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Operations and Services
Hydrologic Services Program, NWSPD 10-9

HYDROLOGIC DATA NETWORK SERVICES

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SUMMARY OF REVISIONS: This directive supersedes NWS Instruction 10-940 "Hydrologic Data Network Services," dated October 15, 2003. The following revisions were made to this instruction:

1) In Section 2.1, "Weather Forecast Office Responsibilities," corrects the National Directives System number of the directive cited for the NWS Cooperative Observing Program and provides a link to this directive.
2) In section 2.1, transfers instructions on the quality control of observational data to NWS Instruction 10-921 – *Weather Forecast Office Hydrologic Operations*.
3) Enhances Section 3.1, "Gaging Station Closures," by adding procedures on the appropriate path and signature authority for letters written to describe the impact of streamgaging station closure(s).
4) Separates out procedures on gage datum and flood stage into new subsections under Section 3.2, "Gaging Station Information."
5) In new subsection 3.2.1, "Gage Datum," adds instructions on the citing of gage datum in NWS products.
6) In new subsection 3.2.2, "Flood Stage," enhances the discussion on changing flood stage to emphasize the importance of coordination with all affected interests.

(Signed) February 15, 2007

Dennis H. McCarthy Date
Director, Office of Climate,
Water, and Weather Services

Hydrologic Data Network Services

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1. Introduction. This directive provides instructions specific to the hydrologic/ hydro-meteorologic network concerns of the Hydrologic Services Program in the National Oceanic and Atmospheric Administration's (NOAA) National Weather Service (NWS).

2. Network Management Responsibilities. All NWS offices, including the National Centers for Environmental Prediction (NCEP), Office of Science & Technology, Office of Operational Systems, and Office of Hydrologic Development, whose activities affect the operation of networks operated and/or used by the NWS, should account for river forecast center (RFC) and weather forecast office (WFO) data requirements. When appropriate, RFCs and WFOs should coordinate surface data network-related issues, including the design, development, and maintenance of these data networks. RFCs and WFOs rely on hydrometeorological data from networks operated by the NWS and agencies such as the U.S. Geological Survey (USGS), U.S. Army Corps of Engineers, Bureau of Reclamation, Natural Resources Conservation Service (NRCS) as well as state and local cooperators. Data from these networks are, in many cases, received simultaneously at RFCs and WFOs through real-time distribution mechanisms. The operation and maintenance of NWS data distribution networks is the shared responsibility of NWS Headquarters and field office personnel.

2.1 Weather Forecast Office Responsibilities. WFOs are responsible for maintaining the portion of the NWS Cooperative Observer Network within their area of responsibility. The service hydrologist or hydrology focal point (herein collectively referred to as the hydrology program manager, or HPM) should ensure that the Cooperative Observer Network is meeting the requirements of the hydrology program through periodic monitoring of data; notifying the observing program leader (OPL) of problems; and coordinating with partners, other users, and supporting RFC(s). Responsibilities for management, operation, and maintenance of the NWS Cooperative Observing Program, its networks and observation sites, and associated databases are provided in NWS Instruction 10-1307 - *Cooperative Station Management*.

If a WFO serves as a central data collection site for a local data acquisition network, including but not limited to automated flood warning systems (AFWS), the WFO should forward the data to supported offices, including RFCs which need the data for operations, in as timely a manner as possible.

2.2 River Forecast Center Responsibilities. To support their hydrologic modeling operations, RFCs ingest large volumes of data from networks operated by the NWS (including the NWS Cooperative Observer Network) and external partners (e.g. Geostationary Operational Environmental Satellite [GOES] data collection platforms [DCP], SNOwpack TELemetry [SNOTEL], and AFWS). While WFOs or outside partners are responsible for maintaining these networks, RFCs should monitor incoming data, notify WFOs or partners of problems, and provide input when networks are being implemented or improved.

If an RFC serves as a central collection location for any type of local data acquisition network, including but not limited to automated AFWS, the RFC should forward the data to supported offices, including WFOs which need the data for operations, in as timely a manner as possible.

3. Stream Gaging Network. The NWS relies on other government agencies; primarily the USGS, but also other federal, regional, state, and local agencies; to operate the automated and manual streamgaging stations required for hydrologic forecast and warning operations.

3.1 Streamgage Closures. The NWS should work with the USGS and other gaging station operators at all agency levels to ensure that it obtains information on potential gaging station closures as early in the process as possible. Through their ongoing interactions with partners, HPMs should be on the alert for potential gaging station closures in their hydrologic service areas (HSA). When the potential for streamgage closures becomes known, HPMs will notify hydrologic services personnel in regional headquarters. Once the potential for the closure of one or more gaging stations has been identified, the impacts of the closure on NWS hydrologic services will be documented. This documentation will normally involve collaboration between the WFO, RFC, and hydrologic services personnel in regional headquarters. The documentation will be shared between all levels of the NWS Hydrologic Services Program, including Hydrologic Services Division in the Office of Climate, Water and Weather Services (OCWWS HSD). The documentation will also be shared with the operating agencies, other cooperating agencies, and affected emergency managers/local officials. Along with this impact documentation, the NWS should use letters, meetings and other contacts to encourage operators and partners to keep critical gaging stations operational.

The USGS is continually working with the 850+ funding partners that support the streamgaging program, along with the federal funds appropriated to the USGS, to keep the streamgaging program in operation. There are, however, times when it becomes necessary to discontinue operation of a streamgage(s) during the next year. If the USGS determines that support for one or more gaging stations is insufficient to continue their operation, they inform the appropriate hydrologic services personnel in NWS regional headquarters, WFO(s), and RFC(s). Hydrologic services personnel in regional headquarters will coordinate with affected field office(s) to assess the potential impact of closing each USGS streamgaging station used in NWS hydrologic forecast and warning operations. If NWS hydrologic forecast services will be degraded, hydrologic services personnel in regional headquarters and/or affected field office(s) will write a letter to the appropriate USGS State Water Science Center office and/or federal/state/local cooperator describing the impact of the closure(s) (see Appendix A for template). The following procedures will be used to determine the coordination path and signature authority for this letter:

a. If the cooperator is a sister agency of the USGS in the Department of the Interior, the letter should be developed at the regional headquarters level, coordinated with OCWWS HSD, and signed and sent by the appropriate manager in regional headquarters to the USGS State Water Science Center office with local responsibility for the streamgage. The letter will include a request to the USGS to forward the letter to the funding cooperator in the Department of the Interior.

b. If the cooperator is not a sister agency of the USGS, the letter may be written and signed at the WFO level and sent directly to the cooperator with a cc: to the USGS State Water Science Center that has local responsibility for the streamgage. However, the letter will be coordinated with hydrologic services personnel in regional headquarters before it is sent.

c. In all cases, the grade or managerial level of the NWS individual signing the letter will, at a minimum, be comparable to that of the recipient.

Copies of this letter will be sent to the Chief, OCWWS HSD. Before the letter is written, OCWWS HSD should be notified of the situation so that action can be taken at the National level as well to support the integrity of the streamgaging network used in NWS hydrologic forecast and warning operations.

Closure of a streamgaging station may necessitate a change in NWS service for the forecast point that is no longer supported. Hydrologic services personnel in regional headquarters, in collaboration with the appropriate field office personnel, will assess whether a change in service is necessary. Such service changes could include providing categorical forecasts (e.g., no flooding, flooding, major flooding) instead of numerical forecast values.

3.2 Streamgage Station Information.

3.2.1 Gage Datum. Gage datum is defined in NWS Instruction 10-950 - *Definitions and General Terminology*, which provides the same definition used by the USGS. On rare occasion, a change in gage datum may be necessary, such as when a significant hydrologic event renders an old gage datum unusable, the need arises to link to a newer datum system, or a gaging station is relocated. The NWS relies on the USGS and other government operators of automated and manual stream gaging stations to establish and maintain a gage datum for each location where point-specific hydrologic forecast and warning services are provided.

Whenever gage datum is provided for a forecast point in a product, WFOs and RFCs should ensure it is the same as the datum currently used by the entity operating the stream gaging station (e.g., USGS). In all products (including web-based products) where the gage datum for a forecast point is provided, both the gage datum and the official title of the system the datum was derived from (e.g., National Geodetic Vertical Datum of 1929 [NGVD 1929], North American Vertical Datum of 1988 [NAVD 1988]) will be provided. The full level of precision (i.e., decimal places) provided for the datum by the gaging station operator will be used when citing the gage datum in a NWS product. A second gage datum and title may also be included in an NWS product if a newer one has been estimated; however, the first gage datum cited will be the one currently in use by the gaging station operator.

3.2.2 Flood Stage. Flood stage is defined in NWS Instruction 10-950. Changes in flood stage may be necessary at times, such as when significant channel changes occur, development (e.g., urbanization) encroaches on the floodplain, the gaging station is relocated, and/or when it would improve NWS flood warning services. Changing a flood stage can be a highly sensitive and potentially controversial matter, since political and/or economic interests may be affected. Changes in flood stage, including those proposed by the NWS, will be coordinated with the appropriate local public officials and communicated to partners and other users as well as the general public. All changes will be approved by hydrologic services personnel in regional headquarters. These changes and associated flood impact information will be updated in the WFO hydrologic database and shared with the appropriate RFC(s).

4. Hydrometeorological Networks. Hydrometeorological networks used by the NWS consist of a combination of NWS- and cooperator-owned sites. This section provides policies on selected operational aspects of these networks. WFOs should pursue access to new sources of hydrometeorological data, including automated data (precipitation and streamflow) from mesonets.

4.1 Automated Surface Observing System. General procedures covering the operations and services aspects of Automated Surface Observing System (ASOS) are provided in several Instructions under NWS Policy Directive 10-13. Each WFO will be responsible for defining the onset and termination thresholds used in the ASOS precipitation products for each ASOS in its HSA.

4.2 GOES Data Collection Platforms. Some DCPs are owned and operated by the NWS, but most are operated by cooperators. WFOs and RFCs regularly use data from these systems in their hydrologic forecast and warning operations. HPMs should coordinate with DCP owners

and/or operators to maximize the availability of DCP data in meeting the requirements of the NWS Hydrologic Services Program.

The NWS supported system for processing and distributing GOES data is the Hydrometeorological Automated Data System (HADS). HADS is an Office of Hydrologic Development supported system (http://www.nws.noaa.gov/oh/hads/internal/) which interfaces with other computer systems to obtain real-time hydrometeorological data from GOES DCPs. HADS decodes the data and then distributes it to NWS field offices. Field offices should utilize the HADS, request additional data types, and recommend other changes in HADS processes through procedures outlined in the HADS Handbook (http://www.nws.noaa.gov/oh/hads/internal/). All requirements for changes to the HADS will be coordinated with the Office of Hydrologic Development.

4.3 NWS Cooperative Observer Network. Daily and criteria precipitation values from the cooperative observer network are required to support the hydrologic modeling operations at WFOs and RFCs. NWS Instruction 10-1307, "Cooperative Observer Program (COOP)," contains procedures for the Cooperative Observer Program. See the following web page - http://www.nws.noaa.gov/om/coop/index.htm for additional details on this program.

4.4 SNOTEL and Snow Course Networks. The SNOwpack TELemetry (SNOTEL) and manual snow course networks are operated by the NRCS. Each day, the NRCS provides real-time data from the SNOTEL network to the NWS. Snow course data is supplied to RFCs when the manual snow course measurements are taken by NRCS snow surveyors during the winter months. Issues regarding location and placement of SNOTEL and snow courses should be directed to the NRCS. See the following web page - http://www.wcc.nrcs.usda.gov/ for additional details on SNOTELs and snow courses.

4.5 Limited Automated Remote Collectors. Limited Automated Remote Collectors (LARC) allow the NWS to access data from a hydrometeorological sensor via a telephone line. Often, but not always, the sensor(s) are maintained by another agency. LARCs are polled by the Centralized Acquisition and Dissemination System (CADAS) to obtain stream elevation and/or precipitation amounts. Collection intervals can be set by the WFO to be anywhere from every 15 minutes to 6 hours. CADAS system is maintained at NWS headquarters. Polling by an individual office may provide more parameters and/or more frequent data.

4.6 Supplementary Climatological Data Network. The Supplementary Climatological Data (SCD) network provides data every six hours from every WFO. WFOs and RFCs should use this data in their forecasts and warnings when appropriate.

Appendix A - Template for Letter on Impacts of Streamgage Closures

Name
Address

Dear *Name*,

The proposed discontinuation of funding for streamgages operated by the U.S. Geological Survey (USGS) is expected to have a major impact on the National Weather Service (NWS) river and flood forecasting capabilities for the state of *state name*. If this action is taken, NWS services will be seriously affected, including our ability to provide timely and accurate warnings and forecasts of floods for the city of *Name of city* as well as additional communities downstream, including *Name of city* and *Name of city*.

[Discuss a recent hydrologic event when the USGS streamgage(s) proposed for closure were instrumental in providing NWS forecast and warning services. Describe the causes for the event, where the flooding occurred (e.g., basins), the magnitude of the event, and how data from the threatened stream gages were used to provide timely and accurate flood forecasts.]

Streamgaging stations operated by the USGS include *Number* official NWS forecast points in *State*. This is slightly more than *Fraction* of the total number of forecast points in the entire state. There are also *Number* additional streamgages which are used in forecast procedures. These locations are identified on the enclosed chart. They affect the issuance of river forecasts at *Number* NWS Forecast Offices. They also impact forecast operations at *Number* River Forecast Centers.

Real-time streamflow data is essential to the issuance of accurate river, flood stage, and water supply forecasts that are issued by the NWS. Without real-time data from these streamgages that are scheduled to be closed, the NWS will be forced to discontinue the issuance of site-specific river forecast products with stage forecast values. We will then only be able to provide limited services such as categorical forecasts for minor, moderate, and major flooding, because forecasts will be based on precipitation data alone rather than both precipitation data and observed river stage.

I urge you to continue funding your share of the operation of the USGS streamgaging network in *state*. If you require additional information about the effect of discontinuing these gages and what it would mean to the people in your state, please feel free to contact me at *Phone number*.

Sincerely yours,

Meteorologist In Charge, *Name of WFO*
or
Manager's Title in Regional HQ, *Name of NWS Region HQ*