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Operations and Services
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NATIONAL WATER CENTER OPERATIONS

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SUMMARY OF REVISIONS: This is an initial issuance of this procedural directive to provide instructions on key National Water Center operations supporting provision of national products and services.

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National Water Center Operations

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1. Introduction

This directive specifies the national instructions on operations at the National Water Center (NWC) in National Oceanic and Atmospheric Administration's (NOAA) National Weather Service (NWS). The NWC is an integral component of the Office of Water Prediction (OWP), and the NWC Director also serves as the Deputy Director of the OWP. The OWP through the NWC, 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 compliments and supports services provided at local, regional, or national levels – for hydrologic events in the United States. For the purposes of this instruction, NOAA field offices include Weather Forecast Offices (WFOs), River Forecast Centers (RFCs), Regional Operations Centers (ROCs), NWS Operations Center (NWSOC), the National Centers for Environmental Prediction (NCEP), and NOAA Line Offices such as the National Integrated Drought Information System program. NWC services include flash flooding, riverine flooding, and water resources outlooks; and providing Impact-Based Decision-Support Services (IDSS) to inform event-driven emergency, and routine water resources management decisions.

Instructions on content of NWC products are described in NWS Instruction 10-930, *National Water Resources Products Specification* as well as a few web-based products that are described in NWS Instruction 10-932, *National Hydrologic Web Products Specification*. This directive provides instructions on key NWC operations supporting provision of national products and services.

2. NWC Operational Responsibilities and Specialty Areas

Water resources operations are a team effort of the NWC Operations staff as described in this section. Below is the management structure that oversees forecasters and engineers that deliver the NWC operations mission.

2.1 NWC Director

The NWC Director is ultimately responsible for the quality of the overall NWC operational water resources services. The NWC Director may represent the NWC water resources operations at media briefings or other high-level meetings with partners/users, but delegates routine water resources operations responsibilities to the NWC Water Prediction Operations Division (WPOD) Director.

2.2 Water Prediction Operations Division (WPOD) Director

The WPOD Director provides oversight and management for all operational personnel, and is responsible for the operational delivery of NWC water resources services. The WPOD Director oversees NWC operational collaboration with NOAA field offices, as well as water-oriented agencies outside the NWS including national partners such as the United States Geological Survey (USGS), Federal Emergency Management Agency (FEMA), and United States Army Corps of Engineers (USACE). Additionally, the WPOD Director facilitates coordination across the OWP leveraging science and service expertise to support and enhance operations.

2.3 WPOD Service Coordination Hydrologist

The WPOD Service Coordination Hydrologist (SCH) oversees NWC service coordination with NOAA field offices as well as water-oriented agencies outside the NWS including national partners such as the USGS, FEMA, and USACE.

2.4 WPOD Techniques Development Hydrologist

The WPOD Techniques and Development Hydrologist (TDH) provides technical direction for integrated implementation and operational support for the high levels of hydrologic and hydraulic science and technology employed by the OWP at the NWC. The TDH has overall responsibility for assessment of analytical and forecast services capabilities along with providing direction for modifications and enhancements. The TDH also provides oversight of the complex details associated with the evaluation of water resources-specific products and services and training of the WPOD staff.

3. Hours of Operation

As described in the following section, WPOD staff are available to provide 24-hours per day, 7 days per week service to their partnering water management agencies and NOAA field offices. The nominal staffing is 16 hours, 7 days per week, which can be extended to 24-hour operations when operational criteria are anticipated to be met as outlined below. The NWC designates off-hour contacts and establishes procedures to ensure availability of mission-critical products and data systems during un-staffed periods.

3.1 NWC Activation and Activation Levels

NWC operations adhere to the National Incident Management System (NIMS) guidelines, which are utilized throughout NWS and the rest of NOAA. Where applicable, the NWC implements the Incident Command System (ICS) to achieve:

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

The NWC uses a layered ICS. 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 the OWP Director, NWS leadership and NOAA field offices, other national federal water agencies, as well as with external partners as appropriate. Escalation from one level to the next will be inclusive of procedures and services associated with lower levels.

Escalation occurs if an event:

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

Activation is as follows:

- Level 1 - Full Activation: A major national emergency is occurring or expected, requiring the highest level of attention. Staffing hours are 24 hours per day.
- Level 2 - Partial Activation: As emergency is occurring or expected, requiring a significant OWP response. Staffing hours are up to 24 hours per day.
- Level 3 - Enhanced Operations: A planned or unplanned event requiring enhanced operations over multiple operational periods. Staffing hours are up to 24 hours per day.
- Level 4 - Routine Operations: Routine services. Staffing hours are 16 hours per day.

4. NWC Water Resources Operations

The NWC complements and supports the efforts of NOAA field offices, as well as national partners who engage in operational water resources decision-making that impacts the protection of life and property. The NWC also works to develop new and enhanced hydrologic products and services and to facilitate the transition of water resources research into operations by performing several major functions, which are inherently interconnected. The OWP and NWC coordinate with the national Water Resources Service Program Team, NOAA field offices, and other federal water agencies as necessary to determine when additional services are required.

4.1 Coordination and Collaboration

To provide IDSS for all water resources-related issues spanning minutes to months in the future, the NWC supports NOAA, NWS, and national 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., USGS, USACE, FEMA).
- Leverage expertise from and collaborate with regional and local field staff to ensure consistency of messaging from the local level to the national level.

4.2 Routine Services

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

The NWC 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 high/low flow criteria and timing.
- Continental snow analysis and data assimilation.
- National summary 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 including routine monitoring of data flow and stability of the RFC operational backup system, NWM, NWC WaterView application, NWC Flood Inundation Mapping Reviewer application, and the NWC Hydrologic Remote Sensing Operations.

More detailed instructions for routine products including the Model Areal Extent of Snow Cover Product and the Modeled Snow Water Equivalent by Basin Product are included in NWS Instruction 10-930, *National Water Resources Products Specification*. More detailed instructions for the NWS Water Resources Services Program Web Presence and the National

Hydrologic Assessment are included in NWS Instruction 10-932, *National Water Resources Web Products Specification*.

4.3 Episodic Operations

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) including national interagency coordination.
- 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 to national partners and to regional and local partners at the request of and in collaboration with NOAA field offices.

More detailed instructions for episodic products including the Airborne Survey Gamma Product are included in NWS Instruction 10-930, *National Water Resources Products Specification*.

4.4 Common Operating Picture

The Common Operating Picture[1] (COP) is the core situational awareness capability for effective decision-making and appropriate mission execution. In order to provide water resources situational awareness, the NWC will facilitate, in coordination with the national Water Resources Service Program Team, NOAA field offices, and other federal water agencies, the establishment of a common operating picture for water resources services across the country.

4.5 Impact-based Decision Support Services

The NWC delivers a set of water resource-related IDSS for national partners and to regional and local partners at the request of and in collaboration with NOAA field offices. NWC IDSS aims to facilitate decision making associated with water supply planning and events ranging from flash floods to drought. Additionally, the NWC leads national and multi-regional water resources activities to ensure consistent messaging in coordination with NOAA field offices. Building relationships needed 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.

[1] 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.

4.6 RFC Service Backup/Continuity of Operations

A key function of the NWC is to facilitate a NWC-based service backup capability for the RFCs to support continuity of operations by means of RFC staff accessing the NWC system to fulfill their core functions. This support ensures 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.