

**National Oceanic and Atmospheric Administration
National Weather Service
National Data Buoy Center Ocean Observing System of Systems
NOOSS O&M
04-02-02-001**

**Operational Analysis
FY2010**

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Executive Summary

National Data Buoy Center (NDBC) is comprised of National Oceanic and Atmospheric Administration (NOAA) civil service employees and a commissioned corp officer, U.S. Coast Guard (USCG) personnel, and a technical service contractor performing in the final year of a 5-year contract. NDBC executes, manages and serves as the program office for the NOAA/NWS/NDBC Ocean Observing System of Systems (NOOSS). The NOOSS is the nation's primary marine surface observing network. The NOOSS component systems are moored marine meteorological-oceanographic observing buoys, Coastal-Marine Automated Network (C-MAN) stations, Voluntary Observing Ships (VOS), Deep-ocean Assessment and Reporting of Tsunamis (DART[®]) warning array stations, and the Pacific Tropical Atmosphere, Ocean (TAO) array. The NOOSS provides accurate, quality controlled atmospheric/oceanographic data in real-time, 24x7x365, to the public, NOAA service and modeling communities, other government agencies, the private sector and universities.

NOOSS surface and oceanographic observations are a primary and critical information source of NOAA's Goal Teams and over 15 NOAA operational Programs, such as the Integrated Ocean Observing System (IOOS) Program, Local Forecasts and Warnings, Environmental Modeling,

Coasts, Estuaries and Oceans, Climate Observations and Monitoring, and the Tsunami Program. The Commerce and Transportation Mission Goal outcomes, to increase transportation safety and productivity, directly depend on NOOSS observations.

The NDBC IOOS Data Assembly Center (DAC) integrates regional observations into NOAA's operational data stream from locations and stations that are being created by the IOOS regional coastal ocean observing systems known as Regional Associations (RA) as well as observations from other national and international publicly and privately funded ocean observing systems. NDBC operates the IOOS DAC with primary data assembly and quality control (PDA&QC) responsibilities, ingesting and processing all RA and other partners' data and distributing that data into all standard NOOSS data distribution channels, including NOAAPORT and AWIPS.

Program achievements during FY2010 include:

- NWS Observations delivered (year) - 1,921,025 observations
- Total Observations delivered (year) - 10,753,887 observations
- Increased total observations adding 7 new IOOS partners with 29 new stations for a total of 44 partners with 513 platforms
- Deployed 6 prototype TAO buoys for a total of 11 Refreshed TAO buoys in side-by-side operational testing with legacy TAO buoys in the equatorial Pacific

This report focuses on the operational state of the program as of September 30, 2010, and is based on guidance developed by the Department of Commerce. The NOOSS program directly facilitates 3 of NOAA's Strategic Mission Goals - Climate, Water and Weather, and Commerce and Transportation.

The current program meets established cost and schedule parameters. With the exception of data availability from the NWS Moored Buoy network, NOOSS meets its performance goals. NWS Moored Buoy activities failed to meet performance expectations for the year by nearly 5%, primarily due to cancellations in servicing the buoys by the US Coast Guard as a result of the USCG response to the Deepwater Horizon spill. NOAA received only 133 days at sea from the USCG, which is a 50% reduction from the support that NOAA typically receives.

This operational analysis (OA) is an annual, in-depth review of the program's performance based on the following:

- Customer Results
- Strategic and Business Results
- Financial Performance
- Innovation

1.0 Customer Results

NOOSS serves as the nation's primary surface marine observing network providing critical information to a wide variety of customers. NOOSS provides the nation an improved ability to forecast and predict hazardous phenomena such as hurricanes, storm surge, floods, harmful algal blooms, tsunamis, El Nino, etc. NOAA benefits by filling in-situ observation gaps:

1. Improve accuracy and timeliness of weather and water information will improve the ability to reduce coastal hazard impacts.
2. Increase lead time and accuracy for weather and water warnings and forecasts.
3. Increase development, application, and transition of advance science and technology to operations and services.
4. Develop data sets available for integration via IOOS DMAC standards.
5. Access and integrate non-NOAA observational data with operational NOAA data streams.

1.1 Customer Requirements and Costs

NOOSS surface and oceanographic observations are a primary and critical information source of NOAA's Goal Teams and over 15 NOAA operational Programs, such as the IOOS; Local Forecasts and Warnings; Environmental Modeling; Coasts, Estuaries, and Oceans; Climate Observations and Monitoring; and the Tsunami Program. The Commerce and Transportation Mission Goal outcomes, to increase transportation safety and productivity, directly depend on NOOSS observations. The present NOOSS does not provide the temporal, spatial or diversity of measurements to adequately characterize the marine environment and it does not measure all the required parameters. In some coastal and ocean areas there is a total coverage gap, a data void. NOAA lacks the capacity to effectively operate and maintain the existing in-situ buoy infrastructure

NDBC works collaboratively to expand observations available to NOAA customers and partners:

- Other Federal Agencies requiring surface data for operational decisions including the MMS, DOD, EPA, Corps of Engineers, DHS
- State and local emergency managers and local officials charged with public preparedness and response decisions for extreme events, hazardous spills, homeland security issues, and wild fire
- Private sector environmental information providers
- Universities
- NOAA Regional Associations
- Weather sensitive businesses including transportation, energy, and agriculture
- National, state, and local media
- Citizens who act on the information or are directed to respond by governmental and other local decision makers

1.2 Performance Measures

The performance goals are achieved by a comprehensive effort that 1) provides for a robust preventive and corrective maintenance program, 2) ensures an adequate and efficient level of spares are maintained at the depot, and 3) supports an aggressive, proactive program to identify

and replace components that are vulnerable to technology obsolescence or that are demonstrating excessive failure rates.

These measures align with the “Customer Results Measurement Area” of the Performance Reference Model developed by the Federal Enterprise Architecture Program Management Office (FEA-PMO). Table 1 summarizes the performance measures.

Table 1: Customer Results Performance Measure

Measurement Area	Indicator	FY 2010 Baseline	FY 2010 Actual Result
Customer Results	Quality Controlled Observations from NOOSS Primary Data Assembly and Quality Control of NOOSS and Regional Data PDA&QC	1.7M quality controlled NWS marine observations; 3.5M total observations from Federal Backbone and Regional Partners, NOAA and non-NOAA	1.9M quality controlled NWS marine observations; 10.7 total observations from Federal Backbone and Regional Partners, NOAA and non-NOAA

2.0 Strategic and Business Results

The National Data Buoy Center Ocean Observing System of Systems program continues to meet established cost, schedule and performance goals and must continue in order for NOAA to meet its Strategic Goals of Serving Society’s Needs for Weather and Water; and Supporting the Nation’s Commerce with Information for Safe, Efficient, and Environmentally Sound Transportation. The program also continues to meet the goals of our partners. Program management and controls are in place to ensure the program continues to meet its goals and objectives and monitor how well the program performs.

2.1 NOOSS Helps to Achieve Strategic Goals

NOOSS surface and oceanographic observations are the US contribution to the Global Earth Observing System (GOOS), the ocean component of the Global Earth Observation System of Systems (GEOSS). NOOSS observations are a primary and critical information source of NOAA’s Goal Teams and over 15 NOAA operational Programs such as IOOS; Local Forecasts and Warnings; Environmental Modeling; Coasts, Estuaries and Oceans; Climate Observations and Monitoring; and Tsunami Program. The Commerce and Transportation Mission Goal outcomes, to increase transportation safety and productivity, directly depend on NOOSS observations.

2.2 Business Results

2.2.1 Program Management and Controls

The day-to-day program and financial management of the NOOSS O&M program is provided by program managers and analysts within OOS. OOS provides centralized program planning and oversight. Critical functional tasks for operations, engineering, configuration management, logistics management, maintenance, telecommunications, and training are centrally planned by executed by NDBC

2.2.2 Monitoring Cost, Schedule and Performance

OOS program analysts use several systems to measure and track cost, schedule, and performance metrics.

- a. Cost: OOS has oversight responsibility for the entire NOOSS O&M budget. Budget development and execution have been accomplished using the NOAA financial management systems, and PC-based spreadsheets. These tools compare actual cost data with budget models and are used to make model adjustments for subsequent budget development cycles. Cost and financial data are monitored on a monthly and quarterly basis to identify discrepancies with the approved financial plan and to develop corrective actions. These data are also used to support program/budget reviews and to answer questions from NWS, NOAA, OMB, and Congress.
- b. Schedule: Product improvements and sustaining engineering projects are funded within the NDBC Base and Tsunami budgets for NWS Moored Buoy, C-MAN and DART elements of the NOOSS. A Technology Refresh project for TAO was budgeted separately with funding beginning in FY2009.
- c. Performance: System performance is routinely and systematically monitored by the NOOSS Data Assembly Center. The NOOSS DAC is staffed 24/7/365 and supports all observing stations in the NOOSS. Analysis of the station outages and trouble tickets generated is used to improve maintenance and meteorological/oceanographic training, maintenance and operations manuals and documentation. NOOSS maintenance and failure information and statistics are tracked in the NDBC Engineering, Managements and Information System (NEMIS). This information is used to calculate service availability and system reliability. Monthly monitoring of these parameters provides an overall assessment of the health of the system's two key performance measures: 1) System Availability by component network and, 2) Number of stations refreshed. The OOS Operational Analyses show that, except for NWS Moored Buoy performance that had an annual average data availability of 75.2%, the NOOSS meets its performance goals.

2.3 Reviews

The NDBC facilities at Stennis Space Center, MS underwent a NOAA Tier 1 Safety Audit in FY2010. The draft report received in September 2010 indicated only 8 minor findings ranging from some portable machine shop tools not properly anchored to a few incidents of power strips being used with higher than rated electrical load. Most of the findings have already been addressed, and the others will be addressed in 2011..

2.4 Security

The NOOSS is accredited under requirements spelled out in FIPA 200 / NIST 800-53 and all other applicable requirements and policies that are based on OMB and NIST guidance. Management, operational, and technical security controls are adequate to ensure the confidentiality, integrity and availability of information. Key security related dates included in table below. Management, operational, and technical security controls are adequate to ensure the confidentiality, integrity and availability of information.

Name of System	C&A Date	Date Security Control Testing Completed	Date Contingency Plan Tested
NOAA8873	12/11/2009	12/11/2009	10/6/2010

2.5 Performance Measures

The performance measures in Table 2 show the NOOSS's performance with respect to Strategic and Business Results. Strategic and Business Results performance measures introduced in FY2009 include "quality" and "reliability and availability". These measures align with the "Mission and Business Results Measurement Area," "Processes and Activities Measurement Area" and the "Technology Measurement Area" of the Performance Reference Model developed by the FEA-PMO.

Table 2: Business Results Performance Measures

Measurement Area	Indicator	FY 2010 Baseline	FY 2010 Actual Result
Mission and Business Results	Quality Controlled Observations from NOOSS	Steady-State 1.7M quality controlled NWS marine observations	1.9M quality controlled NWS marine observations
Process and Activities	System Availability	Moored Buoys 80% C-MAN 86% TAO: 80% DART [®] : 80%	Moored Buoys 75.2% C-MAN 93% TAO: 82% DART [®] : 85%
Technology	Tropical Atmosphere Ocean Equatorial Moored Buoy, TAO Refresh	TAO Technology Refreshment Acquisition Planning Operational testing of prototype 0 of 55 Stations refreshed.	Acquisition Planning Operational testing of prototypes 11 of 55 in side-by-side testing

3.0 Financial Performance

3.1 Current Performance vs. Baseline

Table 3 shows the NOOSS financial performance for the year. The difference in budget versus actual costs was due to the assessment of NOAA Corporate taxes. **NDBC spent 100% of its FY2010 allocation.**

Table 3: Budget vs Actual Costs

Funding Description	Budget Costs (\$K)	Actual Costs (\$K)	Variance
Weather buoy/C-MAN O&M	\$15,300	\$14,439	5.63%
IOOS DAC - IT	\$1,500	\$1,500	0.00%
Data Management - IT	\$2,625	\$2,625	0.00%
Hurricane Buoy O&M	\$4,400	\$4,145	5.80%
Ocean Sensor O&M	\$1,350	\$1,272	5.80%
TAO O&M	\$3,200	\$3,014	5.80%
TAO Refresh	\$1,100	\$1,036	5.80%
Tsunami O&M	\$12,130	\$11,834	2.44%
NOOSS Total	\$41,605	\$39,865	4.18%

3.2 Financial Performance Review

Financial performance is monitored on a monthly basis by OOS program analysts and reviewed with the various NWS and NOAA organizations for reasonableness and cost efficiency. The NOOSS O&M budget is reviewed quarterly by the OOS Director in conjunction with the overall OOS budget. Monthly budget reviews are held with the NDBC managers, CORs and technical managers to ensure contracts are within cost and on schedule. Monthly reports from contractors are required to ensure the Government has the information it needs to evaluate cost performance. A detailed review of work and priorities is undertaken if cost is significantly above base lined values. Also, any necessary corrective actions are also identified and implemented.

4.0 Innovation to Meet Future Customer Needs

The mission of the OOS is to provide cost effective operations and maintenance support for NWS systems in support of our customers. OOS routinely explores alternative operations and maintenance concepts, best practices, contract strategies, technologies, etc to provide improved services at lower costs.

NDBC continues to look for cost efficient ship time from NOAA, the US Coast Guard, US Navy, local park services and commercial vendors to support routine and discrepancy service for the NOOSS. Additionally, NDBC is investigating new technologies for alternative platforms for making ocean observations that may reduce some of the required ship time.

NDBC is continuing to support joint efforts with both the National Ocean Service (NOS) and with the Office of Atmospheric Research to deploy sensors on NWS meteorological buoys to measure key ocean parameters including temperature, salinity, ocean currents, and CO₂.

Additionally, NWS buoys provide a platform from which endangered species can be monitored, and other chemical and biological parameters can be measured. These activities effort transform the NWS buoys into a multi-purpose platform that increase capabilities with only small if any increase to NOAA costs.