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Operations and Services
Water Resources 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 July 14, 2020. This is an administrative update made only to fix broken links in sections 2.1, 3.2.1, 3.2.2, 3.2.3, 3.2.4, 4.1, 4.2, 4.3, 4.4, and Appendix B. No content changes were made with this update, and the effective date was not affected.

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Director
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Hydrologic Data Network Services

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1. Introduction.

This directive provides instructions specific to the hydrologic/ hydrometeorologic network concerns of the Water Resources 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) Central Operations (NCO) and Office of Dissemination (DIS), 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. RFCs and WFOs should coordinate surface data network-related issues, including the design, development, and maintenance of these data networks with their regional hydrology point of contact. 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), and state and local partners. 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 NCO, NWS Headquarters and field office personnel. NOAA's Office of Atmospheric Research Earth System Research Laboratory Global System Division (GSD) manages the Meteorological Assimilation Data Ingest System (MADIS) on behalf of the NWS. NCO operates the MADIS systems and provides support for Hydrometeorological Automated Data System (HADS) and Automated Flood Warning Systems (AFWS), as well as SNOwpack TELemetry (SNOTEL) through MADIS. In coordination with GSD, DIS provides software development and maintenance support for HADS and AFWS.

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 (HPM), should ensure that the Cooperative Observer Network is meeting the requirements of the water resources program through periodic monitoring of data, notifying the Data Acquisition Program Manager (DAPM) or 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*.

To support their warning and forecast operations, WFOs ingest large volumes of data from NWS networks and external partner networks (e.g. Geostationary Operational Environmental Satellite [GOES] data collection platforms [DCP], SNOTEL, and AFWS). WFOs should monitor incoming data from these networks, notify supporting RFCs or partners of problems, and provide input to partners when networks are being implemented or improved. If a WFO serves as a central data collection site for a local data acquisition network, including but not limited to 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 water resources 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. GOES DCP, SNOTEL, and AFWS). While WFOs or external 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.

In this directive, "stream gage" is a generic term for any water level measuring device providing data which is used in water resources forecast and warning services. Therefore, "stream gage" can include reservoir elevation gages and even a gage at the mouth of a river where tidal influences may be greater than upstream flow, so long as the data is used in water resources forecast and warning services. A stream gaging station is a particular site on a watercourse where systematic observations of stage/ and or flow are measured.

The NWS relies on federal, regional, state, and local partners, to operate most of the automated and manual stream gaging stations required for hydrologic forecast and warning operations. Sufficient demand for NWS river and flood forecasts may exist and require NWS resources to more actively coordinate with partners to acquire, process, and share stream gage data. For example, the Alaska Region helps to operate about 40 percent of the river gages in its statewide network.

3.1 Coordination of Stream Gaging Station Closures.

The NWS should coordinate with partners to obtain information on potential stream gaging station closures as early in the process as possible. HPMs should work with all levels of the NWS Water Resources Services Program, along with local and regional partners to keep critical gages in service and operating in their hydrologic service areas (HSA). If the closure of one or more gaging stations are imminent, the impacts of the closure on NWS water resources services shall be documented by the HPM. This information will be shared with all stakeholders of the NWS Water Resources Services Program, including the affected WFOs, RFCs, hydrologic services personnel in regional headquarters, and the Analyze, Forecast and Support (AFS) Water Resources Services Branch (WRSB). The information will be helpful in coordinating with the partners and affected emergency managers/local officials. The NWS should also use letters, meetings and other contacts to encourage partners to keep critical stream gages operational. HPMs may work with local partners to assist in the identification of new or collaborative sources of funding to operate and maintain the stream gaging station.

Hydrologic services personnel in regional headquarters will coordinate with affected field office(s) to assess the potential impact of closing each stream gaging station used in NWS water resources forecast and warning operations. If NWS water resources forecast services will be

degraded, hydrologic services personnel in regional headquarters and/or affected field office(s) will write a letter to the federal/state/local primary funding partner 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 primary funding partner is a Federal agency, the letter should be developed at the regional headquarters level, coordinated with the AFS WRSB, signed, and sent by the appropriate manager in regional headquarters to the Federal agency with local responsibility for the stream gaging station. .

b. If the primary funding partner is not a Federal agency, the letter may be written and signed at the WFO level, sent directly to the partner, and coordinated with hydrologic services personnel in regional headquarters before it is sent.

Copies of this letter will be sent to the AFS WRSB Chief. Before the letter is written, AFS WRSB should be notified of the situation so that action can be taken at the National level as well to support the integrity of the stream gaging network used in NWS water resources forecast and warning operations.

Closure of a stream gaging station may necessitate a change in the NWS river forecast services. 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 or completely discontinuing services.

3.2 Stream Gage Station Information.

3.2.1 Vertical Gage Datum.

The NWS relies on the USGS and other stream gaging partners to establish and maintain the vertical and horizontal gage datum for each location where point- specific water resources forecast and warning services are provided. The vertical gage datum, synonymous with "gage zero," is defined in NWS Instruction 10-950, *Definitions and General Terminology*. The definition in NWS Instruction 10-950 is the same used by the USGS. A tutorial providing a more in-depth explanation of datums can be found at https://vdatum.noaa.gov/docs/datums.html.

When the vertical gage datum for any stream gaging station used in NWS water resources operations is provided in a product such as a web page, RSS feed, or shapefile, the issuing WFO or RFC will ensure the:

a. Reference vertical gage datum is to be the same as the local datum currently used by the entity operating the stream gage,

b. Title of the gage datum should always be included after its numerical value (e.g., as "National Geodetic Vertical Datum of 1929 [NGVD 29]" or "North American Vertical Datum of 1988 [NAVD 88]") with abbreviations used where space is limited, and

c. Full precision for the vertical gage datum used by the stream gaging partner is provided in the NWS product.

A second unofficial vertical gage datum and title may also be included in an NWS product, but the primary gage datum is clearly affixed to the product without exception.

A change in vertical gage datum may sometimes be necessary when the National Spatial Reference System (https://www.ngs.noaa.gov/INFO/OnePagers/NSRSOnePager.pdf) is updated, a gaging station is relocated, or the previous gage datum is destroyed by a significant water resources event. Changes in vertical datum require more actions at the national, regional, and local field office level than may initially be realized. These include:

a. Coordinating with the gage partners when datum are being converted e.g., from NGVD 29 to NAVD 88,

b. Making revisions to WFO and RFC databases, as needed,

c. Updating databases and other files used in the NWS hydrology web presence, as necessary, and

d. Conducting outreach to educate partners and other users about datum changes and their possible effects on NWS water resources products and services. If a change in gage datum will affect the ability of partner/user systems to parse observed and forecast data in water resources products, advance notification (in this case, through a service change notice) of 75 days will be required in keeping with the procedures in NWS Instruction 10-1805, *National Service Change and Technical Implementation Notices* (see Appendix B).

NAVD 88 was affirmed as the official vertical datum for the United States by a notice in the Federal Register (Volume 58, Number 120, page 34245) on June 24, 1993. This means many stream gaging stations used by the NWS, most of which are operated by the USGS, will need to have their gage datum revised. However, the NWS provides the same gage datum in its products as the one used by the stream gaging partner, even if that datum is for an old system. Even though an on-line program exists for converting from NGVD 29 to NAVD 88, NWS personnel will not make unilateral changes to a datum without collaborating with the stream gaging partners. NWS personnel will wait for the partners to develop accurate conversions to NAVD 88 for each stream gage location.

With increasing use of elevation-sensitive hydraulic modeling and geo-referencing technologies, the vertical and horizontal gage datum provided in NWS products such as web pages can be critical to partners and other users. HPMs should develop close working relationships with USGS and other partners supporting the stream gaging network in their hydrologic service area and emphasize the need to be notified when a gage datum is being changed. A change in gage datum may affect the elevations reported in NWS products, services, and databases. Procedures for adjustments to vertical gage datum for existing forecast points are described in Appendix B. The USGS Office of Surface Water recognizes this sensitivity and has specifically instructed the USGS Water Science Centers (WSC) to give proper notification of any local and/or geodetic datum changes (https://water.usgs.gov/admin/memo/SW/sw13.02.html). Since USGS is the main operator of the stream gages, examples in Appendix B are specific to USGS but may apply

to other partners as well.

3.2.2 Horizontal Datum.

The horizontal datum of a stream gage is the geographic location in terms of latitude and longitude. The NWS relies on the stream gaging partners to establish and maintain the horizontal datum for each location where point-specific water resources forecast and warning services are provided. Whenever the location of a stream gage is provided in an NWS product, WFOs and RFCs should ensure the:

a. Referenced horizontal datum is the same as the horizontal datum currently used by the entity operating the stream gaging station,

b. Referenced horizontal datum (e.g., National American Datum of 1927 [NAD 27] or North American Datum of 1983 [NAD 83]) is affixed to the site geospatial location of the latitude and longitude, and

c. Full level of precision used by the stream gaging partner for the latitude and longitude, at least four decimal places, is provided in the product. Four decimal places work out to a precision of about 11 meters for latitude (precision for longitude varies with latitude).

Increasing use of technologies requiring precise geo-referencing of locations makes it critical to provide the most up-to-date horizontal datum in NWS products. NAD 83 was affirmed as the official horizontal datum for the United States by a notice in the Federal Register (Volume 54, Number 113, page 25318) on June 14, 1989. Adoption of NAD 83 facilitated calculation of latitudes and longitudes that were much more compatible with modern survey techniques and removed significant local distortions which had accumulated over the years with the older system. Given the requirement to provide latitude and longitude to at least four decimal places for NWS water resources needs, World Geodetic System 1984 (WGS 84) can be considered equivalent to NAD 83. If a requirement calls for higher precision information (6 meters or less), the reference horizontal datum should be NAD 83.

On an annual basis, HPMs should ensure NWS databases are up-to-date by checking latitude/ longitude in stream gaging partnered databases for any changes that might have been made during the past year due to changes in horizontal datum, relocation of the stream gage, etc. This annual review should include:

a. Ensuring the latitude/longitude stored in the WFO database (i.e., Integrated Hydrologic Forecast System [IHFS] database) is identical to the coordinates stored in the NWS Location Identifier (NWSLI) database (see https://cbits.nws.noaa.gov/. The HPM should coordinate with the WFO staff member responsible for local input to the NWSLI database (e.g., Observing Program Leader [OPL]) to ensure consistency between the two databases. Changes should be made to the NWSLI database as necessary. In the event of a discrepancy between the IHFS and the NWSLI databases, the latitude/longitude used by the stream gaging partners should be used in both NWS databases. If the NWS personnel have a valid reason to believe their

coordinates are more correct, the NWS personnel should coordinate with the partnering entity to correct the discrepancy. For more information on the NWS Location Identifier System, see NWS Instruction 30-1204, *Site Identifiers*.

b. Ensuring revisions made to the WFO databases are passed on to backup WFOs and supporting RFCs.

Tools, such as the Advanced Hydrologic Prediction Service Toolbox Metadata Checker (https://water.weather.gov/monitor/tools.php) could be useful to help monitor datum, as well as other gaging network inconsistencies. Inconsistencies should be brought to the attention of the stream gaging partner and hydrologic services personnel in regional headquarters.

3.2.3 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 it is recognized as necessary to 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).

A change in flood stage may require some NWS partners and other users to make revisions to their databases. Since flood stage information is included in a shapefile that can be downloaded through the NWS hydrology web presence, 30 days notification in advance of the change through issuance of a local service change notice is sufficient and will be provided. Sample service change notices announcing a change in flood stage (with no change in gage datum) are provided in Appendix C.

3.2.4 Flood Categories.

Flood categories are defined in NWS Instruction 10-950. A change in flood stage may also involve revisions to a stream location's flood categories. Changes in flood categories may require some NWS partners and other users to make revisions to their databases. Since flood categories are included in a shapefile that can be downloaded through the NWS hydrology web presence, 30 days notification in advance of the change through issuance of a local service change notice is sufficient and will be provided. Sample service change notices announcing a change in flood categories (along with a change in gage datum) are provided in appendix B. A sample service change notice announcing a change in flood categories (with no change in gage datum) is provided in Appendix C.

3.2.5 Miscellaneous Stream Gaging Station Changes.

Various situations may arise requiring a change in flood stage/categories, gage datum, and/or observation/forecast values for a forecast point, such as a gaging station due to a major change in channel geometry. When these occur, the HPM will determine what needs to be done to

address each situation and coordinate with regional headquarters. The HPM will draw from the relevant material in Appendices B and C to develop an appropriately worded service change notice and make the necessary modifications to the IHFS database and the NWS web presence.

4. Hydrometeorological Networks.

Hydrometeorological networks used by the NWS consist of a combination of NWS- and partner 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 directives under NWS Policy Directive 10-13, *Surface Observing Program*. Each WFO will be responsible for defining the onset and termination thresholds used in the ASOSprecipitation 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 partners. WFOs and RFCs regularly use data from these DCPs in their water resources forecast and warning operations. HPMs should coordinate with DCP partners to maximize the availability of DCP data in meeting the requirements of the NWS Water Resources Services Program, such as also transmitting precipitation in accumulated format using the shef code PC to maximize the value of this data should telemetry outages occur.

The NWS field offices should utilize the HADS, which is the NWS supported system for processing and distributing GOES DCP data. HADS, which is a function of MADIS, interfaces with other computer systems to obtain real-time hydrometeorological data from GOES DCPs, decodes the data, and then distributes it to NWS field offices. More information about HADS is available at the website (https://hads.ncep.noaa.gov/) and from Section 2 of NWS Instruction 10-930, *National Hydrologic Products Specification*.

Any DCP changes or user requests are to be reported to the MADIS/HADS Team via email at hadsteam@noaa.gov. Users are to report any outages to MADIS Support at 301-683-3943 or ncep.list.madis_support@noaa.gov during normal business hours. Otherwise, outages during non-business hours should be reported to the Senior Duty Meteorologist (SDM) at 301-683-1500 or SDM@noaa.gov.

4.3 NWS Cooperative Observer Network.

Daily and criteria precipitation values from the cooperative observer network are required to support the water resources modeling operations at WFOs and RFCs. NWS Instruction 10-1307 contains procedures for the Cooperative Observer Program. Additional details on this program can be found at: https://www.weather.gov/coop/overview.

4.4 SNOTEL and Snow Course Networks.

The SNOTEL and manual snow courses are operated by the NRCS. The NRCS provides daily real-time data from the SNOTEL network to the NWS. The NRCS also supplements this data with monthly quality controlled summaries from January through May or June, depending on the duration of the snow melt season. More information about SNOTEL products are in Sections 3 and 4 of NWS Instruction 10-930.

MADIS shall process the SNOTEL information, create products, such as the Daily SNOTEL Report (RSD) and Monthly SNOTEL Report (RSM), and disseminate these products to the NWS offices. Snow course data is only provided to the NWS during the winter months when the manual snow course measurements are taken by NRCS snow surveyors.

NWS should direct issues with processing and dissemination to MADIS at 301-683-3943 or ncep.list.madis_support@noaa.gov during normal business hours. Otherwise, outages during non-business hours should be reported to the SDM at 301-683-1500 or SDM@noaa.gov. NWS should direct issues regarding location and placement of SNOTEL sites or snow courses to the NRCS. Additional details on SNOTELs and snow courses can be found at https://www.nrcs.usda.gov/programs-initiatives/sswsf-snow-survey-and-water-supply-forecasting-program.

4.5 Limited Automated Remote Collectors.

Limited Automated Remote Collectors (LARCs) allow the NWS to access data from a hydrometeorological sensor via a telephone line. Often, but not always, the sensors are maintained by another agency. The central CADAS server providing interrogation and dissemination of hydromet data was decommissioned in 2018. NWS offices have either converted LARCs to GOES DCPs or are now polling the LARC data via other means, such as Local Data Acquisition and Dissemination (LDAD) system.

Appendix A - Template for Letter on Impacts of Stream Gage Closures

Name
Address

Dear *Name*,

The proposed discontinuation of funding and support for stream gages operated by the *Name of Partner* 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 water resources event when the stream gage(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.]

Stream gaging stations operated by the *Name of partner* 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 stream gages 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 stream gages 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 supporting the operation of the stream gaging 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*

Appendix B
Procedures for Adjustments to Vertical Gage Datum for Existing Forecast Points

Changes to the datum may affect existing national, regional, and local databases. NWS field offices ensure that local systems and the NWS water resources web presence report the same and correct information. Most importantly, since any physical changes made at the gaging station, such as shift in a staff gage, gage tape, orifice, or data collection platform (DCP) offset, may affect subsequent gage readings and reported stages, field offices are required to take action to ensure the web and text products provide the same information as reported by our partners on their websites such as the USGS National Water Information System (NWIS). This appendix covers the various actions to be taken when datum adjustments are being implemented.

This appendix describes three situations or cases where products and information provided through the NWS water resources web presence will be impacted. HPMs should evaluate the forecast and data points in their hydrologic service area to determine which case is applicable to each station.

- **Case A** – stations where river observations are reported as stage values (e.g. 10.0 feet) above gage datum (gage zero or local datum).
- **Case B** – stations where river, tailwater, or pool observations are reported asabsolute elevations above specified geodetic datum (e.g. 103.1 feet above NGVD 29).
- **Case C** – stations where river, tailwater, or pool observations will change from being reported as stage values (e.g. 10.0 feet) to absolute elevations above a specified geodetic datum (e.g. 103.1 feet above NAVD 88). Such changes are made at the partner's request.

Beginning early FY09, the USGS has been converting datums from NGVD 29 to NAVD 88 to comply with policies in the Federal Register. To determine the timeframe for changes in gage datum at forecast and data points, the HPM at each WFO should regularly coordinate with their local USGS WSC and any other stream gaging partner(s) in the hydrologic service area. If flooding threatens or is occurring at a station, it is recommended the HPM coordinate a postponement in the gage datum change, especially for Case B or C situations.

When the gage datum is officially changed, the stream gaging partner(s) and the NWS will make appropriate changes to their database. Changes to the USGS NWIS reference database are reflected in the information provided with their station site map (see example in Figure B-1). Although the impacts to products provided through the NWS water resources web presence will be minimal at many sites (Case A locations), they will be significant at some sites and appropriate steps need to be taken for all forecast and data points to accommodate this conversion. Changes to the NWS hydrology web presence, coordination with partners and other users, and other steps to be taken for each of the three cases are described in the following sections. The database changes identified for these three cases will be made to the IHFS database on a WFO's Advanced Weather Information Processing System (AWIPS), which is in turn used to populate the configuration management system (CMS) database used by the NWS hydrology web presence.

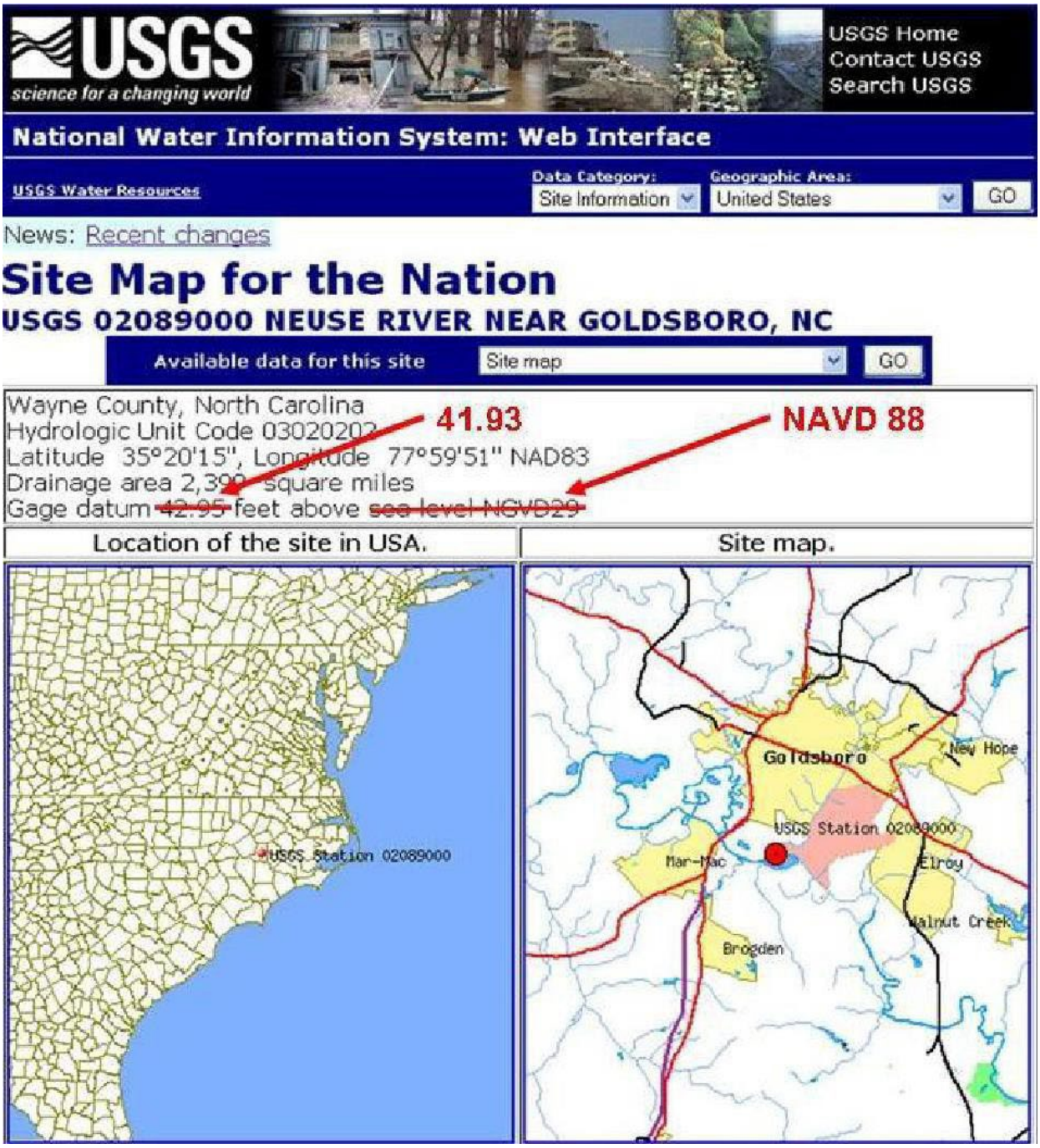


Figure B-1. Sample USGS site map showing where changes would be made to the gage datum for a station

Gage datum may be revised at multiple stream locations on the same date. This increases the complexity of coordination activities and NWS/partner system changes over the short term, but has the advantage of completing the process for multiple sites on the same date and eliminating the need to repeat everything for each site as described in the following sections.

1 Case A Considerations.

In Case A, the vertical gage datum is changed, but stage values are not affected because they are still reported as heights in feet above gage zero. However, a change in vertical gage datum is important to elevation-sensitive applications such as hydraulic modeling, so the datum and elevation references will need to be revised wherever they arestored in files or databases used in the NWS hydrology web presence. When the USGS and partners officially make a Case A vertical gage or local datum change as reflected in the NWIS, the following changes will be made to files and databases used by the NWS hydrology web presence:

- Change the "Gage 0" Datum and reference in the bottom left corner of the hydrograph plot in the NWS water resources web presence (see Figure B-2).
- Change all affected values within the "About This Location" table (see Figure B-3). In the NAVD 88 row, the elevation under "gage height = 0" will need to be filled in with the new gage datum in feet above NAVD 88 and the elevation under "gage height = flood stage" will need to be filled in with the flood elevation in feet above NAVD 88.

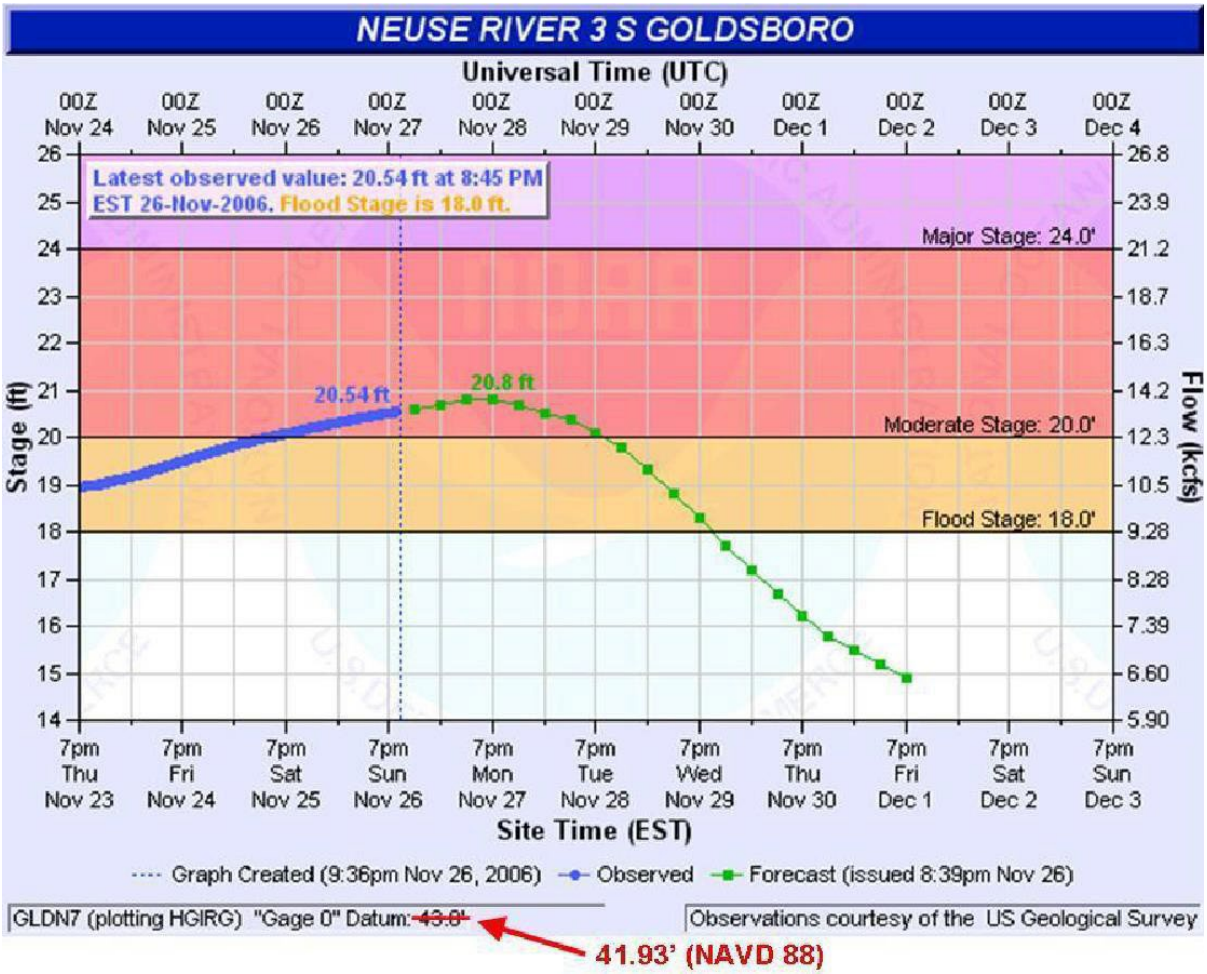


Figure B-2. Sample hydrograph plot for a Case A location in the NWS hydrology web presence. Red text shows how the gage datum should appear after conversion from 42.95 feet NGVD 29 to 41.93 feet NAVD 88.

About This Location Collapse

Latitude: 35.33700° N, Longitude: 77.998000° W, Horizontal Datum: NAD 1983

River Stage Reference Frame	Gage Height	Flood Stage	Uses
NWS stage	0 ft	18 ft	Interpreting hydrographs and NWS watch, warnings, and forecasts, and inundation maps
Vertical Datum	**Elevation (gage height = 0)**	**Elevation (gage height = flood stage)**	**Elevation information source**
NAVD 88	~~N/A~~ 41.93 ft (NAVD 88)	~~N/A~~ 59.93 ft (NAVD 88)	Survey grade GPS equipment, FEMA flood plain maps, newer USGS topographic maps
NGVD 29	42.95 ft NGVD 29	60.95 ft NGVD 29	Older USGS topographic maps, NGVD 29 benchmarks
Other	~~42.95 ft~~ N/A	~~60.95 ft~~ N/A	

Figure B-3. Sample "About This Location" table below the hydrograph plot in the NWS hydrology web presence. For Case A locations, the elevation fields highlighted in yellow will require revision when a gage datum is changed from 42.95 feet NGVD 29 to 41.93 feet NAVD 88. Note: do not include a row in the table for MSL (mean sea level) – MSL is not a fixed datum

Although a Case A datum change does not affect reported stage values, WFOs should still notify partners and other users the change has occurred by issuing local service change notices. This will ensure partners and other users know that the gage datum values have been revised in the various displays and tables provided through the NWS hydrology web presence. With a Case A change, the content of products transmitted via NOAAPORT or NOAA Weather Wire is unaffected and there is no change to the issuance time, frequency, or schedule of any product. Therefore, the rules for notification lead time in NWS Instruction 10-1805 do not apply, but issuance of a local service change notice 30 days before a Case A change is recommended. Examples B-1 and B-2 are two templates for possible local service change notices for Case A datum changes.

It is possible for a WFO to revise the flood stage and/or flood categories at the same time as a Case A change, even though the two are not linked together. This is not a recommended practice, but WFOs may make the two changes simultaneously with the approval of regional headquarters. Examples B-3 and B-4 are two templates that could be used for local service change notices for the situation when flood stage and/or flood categories are being revised simultaneously with a Case A change. Even though the flood category stages are not mentioned in flood warning and other products transmitted via NOAAPORT or NOAA Weather Wire, changes in flood stage and/or flood categories would require partners to revise the category definitions within their systems. Therefore, partners will be given 30 day notification through issuance of a service change notice when a change in flood stage or any flood category is made in addition to a Case A change when NWS Instruction 1805 does not apply.

Example B-1 - Template for a possible service change notice for a Case A vertical datum change.

NOUS42 K[*WFO Id*] DDHHMM
PNS[*xxx*]

Service Change Notice
National Weather Service [*WFO Name*]
[*hhmm*] [*AM*/*PM*] [*Time zone*] [*Day*] [*Month*] [*Day*] [*Year*]

To: Subscribers:
-Family of Services
-NOAA Weather Wire Service
-Emergency Managers Weather Information Network
Other NWS partners, users, and employees

From: [*MIC Name*]
Meteorologist in Charge
Weather Forecast Office[*WFO Location*] [*State*]

Subject: Change in Gage Zero Elevation for the River Gage [at/near] [*Gage Location*] on the [*River Name*] ([*NWSLI*])

Effective at [*HHMM*] Coordinated Universal Time on [*Day*] [*Date*], the [stream gaging partner (e.g., USGS)] will change the Gage Zero/Gage Datum Elevation for the river gage [at/near] [*River Gage Name*] on the [*River Name*] from [*yyy.yy*] feet above National Geodetic Vertical Datum of 1929 (NGVD 29) to [*xxx.xx*] feet above North American Vertical Datum of 1988 (NAVD 88). For this location, Gage Zero is the elevation at which river stage is zero feet. The gage will remain at the same physical location. Only the elevation of the Gage Zero will change.

This change is being made as part of an initiative to modernize vertical datums associated with stream gaging equipment. This change in the Gage Zero will not require a change in flood stage, flood categories, or flood impact stage levels.

Observations and forecasts will remain as stage reported in feet above Gage Zero for the stream gage at [*River Gage Name*] on the [*River Name*] and can be used by persons between [*Upstream Town Name*] and [*Downstream Town Name*].

The National Weather Service welcomes public feedback. If you have any questions or comments on this change, please contact:

[*Name*]
[*Title*]
National Weather Service Forecast Office
[*Address*]

Phone: [*zzz.zzz.zzzz*]
E-mail: [*firstname.lastname*]@noaa.gov

$$

Example B-2 - Template for a possible service change notice for a Case A situation with a lower level of detail than Example B-1.

NOUS42 K[*WFO Id*] DDHHMM
PNS[*xxx*]

Service Change Notice
National Weather Service [*WFO Name*]
[*hhmm*] [*AM*/*PM*] [*Time zone*] [*Day*] [*Month*] [*Day*] [*Year*]

To: Subscribers:
-Family of Services
-NOAA Weather Wire Service
-Emergency Managers Weather Information Network
Other NWS partners, users, and employees

From: [*MIC Name*]
Meteorologist in Charge
Weather Forecast Office[*WFO Location*] [*State*]

Subject: Change in Gage Zero Elevation for the River Gage [at/near]
[*Gage Location*] on the [*River Name*] ([*NWSLI*])

Effective at [*HHMM*] Coordinated Universal Time on [*Day*] [*Date*], the [stream gaging partner (e.g., USGS)] will change the Gage Zero/Gage Datum for the river gage at [*River Gage Location*] on [*River Name*] from [*yyy.yy*] feet above National Geodetic Vertical Datum of 1929 (NGVD 29) to [*xxx.xx*] feet above North American Vertical Datum of 1988 (NAVD 88). The gage will remain at the same physical location. Only the elevation of the Gage Zero will change.

This change in the vertical gage datum will require no change in the flood stage for the river gage near [*River Gage Location*] on the [*River Name*]. The flood stage will remain at [*xx.x*] feet above Gage Zero.

The National Weather Service welcomes public feedback. If you have any questions or comments on this change, please contact:

[*Name*]
[*Title*]
National Weather Service Forecast Office
[*Address*]

Phone: [*zzz.zzz.zzzz*]
E-mail: [*firstname.lastname*]@noaa.gov

$$

Example B-3 – Template for a possible service change notice for a Case A situation when flood category stages are also being changed.

NOUS42 K[*WFO Id*] DDHHMM
PNS[*xxx*]

Service Change Notice
National Weather Service [*WFO Name*]
[*hhmm*] [*AM*/*PM*] [*Time zone*] [*Day*] [*Month*] [*Day*] [*Year*]

To: Subscribers:
-Family of Services
-NOAA Weather Wire Service
-Emergency Managers Weather Information Network
Other NWS partners, users, and employees

From: [*MIC Name*]
Meteorologist in Charge
Weather Forecast Office[*WFO Location*] [*State*]

Subject: Changes in Gage Zero and Flood Categories for the River Gage
[at/near] [*Gage Location*] on the [*River Name*] ([*NWSLI*])

Effective at [*HHMM*] Coordinated Universal Time on [*Day*] [*Date*], the [stream gaging partner (e.g., USGS)] will change the Gage Zero/Gage Datum Elevation for the river gage [at/near] [*River Gage Name*] on the [*River Name*] from [*yyy.yy*] feet above National Geodetic Vertical Datum of 1929 (NGVD 29) to [*xxx.xx*] feet above North American Vertical Datum of 1988 (NAVD 88). For this location, Gage Zero is the elevation at which river stage is zero feet. The gage will remain at the same physical location. Only the elevation of the Gage Zero will change.

On the same date due to significant [erosion, sedimentation and/or land use changes] on the river channel, flood category stages cited in NWS forecast products for the [*River Name*] near [*River Gage Name*] will be changed as follows:

1. Flood stage will be [*xx.x*] feet above Gage Zero. Previous flood stage was [*yy.y*] feet above Gage Zero.
2. Moderate flood stage will be [*xx.x*] feet above Gage Zero. Previous moderate flood stage was [*yy.y*] feet above Gage Zero.
3. Major flood stage will be [*xx.x*] feet above Gage Zero. Previous major flood stage was [*yy.y*] feet above Gage Zero.

Observations and forecasts expressed as feet above Gage Zero for the stream gage at/near [*River Gage Name*] on the [*River Name*] can be used by persons between [*Upstream Town Name*] and [*Downstream Town Name*].

The National Weather Service welcomes public feedback. If you have any questions or comments on this change, please contact:

[*Name*]
[*Title*]
National Weather Service Forecast Office
[*Address*]
Phone: [*zzz.zzz.zzzz*]
E-mail: [*firstname.lastname*]@noaa.gov

$$

Example B-4 – Template for a possible service change notice for a Case A situation when the flood stage is also being changed. This template has a lower level of detail than Example B-3.

```
NOUS42 K[WFO Id] DDHHMM
PNS[xxx]

Service Change Notice
National Weather Service [WFO Name]
[hhmm] [AM/PM] [Time zone] [Day] [Month] [Day] [Year]

To:      Subscribers:
         -Family of Services
         -NOAA Weather Wire Service
         -Emergency Managers Weather Information Network
         Other NWS partners, users, and employees

From:    [MIC Name]
         Meteorologist in Charge
         Weather Forecast Office[WFO Location] [State]

Subject: Changes in Gage Zero and Flood Stage for River Gage
         [at/near] [Gage Location] on the [River Name] ([NWSLI])

Effective at [HHMM] Coordinated Universal Time on [Day] [Date], the
[stream gaging partner (e.g., USGS)] will change the Gage Zero/Gage
Datum for the river gage [at/near] [River Gage Location] on [ River
Name] from [yyy.yy] feet above National Geodetic Vertical Datum of
1929 (NGVD 29) to [xxx.xx] feet above North American Vertical Datum of
1988 (NAVD 88). The gage will remain at the same physical location.
Only the elevation of the Gage Zero will change.

On the same date, NWS will also adjust the flood stage for the river
gage near [River Gage Location] on [River Name]. The new flood stage
will be set at [xx.x] feet above the new Gage Zero ([xxx.x] feet NAVD
88). The previous flood stage was [yy.y] feet above the OLD Gage Zero
([yyy.y] feet NGVD 29).

The National Weather Service welcomes public feedback. If you have any
questions or comments on this change, please contact:

     [Name]
     [Title]
     National Weather Service Forecast Office
     [ADDRESS]

     Phone:  [zzz.zzz.zzzz]
     E-mail:  [firstname.lastname]@noaa.gov


$$
```

2 Case B Considerations.

In Case B situations, the vertical gage datum is being changed for a station which reports stage as an elevation above a specified datum, such as NGVD 29. With this type of change, river, pool, or tailwater stage reports will switch from elevation infeet above NGVD 29 to elevation in feet above NAVD 88. Conversion to NAVD 88 will result in a change for every observation taken at the station. For example, if the conversion to NAVD 88 resulted in a change of 3.10 feet, a reading of 100.0 feet above NGVD 29 would be 103.1 feet above NAVD 88. Because every gage reading will be affected by a Case B datum change, it is particularly important to collaborate with the appropriate USGS WSC to determine the precise date of the vertical datum change. The USGS refers to this type of change as a "geodetic change" impacting local observations in NWIS.

When the USGS officially makes a Case B change as reflected in the NWIS, the NWS local office will:

- Revise the "Gage 0" Datum information in the bottom left corner of the hydrograph plot in the NWS water resources web presence (see Figure B-4). Past NWS practice has been to use '"Gage 0" Datum N/A' for stations reporting stage as absolute elevation above sea level. For every Case B station, the change to NAVD 88 should be used as an opportunity to change the bottom left corner to read "Gage 0" Datum 0.00' NAVD 88.
- Revise all historical crest and low water records as shown in Figure B-5.
- Revise all flood impact and low water impact information as shown in Figure B-6.
- In the "About this Location" table (see Figure B-7), insert elevation data related to NAVD 88 across the NAVD 88 row.
- In the "About this Location" table, convert historical information in any other row from NGVD 29 or any other fixed datum to NAVD 88.
- Plan and coordinate as further defined in sections 4, 5 and 6.

Because a Case B datum change affects every reported and historical stage value, it is very important for WFOs to notify partners and other users the change will occur by issuing one or more local service change notices. This will ensure partners and other users know the precise time when observations and forecasts will be reported differently in water resources text products and when the various displays and tables provided through the NWS water resources web presence will be revised. According to NWS Instruction 10-1805, a significant change to a product or its content which affects the automated parsing of the product requires an advance notification (in this case, via service a change notice) of 75 days. Examples (B-5 and B-6) are two templates for possible local service change notices for Case B changes. A second follow-up service change notice is recommended when the date of the change is approaching.

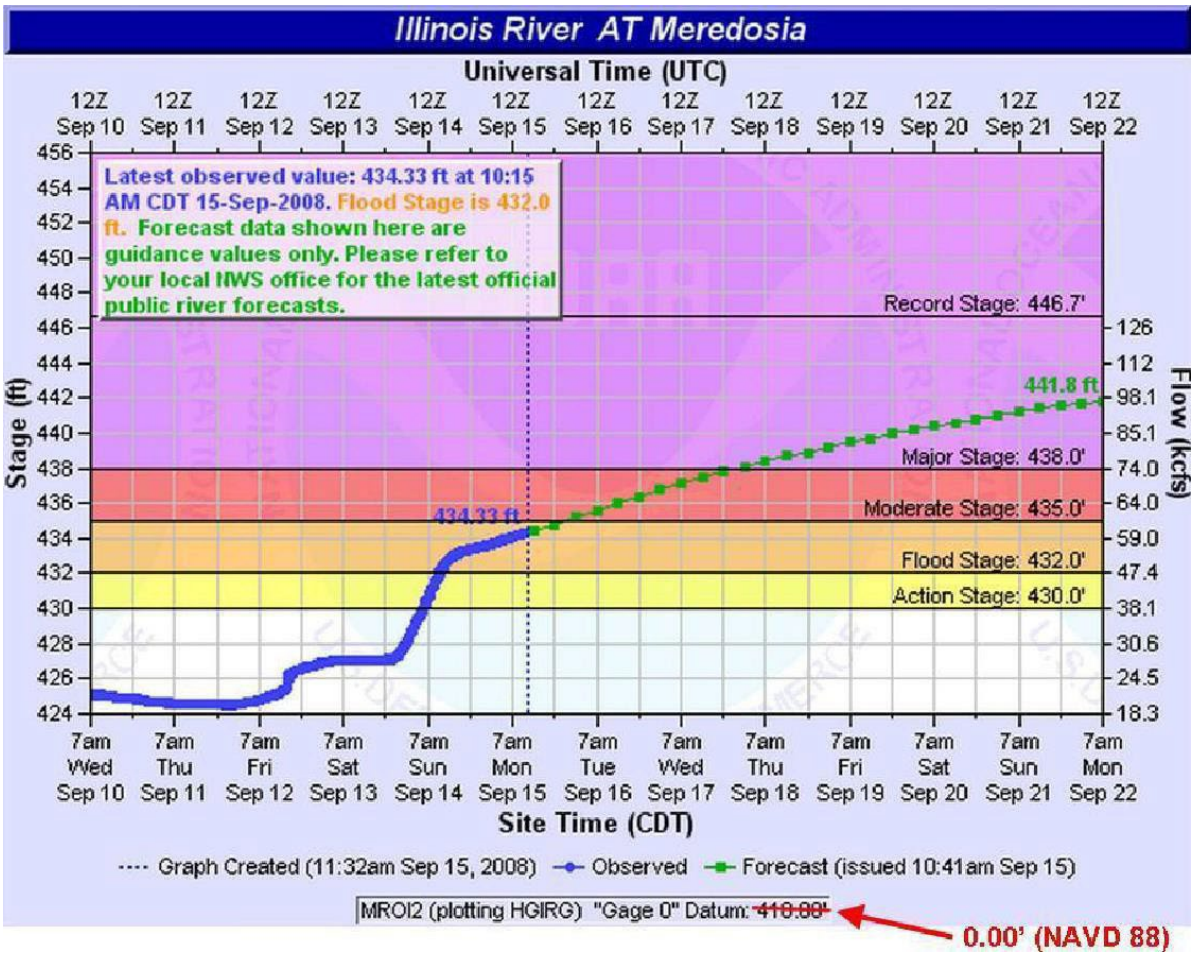


Figure B-4. Sample hydrograph plot for a Case B location in the NWS hydrology web presence. Red text shows how the gage datum should appear after conversion from 418 feet NGVD 29 to 417.64 feet NAVD 88. Note: correct format is “Gage 0” Datum 0.00’ NAVD 88

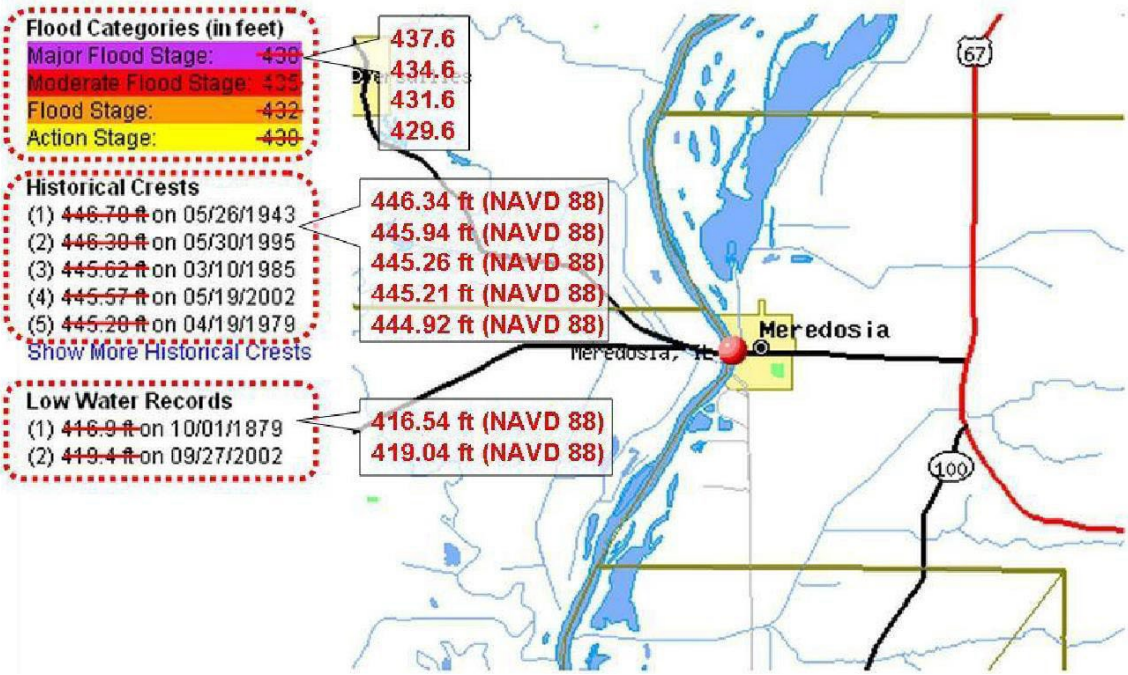


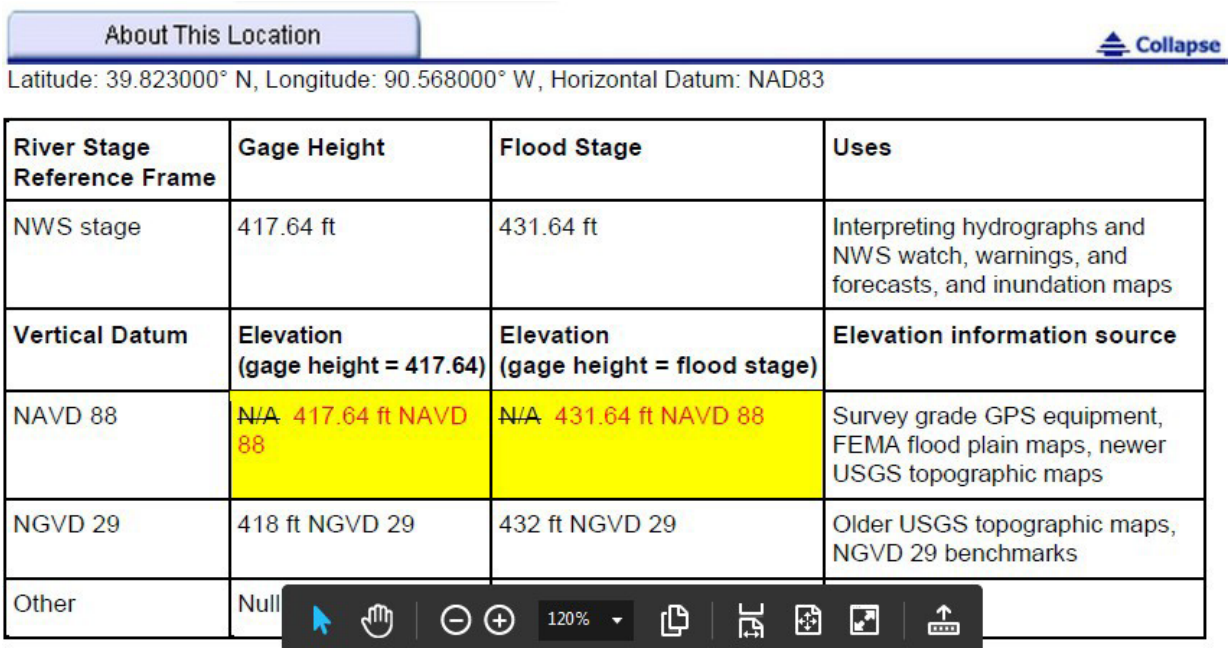
Figure B-5. Example of changes to flood categories and historical crests in the NWS water resources web presence for a Case B datum change from 418 feet NGVD 29 to 417.64 feet NAVD 88. Information in red will need to be revised

Flood Impacts — Collapse

All elevations in feet ~~NGVD 29~~ above NAVD 88

~~456.0~~ 455.6	Coon Run Levee is overtopped.
~~451.5~~ 451.1	McGee Creek Levee is overtopped.
~~450.0~~ 449.6	Mauvaise Terre Levee is overtopped.
~~449.0~~ 448.6	Meredoisa Lake Levee is overtopped.
~~447.8~~ 447.4	Burlington Northern Railroad tracks and Levee at route 104 overtop.
~~446.0~~ 445.6	At levels above 445.64 feet (NAVD 88), Scott County and Northern Meredoisa Levees are overtopped and flood fighting activities begin at Willow Creek Lake and Dam. Also this level normally has a 5 percent annual chance of occurring or being exceeded in any given year.
~~445.0~~ 444.6	Flood fighting begins at Scott County... Coon Run... and Meredosia Lakes and Dams.
~~444.4~~ 444.0	Flood fighting begins at Valley City Lake and Dam and floodwaters overtop Little Creek Levee.
~~444.0~~ 443.6	Damage begins to buildings in Meredosia.
~~443.4~~ 443.0	Flood fighting begins at Little Creek Lake and Dam.
~~442.2~~ 441.8	Damage begins to buildings in Montezuma.
~~441.8~~ 441.4	Damage begins to buildings and main access roads overtopped in Florence.
~~441.0~~ 440.6	Flood fighting activities begin at Big Swan Lake and Dam.
~~440.4~~ 440.0	Meredosia Lake Road overtopped.
~~440.2~~ 439.8	Low roads in Florence overtopped.
~~440.0~~ 439.6	Cargill Company in Florence begins flood fighting activities.
~~438.0~~ 437.6	Main road in Valley City overtopped.
~~436.0~~ 435.6	City of Meredosia plugs storm sewer outlets. Also this level normally has a 50 percent annual chance of occurring or being exceeded in any given year.
~~435.4~~ 435.0	Meredosia boat dock floods.

Figure B-6. Sample "Flood Impacts" table below the hydrograph plot in the NWS hydrology web presence, showing the elevation fields requiring revision for a Case B datum change from 418 feet NGVD 29 to 417.64 feet NAVD 88



About This Location

Collapse

Latitude: 39.823000° N, Longitude: 90.568000° W, Horizontal Datum: NAD83

River Stage Reference Frame	Gage Height	Flood Stage	Uses
NWS stage	417.64 ft	431.64 ft	Interpreting hydrographs and NWS watch, warnings, and forecasts, and inundation maps
Vertical Datum	**Elevation (gage height = 417.64)**	**Elevation (gage height = flood stage)**	**Elevation information source**
NAVD 88	~~N/A~~ 417.64 ft NAVD 88	~~N/A~~ 431.64 ft NAVD 88	Survey grade GPS equipment, FEMA flood plain maps, newer USGS topographic maps
NGVD 29	418 ft NGVD 29	432 ft NGVD 29	Older USGS topographic maps, NGVD 29 benchmarks
Other	Null		

Figure B-7. Sample "About This Location" table below the hydrograph plot in the NWS hydrology web presence. For a Case B datum change from 418 feet NGVD 29 to 417.64 feet NAVD 88, elevation fields highlighted in yellow will require revision. Note: do not include a row in the table for MSL (mean sea level) – MSL is not a fixed datum

Example B-5 - Sample template for a possible service change notice for a Case B situation.

NOUS42 K[*WFO Id*] DDHHMM
PNS[*xxx*]

Service Change Notice
National Weather Service [*WFO Name*]
[*hhmm*] [*AM*/*PM*] [*Time zone*] [*Day*] [*Month*] [*Day*] [*Year*]

To: Subscribers:
-Family of Services
-NOAA Weather Wire Service
-Emergency Managers Weather Information Network
Other NWS partners, users, and employees

From: [*MIC Name*]
Meteorologist in Charge
Weather Forecast Office[*WFO Location*] [*State*]

Subject: Changes in Gage Reporting and Flood Categories for Stream Gage at/near[*Gage Location*] on the [*River Name*] ([*NWSLI*])

Effective at [*HHMM*] Coordinated Universal Time on [*Day*] [*Date*], the [stream gaging partner (e.g., USGS)] will change the Gage Zero/Gage Datum for the stream gage at/near [*River Gage Name*] on the [*River Name*] from [*yyy.yy*] feet above National Geodetic Vertical Datum of 1929 (NGVD 29) to [*xxx.xx*] feet above North American Vertical Datum of 1988 (NAVD 88).

Because of this change, starting on [*Day of Week*] [*Month*] [*Day*] [*Year*], every stage observation will be [z.zz] feet [higher/lower] than it would have been under the old NGVD 29 system. This change is being made as part of a U.S. Geological Survey initiative to modernize vertical datums associated with stream gaging equipment.

To ensure consistency in NWS forecast and warning services, this change also requires an adjustment to flood category elevations. The new flood category stages will be as follows:

1. New flood stage is [*xxx.x*] feet above NAVD 88. Previous flood stage was [*yyy.y*] feet above NGVD 29.
2. New moderate flood stage is [*xxx.x*] feet above NAVD 88. Previous moderate flood stage was [*yyy.y*] feet above NGVD 29.
3. New major flood stage is [*xxx.x*] feet above NAVD 88. Previous major flood stage was [*yyy.y*] feet above NGVD 29.

Observations and forecasts for the stream gage at/near [*River Gage Name*] on the [*River Name*] can be used by persons between [*Upstream Town Name*] and [*Downstream Town Name*].

The National Weather Service welcomes public feedback. If you have any questions or comments on this change, please contact:
[*Name*]
[*Title*]
National Weather Service Forecast Office
[*Address*]
Phone: [zzz.zzz.zzzz]
E-mail: [firstname.lastname]@noaa.gov

$$

Example B-6 – Sample template for a possible service change notice for a Case B situation with less descriptive information than Example B-5.

```
NOUS42 K[WFO Id] DDHHMM
PNS[xxx]

Service Change Notice
National Weather Service [WFO Name]
[hhmm] [AM/PM] [Time zone] [Day] [Month] [Day] [Year]

To:      Subscribers:
         -Family of Services
         -NOAA Weather Wire Service
         -Emergency Managers Weather Information Network
         Other NWS partners, users, and employees

From:    [MIC Name]
         Meteorologist in Charge
         Weather Forecast Office[WFO Location], [State]

Subject: Changes in Gage Reporting and Flood Categories for Stream
         Gage at/near[Gage Location] on the [River Name] ([NWSLI])

Effective at [HHMM] Coordinated Universal Time on [Day] [Date], the
[stream gaging partner (e.g., USGS)] will change the Gage Zero/Gage
Datum on the stream gage at/near [River Gage Location] on the [River
Name] from [yyy.yy] feet above National Geodetic Vertical Datum of
1929 (NGVD 29) to [xxx.xx] feet above North American Vertical Datum of
1988 (NAVD 88). As a result, every stage observation will be [z.zz]
feet [higher/lower] than it would have been under the old NGVD 29
system.

The change in the vertical gage datum reference will also require a
change to the flood stage to ensure consistency in NWS forecast and
warning services. The new flood stage will be set at [xx.x] feet above
NAVD 88. The previous flood stage was [yy.y] feet above NGVD 29. All
other flood categories will be adjusted accordingly.

The National Weather Service welcomes public feedback. If you have
any questions or comments on this change, please contact:

     [Name]
     [Title]
     National Weather Service Forecast Office
     [ADDRESS]

     Phone:  [zzz.zzz.zzzz]
     E-mail:  [firstname.lastname]@noaa.gov

$$
```

3 Case C Considerations.

In Case C situations, the vertical gage datum is being changed and simultaneously the reporting of river, pool, or tailwater stage is being changed from height above a gage zero to an elevation above a specified datum, i.e. NAVD 88 by request of a local stream gage partner. This is the most radical change of the three cases because a relatively small change caused by converting from NGVD 29 to NAVD 88 can easily be dwarfed by the large change caused by switching from stage-based readings to elevation-based readings. Implementing these two changes at the same time will result in a significant change for every river stage observation taken at the station. For example, a stage reading of 15.0 feet above gage zero might be 108.5 feet above NAVD 88. Because every stage reading will be significantly affected by a Case C datum change, it is extremely important to collaborate with the appropriate USGS WSC to determine the precise date of the "double change." The USGS considers this as a "geodetic change" impacting the local observations in NWIS.

A Case C datum change requires several changes in the NWS hydrology web presence. When the USGS officially makes a Case C change which impacts local observations in NWIS, the NWS will simultaneously made changes to files and databases used by the NWS hydrology web presence:

- Revise the "Gage 0" Datum information in the bottom left corner of the hydrograph plot in the NWS water resources web presence as shown previously in Figure B-4. The correct format for this information in a Case C situation is: "Gage 0" Datum 0.00' NAVD 88.

- Revise all historical crest and low water records as highlighted previously in Figure B-5.

- Revise all flood impact and low water impact information as illustrated previouslyin Figure B-6.

- Revise vertical gage datum and all values affected by that change in the "About This Location" table as illustrated previously in Figure B-7. Note: do not include a row in the table for MSL (mean sea level) – MSL is not a fixed datum.

- Convert any other historical information from NGVD 29 or any other fixed datum to elevation-based stages in NAVD 88.

Because a Case C change affects every reported stage observation, it is especially important for WFOs to notify partners and other users the change will occur by issuing one or more local service change notices. This will ensure partners and other users know the precise time when observations and forecasts will be reported differently in water resources text products and when the various displays and tables provided through the NWS water resources web presence will be revised. According to NWS Instruction 10-1805, a significant change to a product or its content which affects the automated parsing of that product requires an advance notification (in this case, via service a change notice) of 75 days. Examples B-7 and B-8 are two templates for possible local service change notices for Case C changes. A second follow-up service change notice is highly recommended when the date of the change is approaching.

Example B-7 - Sample template for a possible service change notice for a Case C situation.

NOUS42 K[*WFO Id*] DDHHMM
PNS[*xxx*]

Service Change Notice
National Weather Service [*WFO Name*]
[*hhmm*] [*AM/PM*] [*Time zone*] [*Day*] [*Month*] [*Day*] [*Year*]
To: Subscribers:
-Family of Services
-NOAA Weather Wire Service
-Emergency Managers Weather Information Network
Other NWS partners, users, and employees
From: [*MIC Name*]
Meteorologist in Charge
Weather Forecast Office[*WFO Location*], [*State*]
Subject: Changes in Gage Reporting and Flood Categories for Stream
Gage at/near[*Gage Location*] on the [*River Name*] ([*NWSLI*])

Effective at [*HHMM*] Coordinated Universal Time on [*Day*] [*Date*], the [stream gaging partner (e.g., USGS)] will change the reporting of observations for the stream gage at [*River Gage Location*] on the [*River Name*] from a stage value in feet above Gage Zero/Gage Datum to an elevation height in feet North American Vertical Datum of 1988 (NAVD 88).

Because of this change, starting on [*Day of Week*] [*Month*] [*Day*] [*Year*], every observation will be [z.zz] feet [higher/lower] than it would have been as a stage expressed in feet above Gage Zero. This change is part of a U.S. Geological Survey initiative to modernize vertical datums associated with stream gaging equipment and is being made per a request of the partner funding this gage.

Changing the reporting of observations to absolute elevation in feet NAVD 88 will require new stages to be assigned for National Weather Service (NWS) flood categories to ensure consistency in NWS forecast and warning services. The new flood categories will be as follows:

1. New flood stage is [*xxx.x*] feet above NAVD 88. The previous flood stage was [*yy.y*] feet above Gage Zero.
2. New moderate flood stage is [*xxx.x*] feet above NAVD 88. Previous moderate flood stage was [*yy.y*] feet above Gage Zero.
3. New major flood stage is [*xxx.x*] feet above NAVD 88. Previous major flood stage was [*yy.y*] feet above Gage Zero.

Observations and forecasts for the stream gage at/near [*River Gage Name*] on the [*River Name*] can be used by persons between [*Upstream Town Name*] and [*Downstream Town Name*].

The National Weather Service welcomes public feedback. If you have any questions or comments on this change, please contact:
[*Name*]
[*Title*]
National Weather Service Forecast Office
[*Address*]
Phone: [zzz.zzz.zzzz]
E-mail: [firstname.lastname]@noaa.gov

$$

Example B-8 - Sample template for a possible service change notice for a Case C situation with less descriptive information than Example B-7.

```
NOUS42 K[WFO Id] DDHHMM
PNS[xxx]

Service Change Notice
National Weather Service [WFO Name]
[hhmm] [AM/PM] [Time zone] [Day] [Month] [Day] [Year]

To:      Subscribers:
         -Family of Services
         -NOAA Weather Wire Service
         -Emergency Managers Weather Information Network
         Other NWS partners, users, and employees

From:    [MIC Name]
         Meteorologist in Charge
         Weather Forecast Office[WFO Location], [State]

Subject: Changes in Gage Reporting and Flood Categories for Stream
         Gage at/near[Gage Location] on the [River Name] ([NWSLI])

Effective at [HHMM] Coordinated Universal Time on [Day] [Date], the
[stream gaging partner (e.g., USGS)] will change the reporting of
observations for the stream gage at/near [River Gage Location] on the
[River Name] from a stage value in feet above Gage Zero/Gage Datum
National Geodetic Vertical Datum of 1929 (NGVD 29) to an elevation
height in feet above North American Vertical Datum of 1988 (NAVD 88).
This change is being made at the request of local stream gaging
partners.

The change in the gage reporting and associated vertical gage datum
reference will also require a change to the flood stage to ensure
consistency in NWS forecast and warning services for the River gage
at/near [River Gage Location] on the [River Name].

The new flood stage will be set at [xx.x] feet above NAVD 88. The
previous flood stage was [yy.y] feet above Gage Zero. All other flood
categories will be adjusted accordingly.

The National Weather Service welcomes public feedback. If you have
any questions or comments on this change, please contact:

     [Name]
     [Title]
     National Weather Service Forecast Office
     [Address]

     Phone:  [zzz.zzz.zzzz]
     E-mail:  [firstname.lastname]@noaa.gov

$$
```

4 Special Case B and Case C Considerations.

For both Case B and Case C situations, a few changes in addition to those described in Sections 2 and 3

are made, depending on whether the USGS makes the adjustment internally at the database level or in the field at the data collection platform (DCP) level. Note: several other changes, such as rating curve updates, will be required for RFC operational forecast systems and the WFO Hydrologic Forecast System (WHFS), but these changes are out of the scope of this directive.

4.1 Web-Based Hydrograph Headlines.

For Case B and Case C situations, a recommended practice is to place a headline above the web-based hydrograph plot for a few weeks before and after the datum change to help ensure partners and other users are aware of the change. This should also be done for Case A situations when flood stage/categories are changed.

4.2 Change in Datum Offset in NWIS Database.

If the USGS internally adjusts the datum offset inside their database such that this offset is added to the raw values they receive from the DCP, NWS will need to make its own changes to Base Elevation within HADS database (see https://hads.ncep.noaa.gov/) and any internal NWS database where an offset is added to the raw values (See HADS metadata table, Figure 8). The field office coordinates this change with the MADIS/HADS team (hadsteam@noaa.gov).

4.3 Change in Transmitted Data.

It is important for the WFO to coordinate with the USGS and MADIS/HADS support team during Case B and Case C situations, because the USGS could make an unanticipated change in data transmission at the gage. If the USGS physically adjusts the DCP or any attached field equipment to directly report the elevation stages without the need for any further translation, NWS will not need an offset value in the Base Elevation element of the HADS database, but will need to change the static information for the NWS water resources web presence as previously described as well as any internal NWS database.

Since human nature favors whole number offsets, the USGS may adjust the wire weight gage or add a correction factor in the gaging station's pressure transducer. Alternatively, the USGS may insert a correction factor within the gaging station's DCP. Most importantly, the USGS intent would be to ensure readings obtained via the wire weight (reading + offset), DCP (display readout or display + offset), and staff gage (staff reading, or staff reading + offset) provide the correct elevation in NAVD 88. The manner in which the USGS accomplishes this may or may not affect the numbers transmitted by HADS. Therefore, it is critical to coordinate how any changes will be made in data transmissions with both the USGS and the MADIS/HADS team.

5. Planning and Coordination.

Prior to any datum changes, in any of the three cases noted previously, the NWS field offices should reconfirm with their local USGS office on the timeframe when the change will be applied, ensure an understanding of the net effects, and coordinate efforts to minimize impacts to operations. The field office also coordinates with NWS partners and other users as previously described.

As early as possible, the field office also coordinates with their respective river forecast center

(RFC) concerning the pending changes. The RFC will also need to make adjustments to its IHFS database and other local databases. When elevation-based data locations are involved (i.e., Case B or C situations), particular attention should be paid to rating tables and elevation

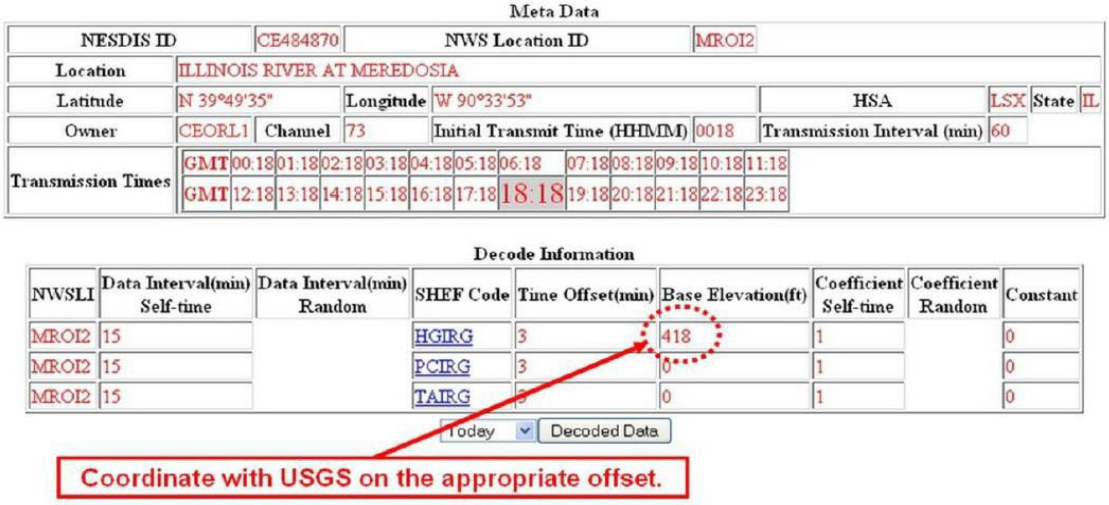


Figure B-8. Sample metadata table from HADS. The appropriate base elevation offset, circled in red, should be coordinated with the USGS.storage curves. For elevation-based data locations where manual observations are taken by observers (either for routine or backup purposes), the observers will need to be trained on how to appropriately translate a staff gage reading to the correct elevation above NAVD 88.

6. Post-Conversion Confirmation.

Immediately after the vertical datum changes, the WFO should monitor the outcome and take corrective actions as necessary. Actions taken by WFOs after the official transition date in the service change notice should include thefollowing:

- Ensure readings are being reported as elevation heights according to the new gage datum (for Case B situations) or ensure readings are no longer being reported as stage above gage zero and are now being reported as elevation heights according to the new gage datum (for Case C situations).
- Ensure all observations and/or static data in the NWS water resources web presence are reflecting the new gage datum.
- For any stations receiving manual observations, ensure measurements are appropriately reported as a stage above gage zero or an elevation feet above NAVD 88.
- Continue the coordination process with partners and other users to make them aware of how to correctly interpret observations according to the new gage datum (mainly important for Case B and C situations) and provide assistance as necessary.
- Continue the coordination process with supporting RFC(s) to make them aware of the need to make adjustments to the IHFS database and other local databases.
- Ensure that forecast products are being provided with appropriate stage values above gage zero or elevation heights above NAVD 88.

Appendix C
Sample Public Information Statements for Changes to Flood Category Stages

Example C-1 - Sample template for change in flood stage reported above gage zero (i.e., a stage-based station). No changes made to other flood categories.

NOUS42 K[*WFO Id*] DDHHMM
PNS[*xxx*]

Service Change Notice
National Weather Service [*WFO Name*]
[*hhmm*] [*AM*/*PM*] [*Time zone*] [*Day*] [*Month*] [*Day*] [*Year*]

To: Subscribers:
-Family of Services
-NOAA Weather Wire Service
-Emergency Managers Weather Information Network
Other NWS partners, users, and employees

From: [*MIC Name*]
Meteorologist in Charge
Weather Forecast Office[*WFO Location*], [*State*]

Subject: Changes in Flood Categories for Stream Gage at/near
[*Gage Location*] on the [*River Name*] ([*NWSLI*])

Effective at [*HHMM*] Coordinated Universal Time on [*Day*] [*Date*], the National Weather Service will change the flood stage for the stream gage at [*River Gage Location*] on the [*River Name*].

The new flood stage referenced in flood warnings, flood statements, and flood advisories will be [*xxx.x*] feet above Gage Zero. The previous flood stage was [*yy.y*] feet above Gage Zero. This change is part of a recent re-evaluation of the flood plain with local emergency managers. Other flood category stages at this stream gage will remain unchanged.

The National Weather Service welcomes public feedback. If you have any questions or comments on this change, please contact:

[*Name*]
[*Title*]
National Weather Service Forecast Office
[*Address*]

Phone: [zzz.zzz.zzzz]
E-mail: [firstname.lastname]@noaa.gov

$$

Example C-2 - Sample template for changes in flood category stages reported above gage zero (i.e., a stage-based station).

```
NOUS42 K[WFO Id] DDHHMM
PNS[xxx]
Service Change Notice
National Weather Service [WFO Name]
[hhmm] [AM/PM] [Time zone] [Day] [Month] [Day] [Year]

To:      Subscribers:
         -Family of Services
         -NOAA Weather Wire Service
         -Emergency Managers Weather Information Network
         Other NWS partners, users, and employees

From:    [MIC Name]
         Meteorologist in Charge
         Weather Forecast Office[WFO Location], [State]

Subject: Changes in Gage Reporting and Flood Categories for Stream
         Gage at/near[Gage Location] on the [River Name] ([NWSLI])


Effective at [HHMM] Coordinated Universal Time on [Day] [Date], the
National Weather Service will change the flood category stages as for
the stream gage at [River Gage Location] on the [River Name].

Because of this change, starting on [Day of Week] [Month] [Day]
[Year] flood warnings, flood statements, and flood advisories will
reference the new category levels. This change is part of a recent
re-evaluation of the flood plain with local emergency managers.

The new flood categories will be as follows:

 1.  New flood stage is [xxx.x] feet above Gage Zero. The previous
     flood stage was [yy.y] feet above Gage Zero.

 2.  New moderate flood stage is [xxx.x] feet above Gage Zero. The
     previous moderate flood stage was [yy.y] feet above Gage Zero.

 3.  New major flood stage is [xxx.x] feet above Gage Zero. The
     previous major flood stage was [yy.y] feet above Gage Zero.

The National Weather Service welcomes public feedback. If you have
any questions or comments on this change, please contact:

     [Name]
     [Title]
     National Weather Service Forecast Office
     [Address]

     Phone:  [zzz.zzz.zzzz]
     E-mail:  [firstname.lastname]@noaa.gov

$$
```

Example C-3 - Sample template for changes in flood stages reported above the NAVD 88 reference datum.

```
NOUS42 K[WFO Id] DDHHMM
```

PNS[*xxx*]

Service Change Notice
National Weather Service [*WFO Name*]
[*hhmm*] [*AM*/*PM*] [*Time zone*] [*Day*] [*Month*] [*Day*] [*Year*]

To: Subscribers:
-Family of Services
-NOAA Weather Wire Service
-Emergency Managers Weather Information Network
Other NWS partners, users, and employees

From: [*MIC Name*]
Meteorologist in Charge
Weather Forecast Office[*WFO Location*], [*State*]

Subject: Changes in Flood Categories for Stream Gage at/near
[*Gage Location*] on the [*River Name*] ([*NWSLI*)]

Effective at [*HHMM*] Coordinated Universal Time on [*Day*] [*Date*], the National Weather Service will change the flood category stages for the stream gage at [*River Gage Location*] on the [*River Name*].

Because of this change, starting on [*Day of Week*] [*Month*] [*Day*] [*Year*], flood warnings, flood statements and flood advisories will reference the new category levels. This change is part of a recent re-evaluation of the flood plain with local emergency managers.

The new flood categories will be as follows:

1. New flood stage is [*xxx.x*] feet above North American Vertical Datum of 1988 (NAVD 88). The previous flood stage was [*yy.y*] feet above NAVD 88.

2. New moderate flood stage is [*xxx.x*] feet above NAVD 88. The previous moderate flood stage was [*yy.y*] feet above NAVD 88.

3. New major flood stage is [*xxx.x*] feet above NAVD 88. The previous major flood stage was [*yy.y*] feet above NAVD 88.

The National Weather Service welcomes public feedback. If you have any questions or comments on this change, please contact:

[*Name*]
[*Title*]
National Weather Service Forecast Office
[*Address*]

Phone: [zzz.zzz.zzzz]
E-mail: [firstname.lastname]@noaa.gov

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