homeland Security; and
- Organizational Excellence: Leadership, Human Capital, Facilities, Information Technology and Administrative Products and Services.

OHD STRATEGIC PLAN ELEMENTS

NOAA GOAL 1 – Protect, Restore, and Manage the Use of Coastal and Ocean Resources Through Ecosystem-based Management

Advances in understanding of the physical, chemical, and biological cycles of earth's ecosystems will require greater cooperation among previously distinct scientific disciplines and improved coordination among NOAA's earth science missions. The NWS will put greater emphasis on contributions of NWS weather, water, and climate observations and forecasts to ecosystem forecasting; greater attention to using NWS observations and forecasts of atmospheric, surface, riverine, estuarine, and oceanographic conditions to aid fisheries 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.

The flow of water from America's rivers and streams into estuaries and coastal waterways is one of the major factors that must be considered to manage the ecosystems of our coastal and ocean resources. Wildlife depends on fresh water. Fish and amphibious life may depend on the saline level of their habitat. Man-made or natural pollutants flow along with the fresh water into the estuaries and coastal waterways. Knowledge of and predictability of flow into these waterways will allow others to be more effective in their efforts to improve these ecosystems. OHD is actively engaged in expanding our prediction ability and has planned new products and models that will produce new information that will be more accurate rendering better decisions to improve the ecosystems. Our detailed contributions follow:

NOAA Outcome Measures Affected by OHD Strategies:

- Increased number of coastal and marine ecosystems maintained at a healthy and sustainable level.
- Increased social and economic value of the marine environment and resources.
- Increased number of acres and stream-miles restored for coastal species.
- Increased number of protected species in a stable condition or upward trend.
- Improved ecological conditions in coastal and ocean protected areas.

OHD Strategies & Measures of Success	Supporting Activities	OHD Partners
Monitor and Observe: 1. Monitor and observe aspects of the impact of the flow of water and/or pollutants into estuaries and coastal waterways to identify and acquire new sources of data that will enable us to improve existing, and develop new, prediction models that provide ecosystem decision makers with improved predictions. • Covered under Assess and Predict.	Two Dimensional National Oceanic Services (NOS) Grid Data, Dispersion Data Source	NOS, U.S. Geological Service (USGS), Army Corps of Engineers (COE), Environmental Protection Agency (EPA), State and Local Government, Academia and Research Institutions

OHD Strategic Activities:

- Work with coastal and ecosystem organizations to understand their information needs then develop ways to acquire the data to support those needs.
- Work with coastal and ecosystem organizations to identify new sources for dispersion data.

OHD Strategies & Measures of Success	Supporting Activities	OHD Partners
Understand and Describe: 1. Work with national and international hydrologic research partners to perform and leverage the research that will result in new science that shows the impact of water flow and pollutant dispersion into coastal areas. • Covered under Assess and Predict.	Flood Inundation Forecasts, Flood Wave (FLDWAV)	Office of Science & Technology (OS&T), OCWWS, Office of Operational Services (OOS), NOS, Other Federal Agencies, State and Local Government, Academia and Research Institutions

OHD Strategic Activities:

- Determine better ways to predict, understand, and display the impact of water and pollutant flow through streams and rivers into estuaries and coastal waterways.

OHD Strategies & Measures of Success	Supporting Activities	OHD Partners
Assess and Predict: 1. Develop and implement AHPS, enhanced flood forecast mapping and enhanced FLDWAV products on a national basis. • Additional tools and information to show the impact of the flow of water and/or pollutants into estuaries and coastal waterways. • Increased number of AHPS sites.	AHPS, Flood Inundation Forecasts, FLDWAV	OS&T, OCWWS, OOS, NOS, Other Federal Agencies, State and Local Government, Academia and Research Institutions

OHD Strategic Activities:

- Integrate NOS two dimensional grid data into river mechanics.
- Help integrate NWS operating networks to facilitate increased data sharing.
- Expand AHPS to cover additional rivers and streams that directly flow into estuaries and coastal waterways.
- Incorporate pollutant dispersion into flood forecast mapping and FLDWAV products then implement on a national basis.

OHD Strategies & Measures of Success	Supporting Activities	OHD Partners
Engage, Advise, and Inform: 1. Establish a social science information program that educates coastal and ecosystem customers on the value of OHD-generated information and the need to understand the impact of water flow and pollutant dispersions into coastal watersheds. • Participation in additional collaborative work groups established with other NOAA organizations.	Social Science & Information Dissemination & Education Plans	OS&T, OCWWS, OOS, NOS, Other Federal Agencies, State and Local Government, Academia and Research Institutions
OHD Strategic Activities: • Integrate OHD products with NOAA coastal products to make the presented water and pollutant flow information more meaningful and useful.		

OHD Strategies & Measures of Success	Supporting Activities	OHD Partners
Manage: 1. Provide information and tools to help implement plans, regulations, permits, and enforcement activities for the protection, restoration, and managing ocean, coastal, and Great Lakes resources. • Covered under Assess and Predict.	Flood Inundation Forecasts, FLDWAV	OS&T, OCWWS, OOS, NOS, Other Federal Agencies, State and Local Government, Academia and Research Institutions
OHD Strategic Activities: • Expand efforts to work with those charged to manage coastal and ocean resources to ensure that their hydrologic prediction needs will be met. .		

NOAA GOAL 2 – Understand Climate Variability and Change to Enhance Society's Needs for Weather and Water Information

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 of climate forecasts for local customers and partners. The NWS 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, and energy providers with their resource allocation decisions. NWS will continue to expand coverage and capabilities of 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.

NWS recognizes its responsibility to future generations who will use the climatological and oceanographic data we collect. We recognize 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. We will invest resources to modernize the Cooperative Observer Program. NWS will do our part to make sure 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.

OHD's contributions to NWS and NOAA strategies are significant. Our focus has always been on flood forecasting to enable better flood control and on producing information that the construction industry uses to ensure that water related projects like dams and levees are strong enough to provide the intended protection. Refocusing OHD's efforts to develop a full range of water-related information products and information adds to our contributions. OHD is at the forefront in developing tools that will allow forecasting of severity and length. We are currently providing and will be providing improved information that can be used to manage reservoirs to balance the water needs of irrigation and recreation against the need for consumption. Our information, when used by others, directly affects the public's well-being and contributes to effective use of water for agriculture, transportation, and recreation. Our detailed contributions follow:

NOAA Outcome Measures:

- Increased use of 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.

OHD Strategies & Measures of Success	Supporting Activities	OHD Partners
Monitor and Observe:		
1. Expand collaboration with national and international climate researchers to ensure we understand how to use existing data and/or identify new data sources to increase our understanding of the longer-term climatologic trend impacts on soil moisture and water resources. • Covered under Assess and Predict.	Precipitation Forecasting, Land Data Assimilation System (LDAS), Model Parameter Estimating Experiment (MOPEX), Variational Assimilator (VAR), Potential Evaporation (PE) research, Soil Moisture Studies, AHPS	OS&T & OCWWS, COE, Bureau of Reclamation (USBR), Federal Emergency Management Administration (FEMA), National Aeronautic and Space Administration (NASA), NCDC, State & Local Governments, educational institutions, & international partners

OHD Strategic Activities:

- Expand efforts to provide timely and accurate HADS data to NWS climate prediction personnel.
- Collaborate with other national and international climate research organizations to define new data sources to improve science and leverage each other's findings.

OHD Strategies & Measures of Success	Supporting Activities	OHD Partners
Understand and Describe:		
1. Expand collaboration with climate researchers to ensure that we understand how to use their research findings to increase our understanding of the long-term trend impacts on soil moisture and water resources. • Covered under Assess and Predict.	Precipitation Forecasting, LDAS, MOPEX, VAR, PE research, Soil Moisture Studies, AHPS	OS&T & OCWWS, COE, USBR, FEMA, National Climatic Data Center (NCDC), State & Local Governments
2. Perform additional collaborative studies with other agencies to make more accurate Precipitation Frequency standards to determine the long-range climatologic effect on levees, dams, and water spanning construction. • Covered under Assess and Predict.	Precipitation Frequency Standards	OS&T & OCWWS, FEMA, NCDC

OHD Strategic Activities:

- Actively engage NWS climate activities to determine how to make better use of their research and data and/or jointly perform new research.

OHD Strategies & Measures of Success	Supporting Activities	OHD Partners
Assess and Predict:		
1. Apply joint climate and hydrology research to develop interseasonal and interannual hydrology predictions. • Additional new tools to determine the long-range climatologic effect on the Nation's water supply.	LDAS, MOPEX, AHPS, Additional New Programs	OS&T & OCWWS, COE, USBR, FEMA, NCDC, State & Local Governments
2. Develop more accurate Precipitation Frequency standards to determine the long-range climatologic effect on levees, dams, and water spanning construction. • Additional and more accurate Precipitation Frequency tables.	Precipitation Frequency Standards	OS&T & OCWWS, FEMA, NCDC

OHD Strategic Activities:

- Develop new and expand existing prediction models and products to consider more climatologic trends.
- Expand soil moisture input sources to include snowmelt, temperature, and Climate Ground Cover Geographic Information System (GIS) routines.
- Expand Precipitation Frequency standards to consider 100-year climatologic trends.

OHD Strategies & Measures of Success	Supporting Activities	OHD Partners
Engage, Advise, and Inform: 1. Actively prepare and present LDAS and MOPEX research results to research communities. • LDAS and MOPEX research result presentations to research communities.	Lectures & Symposiums	NOS, Other Federal Agencies, State and Local Government, Academia and Research Institutions
OHD Strategic Activities: • Prepare and deliver lectures and symposium presentations on the results of LDAS and MOPEX to encourage additional cooperation.		

NOAA GOAL 3 – 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 of all weather-related hazards. To meet these expanding requirements, NWS weather and water predictions need to be at the limits of the skill which science, technology, and a highly-trained workforce can provide. NWS is committed to expanding these limits by enhancing observing capabilities; 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 like community modeling; by quickly 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 convenient and understandable form; by taking advantage of existing and emerging technologies to disseminate this information; and by maintaining an up-to-date technology base and a work force trained to use all of these tools to maximum effect. But 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 elements of 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 honor our commitment to excellent customer service.

The majority of the OHD focus is in this NOAA Strategic Goal. We produce information about water. It is our core competency. OHD has always enjoyed a collaborative relationship with educational and research institutions. We are cultivating additional national and international relationships. We consider ourselves as the premier source of applied hydrology knowledge in the world. We are actively accomplishing or planning to accomplish a number of additional activities to enhance our reputation. The resulting benefit will be additional sharing of research findings that we can leverage into our products. We are working to establish more robust data,

technical, and applications architectures. We are actively improving our data handling capabilities to allow for additional data, to improve the speed the data becomes available to our models and other NWS components and decrease the error rate of our real time data. We are developing additional tools and products that will increase the ability of others to control and predict their environment. Lastly, we are committed to process improvement and have initiated efforts to reengineer the way we accomplish our mission. Two of the initial and most critical processes that we are reengineering are our work standard software development and science infusion processes. Our detailed contributions follow:

NOAA Outcome Measures:

- Increased accuracy and amount of lead-time (by category of storm type e.g., hurricanes).
- 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, and temporal and geographic coverage.

OHD Strategies & Measures of Success	Supporting Activities	OHD Partners
Monitor & Observe:		
1. Work with NWS field organizations, national and international Hydrologic research partners to leverage hydrology advances from others seek new cost effective sources of data to improve the usefulness and accuracy of our information. • Covered under Assess and Predict.	Sustain & Advance Collaborative Research, Flood Inundation Forecasts, and LDAS	OS&T, OCWWS, Other Federal Agencies, State and Local Government, Academia and Research Institutions
2. Streamline the data acquisition routines to be able to accept more data and more data types and to process that data faster with fewer errors. • Implemented and streamlined, data source routines that support a higher volume of data types and data sources and a lower volume of errors.	HADS & Geostationary Operational Environmental Satellite (GOES) Data Collection Platform (DCP) Data Improvement, Better Data Quality Control	
3. Improve the reliability of the HADS system. • A higher percentage of HADS available time.	HADS Improvement	

OHD Strategic Activities:

- Redesign and improve transmission of GOES DCP data
- Integrate new sources of data to improve the useability of the prediction information.
- Leverage technology advances to redesign DCP data input and store and forward routines to accept additional real time data sources and process all data significantly faster with fewer errors.
- Improve the routines that process data to make it available faster with fewer errors.
- Off load data archiving and get out of the archiving business process.

OHD Strategies & Measures of Success	Supporting Activities	OHD Partners
Understand and Describe: 1. Research new science and technology to improve and enhance the prediction usefulness and capabilities. • Covered under Assess and Predict. 2. Establish OHD as the scientific leader in hydrologic predictions. • Increased number of honours in academic and professional societies, number of leadership posts, number of articles and publications, and/or number of conferences/workshops hosted and convened.	NWS River Forecast System (NWSRFS) Ensemble Stream Flow Prediction Analysis and Display Program (ESPADP), WFO Hydrologic Forecast System (WHFS) RiverPro, MultiSensor Precipitation Estimator (MPE), PE, LDAS, Reservoir Models	OS&T, OCWWS, OOS, NESDIS, NOS, Other Federal Agencies, State and Local Government, Academia and Research Institutions
OHD Strategic Activities: • Transition OHD research from an internal approach to one that looks externally to leverage other organization's findings increase the number of peer reviewed published papers and findings, and establish and increase the number of hosted collaborative research symposiums. • Conduct follow-on research related to Distributed Model Intercomparison Project (DMIP) and Snow Model Intercomparison Project (MIP). • Research and define the next verification system to enhance accuracy. • Conduct reservoir research to develop better tools to assist reservoir management decisions. • Perform additional research to improve data quality to make models more accurate.		

OHD Strategies & Measures of Success	Supporting Activities	OHD Partners
Assess and Predict:		
1. Continue to improve the accuracy and usefulness of existing prediction models and develop new products, tools, and models that will provide additional usefulness of OHD information based on new sources of data, leveraged research and technologic advances. • Increase the number of AHPS sites. • Increased number of OHD Products and information that contain improved accuracy and functionality.	Enhance NWSRFS FLDWAV & RiverPro, Volume Coverage Patterns (VCP), Ensemble Probabilistic Models, ESPADP, WHFS, MPE , Flood View (FLDVIEW), Distributed Modeling, Site-specific Hydrologic Predictions (small basin fast response modeling), AHPS, Verification	OS&T, OCWWS, OOS, NESDIS, NOS, Other Federal Agencies, State and Local Government, Academia and Research Institutions
2. Modernize the hydrologic forecasting systems and capability using a controlled migration approach. • A Hydrologic Forecasting System & Capability Modernization Plan.	Modernization Plan leading to controlled improvements, Weather Service Radar 1988 Doppler (WSR88D) also known as Next Generation Radar (NEXRAD) science and software improvements	
3. Define and implement infrastructure improvements to plan and standardize the Scientific Infusion and Software Engineering Processes to enable us to enhance existing or develop new science. • Implemented planning infrastructure within OHD organization to define and promote improved business processes.	Reengineer and Improve Business Processes	

OHD Strategic Activities:

- Expand AHPS throughout the United States and enhance site-specific hydrological programs.
- Continue to work with WSR88D and Advanced Weather Interactive Processing System (AWIPS) programs to ensure that they can handle our data and computational requirements.
- Define and develop the future hydrological functions that will be included in the prediction capability and the architecture that will support those functions.
- Develop the next verification system to improve accuracy.
- Develop and improve tools to analyze and display dynamic water effects from a channel routing model that can be applied nationally.
- Update point and hourly precipitation data in the national calibration archives.
- Incorporate National Digital Forecast Database (NDFD) into the hydro forecast process and output hydrologic forecasts back to NDFD.
- Deliver software to AWIPS to accommodate variable forecast lead times, variable forecast phasing.
- Implement the planning function within the OHD organization to help reengineer and improve business processes.
- Set up a Software Engineering Process Group (SEPG) and a Science Infusion Process Group (SIPG) and give them the support to develop standardized methodologies.
- Continue to evaluate and reengineer OHD processes.

OHD Strategies & Measures of Success	Supporting Activities	OHD Partners
Engage, Advise, and Inform:		
1. Establish a social science program that encourages our understanding of customer and user information needs that will lead to better educated customers on the need for and benefits of hydrological predictions. • Implemented Social Science Program that provides feedback on usefulness and adaptability of OHD products and information.	AHPS, OHD Customer Service	OCWWS, Other Federal Agencies, State and Local Government, Academia and Research Institutions
2. Actively determine the customer needs for training on the use of provided information as well as how to use the products to create the information. • Extended customer training capabilities by offering additional material and reaching additional customers.	AHPS, OHD Customer Services	RFCs, WFOs, and OCWWS
3. Develop and present DMIP and Snow MIP lectures to national and international research communities. • Additional DMIP and Snow MIP research papers, lectures, symposium presentations, and the number of conferences/workshops hosted and convened.	Lectures, Symposiums, Conferences & Workshops	OCWWS & International

OHD Strategic Activities:

- Determine the best ways to present our information to all classes of customers
- Increase the useability of presented data.
- Work with other Commerce organizations to incorporate our training into the department-wide distance learning (e-learning) initiative.

NOAA GOAL 4 – 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. NWS will work to provide aviation forecast improvements to help mitigate air traffic delays and reduce weather-related aviation accidents; improve snow and precipitation forecasting which impacts surface transportation; and improve ocean and wind forecasting which impacts sea-borne transport along our coasts and in the Great Lakes. NWS is committed to work with our partners to continue to improve weather information services to support all modes of transportation.

One of the most important transportation factors on the American economy is river barge traffic. Historically the movement of goods along rivers has shifted to rail and then road traffic. However, a significant amount of oil, coal, and agricultural products are moved via the major rivers. Knowing the depth of these rivers is critical to this movement. The Missouri, Mississippi, Ohio and other rivers are a major thoroughfare for this transportation. OHD provided tools and information remains critical to the organizations that manage and use these resources. Our detailed contributions follow:

NOAA Outcome Measures:

- Increased use and effectiveness of environmental information for planning for marine, air, and surface transportation systems.
- Reduced number of and harm from navigation-related accidents due to grounding and allisions (hitting fixed objects).

OHD Strategies & Measures of Success	Supporting Activities	OHD Partners
Monitor and Observe: 1. Acquire additional sources of data that will contribute to our ability to generate information that improves the understanding of the impact of river and stream flow, soil moisture, and snow depth levels on the national economy and transportation. • Covered under Assess and Predict.	AHPS, River Mechanics, LDAS, Distributed Modeling, DMIP, Snow MIP, GIS/SOIL Moisture Integration, GIS/Soil Moisture Integration	OCWWS, COE, Other Federal Agencies, State and Local Government, Academia and Research Institutions

OHD Strategic Activities:

- Identify and integrate new sources of data to improve the useability of the prediction information.

OHD Strategies & Measures of Success	Supporting Activities	OHD Partners
Understand and Describe: 1. Develop new science and define new requirements to improve river forecasts and river routing by enhancing existing and developing new prediction models with new capabilities that affect recreation and barge transportation. • Covered under Assess and Predict. 2. Perform the research that will enable us to develop more accurate and useful models to help manage when, where, and the volume of reservoir and dam releases to rivers and streams for agricultural, commercial and recreational use without jeopardizing consumption levels. • Covered under Assess and Predict.	AHPS, River Mechanics, LDAS, Distributed Modeling, DMIP, Snow MIP, GIS/SOIL Moisture Integration, GIS/Soil Moisture Integration NWSRFS, Reservoir Release Models	OCWWS, COE, Other Federal Agencies, State and Local Government, Academia and Research Institutions

OHD Strategies & Measures of Success	Supporting Activities	OHD Partners
Assess and Predict: 1. Enhance existing and develop new models that provide information that contributes to optimize barge transportation or helps avoid disasters that could negatively affect optimized transportation and provides information to help manage reservoirs and monitor water consumption. • Additional tools and data to make more accurate predictions of the impact of water flow, precipitation, and soil moisture on transportation and/or recreation. • More accurate and useful reservoir release prediction information.	AHPS, River Mechanics, LDAS, Distributed Modeling, DMIP, Snow MIP, GIS/SOIL Moisture Integration, GIS/Soil Moisture Integration, NWSRFS, Reservoir Release Models	OS&T, OCWWS, Other Federal Agencies, State and Local Government, Academia and Research Institutions

OHD Strategic Activities:

- Expand AHPS throughout the United States.
- Expand efforts to provide products and data that have potential commercial use to the transportation, agriculture, communications and media industries.
- Develop additional models to predict water levels and drought conditions based on the hydrologic study of:
  - Reservoir levels and usage;
  - National gridded snow melt run-off;
  - Estimated precipitation; and
  - Soil moisture content.
- Develop and improve tools to analyze and display dynamic water effects, including dam and levee failure, from a channel routing model that can be applied nationally.

OHD Strategies & Measures of Success	Supporting Activities	OHD Partners
Engage, Advise, and Inform: 1. Participate in and/or conduct additional outreach initiatives to better educate customers on the effect of hydrology on commerce. • Increase the number of RFC and WFO personnel trained to use the products to obtain localized meaningful information.	AHPS, OHD Customer Service	OCWWS, Other Federal Agencies, State and Local Government, Academia and Research Institutions
OHD Strategic Activities: • Expand efforts to train RFC and WFO personnel. • Ensure that the Social Science program addresses the impact of OHD products and information on transportation and commerce.		

OHD CONTRIBUTIONS TO NOAA CROSS-CUTTING PRIORITIES

NOAA Cross-cutting Priority 1: Integrated Global Environmental Observation and Data Management System

NOAA will work with its local, state, regional, national, and international partners to develop a global-to-local environmental observation and data management network for comprehensive, continuous monitoring of coupled ocean/atmosphere/land systems. This network will enhance NOAA's ability to protect lives and property, expand economic opportunities, understand climate variability, and promote healthy ecosystems. As part of building this capability, NOAA has begun to inventory it's observing and data management capabilities, and has designed an architectural process for evaluating the efficiency of its data observation and management system and increasing the multiple use of observation platforms and availability of real time data.

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 to ecosystems to the oceans. Working with local, regional, national, and international partners, the NWS will 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. OHD has initiated, or plans to initiate, a number of initiatives to support the NWS and NOAA priority. They are listed below.

Performance measures: user needs better met; improvements in coverage, timeliness, reliability and maintainability

OHD Activities	OHD Partners
Two Dimensional NOS Grid Data, Dispersion Data Source, Precipitation Forecasting, LDAS, MOPEX, VAR, EP Research, Soil Moisture Studies & Establishing a nationwide near-surface soil moisture observation network, HADS Improvements, DMIP, Snow MIP, GOES DCP Data Improvement, Increase access to the USGS and/or other stream gauges	OS&T, OCWWS, OOS, NOS, USGS, USBR, COE, EPA, NASA, FEMA, Homeland Security, Other Federal Agencies, State and Local Government, Academia and Research Institutions

NOAA Cross-cutting Priority 2: Environmental Literacy, Outreach, and Education

NOAA will apply its broad spectrum of environmental and social science expertise to establish an environmental literacy program for educating present and future generations about the changing Earth and its processes. NOAA hopes to inspire our Nation's youth to pursue scientific careers, thereby advancing the future talent of NOAA and its mission partners. This program will improve the public's understanding and response to natural hazards, will assist state and local natural resource managers, and will ensure that decision makers have access to the information they need to appropriately reduce significant human impact on the environment and

to respond to storm warning and environmental change. Due to the high priority of enhancing NOAA's capabilities for Environmental Literacy, Outreach and Education, NOAA will produce a strategic plan on the subject during FY 03.

To help us meet our mission to protect life and property and enhance the national economy, it is essential to educate our users about our products and services, 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 continue to support education in the environmental sciences and particularly encourage young people to pursue science educational opportunities. In addition to these initiatives, OHD is planning to expand our efforts to provide information that has potential commercial use to the communications media, transportation, and other sectors of private industry.

Performance measures: improved public awareness of the agency's role and achievements; prompt delivery of accurate, clear information; higher, more diverse numbers of students pursuing environmental science careers, increase interactions with Minority Serving Institutions, and more agency staff judging science fairs.

OHD Activities	OHD Partners
New Collaboration Agreements, Information Dissemination & Education Plan, Lectures & Symposiums, AHPS, OHD Customer Service, Social Science Program	WFOs, RFCs, OCWWS, OOS, Other Federal Agencies, State and Local Government, Academia and Research Institutions

NOAA Cross-cutting Priority 3: Sound State-of-the-art Research

NOAA will support high-quality research underpinning its environmental assessments, prediction, and ecosystem management missions. The Agency will develop and implement the new products, services, and approaches to ecosystem management needed by a Nation facing urgent environmental, economic, and public safety challenges.

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 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. NWS 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.

Performance measures: agency reputation for generating new discoveries, findings and applications; increased accuracy in predictions and assessments.

OHD Activities	OHD Partners
Flood Inundation Forecasts, Precipitation Forecasting, LDAS, MOPEX, VAR, PE research, Soil Moisture Studies, ESPADP, WHFS MultiSensor Precipitation Estimator, PE, LDAS, Reservoir models, Sustain & Advance Collaborative Research, NWSRFS FLDWAV, DCP Improvement, Data Quality Control, Distributed Modeling, Precipitation Frequency Standards, DMIP, Snow MIP, GIS/Soil Moisture Integration, Reservoir release models,	OS&T, OCWWS, OOS, NOS, USGS, Bureau of Reclamation, Corps of Engineers, EPA, NASA, FEMA, Other Federal Agencies, State and Local Government, Academia and Research Institutions

NOAA Cross-cutting Priority 4: International Cooperation and Collaboration

A rapidly shifting political, cultural, and economic world requires Federal agencies involved in world affairs to cultivate fresh approaches and new services to maintain U.S. leadership in these fields. NOAA will support and promote national policies and interests in ecosystem management, climate change, Earth observation, and weather forecasting and will seek to maximize the mutual benefits of international exchange with its global partners. World-wide benefits of NOAA's El Niño forecasts are at least $450 million annually. Better ship routing from U.S. satellites are worth nearly $100 million a year, $20 million of which is realized by U.S. consumers. Such international collaboration in scientific understanding will significantly benefit the American public economically and socially.

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.

Performance measures: increased initiatives for technical assistance and transfers; more bilateral relationships and multilateral conferences contributing to agency objectives.

OHD Activities	OHD Partners
International Activities, Hydrology Studies for Developing Nations, International Technology Transfer, Training	NWS International, Department of State, Other Federal Agencies, International Institutes, International Educational Institutions

NOAA Cross-cutting Priority 5: Homeland Security

NOAA's core missions of environmental prediction and management are manifested in more than eighty capabilities that support America's efforts to prepare for and, if necessary, respond to terrorist attacks. Best known are NOAA's hazardous materials spill response, atmospheric and waterborne dispersion forecasting, vessel monitoring systems, and support for communities and first responders, including training, decision-making tools, rapid on-site weather forecasts to support emergency operations, and civil emergency alert relay through NOAA Weather Radio. NOAA is also ready to quickly provide its other assets–ships, aircraft, global observation systems, and professional law enforcement officers--to serve the Nation when the need arises. The commercial and academic sectors are critical partners in these efforts –developing and applying new technologies to get the warning message out quickly, deploying important observing systems available in time of need, and advancing science and technology applicable to our common security.

NWS contributions to the Nation's security and disaster management will increase. Our focus will be on activities to prepare, mitigate, respond to and repair the effects of all disasters, whether natural or man-made. The NWS communication infrastructure is an essential element of a national warning capability, and efforts to enhance this capability will continue. We will continue to work with our partners in the private sector and federal, state and local governments to expand NOAA Weather Radio coverage, increase use of this valuable information medium as an all hazards dissemination source, and explore new methods and technology for the public to access warning and emergency information. In addition, we will work with the Department of Homeland Security, Department of Defense, Department of Energy (DOE), and the EPA to broaden our air quality and dispersion forecast capability to support Homeland Security initiatives responding to toxic releases. OHD also has an important role in responding to water-borne agents and potential dam failures.

Performance measures: increased public knowledge of and access to emergency information; improved monitoring and prediction capabilities to support emergency operation; improved continuity of operations plans achieved by identifying critical systems and processes and ensuring these systems and processes are available in the event of a catastrophic event.

OHD Activities	OHD Partners
Water-borne dispersion forecasting; dam, levee, or water resource infrastructure destruction or failure, and training.	FEMA, EPA, National Center for Environmental Protection (NCEP), U.S. Army Soldier Biological Chemical Command, DOE, Defense Threat Reduction Agency, Homeland Security, other Federal, state, and local governments, and the private sector

NOAA Cross-cutting Priority 6: Organizational Excellence: Leadership, Human Capital, Facilities, Information Technology, and Administrative Products and Services

This Strategic Plan provides a framework for raising the bar of performance for NOAA. Improvements in these areas will increase the satisfaction of the customers of NOAA's administrative processes, both inside and outside the Agency; increase employee satisfaction; and improve organizational performance and productivity. They will also address the reforms necessary to comply with the President's Management Agenda.

The NWS workforce is the heart and soul of the NWS and the starting point for our commitment to organizational excellence. Our workforce plan will help recruit, retain, and develop the diverse, highly trained, and customer service-oriented people we need to advance an organizational culture which embraces change; values individual differences, service, and professionalism; and promotes teamwork in serving our customers and partners. Developing and maintaining a comprehensive training program for all employees will enable NWS to continue to capitalize on its strong workforce and develop tomorrow's leaders. Facilities, 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. 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. OHD's commitment to organizational excellence is demonstrated by our recent decision to optimize our organization to include a planning function and our efforts to reengineer and improve our business processes. We are defining the data, technical, and applications architecture that will support requirements-based science infusion and software development processes. We will develop a HADS Disaster Recovery Plan. We also are committed to continue the process of improving the way we meet our mission and support our parent organizations. Lastly, OHD will continue to promote a culture that embraces change, promotes teamwork with customers, partners, and each other, fosters innovation and vision accomplishment, values diversity, and work place flexibility.

Performance measures: customer-focused, interdependent, mission-aligned programs; improved and integrated administrative infrastructure; stable and adequate funding streams, implement an enterprise information technology architecture, and implement "best practices" across the agency.

OHD Activities	OHD Partners
Diversity, Equal Employment Opportunity (EEO), Security, Business Process Definition, Business Organization & Planning, Software Engineering and Science Infusion Process definition, workplace flexibility	NWS Line/staff offices, Private sector (contractors)

OHD PERFORMANCE MEASURES

Performance Measures for NOAA GOAL 1 – Protect, Restore, and Manage the Use of Coastal and Ocean Resources Through Ecosystem Management Approaches

NWS Outcome Measures Affected by OHD Strategies

NWS	Performance Measure	Baseline	Target
Outcome Measure	Number of models made operational to assess and predict natural and human-induced changes in the marine environment.	0 (FY 2003)	Estimated Target (FY 2004)

OHD Goal 1 Performance Measures

Strategy	Performance Measure	Baseline	Target
Monitor and Observe	• Covered under Assess and Predict.	n/a	n/a
Understand and Describe	• Covered under Assess and Predict.	n/a	n/a
Assess and Predict	• Additional tools and information to show the impact of the flow of water and/or pollutants into estuaries and coastal waterways. • Increased number of AHPS sites.	Estimated Baseline (FY 2004) 351 at Beginning of FY 2003	Estimated Target (FY 2005) 2700 at the End of FY 2007
Engage, Advise, and Inform	• Participation in additional collaborative work groups established with other NOAA organizations.	3 in FY 2003	6 in FY 2004
Manage	• Covered under Assess and Predict.	n/a	n/a

Performance Measures for NOAA GOAL 2 – Understand Climate Variability and Change to Enhance Society's Ability to Plan and Respond

NWS Outcome Measures Affected by OHD Strategies

NWS	Performance Measure	Baseline	Target
Outcome Measure	Outreach to user groups to facilitate integration of NWS climate information into decision support systems.	Establish Baseline (FY 2004)	Estimated Target (FY 2005)

OHD Goal 2 Performance Measures

Strategy	Performance Measure	Baseline	Target
Monitor and Observe	• Covered under Assess and Predict.	n/a	n/a
Understand and Describe	• Covered under Assess and Predict.	n/a	n/a
Assess and Predict	• Additional new tools to determine the long-range climatologic effect on the Nation's water supply. • Additional and more accurate Precipitation Frequency tables.	Estimated Baseline (FY 2005) Updates in 17 States	Estimated Target (2007) Complete Updates For Entire Nation by FY 2007
Engage, Advise, and Inform	• LDAS and MOPEX research result presentations to research communities	20 in FY 2003	3 – 4 Additional in FY 2004

Performance Measures for NOAA GOAL 3 – Serve Society's Need for Weather and Water Information

NWS Outcome Measures Affected by OHD Strategies

NWS	Performance Measure	Baseline	Target
Outcome Measure	Flash-flood warning accuracy	.87 (FY 2003 goal)	.90 (FY 2005)
	Flash-flood warning lead time	50 min. FY 2003 goal	58 min. (FY 2008)
	Flash-flood warning false alarm rate	.40 (FY 2002)	.35 (FY 2007)
	River flood warning lead time	Establish Baseline (FY 2005)	Estimated Target (FY 2006)
	River flood warning accuracy	Establish Baseline (FY 2005)	Estimated Target (FY 2006)
	River flood warning false alarm rate	Establish Baseline (FY 2005)	Estimated Target (FY 2006)
	Customer satisfaction rate	Establish Baseline (FY 2005)	Estimated Target (FY 2006)

OHD Goal 3 Performance Measures

Strategy	Performance Measure	Baseline	Target
Monitor and Observe	• Implemented and streamlined, data source routines that support a higher volume of data types and data sources and a lower volume of errors. • A higher percentage of HADS available time.	HADS Timeliness Measure – 10.1 Minutes 98 % Available in FY 2003	Improve HADS throughput by 5 Minutes / FY 2007 99% available by FY 2007

Understand and Describe	• Increased number of honours in academic and professional societies, number of leadership posts, number of articles and publications, and/or number of conferences/workshops hosted and convened.	20 in FY 2003	25 in FY 2004
Assess and Predict	• Increase the number of AHPS sites. • Increased number of OHD Products and information that contain improved accuracy and functionality. • A Hydrologic Forecasting System & Capability Modernization Plan. • Implemented planning infrastructure within OHD organization to define and promote improved business processes.	351 at Beginning of FY 2003 Establish Baseline in FY 2003 Not Currently Available Not Currently Available	2700 at the End of FY 2007 Estimated Target (FY 2008) Modernization Plan in FY 2005 By the End of FY 2003
Engage, Advise, and Inform	• Implemented Social Science Program that provides feedback on usefulness and adaptability of OHD products and information. • Extended customer training capabilities by offering additional material and reaching additional customers. • Additional DMIP and Snow MIP research papers, lectures, symposium presentations, and the number of conferences/workshops hosted and convened.	Not in Current Organization 7 Courses to 17 Customers in FY 2003 5 in FY 2003	By the End of FY 2003 03 Additional Traditional Courses plus Distance Learning Courses in FY 2004 3 Additional in FY 2004

Performance Measures for NOAA GOAL 4 – Support the Nation's Commerce with Information for Safe and Efficient Transportation

NWS Outcome Measures Affected by OHD Strategies

NWS	Performance Measure	Baseline	Target
Outcome Measure	Use and effectiveness of NWS forecast information for planning for marine, air and surface transportation systems.	Establish Baseline (FY 2005)	Estimated Target (FY 2006)
	Weather related transportation accidents, delays, and disruptions.	Establish Baseline (FY 2005)	Estimated Target (FY 2006)

OHD Goal 4 Performance Measures

Strategy	Performance Measure	Baseline	Target
Monitor and Observe	• Covered under Assess and Predict.	n/a	n/a
Understand and Describe	• Covered Under Assess and Predict.	n/a	n/a
Assess and Predict	• Additional tools and data to make more accurate predictions of the impact of water flow, precipitation, and soil moisture on transportation and/or recreation. • More accurate and useful reservoir release prediction information.	Estimated Baseline (FY 2004) Estimated Baseline (FY 2004)	Estimated Target FY 2008 Estimated Target FY 2007
Engage, Advise, and Inform	• Previously defined in the measures for Goal 3 - Engage, Advise, and Inform.	n/a	n/a

GLOSSARY & ORGANIZATIONAL ABBREVIATIONS

AHPS	Advance Hydrological Prediction Service	IT	Information Technology	OHD	Office of Hydrologic Development
AWIPS	Advance Weather Interactive Processor	LDAS	Land Data Assimilation System	OCWWS	Office of Climate, Weather, and Water Services
CMM	Capability Maturity Model	MOPEX	Model Parameter Estimating Experiment	OOS	Office of Operational Services
DCP	Data Collection Platform	MPE	Multi-sensor Precipitation Estimator	OS&T	Office of Science & Technology
DMIP	Distributed Model Intercomparison Project	NASA	National Aeronautic and Space Administration	PE	Potential Evaporation
Ensembles	Collection of 2 or more forecasts that verify at the same time	NCDC	National Climatic Data Center	PE	Precipitation Estimator
EPA	Environmental Protection Agency	NCEP	National Center for Environmental Protection	Snow MIP	Snow Model Intercomparison Project
ESPADP	Ensemble Stream flow Prediction Analysis and Display Program	NDFD	National Digital Forecast Database	RFC	River Forecast Center
FEMA	Federal Emergency Management Administration	NEXRAD	Next Generation Radar	USACE	United States Army Corps of Engineers
FLDVIEW	Flood View	NHDS	National Hydrologic Data System	USBR	United States Bureau of Reclamation
FLDWAV	Flood Wave	NESDIS	National Environmental Satellite Data & Information Service	VAR	Variational Assimilator
GIS	Geographical Information System	NOAA	National Oceanic and Atmospheric Administration	VCP	Volume Coverage Patterns
GOES	Geophysical Operational Environmental Satellite	NOS	National Oceanic Service	WFO	Weather Forecast Office
HADS	Hydrometeorological Automated Data System	NWS	National Weather Service	WHFS	WFO Hydrologic Forecast System
HDPT	HADS Data Product Timeliness	NWSRFS	National Weather Service River Forecast System	WSR88D	Weather Service Radar 1988 Doppler

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