CONCEPT OF OPERATIONS (CONOPS)

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE
OFFICE OF WATER PREDICTION
NATIONAL WATER CENTER
WATER PREDICTION OPERATIONS DIVISION

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1. Executive Summary

This is a Concept of Operations document (CONOPS) for the Water Prediction Operations Division (WPOD). The WPOD is one of the five divisions of the National Oceanic and Atmospheric Administration's (NOAA) National Weather Service (NWS) Office of Water Prediction (OWP) (Appendix A, Figure 1). The WPOD is located in the Operations Center of the National Water Center (NWC) in Tuscaloosa, AL.

The NWC serves as a research, development, and operational center of excellence for hydrologic analyses, forecasting, and related decision support services within NOAA and the NWS, and facilitates collaboration across federal and state departments and agencies, academia, and the private sector on matters relating to water resources. Additional responsibilities of the NWC include improving the understanding of water resources and stakeholder needs regarding water resources; identifying science and services gaps relating to water resources; developing and implementing advanced water resources modeling capabilities; and facilitating the transition of hydrologic research into operations.

The WPOD, in collaboration with NOAA field offices and other federal water agencies, is responsible for the delivery of forecast guidance and analyses, and inundation information - as well as other information that augments services provided at local, regional, or national levels - for hydrologic events in the United States. This includes flash flooding, riverine flooding, and water resources outlooks; and providing decision-support services to inform emergency and water resources management decisions. This information is leveraged by the National Centers for Environmental Prediction (NCEP), as well as the River Forecast Centers (RFCs) and Weather Forecast Offices (WFOs) for their official outlooks, forecasts, watches, and warnings. The Operations Center of the NWC is designed to accommodate WPOD staff along with staff from other NOAA Line Offices and multiple agencies. It is the intent of NOAA to include personnel from other federal water agencies in the Operations Center.

This WPOD CONOPS document establishes a framework for the provision of operational services leveraging the spectrum of NWS/OWP activities and functions, and outlines the organization, characteristics, and functions of the WPOD for Initial Operating Capability -- scheduled for October 1, 2019 -- and beyond. The depth and breadth of the services provided by WPOD is a function of the number of onboard staff.

The WPOD provides both routine, high-value water resources information services and support for event-driven, high impact events. This CONOPS does not change specific authorities and responsibilities of NOAA Line and Staff Offices or the Program Offices under their authority; however, it does define the role and responsibilities of the WPOD for water resources service delivery, as well as other information that augments services provided at local, regional, or national levels. This CONOPS also describes the relationship of the WPOD with other line offices in NOAA as well as with other federal water agencies.

The WPOD was established within OWP to better address the growing water resources challenges our nation faces, by collaboratively advancing and providing water prediction services which support the provision of enhanced Impact-based Decision Support Services (IDSS) necessary to build a Weather- [and Water-] Ready Nation. This collaboration, facilitated by the OWP/NWC, involves all components of the water resources enterprise including federal, academic, non-government organization (NGO), and private sector partners.

WPOD staff function as an integrating force between the research and operational components of the OWP and the broader NWS Water Resources Services Program. Moreover, WPOD supports intra- and inter-agency efforts to establish a common operating picture for water prediction and related services. The WPOD serves as the national public face and reach-back[1] capability for NWS water resources services, providing an enhanced level of expertise and service integration across national, regional and local field offices in coordination with NCEP, NWS Operations Center (NWSOC), Regional Operations Centers (ROCs), RFCs, and WFOs.

2. Introduction

The National Oceanic and Atmospheric Administration's (NOAA) NWS Office of Water Prediction (OWP) (Appendix A, Figure 1) is the organizational home to WPOD. The WPOD is located in the Operations Center of the National Water Center (NWC) in Tuscaloosa, AL.

2.1 Mission of the National Water Center (NWC)

The mission of the NWC is to deliver state-of-the-science forecast guidance and analyses, and inundation information - as well as other information that augments services provided at local, regional, and national levels - for hydrologic events in the United States. This includes flash flooding, riverine flooding, and water resources outlooks; and provide decision-support services to inform emergency management and water resources decision making on all timescales spanning minutes to months in the future.

2.2 Role of the Water Prediction Operations Division (WPOD)

The WPOD serves as a collaborator across all levels of NOAA and with federal partners to develop a common operating picture for water resources, support contingency planning, and facilitate reach-back access to the latest water resources intelligence when needed by field offices.

2.3 Priorities

The following are the WPOD's priorities during routine and episodic operations:

- Protect life, property, and enhance the national economy through hydrologic prediction and related decision support services

[1] "Reach-back" is defined as the process of obtaining and/or disseminating products, services, and other resources that are not readily available/deployed at a local, regional, or national office.

- Support intra- and inter-agency efforts to establish a common operating picture for water prediction and related services across the federal landscape
- Provide a reach-back capability for NOAA and NWS field offices regarding water resources and the provision of IDSS

2.4 Policy/Legal Context

The WPOD will adhere to NWS IDSS Policy Directive 10-24[2]. The NWS mission of protecting lives, property, and enhancing the national economy is an inherently governmental function. The enactment of the Weather Research and Forecasting Innovation Act of 2017 (Public Law 115-25) codifies the NWS provision of IDSS, making public safety a top priority. The Act directs the appropriate position(s) to "work closely with state, local, and tribal emergency management agencies, and other agencies related to disaster management, to ensure a planned, coordinated, and effective preparedness and response effort"[3] and encourages the NWS to "assign other staff as the Director considers appropriate to carry out such responsibility.[4]

Through the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), DOC/NOAA has a statutory requirement to support the Emergency Management community at the federal, state, tribal, territorial, and local levels. Likewise, the National Preparedness System, mandated by Presidential Policy Directive (PPD)-8: National Preparedness, includes a series of National Planning Frameworks, one for each of the five mission areas: Prevention, Protection, Mitigation, Response, and Recovery. NWS plays a key federal role in ensuring national preparedness related to weather, water, and climate.

The WPOD will also adhere to NWS Policy Directives 10 - Operations & Services[5] and 10-9 - Water Resources Services Program (WRSP)[6].

Consistent with NWS Policy Directive 10-9 (2018), the WPOD will work to:

- Operationally support and deliver forecast guidance and analyses, and inundation information - as well as other information that augments services provided at local, regional, or national levels - for hydrologic events in the United States.
- Provide a set of water resource-related decision support services for core partners and stakeholders that facilitate decision making associated with water supply planning and events ranging from flash floods to drought.
- Provide remotely-sensed and modeled water resources products and information for the Nation.
- Coordinate with the NOAA Communications on issues relating to spokesperson preparations, talking points, news releases, supporting press materials, press briefings, and booking and facilitating national media interviews to develop and manage national,

[2] National Weather Service Policy Directive 10-24
[3] Public Law 115-25, Section 405(c)1(E)
[4] Public Law 115-25, Section 405(c)2
[5] National Weather Service Policy Directive 10 - Operations & Services
[6] National Weather Service Policy Directive 10-9

multi-regional, and multi-agency media communications strategies for water resources events.

In addition to these policies, the WPOD will maintain compliance with other NWS governance documentation.

3. Operational Activities

3.1 Overall Approach

At a high level, the WPOD complements and supports the efforts of NOAA and NWS field offices and centers, as well as NWS core partners[7] who engage in water resources decision-making which impacts the protection of life and property. The WPOD also works to develop new and enhanced hydrologic products and services by performing the following major functions, which are inherently interconnected. The WPOD will coordinate with NOAA field offices (including NCEP, NWSOC, ROCs, RFCs, WFOs) and NOAA Line Offices (including the National Integrated Drought Information System program), among other federal water agencies as necessary to determine when additional services are required.

3.1.1 Coordination and Collaboration

In order to enhance the provision of IDSS for all water resources-related issues spanning minutes to months in the future, the WPOD supports NOAA, NWS, and NWS core partners by fostering a collaborative forecast process and fully integrated field structure. This allows for the layering of expertise from the local level to the national level.

Activities include, but are not limited to:

- Provide timely, consistent, state-of-the-science national hydrologic analyses, forecasts, and inundation information and guidance to inform emergency management and water resources decision making
- Act as a catalyst for the integration of social science in emerging products and IDSS messaging to elicit desired outcomes
- Connect hydrologic observations, forecasts, and other guidance to key decision makers across the Nation, in coordination with NOAA field offices and other federal water agencies (e.g., U.S. Geological Survey, U.S. Army Corps of Engineers, Bureau of Reclamation, Federal Emergency Management Agency)
- Leverage expertise from and collaborate with regional and local field staff to ensure consistency of messaging from the local level to the national level

3.1.2 Routine Services

WPOD routine services provide field offices and NWS leadership with a summary of current and predicted water resources conditions. Routine services include coordination of airborne snow, river ice, soil moisture surveys, and real-time evaluation of hydrologic forecasts, including River

[7] Definition of 'core partner' can be found in the National Weather Service (NWS) Service Description Document (SDD) Impact-Based Decision Support Services for NWS Core Partners; Section 3.1

Forecast Center (RFC) forecasts, Hydrologic Ensemble Prediction Service (HEFS) forecast suite, and of current and retrospective National Water Model (NWM) guidance and derived information.

The WPOD also performs routine data functions (i.e. collection, coordination, and management) that support the mission of the NWS Water Resources Services Program.

Routine services include, but are not limited to:

- Holistic monitoring of observations of current and forecast conditions, to assess potential flash and riverine flood
- Interpretation of hydrologic model-based guidance for parameters including streamflow and streamflow anomaly
- Generation of hydrologic model-based guidance for parameters including time to bankfull conditions and other high/low flow criteria
- Continental snow analysis and data assimilation
- Analysis of water supply conditions
- Evaluation of forecast hydrologic models and model guidance and their derivatives
- Remote sensing analysis of snow and soil moisture state conditions
- Data services and data flow monitoring
- Flood Outlook Product (FOP)[8]

These activities are performed routinely to develop a daily situational awareness briefing of hydrologic conditions that is delivered as part of the NWS Daily Status of Operations Briefing.

3.1.3 Episodic Services

Episodic or "ad hoc" services are triggered by high-impact events such as flash flooding, flooding, snow accumulation and ablation, river ice formation and movement, post wildfire response, and drought evolution.

Episodic services vary depending on the nature of the hydrologic event. These include, but are not limited to:

- Detailed geospatial guidance for observed or predicted hazards
- Flood Inundation Mapping (FIM)
- Dam/Levee Failure analysis
- Remote sensing analysis which may include, but is not limited to:
    - snowpack conditions
    - flood inundation extent
    - river ice locations
    - other surface dynamics (e.g., burn scars, debris flow paths, vegetative index)
- Event-specific briefings

[8] The Weather Prediction Center (WPC) of NCEP will transfer ownership of the National FOP to the NWC/WPOD. The WPOD will then consider methods to improve the current FOP product by integrating data from other hydrologic models and input from all 13 RFCs.

3.2 Common Operating Picture

The Common Operating Picture[9] (COP) is the core situational awareness capability for effective decision making and appropriate mission execution. In order to provide water resources situational awareness, the WPOD will facilitate, in coordination with NOAA field offices and other federal water agencies, the establishment of a common operating picture for water resources services across the country.

3.3 Impact-based Decision Support Services (IDSS)

The WPOD will lead national and multi-regional water resources activities to ensure consistent messaging in coordination with NCEP, NWSOC, ROCs, RFCs and WFOs. Building relationships required for successful IDSS requires engagement with the NWS fully integrated field structure , NOAA line offices, and other federal water agencies, as well as external national level partners and stakeholders, to better understand their operations, decision points, and requirements for water resources information.

3.4 RFC Service Backup / Continuity of Operations

A key function of the WPOD is to facilitate a NWC-based service backup capability for the RFCs that would support continuity of operations by means of RFC staff accessing the NWC system to fulfill their core functions. This support will take the form of ensuring a computational capability accessible by RFC staff either remotely or on-site at the NWC, and the routine monitoring of data ingest necessary to sustain RFC forecast operations.

Events that could initiate a NWC-based backup response include, but are not limited to:

- Natural or man-made disruption to the RFC operations and/or infrastructure
- Scheduled outages for software and equipment upgrades

4. Operational Framework

4.1 Overall Approach

This CONOPS covers a spectrum of services to meet the growing water resources information and service needs of our Nation. The WPOD's approach to operations is consistent with that of NOAA and NWS, which adheres to the National Incident Management System (NIMS), and where applicable, implements the Incident Command System (ICS) to achieve:

- Common terminology

[9] A COP provides consistent information to the agencies, managers and operators responsible for water resources quantification, prediction, and management. A COP is manifested through the transfer and uniform application of essential datasets that include: observations, estimates, forecasts, and the supporting metadata; as well as value-added products such as visualizations and maps. In addition to sharing observations and predictions, it also includes collaborative multi-directional sharing of event information. NOAA, USACE, USGS, "Integrated Water Resources Science and Services – System Interoperability and Data Synchronization Scoping and Requirements Report" (2013), p.11 section 4.2.1.

- Manageable span-of-control and unity of command
- Situational awareness
- Integrated and interoperable communications

4.2 Preparedness

An effective CONOPS structure requires professional development and preparation of the operations staff. Staff may require additional training and certifications, depending on the nature of their role and the services required. The WPOD preparation activities are coordinated under the CONOPS.

These activities include, but are not limited to:

- Conducting exercises to validate plans, procedures, and contingencies
- Training personnel
- Developing, testing, and implementing plans and procedures
- Enhancing information sharing and communication systems
- Maintaining preparedness capacity and capability commensurate with NOAA and NWS authorizations, mandates, and responsibilities

4.2.1 Readiness

WPOD staff will take appropriate action to maintain readiness. These actions are designed to increase the WPOD's ability to respond effectively to an event and continue required mission activities without interruption.

Actions to be accomplished to ensure preparedness include, but are not limited to:

- Inspections of critical operational capabilities
- Coordination with the OWP Information Technology Support Group (ITSG) to identify and protect critical IT infrastructure
- Review and update of plans and procedures
- Ensure adequate staff availability
- Provide guidance to staff on appropriate actions
- Disseminate accurate, timely, relevant, and actionable information

4.3 Response

Routine WPOD operations support ongoing preparedness and planning activities. Response operations can include the division's day-to-day services (e.g. daily riverine forecast briefing, snow analysis, etc.). Upon forecast or detection, the WPOD will coordinate event-specific activities and provide enhanced services that support the provision of IDSS.

4.3.1 Operations Center Activation and Activation Levels

The WPOD uses a layered incident support structure. As an event escalates or is projected to escalate in severity of impact, operations can expand from routine daily operations to enhanced operations. The support levels set forth a scalable and flexible incident management structure to coordinate NWC activities, communications, and effective engagement both internally with

NWS leadership and NWSOC, NCEP, respective ROC(s), RFCs, WFOs, NOAA field offices, other federal water agencies, as well as with external partners as appropriate. Escalation from one level to the next be inclusive of procedures and services associated with lower levels (See Figure 2).

Escalation occurs if an event:

- Represents a perceived or actual increased threat to life, property, natural resources and/or NWS/OWP resources
- Commands specific focus of OWP or NWC
- Involves multiple NWS regions, RFCs and/or other government agencies
- Has a high potential for public or political concern and/or media visibility

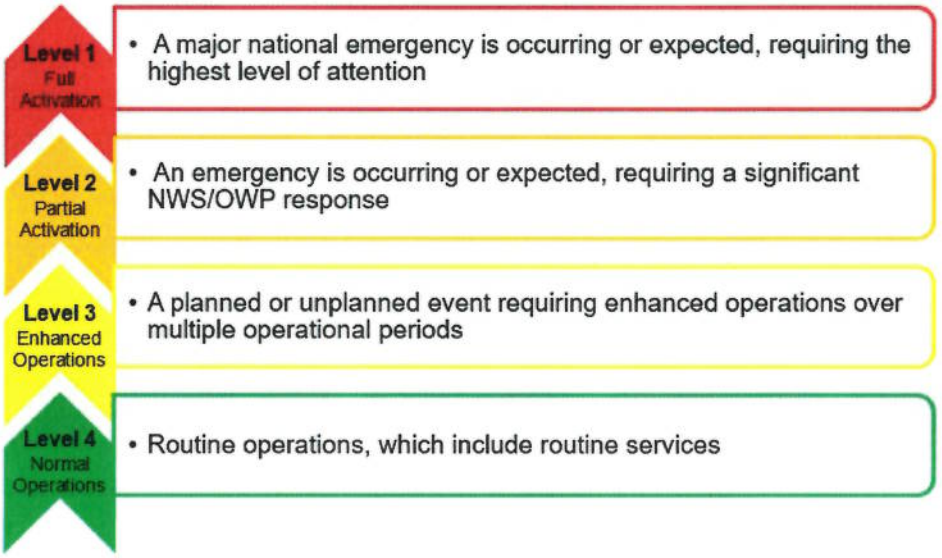

Figure 2: WPOD Activation levels

5. Operational Systems

As the operational unit of OWP, the WPOD has primary responsibility for high-level monitoring of NWC operational systems and circuits used in production and provision of hydrologic products and services.

This responsibility includes, but is not limited to:

- Monitoring and reporting of incoming data abnormalities (e.g. data drop outs, excessive acquisition increases)
- Monitoring and reporting the status of NWC Advanced Weather Interactive Processing System (AWIPS) systems, both NWC-ops and NWC-test
- Monitoring and reporting of NOAA 8202 (OWP IT systems)
- Report any abnormalities, disruptions, and/or reduced functionality to the OWP Information Technology Support Group (ITSG)
- Monitoring data acquisition for RFC Service Backup

- Monitoring data acquisition, workflows, and dissemination for services

Appendix A: Office of Water Prediction Organizational Chart

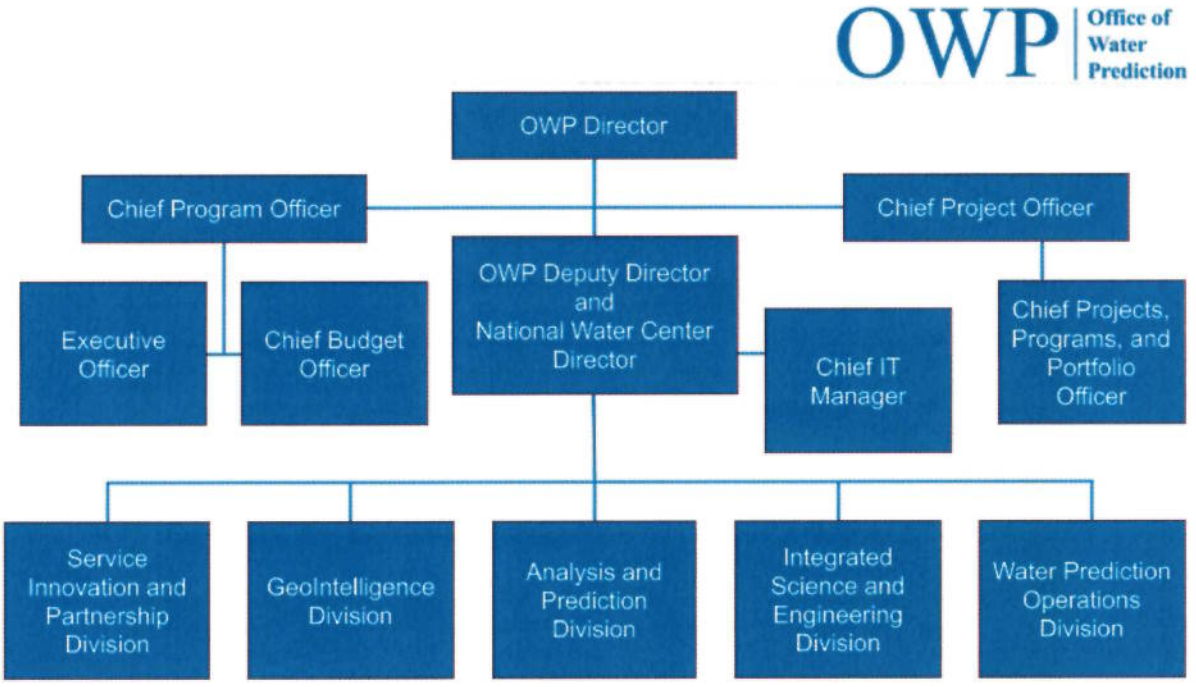

Figure 1: OWP Organizational chart

Appendix B: Acronyms

AWIPS	Advanced Weather Interactive Processing System
CBA	Collective Bargaining Agreement
CONOPS	Concept of Operations
COP	Common Operating Picture
FEMA	Federal Emergency Management Agency
FIM	Flood Inundation Mapping
FOP	Flood Outlook Product
HEFS	Hydrologic Ensemble Forecast Service
ICS	Incident Command System
IDSS	Impact-based Decision Support Services
ITSG	Information Technology Support Group
NCEP	National Centers for Environmental Prediction
NIMS	National Incident Management System
NOAA	National Oceanic and Atmospheric Administration
NWSOC	National Weather Service Operations Center
NWC	National Water Center
NWM	National Water Model
NWS	National Weather Service
OWP	Office of Water Prediction
QPE	Quantitative Precipitation Estimate
QPF	Quantitative Precipitation Forecast
RFC	River Forecast Center
ROC	Regional Operations Center
SOP	Standard Operating Procedure
WFO	Weather Forecast Office
WPC	Weather Prediction Center
WPOD	Water Prediction Operations Division
WRSP	Water Resources Services Program