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Data Management Plan for the U.S. Geological Survey Washington Water Science Center

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By Kathleen E. Conn, Mark C. Mastin, Andrew J. Long, Richard S. Dinicola, and Cynthia Barton

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Abbreviations

BioData	Aquatic Bioassessment Data Management System
DMP	Data Management Plan
DOI	Digital object identifier
FSP	Fundamental Science Practices
GIS	Geographic information systems
GWSI	NWIS Groundwater Site Inventory for groundwater level data
IT	Information Technology
LDM	Local data manager
NWIS	National Water Information System
NWIS-TS	NWIS-Time Series system for continuous data
PCFF	Personal Computing Field Form
QA	Quality assurance
QWDATA	NWIS water-quality system for discrete data
QWDX	Water-Quality Data Transfer System
SIMS	Site Information Management System
SM	Survey Manual
SVMAQ	SVMobileAQ
TS	Time Series
USGS	U.S. Geological Survey
WAWSC	Washington Water Science Center
WMA	Water Mission Area

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Abstract

The primary mission of the U.S. Geological Survey (USGS) Water Mission Area (WMA) is to collect and disseminate reliable, impartial, and timely information needed to understand the water resources of the Nation, including data on streamflow, groundwater, water quality, water use, and availability. Management of data throughout the entire data lifecycle is necessary to meet the mission and maintain the USGS reputation of producing high-quality data as the Nation's primary earth-science information agency. This document describes the data management procedures of the USGS Washington Water Science Center, including responsibilities of staff and workflow procedures.

Introduction

The primary mission of the U.S. Geological Survey (USGS) Water Mission Area (WMA) is to collect and disseminate reliable, impartial, and timely information needed to understand the water resources of the Nation, including data on streamflow, groundwater, water quality, water use, and availability. Management of data throughout the entire data lifecycle is necessary to meet the mission and maintain the USGS reputation of producing high-quality data as the Nation's primary earth-science information agency. Data created by or on behalf of the USGS are the property of the Federal Government, and the USGS is required to retain and preserve an authoritative or original copy of all data for which it is responsible. USGS scientific data shall be managed through the data lifecycle, which includes planning, collection, processing, analyzing, preservation, and publication of data under the authority of USGS Fundamental Science Practices (FSP) requirements (USGS Survey Manual (SM) 502.6, https://www2.usgs.gov/usgs-manual/500/502-6.html). By applying the elements in the lifecycle model, USGS scientists can ensure that data are discoverable, well described, and preserved for access and use beyond the life of research projects (SM 502.6). Guidance and procedures that support this policy are available on various pages of the USGS FSP (https://www2.usgs.gov/fsp/) and at the USGS Data Management website (https://www.usgs.gov/products/data-and-tools/data-management).

The purpose of this Data Management Plan (DMP) is to help ensure that the U.S. Geological Survey Washington Water Science Center (WAWSC) data activities are done in accordance with applicable practices and policies. As described in SM 502.6: "*USGS scientific data encompass a wide variety of information including textual and numeric information, instrument readouts, statistics, images (fixed or moving), diagrams, maps, and audio or video recordings. They include raw or processed, published, and archived data, such as data generated by experiments, models, simulations, observations of natural phenomena at explicit times and locations, and by data stored on any type of media.*" This DMP first describes the data-management responsibilities of WAWSC staff and then describes workflow procedures for data management. The DMP does not reproduce or reiterate already documented and detailed component procedures in the WMA, and instead incorporates them by reference where applicable. The DMP is intended to be a living document that can be readily revised when updates to its individual components are made or when new resources become available. Please note that some of the hyperlink paths in this report are internal to the WAWSC only, as the report describes in detail our internal network structure.

Responsibilities

Although quality assurance (QA) is a personal responsibility of all employees of the USGS, ultimate QA responsibility within each Water Science Center lies with the Director. Clear statements of specific responsibilities promote an understanding of each person's role in the overall process of assuring quality and can help to prevent errors and deficiencies that may otherwise occur. Implementation and follow-up responsibilities lie with data collection, entry, and checking staff, project chiefs, section chiefs, discipline specialists, database administrators, and others. Even if QA responsibilities are ancillary duties for some employees, these functions are to be documented. The responsibilities described in the following sections are adapted from the USGS Pacific Islands Water Science Center DMP (Jeppesen, H.A., U.S. Geological Survey, written commun., 2018).

Data Collection/Entry Personnel

- Collect data in accordance with USGS, WMA, and WAWSC policies and procedures.
- Enter/update data in the National Water Information System (NWIS) database according to USGS, WMA, and WAWSC policies and procedures within 7 days. Data for which there is not a centralized database will be loaded to the WAWSC Studies server (\\gs\tacomawa-w\Studies).
- File original field notes or electronic files in appropriate storage location.
- Check data for accuracy and (or) inform data checker of availability of data for checking.

Data Checking Personnel

- Check data in databases against original field notes in timely manner.
- Notify project chief/hydrographer of any errors detected and correct any errors.

Project Chief

- Communicate purpose of data collection and needs to local data manager (LDM) and collection staff.
- Ensure collection of data for the project is according to project workplan, quality assurance project plan, or other project-management criteria.
- Ensure timely entry and review of data collected for the project.
- Ensure proper storage and archival of data at project completion according to USGS, WMA, and WAWSC policies and procedures.

Section Chief/Field-Office Chief

- Manage, direct, and provide logistical support for data-collection and data-storage activities assigned to the section.
- Assign appropriate data checking responsibilities within the section.
- Ensure that procedural and technical reviews of all data activities are scheduled and comments are addressed.
- Create a training plan for each supervised employee to ensure that USGS and WAWSC policies and procedures are understood and followed for the collection, entry, processing, review, storage, maintenance, and archiving of data.
- Ensure that data management training is incorporated into each employee's training plan, where appropriate.

Discipline Specialist(s)

- Discuss and evaluate, in coordination with the section chief and database administrator(s), the policies and procedures pertaining to the data.
- Review and update appropriate WAWSC QA plans, policies, and procedures.
- Provide technical assistance and consultation to all WAWSC staff involved with data activities within their specialty.
- Participate in the technical review of proposal development and project status within their discipline specialty, including identifying and documenting any updates needed to project-specific data-management plans.

Local Data Manager(s)

- Maintain data integrity within NWIS.
- Inform and discuss with the project chief, discipline specialist, field-office chief and (or) section chief of any data conflicting with USGS or WAWSC policies or procedures.
- Maintain familiarity with NWIS updates and complete periodic database maintenance checks and updates using software provided by WMA.
- Train appropriate personnel in data management and use of the NWIS databases or other acceptable repositories such as USGS ScienceBase.
- Inform section and field office chiefs of data management training needs of personnel.
- Assist project chief, discipline specialist, field-office chief and (or) section chief in stewarding scientific data through the release process, including in non-NWIS repositories such as USGS ScienceBase.
- Coordinate and enact preservation activities for USGS scientific data.
- Collaborate with the data producers and the USGS Records Officer to ensure the appropriate records management requirements are met.
- Assist the discipline specialists with updating and revising the QA plan and policies and procedures of the WAWSC, as needed.

Information Technology (IT) System Administrator(s)

- Direct and install upgrades to the NWIS databases.
- Ensure optimization of NWIS databases and, if necessary, their recovery.
- Perform twice-weekly, weekly, and annual data backup procedures.

- In coordination with the section or field office chief and the database administrator(s), determine and set access rights of personnel for the databases.

WAWSC Director

- Ensure database activities within the WAWSC address the needs of cooperating agencies, including the Federal Government, State and local agencies, tribal governments, the general public.
- Ensure all aspects of the data-management and quality-assurance plans are followed by WAWSC personnel.
- Provide final resolution of any conflicts or disputes related to database activities and data releases by the WAWSC.
- Keep WAWSC staff briefed on procedural and technical communications from the WMA and Regional office.
- Ensure that procedural and technical reviews of all database activities are done and that review comments are promptly addressed.
- Ensure that all data retrievals and other technical communications released by the WAWSC are accurate and in accordance with USGS policy (https://www2.usgs.gov/fsp/scds_data_manage_responsibilities.asp).
- Approve WAWSC-authored data releases.

Data Management Workflow

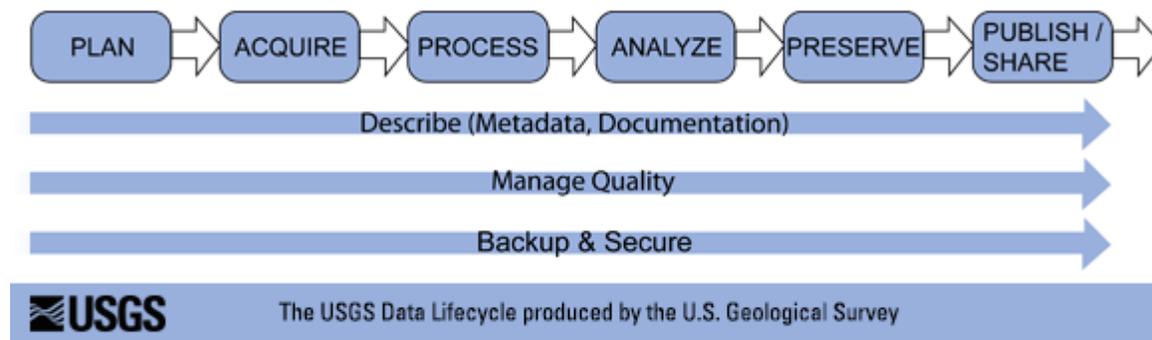This section describes the data management elements for each process of the data lifecycle (fig. 1).

Figure 1. The USGS Data Lifecycle (https://www2.usgs.gov/datamanagement/plan/dmplans.php).

Plan

1. **Proposal.** During the project planning phase, Project Chiefs should address data management by completing the questionnaire in appendix 1 to the degree possible prior to project initiation, including considering the following:

   - Types of data to be collected:
     - Surface water, groundwater, water quality, geological, biological, atmospheric, geospatial and others; including unique/complex data sets (that is, new methods or study design)
     - Which constituent will be collected
     - Amount of data needed (number of sites, duration and frequency of continuous data, number of discrete samples)
     - Data formats and storage volume requirements
     - Necessity of data definitions/dictionaries
   - Individual(s) responsible for managing the data and the metadata
   - Individuals(s) responsible for reviewing and approving the data
   - Storage location of the data (NWIS, other database, ScienceBase data release, or other data-storage options)
   - Data back-up locations
   - Determine if any non-typical (for example, spreadsheets) data processing methods will be used and describe.
   - For models: Describe model and determine who will be responsible for constructing, calibrating, testing, and archiving in accordance with USGS policy

   Project proposals must contain a separate "Data Management" section that addresses and describes (or refers to other sections) the data management plan for the proposed project. Include as much specificity and detail as possible prior to start of the project. The proposed budget must include standard salary time for data entry, data checking, data handling by the LDM, and data review and approval. Salary time may be needed, for example, to create new NWIS parameter codes or to upload data into a non-NWIS database.

2. **Funded project.** The IT section of the WAWSC will set up an electronic project folder after a project is funded. Studies-focused (interpretive) projects are established under the Studies folder of the WAWSC electronic directory network (\\gs\tacomawa-w\Studies) with the following standard structure:

   ProjectName
     Admin (includes proposal, budget, quality-assurance project plan, workplan, safety, laboratory evaluation, contacts, project reviews, progress reports, web page)
     Data (includes field protocols, forms, laboratory requests, working copies of site visit data and information, sample tracking log, record review checklist and other documentation)
     GIS
     Interpretation (includes analysis, models, statistics)
     Literature
     Products (includes abstracts, reports, presentations)

   The structure and content in each of these subfolders can be customized as relevant to the project.

Information for projects primarily focused on data collection, such as long-term continuous streamflow data collection, are stored under the Data folder of the WAWSC network (\\gs\tacomawa-w\Data) by Station ID, under one of the four field office folders:

\\gs\tacomawa-w\Data\mid_columbia\stations

\\gs\tacomawa-w\Data\nw_washington\stations

\\gs\tacomawa-w\Data\upper_columbia\stations

\\gs\tacomawa-w\Data\western_washington\stations

Under the four field office folders, each station folder follows the following standard structure, detailed in the WAWSC Directory Structure for Surface-Water, Groundwater, Water-Quality and Related Records (appendix 2):

\StationID

    \ADVM (files related to Acoustic Doppler Velocity Meters)

    \EDL_Data (downloaded Electronic Data Logger files)

    \Site Establishment_Land_Use Agreements

    \Site Visit

    \Photos

    \Record_Review

    \Safety

A fifth Data folder named "Projects" (\\gs\tacomawa-w\Data\projects\stations) is typically for miscellaneous measurements at non-gaged stations (usually from interpretive studies), and follows this standard structure:

\StationID

    \EDL_Data

    \Site_Information

    \Site Visit

    \Photos

    \Record_Review

    \Safety

The naming conventions for the Project station folders are the same those described in appendix 2, with the following exceptions: (1) there is no ADVM folder, and (2) the "Site Establishment and Land Use Agreements" folder is renamed "Site Information" and includes the site schedule, site map, well log, field sketches, aerial maps, land-use agreements, and landowner contact information. Groundwater station ID folders will be stored within County subfolders within this "projects" folder, for consistency with the Center's established organization by County and local number. Additional details on the storage of electronic and paper data and site information are described in the section, "Acquire."

The Project Chief also will work with IT for any special data storage needs, for example, storage of large-volume geospatial data sets, model input and output, or special modeling software needs. Prior to data collection, the Project Chief creates a detailed workplan that expands upon the study design description in the proposal. Detailed Quality Assurance Project Plans may be required for some projects.

The workplan adheres to and refers to the WAWSC's QA plans:

Groundwater (Kozar and Kahle, 2013): https://doi.org/10.3133/ofr20131151
Water Quality (Conn and others, 2017): https://doi.org/10.3133/ofr20171044
Surface Water (Mastin, 2017): https://doi.org/10.3133/ofr20161020

The Project Chief works with the appropriate LDM to establish any new sites in the National Water Information System (NWIS) Groundwater Site Inventory (GWSI) database per the process described in the Center's QA plans. The Project Chief works with the surface water LDM to establish new time series (TS) in NWIS-TS (raw data is entered into Aquarius, the software that processes the data for entry into NWIS; collectively, this database system is called NWIS-TS). For time-series data or long-term monitoring data, site information is entered in the USGS Site Information Management System (SIMS).

Acquire (Data Collection)

Data are collected per WAWSC and USGS procedures and policies, as described in the three WAWSC QA Plans (Kozar and Kahle, 2013; Conn and others, 2017; Mastin, 2017) and various WMA policies (https://sites.google.com/a/usgs.gov/wma-wiki/procedures/policy). According to WMA policy, all original data that are published or support published scientific analyses shall be both accessible to authorized WAWSC personnel and preserved for archive (SM 502.9; Hubbard, 1992). Original data—from automated data-collection sites, laboratories, outside sources, and non-automated field observations—are unmodified data as collected or received and in conventional units (engineering units, generally with a decimal). Original data should be preserved in this form, no matter how they may be modified later (Hubbard, 1992). Original data include

- paper and electronic field notes,
- field measurements,
- images,
- laboratory request forms
- instrument calibration information,
- real-time electronic readings retrieved by satellite telemetry,
- downloaded data logger files, and
- laboratory results.

Original field data are stored at the WAWSC by Station ID, or by local number for historical groundwater sites (described further in the following paragraph). Electronic storage follows the directory structure outlined in the Plan section. Original paper records at the WAWSC (primarily generated for water-quality studies) are converted to an archivable format, for example, to Archival PDF format (PDF/A) for electronic filing, and the original paper records are stored by Station ID in filing cabinets located on the second floor of the WAWSC Tacoma office.

Groundwater station information currently is stored in paper form in binders on the third floor of the Tacoma office. Stations are organized by County and local number. Stored information includes the site schedule, site map, well log, previous inventory form, current inventory form, and field forms for synoptically sampled sites. When multiple sites are selected for synoptic monitoring for new interpretive projects, an electronic site folder will be established for each site within the Data side of the WAWSC electronic network (\\gs\tacomawa-w\Data\projects\stations), unless a site folder already exists under one of the field office folders, in which case the existing site folder will be used. The folder structure will follow that described in the section, "Plan." The paper site folder will be pulled from the black binders and electronically scanned and stored in the electronic folder. Paper well inventory forms for groundwater sites that were inventoried but not selected for synoptic monitoring will continue to be stored in the black binders, unless a Project Chief decides to establish an electronic site folder on the Data side for any particular site of special interest or value. A list of inventoried, but not selected, sites should be included under the Studies folder.

It is encouraged that all original data and site information be stored on the Data side of the WAWSC electronic network as it is collected. However, if data are stored in the Studies folder for ease of access and use throughout the duration of the project, then the data must be stored using the same structure and naming convention as on the Data side. It is the Project Chief's responsibility to ensure that, at the end of the project, all original data are moved from the Studies folder to the Data folder for long-term storage by Station ID, without over-writing any existing data.

The NWIS is the primary repository for data collected at the WAWSC—discrete water-quality data in NWIS water-quality system for discrete data (QWDATA), discrete groundwater-level data in GWSI, and continuous data of all types in NWIS-TS. NWIS data are publicly-accessible through the NWISWeb interface. Biological data including aquatic community- and population-level taxon identification and enumeration, and associated habitat data are placed in the Aquatic Bioassessment Data Management System (BioData, https://aquatic.biodata.usgs.gov/). Data collected in Washington State by others, such as cooperators, universities, or consultants, which are used to support published USGS documents and are not published or archived elsewhere, also are entered into NWIS or BioData, and flagged with the appropriate data elements to assign the data as collected by non-USGS personnel. Sometimes data collected by project personnel cannot be entered into NWIS because NWIS cannot accept the type of data that are generated by the project (for example, geospatial data). Electronically stored data that cannot be entered into NWIS or BioData are stored on the WAWSC electronic network during collection and processing, and the final, approved dataset is stored in an alternate publicly accessible repository such as ScienceBase that meets USGS data storage and accessibility standards, as described in the FSP Standards for Establishing Trusted Repositories for USGS Digital Assets (https://www2.usgs.gov/fsp/trusted_respositories_digital_assets.asp). Models and associated GIS data are archived at the USGS Water Resources NSDI node (https://water.usgs.gov/lookup/getgislist). The following paragraphs describe the acquisition of data, categorized into five types: (1) site description, (2) site visit information, (3) discrete data, (4) continuous data, and (5) other types of data.

1. **Site description**. Includes descriptions of site characteristics and conditions, structures, equipment, instrumentation, altitudes, location, and changes in conditions at each site. For groundwater-level sites, the description should include a description of the measurement point and any other surveyed markers at the site. These documents also provide a history of past floods, nearby construction, any changes to the site or equipment, or any unusual occurrences at the site. It also includes safety information, land-use agreements and contact information, and photographs. The site-level information is stored on the WAWSC server per the electronic directory structure (previously described) and is used to populate relevant fields of the Station Description in SIMS. For long-term monitoring stations, the Station Description is written at the time the first-year records are computed and becomes part of the permanent record for the station.

2. **Site visit information.** Notes are recorded on a field form during every site visit. An electronic field form, such as SVMobileAQ (SVMAQ) or the Personal Computing Field Form (PCFF), is preferred, although paper field forms can be customized to meet study-specific needs. The hydrographer enters measurements into the NWIS database by uploading SVMAQ, PCFF or SedLOGIN files using Aquarius, the Water-Quality Data Transfer System (QWDX), or by manually entering data from paper field forms. The original field form is stored by Station ID on the WAWSC server or in filing cabinets located on the second floor of the Tacoma office. Files are uploaded within 7 days of the field trip.

3. **Discrete data.** Field measurements collected during site visits also are entered in the field form, reviewed for accuracy, entered into NWIS, and stored on the WAWSC server. QWDATA houses discrete water-quality measurements such as water temperature, pH, dissolved oxygen, specific conductance, turbidity, nitrate, and alkalinity and associated metadata such as stream width, sampling depth, site conditions, sampling equipment, and sampling method. GWSI houses water-level measurements and associated metadata. The NWIS Documentation Index, available on the internal USGS website, provides manuals, related documents, coding sheets, and tip sheets for each program within NWIS. Surface-water information such as measured gage heights and discharge measurements are entered into SVMAQ and then the SVMAQ file is entered into Aquarius. Laboratory results are uploaded from the laboratory to NWIS.

4. **Continuous data.** The WAWSC collects continuous data (for example, hourly or 15-minute values) of surface water gage height, groundwater levels, and water-quality information in the form of electronic readings in a data logger, telephone modem, and electronic transmissions by satellite. For stations with Data Collection Platforms, data are retrieved by satellite telemetry and a software suite (DEvice COnversion and DElivery System [DECODES]) converts the data into standard engineering units, suitable for entry into a database such as NWIS-TS. Personnel transfer data from Electronic Data Loggers to portable laptop field computers, and then transfer the data into USGS computer files using appropriate software for that purpose. The real-time data are used as the primary record whenever possible. In the case of missing data, for example, during a site visit or from instrument failure, backup record is inserted from data-logger data. Data are uploaded to NWIS within 5 working days after a site visit. Other related data from continuous surface-water stations are transferred to permanent storage on the WAWSC server within 2 working days of returning to the office and archived and reviewed within 5 working days after returning from the field.

5. **Other types of data.** Data sets that cannot be stored in NWIS include longitudinal surveys that cannot be assigned to a single station, geospatial data such as aerial photography, lidar, bathymetry, and geographic information systems (GIS) data sets. These types of original data are reviewed for accuracy after collection and stored in the project directory (\\gs\tacomawa-w\Studies) for analysis.

Process (Data Review and Approval)

Per SM 502.2, "Data processing denotes those actions or steps taken to verify, organize, transform, repair, integrate, and convert data to appropriate formats for subsequent use. Processing methods and steps must be documented to ensure the utility, quality, and integrity of the data and the ability to reproduce final released data from the original raw data." Data are processed per Center procedures and policies, as described in the three WAWSC QA Plans (Kozar and Kahle, 2013; Conn and others, 2017; Mastin, 2017) and in USGS policy, including:

- Surface-water Technical Memorandum: https://water.usgs.gov/admin/memo/sw/;
- Groundwater Technical Memorandum: https://water.usgs.gov/admin/memo/gw/;
- Water-quality Technical Memorandum: https://water.usgs.gov/admin/memo/qw/; and
- Procedures and templates for processing, approving, publishing, and auditing time-series records for water data: https://water.usgs.gov/osw/time-series-guidance/.

Briefly, time-series records are analyzed and approved on a less-than-annual time-frame per **Continuous Record Processing procedures**—Every 120 days for most records, and 240 or 365 days for select records, the hydrographer assigned to the station usually analyzes the records associated with it using tools within NWIS-TS. An approver reviews the work of the analyst and either sends it back for reanalysis or approves the data in NWIS-TS (at which time the code associated with each value is changed from "P," provisional to "A," approved). A senior hydrographer audits the records as needed or required (generally once a year; https://water.usgs.gov/osw/time-series-guidance/). Continuous record processing checklists are available at the WAWSC internal website to assist analyzer, approver, and auditor. Documents not stored in NWIS-TS are placed in the Record_Review sub-folder on the WAWSC network, per the electronic directory structure and naming conventions are described in appendix 2.

Data collected for studies at the WAWSC are reviewed for completeness and accuracy and approved by the Project or Field Office Chief (or designee). Discrete water-level data are processed per USGS policy (https://water.usgs.gov/ogw/policy/discrete-data-guidance/). Project Chiefs (or designees) are notified that discrete water-quality data for their project have been entered into QWDATA by an email notification of a new "watlist," which lists data for recently modified records. Records are promptly reviewed so reanalysis requests can be made within sample holding times. When the analytical data have been returned, the Project or Field Office Chief retrieves data from NWIS and imports it into spreadsheets or statistical programs for additional review. After validation, the Project or Field Office Chief (with help from the LDM) finalizes the data record in NWIS by setting the Data Quality Indicator code from "S" (provisional) to "R" (reviewed and approved) or "Q" (reviewed and rejected). All discrete water-quality data in NWISWeb should have a code of 'R' no later than and often well before April 1 of the year following the water year of sample collection.

The WAWSC internal website, in particular the "GW," "SW," and "QW" tabs, provide additional current and relevant resources and guidance (for example, links to field forms and software packages and Center guidance documents for the collection and processing of discrete and continuous data). For example, the WAWSC has developed tools for efficient tracking of water-quality results for samples that are collected by the WAWSC and submitted for laboratory analysis, including tagging records with a project-specific code (PRJCT parameter-code in NWIS) to facilitate data retrieval and parsing of "watlists," and a customizable sample tracking log.

Data not stored in NWIS are reviewed and approved by the Project Chief (or designee) and published in an alternative database and (or) repository, such as ScienceBase (see section, Publish/Share). Revisions for approved time-series and discrete water data for groundwater, surface water, and water quality are made per USGS policy (https://water.usgs.gov/osw/RevisionsGuidance.html).

Analyze (Interpret)

Per the USGS Data Management website (https:\\www2.usgs.gov/datamanagement/analyze.php), "The Analyze stage of the Science Data Lifecycle represents activities associated with the exploration and assessment of data, where hypotheses are tested, discoveries are made, and conclusions are drawn." Data analysis also may be less targeted and deal with interpretation of data to better understand content, context, and quality. In this stage of the Lifecycle, conclusions or new datasets are generated and methods are documented. The WAWSC uses various data analysis techniques and methods, as appropriate to meet project objectives. These include statistical analysis, spatial analysis, modeling, visualization, image analysis, and interpretation. The analysis activities may guide future data collection, and typically are presented in peer-reviewed publications.

Preserve (Archive)

The USGS Survey Manual requires that actions and steps be taken to ensure that data are retained and accessible consistent with the appropriate USGS Records Disposition Schedules and other applicable requirements (SM 431.1, File Management). Controls must be in place to protect proprietary and pre-decisional data (SM 502.5, Fundamental Science Practices: Safeguarding Unpublished U.S. Geological Survey Data, Information, and Associated Scientific Materials) and the scientific integrity of the data (SM 500.25, Scientific Integrity). USGS data approved for release must be preserved as described in SM 502.9, Fundamental Science Practices: Preservation Requirements for Digital Scientific Data.

NWIS serves as the repository for all basic surface-water, groundwater, and water-quality data. Data that cannot be stored in NWIS, such as longitudinal surveys, geospatial data, lidar, bathymetry, and GIS data sets are stored in an alternate publicly accessible repository such as ScienceBase that meets USGS data storage and accessibility standards, as described in the FSP Standards for Establishing Trusted Repositories for USGS Digital Assets (https://www2.usgs.gov/fsp/trusted_respositories_digital_assets.asp). Electronic data are filed per the directory structure described in the section "Plan," and then annually archived by the WAWSC IT Services Section on Linear Tape Open 6 and DVDs. Two copies are made—one for off-site storage (in a temperature-controlled, fire-resistant safe at the WAWSC warehouse facility in Lakewood, Washington), and one for onsite storage (in a temperature-controlled, locked server room in the IT Services Section). This annual archive is done for all WAWSC station folders, typically after April 1, and includes data from the most recently completed water year and the previous 2 years. The WAWSC

sends surface-water information to the Federal Records Center every 7–10 years, on average. The Administrative Services Section maintains records of exactly what has been archived.

For Studies projects, the Project or Field Office Chief is responsible for initiating the archive process of studies-related electronic data and results by making a request to the IT Services Section after the project has been completed. One important part of the archival process is for the project chief to confirm that all original data collected as part of the study is stored by Station ID on the Data side of the network, rather than by project on the Studies side of the network. This ensures that a future project at a station will have access to all historical data collected at that station. The Project Chief also prepares a physical storage box as needed containing original paper records, that is maintained by the Administrative Services Section for 2 years after project completion and then is transferred to the Sand Point Federal Records Center in Seattle, Washington. It is important that the Project Chief understand the disposition schedule for the information they are archiving to ensure future availability of the data if needed. The Project Chief should not attempt to archive everything. Instead, the archive must be selective, organized, and complete to include, in addition to paper original data, only important documents that demonstrate milestones in the project and critical data sets and analyses and model runs. Each project archive should include a "readme" file in the root directory of their project area that summarizes the project including: project name, project chief, years/duration, list of station IDs where data were collected, summary of project goals and data collected to meet those objectives, and a list of published products. The WAWSC archiving process is described in an internal memo which is emailed to all WAWSC personnel annually. The disposition schedule (https://www2.usgs.gov/usgs-manual/schedule/) for WMA records includes a description of record types and disposal instructions.

Other types of data including groundwater and surface-water models, aquifer tests, borehole geophysical data, and surface geophysical data, such as fiber optic distributed temperature sensor data are archived internally at \\gs\tacomawa-w\Resources\Archive. Specifically, the WAWSC groundwater model archive repository for models that have met USGS policy for model approval is \\gs\tacomawa-w\Resources\Archive\gwarchive\gwmodels. The WAWSC geophysics archive repository is \\gs\tacomawa-w\Resources\Archive\gwarchive\geophysics. The WAWSC surface-water model archive repository for models that have met USGS policy for model approval is \\gs\tacomawa-w\Resources\Archive\swmarchive. Additionally, the WAWSC maintains a GIS library for final GIS-based products that have been published in interpretive reports under the Resources folder in the WAWSC server (\\gs\tacomawa-w\Resources\gislib). Models and associated GIS data are archived publicly at the USGS Water Resources NSDI node (https://water.usgs.gov/lookup/getgislist).

Publish/Share

USGS scientific data used to support scholarly conclusions in USGS authored or funded publications must be released free to the public consistent with the USGS Public Access Plan (https://www2.usgs.gov/quality_integrity/open_access/), that is, before or commensurate with the publication using these data. To identify USGS-authored or -funded publications, all authors employed or funded by the USGS are required to obtain an Open Researcher and Contributor ID (ORCID, https://orcid.org/). Data are considered published when accessible from NWISWeb and (or) a USGS data release. Continuous water-quality data are computed, analyzed, checked, reviewed, and finalized on an ongoing basis and are considered published when they are posted online using NWISWeb and labeled "A" (approved). Discrete water-quality data stored in QWDATA and water-level data stored in GWSI are available to the public through NWISWeb and are considered published when the Data Quality Indicator has been changed from "S" (provisional) to "R" (reviewed and approved) or "Q" (reviewed and rejected).

1. **Data Releases**

Data releases make data available to users without interpretations or conclusions, and are stored in an alternate public repository, such as ScienceBase (https://www.sciencebase.gov/catalog/). The review process in the WAWSC for data releases includes:

- Supervisor review for technical and editorial adequacy and readiness for technical review.
- Technical specialist review for adherence to policy (the specialist review can be limited to relevant sections only).
- A technical peer review (preferably outside of the WAWSC).
- Metadata review by a designated metadata reviewer (see later in this section).
- Author reconciliation of all review comments.
- Editorial review for adequacy of organization, rhetoric, grammar, audience level, consistency, and for verification (not required, but can be requested as appropriate).
- WAWSC Director review for approval (https://www2.usgs.gov/fsp/center_director_approval_datarelease_checklist.pdf).

The data release is assigned a unique DataCite Digital Object Identifier (DOI, 10.5066, DataCite.org) and is accessed by the public through a landing page that provides background information (such as, introduction and methods) and links to download the file(s) and (or) view the data using a map viewer or a model. Though a data release is not housed at the USGS Publications Warehouse, the approval package must be routed through the internal USGS Information Product Data System. Any data used in interpretive reports must be publicly available and cited, such as in NWIS or an accompanying data release. Interpretive reports include USGS Circulars, Professional Papers, Fact Sheets, Scientific Investigations Reports, and Open-File Reports, as well as non-USGS outlets, such as scientific journals, books, and proceedings of technical conferences.

2. **Interpretive Reports**

The review process for reports in the WAWSC includes:
- Supervisor review for technical and editorial adequacy and readiness for technical review.
- Technical specialist review for adherence to policy (the specialist review can be limited to relevant sections only).
- Two technical peer reviews (at least one from outside of the WAWSC).
- Metadata review by a designated metadata reviewer (see section, "Describe (Metadata)").
- Author reconciliation of all review comments.
- Editorial review for adequacy of organization, rhetoric, grammar, audience level, consistency, and for verification.
- WAWSC Director review for approval.
- Bureau Approving Official review for approval.

After approval, the report is assigned a unique CrossRef DOI (10.3133, CrossRef.org) and is accessed through the report landing page either in USGS Publications Warehouse or through an outside publisher website.

Publications should be announced internally prior to publication, for example, announced as a weekly internal USGS highlight, at the time it is submitted for Bureau approval. Data releases and reports (USGS or outside publications) each must be accompanied by metadata.

Describe (Metadata)

Metadata must accompany USGS scientific data to enable reuse and reproducibility of research results. Standardized metadata are required so that USGS data can be approved for release as described in SM 502.7, Fundamental Science Practices: Metadata for USGS Scientific Information Products Including Data (https://www2.usgs.gov/usgs-manual/500/502-7.html). Metadata records must comply with one of the following Federal Geographic Data Committee standards: Federal Geographic Data Committee Content Standard for Digital Geospatial Metadata or the International Organization for Standardization suite of standards (refer to https://www.fgdc.gov/metadata). Metadata components and examples are available at the USGS Data Management web page (https://www.usgs.gov/products/data-and-tools/data-management). During the data and (or) report review process, a metadata review must include checking for compliance with metadata standards using a recommended metadata validation tool, when available, and performing quality checks. The metadata review can be done as part of the data review, editorial review, or separately as appropriate. A report of all metadata reviews (reviewer comments and how they were reconciled) must be included in the package in the internal USGS Information Product Data System that is submitted for Bureau approval. A checklist that provides guidelines to reviewers of metadata for data is available from the USGS Data Management web page (https://www.usgs.gov/products/data-and-tools/data-management/data-release#checklists).

Manage Data Quality

Data management activities at the WAWSC, including use of standard methods and best practice techniques, are done in a consistent, objective, documented, and replicable manner to help ensure that high-quality and verifiable results are achieved (refer to SM 502.2, Fundamental Science Practices: Planning and Conducting Data Collection and Research, https://www2.usgs.gov/usgs-manual/500/502-2.html). Quality assurance checks are made throughout the science data lifecycle (https://www.usgs.gov/products/data-and-tools/data-management/manage-quality), in accordance with the Center's Quality Assurance Plans (Kozar and Kahle, 2013; Conn and others, 2017; Mastin, 2017).

Back Up/Secure

Back-up copies of data are maintained to allow recovery from loss due to human error, hardware failure, computer viruses, power failure, or natural disaster. Best practices for backup and securing data at all stages of the data lifecycle are available (https://www.usgs.gov/products/data-and-tools/data-management/backup-secure). *"*USGS employees are responsible for complying with all policies and procedures relating to the USGS Records Management Program. This includes protecting official government records in their custody, ensuring that all records in their custody are disposed of only in accordance with applicable USGS records disposition schedules, and upon leaving the USGS, not removing or destroying any official USGS records, except as authorized by their supervisor or the USGS Records Management Office (https://www2.usgs.gov/usgs-manual/410/431-1.html).*"* The Project or Field Office Chief has responsibility of ensuring that all WAWSC-generated paper and electronic original records are backed up and stored according to rules for Federal Records Management. Tools such as SIMS and NWIS are available to facilitate this process. The IT team optimizes the NWIS databases through upgrades and other maintenance. A full backup of the WAWSC electronic network is performed by the IT Section once a week and partial backups are performed Tuesday through Thursday. A full set of backup tapes is stored for at least 1 year. Backups are written to LT06 tapes. The server also provides "on-line" backups with the use of shadow copies that are made twice a day.

Acknowledgments

References Cited

Conn, K.E., Huffman, R.L., and Barton, C., 2017, Quality-assurance plan for water-quality activities in the U.S. Geological Survey Washington Water Science Center: U.S. Geological Survey Open-File Report 2017–1044, 66 p., https://doi.org/10.3133/ofr20171044.

Hubbard, E.F., 1992, Policy recommendations for management and retention of hydrologic data of the U.S. Geological Survey: U.S. Geological Survey Open-File Report 92-56, 32 p., https://doi.org/10.3133/ofr9256.

Kozar, M.D., and Kahle, S.C., 2013, Quality-assurance plan for groundwater activities, U.S. Geological Survey, Washington Water Science Center: U.S. Geological Survey Open-File Report 2013-1151, 88 p., https://doi.org/10.3133/ofr20131151.

Mastin, M.C., 2017, Surface-water quality-assurance plan for the U.S. Geological Survey Washington Water Science Center (ver. 1.1, August 2017): U.S. Geological Survey Open-File Report 2016-1020, 85 p., https://doi.org/10.3133/ofr20161020.

Appendix 1: Data Management Planning Questionnaire

Modified August 2018 from the Fort Collins Science Center template available at
https://www2.usgs.gov/datamanagement/plan/dmplans.php

PI Name:

Project Title:

1. Will your Project use existing or historical data? ☐Yes/☐No

   a. Where is the existing or historical data hosted/stored?

   b. Are there access/use limitations associated with your historical data? ☐Yes/☐No (If yes, please provide a brief description of the limitations.)

2. Will your Project collect new data? ☐Yes/☐No

   a. What file format will be used to collect the data?

3. Will this project collect physical samples? ☐Yes/☐No

   a. Will physical samples need long-term storage? ☐Yes/☐No

4. Is raw or analyzed data considered proprietary or sensitive (and shouldn't be publicly available)? ☐Yes/☐No

   a. If yes, and you are releasing data, please specify the techniques you will use to obscure sensitive data (that is, omission of particular field(s), aggregation):

5. What distribution platform will your data release use? (Per FSP requirements, data approved for release must be placed in an acceptable digital repository) ☐ScienceBase ☐National Water Information System (NWIS) ☐USGS Biodata ☐USGS NatWeb ☐EROS Data Center ☐Other: _____ (A full list of Trusted Digital Repositories is available at https://www2.usgs.gov/fsp/acceptable_repositories_digital_assets.asp.)

6. What Open Source format will your data be released in? ☐CSV ☐Shapefile ☐GeoTIFF ☐Other: _____

7. Will your original input/raw data also be made available to the public (discoverable)? ☐Yes/☐No

8. Is your project creating software/scripts? ☐Yes/☐No

   a. Will the software/scripts also be made available to the public (discoverable)? ☐ Yes/☐No

9. How will the data for this project be archived?

10. Are you collaborating with another entity on this project? ☐Yes/☐No

    a. If yes, who will be responsible for releasing the data to ensure compliance with policy requiring public access to open data? ☐Self/☐Other:
    b. If yes, your project also requires that a Data Sharing Agreement for each collaborator be uploaded to DataDash.

11. Does data for this project rely on proprietary or licensed software? List software:

    a. If so, how will it be submitted in a non-proprietary format for release? List format(s):

12. What products or deliverables will your project produce? (check all that apply) ☐Data release ☐Journal/Periodical article ☐USGS Data Series ☐Open-File Report ☐Other (list multiple products if necessary): _____

13. Articulate quality assurance and (or) quality control procedures that are associated with each product (these procedures may not get fully developed until later in the project's lifecycle):

14. What is your anticipated timeline for the Project in relation to these key time points?

      a. End Data Collection
      b. End Data Analysis
      c. Publication of Products/Deliverables (may include multiple dates)
      d. Completion of Project (Archiving)

15. Is this project considered Mission Critical? ☐Yes/☐No

      a. Is a Freedom of Information Act (FOIA) request likely? ☐Yes/☐No

      b. Is this high-profile research? ☐Yes/☐No

      c. Is this research project related to topics in litigation? ☐Yes/☐No

      d. Does this project contain high value and (or) long term data sets? ☐Yes/☐No

      e. Does this project contain data about endangered and (or) threated species ☐Yes/☐No

      f. Would products produced be considered 'Influential Products' by FSP (Fundamental Science Practices) and require additional OMB review? ☐Yes/☐No

      g. Other

Appendix 2: WAWSC Directory Structure for Surface-Water, Groundwater, Water-Quality and Related Records

Last updated February 2, 2018

Directory structure example for station number 12134500:

/12134500
    /ADVM
    /EDL_Data
    /Site Establishment_Land_Use Agreements
    /Site Visit
    /Photos
    /Record_Review
    /Safety

/ADVM subdirectory—In this subdirectory, include all ADVM data (beamchecks, downloads, and visit log files), as well as the rating-development worksheet, cross-section information, and Areacomp2 output. Downloaded ADVM files should include the one-minute ADVM data collected during discharge measurements. The ADCP discharge measurements are stored in the "**/Site Visit**" subdirectory.

    /ADVM_Downloads_From_Field
    /Beam_Checks
    /Recorder_Data—In this subdirectory, include the raw data from the ADVM
    /Visit_Log_Files—In this subdirectory, include arrival and departure logs of interactions, inspections, and reprogramming for the ADVM)
    /IV_Rating
    /Stage-Area_Rating

/EDL_Data subdirectory—In this subdirectory, include electronic data logger (EDL) files using the file format (use the start date of the data logger file in the naming convention): *stationNo.yyyymmdd.*

/Site Establishment_Land_Use_Agreements subdirectory—In this subdirectory, include site establishment documents such as the GWSI site file forms, inventory field forms for site set up and updates, and land-use agreements using the file format *stationNo.yyyy*, where yyyy is the year in which the agreement was signed.

Note: No more "Levels" folder. Levels are stored in the "Site Visit" folder and SLAP with the following naming convention. Example: 12134500.20170516.inspection.levels (this is when a gage inspection was done)

Example: 12134500.20170516.313.riverray.levels (this is when a Qm was done and levels circuit)

/Site Visit subdirectory—In this subdirectory, each subdirectory includes all files generated during the site visit, including electronic files and scanned hand-written notes.

Please note: Changes made to information in Aquarius must be tracked using comments. Edits to Aquarius can be made in one of two ways: (1) by editing the information in Aquarius and including a comment that documents the change, or (2) by editing the SVMobileAQ file and re-entering it into Aquarius. ***The preferred method for the WAWSC (option#2) is to make changes in NWIS-TS and include a comment that documents the change. If editing a SVMobileAQ file must be done, it should be done by the following process:***

- ***The original SVMobileAQ xml file is copied and the word "original" is added to the file name (for example, file SV_12028060_20140502_161100.xml is copied and renamed SV_12028060_20140502_161100_original.xml).***
- ***The file without "original" in the file name is reloaded into SVMobileAQ, the edits are made, and then comments are made in the "Comment" field in SVMobileAQ that documents the initials of the person making the edit, the date of the edit, the nature of the edit and why it was made.***
- ***The SVMobileAQ file is then attached to the existing field visit in Aquarius using the "Attachments" option. More information on this is available on the Aquarius parking lot.***

Please also note: The following file naming conventions should be used for miscellaneous files that may need to be filed in the subdirectory of a specific measurement:

- Mean Gage Height Form (from internal Data web page): StationNo.Qnum_correctMGH.xlsm
- Tipping Bucket Calibration Form (from internal Data web page): *StationNo.yyyymmdd.calibration*
- (Additional examples can be added later as needed…)
  /12134500.20140719.572.aa (format *stationNo.yyyymmdd.measurementNo.devicename*)

In this subdirectory, include any software files used to calculate discharge within this subdirectory, e.g., SVMobile style sheet in PDF format or aquacalc files or scanned notes.

Example of files to include:
SV_12134500_20140719_110700.xml
12134500.20140719.aquacalc.csv
  /12134500.20140720.573.pygmy (format *stationNo.yyyymmdd.measurementNo.devicename*)

In this subdirectory, include any software files used to calculate discharge within this subdirectory, e.g., SVMobile style sheet in PDF format or aquacalc files or scanned notes.

Example of files to include:
SV_12134500_20140720_110700.xml
12134500.20140720. aquacalc.csv
  /12134500.20140721.574.flowtracker (format *stationNo.yyyymmdd.measurementNo.devicename*)

In this subdirectory, include all FlowTracker files, any field sheets and other related documents (for example, SVMobileAQ style sheet, scanned notes).

Example of files to include:
12134500.wad
12134500.ctl
12134500.dis
12134500.sum
12134500.dat
SVMobileAQ style sheet
  /12134500.20140724.577.riverray (format *stationNo.yyyymmdd.measurementNo.devicename*)
  Other examples (for measurements using section by section pro)**:**
12134500.20170516.313.riverray.sxs

In this subdirectory, include all RiverRay files, QRev, any field sheets and other related documents (for example, SVMobileAQ style sheet, scanned notes, loop test for moving bed file).

Example of files to include:
12134500_577.mmt
12134500_577_000_14-07-24_105442.PD0
12134500_577_000_14-07-24_105442_ASC.TXT
12134500_577_000_14-07-24_105442_ASC20120524.lcf
12134500_577_001_14-07-24_111221.PD0
12134500_577_001_14-07-24_111221_ASC.TXT
12134500_577_002_14-07-24_111610.PD0
12134500_577_002_14-07-24_111610_ASC.TXT
12134500.20140724103147_extrap.txt
12134500.20140724.577.qrev
SVMobileAQ style sheet

/12134500.20140726.579.streampro (format *stationNo.yyyymmdd.measurementNo.devicename*)

Other examples (for measurements using section by section pro): *12134500.20170516.313.streampro.sxs*

In this subdirectory, include all StreamPro files, QRev, any field sheets, and other related documents (for example, SVMobileAQ style sheet, scanned notes, loop test for moving bed file).

Example of files to include:
12134500_579.mmt
12134500_579_000_14-07-26_105442.PD0
12134500_579_000_14-07-26_105442_ASC.TXT
12134500_579_000_14-07-26_105442_ASC20120524.lcf
12134500_579_001_14-07-26_111221.PD0
12134500_579_001_14-07-26_111221_ASC.TXT
12134500_579_002_14-07-26_111610.PD0
12134500_579_002_14-07-26_111610_ASC.TXT
12134500.20140726103147_extrap.txt
12134500.20140726.579.qrev
SVMobileAQ style sheet

/12134500.20140912.inspection (format *stationNo.yyyymmdd.inspection*)

In this subdirectory, include all files for miscellaneous site visits such as gage inspections and repairs.

/12134500.20140912.qw.inspection (format *stationNo.yyyymmdd.qw.inspection*)

In this subdirectory, include all files from a continuous water-quality site visit, such as for SC, pH, turbidity, TDG, and any other related files. Subdirectory contains all field sheets (for example, CHIMP, SVMobileAQ style sheet), scanned notes, calibration information, cross-section field forms, other measurements for QW data, and any other related information.

Example of files to include:
12134500.20140726.CHIMP.pdf
12134500.20140726.calibration.pdf
12134500.20140726.qw.xsection.xlsx (original field form)
12134500.20140726.qw.xsection.pdf (locked field form, including QWDATA2 record numbers)
SVMobileAQ style sheet

/121314500.20140726.discreteqw—In this subdirectory, includes all files generated for a discrete water quality field visit, including field forms (for example, PCFF), lab correspondence (e.g. ASRs to NWQL, CVO, etc.), electronic files and scanned hand-written notes.

Example of files to include:
12134500.20140726.PCFF.pdf
12134500.20140726.calibration.pdf
12134500.20140726.ASR.pdf
12134500.20140726.CVO.pdf

/12134500.20140912.350.flowtracker.discreteqw (format *stationNo.yyyymmdd.[activity1].[activitiy2]*)

Use this naming convention if multiple activities were completed during the same site visit, for example, a discharge measurement and collection of a discrete water-quality sample. List all activities in the header. Include files from all activities.

/471032122292701.20171107.gw.insp (format *stationNo.yyyymmdd.gw.insp*)

In this subdirectory, include all notes and files generated for a water-level field visit, including field forms, SVMobileAQ style sheets, other electronic files, and scanned hand-written notes.

Example of files to include:
SVMobileAQ stylesheet
471032122292701.20171107.FieldNotes.pdf (scanned field notes)
471032122292701.20171107.EDL (downloaded file from datalogger during visit)

/Photos subdirectory—In this subdirectory, include sets of 4–5 photographs of the gage and gaging site, as listed below. Please note that photographs of upstream and downstream (control) views may be shown on NWISWeb. **Photographs need to be updated in this area only when a significant change is made to a gage house, instrument replacements, control/channel changes, sensor changes, or installation locations.**

1. Photograph of front of gage house with door closed (file name *stationNo.yyyymmdd.gagehouse*)
2. Photograph of instruments in gage house with door open (file name *stationNo.yyyymmdd.instruments*)
3. Photograph of control facing downstream from gage house (filename *stationNo.yyyymmdd.control*)
4. Photograph of stream facing upstream from gage house (filename *stationNo.yyyymmdd.upstream*)
5. If visible, photograph of sensor installed in stream (filename *stationNo.yyyymmdd.sensor*)
6. For wells, photographs of well, measuring point, and other reference marks (filename *stationNo.yyyymmdd.well*, *stationNo.yyyymmdd.MP*, *stationNo.yyyymmdd.RM*)

Photographs specific to gage inspections (that is, control or channel photos, damage to gage or instruments, and any other related photographs) should be uploaded to Aquarius for that site inspection. Photographs can be stored in the site visit folder with the inspection files if desired but it is not necessary if stored in Aquarius.

/Record_Review subdirectory
/Discharge
    /yyyymmdd-yyyymmdd
        /12131500.CRP_Streamflow_Checklist
/Precip
    /yyyymmdd-yyyymmdd
        /12131500.CRP_Streamflow_Checklist
/TDG
    /yyyymmdd-yyyymmdd
        /12131500.CRP_QW_Checklist
/Nitrate (use this subdirectory for a stand-alone sensor)
    /yyyymmdd-yyyymmdd
        /12131500.CRP_QW_Checklist
/WaterTemp (use this subdirectory for a stand-alone sensor)
    /yyyymmdd-yyyymmdd
        /12131500.CRP_QW_Checklist
/Turbidity (use this subdirectory for a stand-alone sensor)
    /yyyymmdd-yyyymmdd
        /12131500.CRP_QW_Checklist
/pH (use this subdirectory for a stand-alone sensor)
    /yyyymmdd-yyyymmdd
        /12131500.CRP_QW_Checklist
/SpecCond (use this subdirectory for a stand-alone sensor)
    /yyyymmdd-yyyymmdd
        /12131500.CRP_QW_Checklist
/DO (use this subdirectory for a stand-alone sensor)
    /yyyymmdd-yyyymmdd
        /12131500.CRP_QW_Checklist
/QW-MultiParameter (use this subdirectory for a multi-parameter sensor)
    /yyyymmdd-yyyymmdd
        /12131500.CRP_QW_Checklist—Subdirectory contains one Excel file with all
            parameters and supporting documents. The multi-parameter Excel file is generated by
            the worker. Include CRP Checklist.
/GroundwaterLevel
    /yyyymmdd-yyyymmdd
        465033122570203.CRP_ GW_Checklist.xls (example of checklist)
        465033122570203.StationAnalysis.docx (example of station analysis)
/Safety subdirectory—In this subdirectory, include any safety-related files using the file format
stationNo.yyyymmdd.category
    Example of files to include:
    12134500.master-copies These are the blank or unsigned versions.
    12134500.20140722.cableway-inspection
    12134500.20140722.general-inspection

Example of files to include:

/Master_Copies/12134500.master-copies

    These are the blank or unsigned versions with information pre-filled out. As signed PDF files cannot be modified, storing master copies allows for easier duplication of files without having to re-enter information that does not typically change.

/Cableway_Inspections/12134500.20140722.cableway-inspection

    Main folder for all cableway inspection folders. Each inspection folder would contain the PDF of the signed cableway inspection form and any other pertinent files like inspection photographs.

/Gage_Inspections/12134500.20140722.gage-inspection

    Main folder for all gage inspection folders. Each gage inspection folder would contain the PDF of the signed cableway inspection form and any other pertinent files like inspection photographs.