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U.S. GEOLOGICAL SURVEY
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MEMORANDUM

June 2, 2015

TO: National Water Quality Program (NWQP) Leadership Team
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From: Bill Wilber, Coordinator, NWQP

Subject: Programs and Plans — Fiscal Year 2016 Work Plan Guidance for the National Water-Quality Program

Budget submission requested to [NWQP Sharepoint Site](#) by Tuesday, August 15, 2015

BACKGROUND

This memorandum describes the Fiscal Year (FY) 2016 work plan guidance (WPG) for the Water Mission Area's National Water Quality Program (NWQP). This newly restructured program merges accountability for water-quality studies and research being conducted as part of the National Water-Quality Assessment (NAWQA) Cycle 3 Science Plan, the Cooperative Water Program, and the National Research Program. Additional details of the WMA program restructuring are provided in the [FY2016 USGS Greenbook](#) (pages J-29 through J-45). Figure 1 illustrates the new functional organization of the NWQP and its technical relations with other WMA organizations having significant responsibility for water-quality investigation.

The President's proposed FY2016 budget for the NWQP is \$96.1 M. Despite the optimism expressed in this budget, we will initiate the FY2016 work planning cycle with the conservative assumption that we will begin the fiscal year under an extended continuing resolution at the FY2015 funding level. Consistent with that approach, the WMA has issued a restructured NWQP budget based on a funding level of \$92.6M.

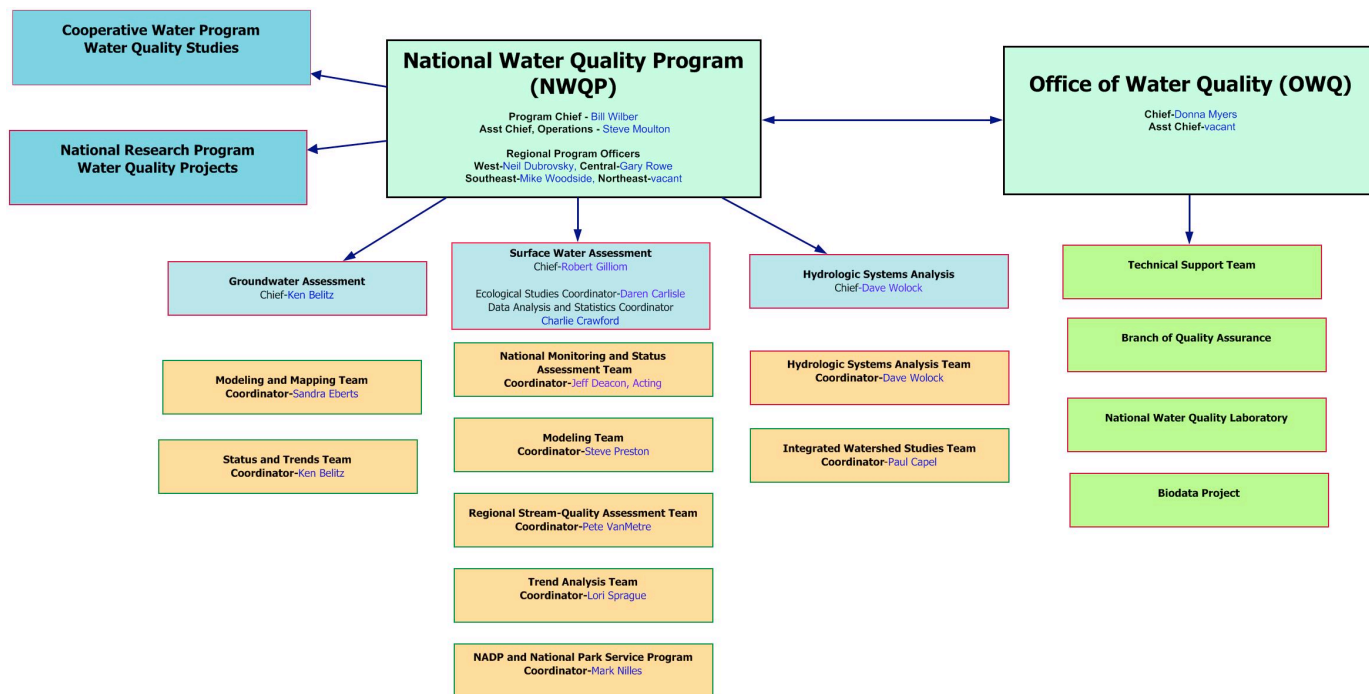


Figure 1. Functional organization of water quality components and related technical support activities in the National Water Quality Program and Office of Water Quality.

NWQP HIGHLIGHTS FOR FY2016

The FY2016 NWQP WPG presents highlights for the NAWQA Cycle 3 (Groundwater Assessment, Surface Water Assessment, and Hydrologic Systems) study components and related water quality technical support activities in the Office of Water Quality. As water quality activities are coordinated across the WMA, future WPG communications are expected to include relevant highlights for the Cooperative Water Quality Studies, National Research Program, and other technical offices. Additional information on NWQP highlights can be found on pages J-29 through J-45 of the [2016 USGS Greenbook](#).

NAWQA Groundwater Assessment Component

The Groundwater Assessment component is addressing three important questions: What is the quality of the Nation's groundwater? Is it getting better or worse? And, how might groundwater quality change in the future? These questions will be answered through a coordinated effort that includes active groundwater quality monitoring, mining of existing databases; and modeling. The Groundwater Assessment component has two teams: the Status and Trends Team (S&T) and the Modeling and Mapping Team (M&M).

Status and Trends: The S&T Team works with Water Science Centers (WSCs) to acquire groundwater quality across the Nation, and uses that data to address the Program goals. About 550 wells distributed across 26 networks will be sampled in FY2016. These networks include: Principal Aquifer Surveys (PAS); Decadal Trends networks which can be either Land Use Surveys (LUS) or Major Aquifer Surveys (MAS); Enhanced Trends Networks (ETN); Flow Path Studies (FPS) and Vertical Flow Path Studies (VFPS); Oil and Gas studies (GWOG); and, Model Support Studies (MSS).

The PAS networks are designed to assess the quality of groundwater used for public supply, and in FY2016 about 160 wells in 4 PAs will be sampled: Biscayne (FL), Columbia Plateau (ID, OR, WA), High Plains (TX), and Ozarks Plateau (AR, IL, KS, KY, MO, OK) (subject to availability of funds). At the end of FY2016, the NWQP will have sampled about 1100 of the 1500 public supply wells planned for Cycle 3.

The Decadal Trends networks are designed to evaluate long-term changes in groundwater quality. There are about 80 LUS and MAS networks to be resampled during Cycle 3, with about 8 networks sampled per year. In FY2016, about 260 wells in 9 networks (6 LUS and 3 MAS; MI, NM, SC, MN, ID, MI, NV, WA) will be resampled.

Groundwater quality varies at time scales both shorter and longer than 10 years. ETNs are designed to evaluate groundwater quality variation at short time-scales. A typical ETN site consists of 3 wells that are instrumented with continuous recorders (temperature, conductance, dissolved oxygen, pH). Each well is sampled bimonthly for a period of 4 years and annually for a period of 6 years. In FY2016, 4 ETN sites are on the bimonthly schedule (CA, TX, TN, NH) and 4 are on the annual schedule (NM, MD, WI, OR).

FPS and VFPS studies are designed to evaluate groundwater quality variation at long time-scales (>decadal). FPS studies are designed to sample groundwater along a defined flow path, and VFPS studies are designed to leverage existing networks of LUS and MAS wells, under the recognition that groundwater age increases with depth. There are 3 FPS and 12 VPS networks. In FY2016, about 95 wells (about 65 that are a part of an existing network and 30 additional wells) in 2 VFPS networks (MI, NM) will be sampled.

The Groundwater Assessment component conducts targeted studies to better understand the factors affecting groundwater quality. GWOG studies are designed to evaluate groundwater quality in drinking water supply wells that are either proximal to or distal from well-sites that have been fracked. In FY2016, 30 wells associated with unconventional production in the Eagle Ford Shale (TX) will be sampled. MSS networks are designed to acquire data, particularly groundwater-age tracers, which can be used to

calibrate regional-scale groundwater flow models. In FY2016, 45 wells in two locations within the North Atlantic Coastal Plain PA (NY, MD) will be sampled.

An important aspect of the NAWQA groundwater activities is the follow-up that needs to be done after the sampling of wells that took place in a previous Fiscal Year. In FY2016, follow-up work will be done for sampling that occurred in FY2015: PAS networks (AL, CO, FL, GA, ID, KS, NE, NM, NV, OK, SC, TX, UT, WY); decadal trends (CA, GA, IL, MD, NE, TX, WA, WI); GWOG (AR, LA, TX); and, VFPS (NE).

Modeling and Mapping: The M&M Team builds upon the datasets and analyses provided by the S&T Team. Models are being developed to produce maps of constituents present in groundwater at concentrations of significance to human health at the depth zones used for domestic and public supply. The modeling & mapping work in FY2016 is focused on four Principal Aquifers (Central Valley, Glacial, Northern Atlantic Coastal Plain, and Mississippi Embayment). Models and maps of intrinsic susceptibility (groundwater age), nitrate and arsenic will be completed for the Central Valley Principal Aquifer (PA). The Glacial PA team will focus on characterizing the intrinsic susceptibility of the aquifer system to contamination—information that is needed for every future constituent-specific map for the aquifer. Several scales of nested groundwater-flow models, along with statistical models, will inform the intrinsic susceptibility mapping in the Glacial PA during this third year of work. In the Northern Atlantic Coastal Plain, the Groundwater Resources Program groundwater-flow model will be used to begin exploring intrinsic susceptibility at the aquifer scale, while inset models will be built to eventually delve into important regional water quality issues in Long Island, the western shore of the Chesapeake Bay, and along the “Fall Line” where confining units pinch out and confined aquifers used for drinking-water supply become vulnerable to anthropogenic contamination. Finally, the Mississippi Embayment effort will be in its first year during FY2016 and will focus on refining modeling & mapping plans for the aquifer system. Resultant maps will provide an improved spatial understanding of the Nation’s groundwater quality in these important aquifer systems.

NAWQA Surface Water Assessment Components

National Monitoring and Status Assessment (NMSA): The NMSA Team oversees and manages monitoring operations of the National Water Quality Network: *Rivers and Streams*, quality assurance of monitoring data, annual reporting of monitoring results, timely computation of nutrient loads for sites in the Mississippi River Basin, and continued development of refined WARP models for pesticides, including associated pesticide use data.

The National Water Quality Network: *Rivers and Streams* (NWQN: *Rivers and Streams*) is a nationally integrated monitoring network comprised of the merger of NAWQA’s former National Fixed Site Monitoring Network—which was a combination of NAWQA monitoring, National Stream Quality Accounting Network (NASQAN), the National Monitoring Network (NMN)—and now the Hydrologic Benchmark Network (HBN). The monitoring network includes a combination of large inland and coastal rivers, as well as streams in selected land-use settings under a single national design that uses consistent sampling protocols and analytical methods. The National Streamflow Information Program (NSIP) allocates funds for the operation of stream gages used in the NWQN: *Rivers and Streams*.

NMSA priorities during FY2016 include:

- Integrate HBN and former NAWQA reference sites to form a unified national subnetwork of sites on reference streams.
- Expand the scope of the annual water-quality tracking web site to include pesticides and selected other enhancements.
- Expand WARP web site for mapping pesticide concentrations to incorporate additional pesticides.
- Implement data analysis for all monitoring network quality assurance data.

- Update national summary of nutrient conditions in the Nation's rivers and streams (Circular 1350) with data through 2014.

Regional Stream Quality Assessment (RSQA): The RSQA Team designs, manages, and reports on regional studies of stream water quality across the nation. Most of the studies are multi-stressor studies aimed at determining the dominant stressors on the biological conditions of streams, considering nutrients, sediment, contaminants, and streamflow alteration. Some studies are directed specifically at flow alteration effects in otherwise undeveloped settings. Collectively, the RSQA studies during Cycle 3 will cover streams in a substantial portion of the most critical ecoregions nationwide.

RSQA priorities during FY2016 include:

- A regional stream quality assessment (RSQA) study will be conducted in the Northeastern Region and feature collaboration among NAWQA, New York, New England, and other WSCs. External partners include USEPA and Nature Conservancy to date, and other partnerships are being pursued. Study coordinators are Karen Murray (NY WSC) and Jim Coles (New England WSC). Specific information on study plans is forthcoming from Pete Van Metre, RSQA Team Leader and the study coordinators.
- Data analysis and reporting on results from the 2013 RSQA in the Midwest and the 2014 RSQA in the Southeast U.S. (Piedmont, Blue Ridge, and Ridge and Valley ecoregions).
- Data management for the Pacific Northwest study for which data collection was completed in FY15.

Modeling: The Modeling Team develops and applies water quality models that estimate nutrient, dissolved solids, and sediment loads (SPARROW) nation-wide, organized in five large regions (Southwest, Pacific, Southeast, Northeast, and the Mississippi River Basin). Updates based on 2012 data in all regions will be completed over the next two years, followed by additional updates and enhancements through Cycle 3.

Modeling Team priorities during FY2016 include:

- Enhancements to improve spatial resolution.
- Updates to contaminant source data and water quality data required for model development.
- Completion of sediment models.
- Continued enhancement of decision-support tools used for evaluating how nutrient and sediment loads will change in response to changes in climate, land use, or management policies.

Trend Analysis: The Trend Analysis Team is evaluating all historical water quality data for US rivers and streams, including data from USGS and any other source that qualifies, to determine which river and stream sites have sufficient data to analyze for long-term trends in nutrients, sediment, pesticides, biological condition, and other parameters. The team will analyze trends for qualifying site/parameter combination, interpret results in relation to potential causes, and report on results.

Trend Analysis Team priorities during FY2016 include:

- Statistical analysis of magnitude and significance of trend over multiple time periods.
- Summarize and report on results nationally as the basis for subsequent interpretive analyses.
- Initiate and prepare initial phases of interpretive analyses of national results.

National Atmospheric Deposition Program (NADP): The NADP team supports the USGS role as the lead federal agency for the monitoring of wet atmospheric deposition (chemical constituents deposited from the atmosphere via rain, sleet, and snow) in the United States. The team provides participation and leadership in several interagency NADP networks and conducts scientific research and assessments to evaluate trends and the effects of atmospheric deposition on aquatic and terrestrial ecosystems. Current

high priority applications of NADP data include quantifying atmospheric sourced nutrient enrichment and mercury inputs to ecosystems.

NADP priorities during FY2016 include:

- Supporting 77 of the approximately 250 NADP-National Trends Network sites, which measure acidity, nutrients and other major ions in precipitation as well as supporting sites in the NADP-Mercury Deposition Network and the NADP Mercury Litterfall Network.
- Completing the intensive data collection phase to characterize wet atmospheric deposition of major ions, nutrients, and mercury in precipitation along with dry deposition of ammonia and deposition of mercury via vegetative litterfall at NADP station El Verde, Puerto. This site has among the highest atmospheric loadings of mercury measured in the NADP mercury deposition network despite its remoteness from mercury emission sources.
- Conducting a national scale status and trends update on wet deposition to evaluate the response to recent large declines in sulfur and nitrogen emissions.

National Park Service Water Quality Partnership: Since 1998 the National Park Service (NPS) and U.S. Geological Survey (USGS) have worked together to administer and operate a water quality partnership program. Projects are developed jointly by USGS and NPS personnel and utilize USGS expertise to support a broad range of water quality science priorities in NPS administered lands. The results from these studies provide Park resource managers with the information necessary to make sound and scientifically defensible management and policy decisions. Cumulatively through fiscal year 2015, 219 partnership projects have been initiated in over 120 national park units. Typically 20 projects are underway at any given time.

The NPS Water Quality Partnership priorities during FY2016 include:

- Commencing seven new water-quality projects in NPS administered units.
- Projects will focus on providing the NPS with information needed for management decisions to protect and improve water quality and ecosystem health related to historic land use and reclamation, nutrient loading impacts, visitor use impacts and contaminants of emerging concern.
- In support of the National Park Service 100th anniversary in 2016, USGS projects with innovative science and research that complement Centennial goals and events will be prioritized.

NAWQA Hydrologic Systems Analysis Component

The Hydrologic Systems Team (HST), which includes the Integrated Watershed Studies team, will continue to enhance NAWQA's surface and groundwater quality models in FY2016. Goals for FY2016 include (1) develop better understanding and estimation techniques on groundwater movement and associated travel times and how these affect water quality in streams and wells, (2) incorporate the effects of management practices on water quality in NAWQA models, and (3) develop approaches to integrate high-resolution water quality data into data interpretation and modeling. These topics are critical for understanding historical trends and hydrologic processes that influence groundwater and surface-water quality, as well as for developing the capability to forecast the effects of future land-use and climate changes on water quality, and the corresponding changes in water use on water quality.

Office of Water Quality

The OWQ establishes water quality policies and guidance related to data production, delivery, and interpretive studies. The OWQ produces and publishes technical and scientific products in support of USGS water quality monitoring, assessment, and research that addresses needs across all USGS programs and activities. The OWQ also develops and revises tools such as software for data processing and statistical analysis, supports a group of subject matter experts on water quality databases, and co-leads

with the Office of Groundwater the triennial technical reviews of WSCs. Other priorities include updates and revisions to the National Field Manual and Techniques and Methods reports. Special projects and workshops are developed to assist in the technical transfer of innovative methods of sample processing and analysis in the laboratory and field and to address new program development efforts. In FY2016, the OWQ will continue to provide subject matter experts for efforts to modernize QWDATA, expand capabilities in BioData, and complete development through the first release of the AQUARIUS system for time series water quality data. Continuing work includes revisions to the National Field Manual and planned publication of two new Techniques and Methods reports, one on computation of chemical and microbiological surrogates from time series sensor data and another on new methods of groundwater sampling. Ongoing projects to support the Water-Quality-Watch Web site, PCFF, and new R-coded scripts for the Water Quality Tool Box also are major highlights. The OWQ plans to hire two new employees to support these activities and to promote the development of low cost, low maintenance, and high accuracy water quality sensors through participation in the multi-agency Nutrient Sensor Challenge.

BioData Team: The BioData team, in collaboration with the Center for Integrated Data Analytics (CIDA), will enhance the USGS BioData System to (1) build out the batch data-loading system for all types of fish, invertebrate, and algae samples, (2) integrate with the NWQP Ecology Electronic Field Forms software application, (3) add support for images that document site conditions, and (4) import previously-existing USGS data collected by science center projects.

FUNDING TARGETS, WORK PLANS, & BUDGETS

The [FY2016 NWQP WPG](#) provides funding targets and work plan information for WSCs to follow in completing budget templates for the NAWQA Groundwater Assessment, Surface Water Assessment, and Hydrologic Systems components. This information does not include planning guidance concerning the Cooperative Water-Quality Studies, National Research Program, NADP, and NPSWQP components of the NWQP.

Water Science Center funding targets for the NAWQA Groundwater Assessment, Surface Water Assessment, and Hydrologic Systems components are listed in the [FY2016 WPG target spreadsheet](#) and include sub-targets, if applicable, for data collection, laboratory analysis, and report costs. Reviewed and approved initial funding allocations to each WSC will be made within the time frames identified by the Bureau pending passage of the FY2016 appropriations bill that funds the USGS. With the approval of the component leader (see Figure 1), other funding allocations may occur throughout the fiscal year using the change of allocation procedure.

The designated [WSC contact](#) should review the [FY2016 WPG Matrix](#) to determine the scope of work expected from each study component then prepare budgets within specified WSC center targets and approve them with center management prior to submitting to the [NWQP Sharepoint Site](#). Frequent and close communication among component leaders, WSC staff, and Regional NWQP Officers (RNPOs) is key to ensuring that budgets are well prepared.

Water Science Center budgets should not include analytical services costs for National Water Quality Laboratory (NWQL) and other laboratories except WSC sediment concentration laboratories. NWQP component leaders are asked to provide the estimated type, quantity, and costs for NWQL and other laboratory analytical work to the NWQP Operations Team (GS-W NAWQA OPS); funds will be allocated from NWQP Headquarters directly to each laboratory. These analytical costs and schedules are listed in the FY2016 Work Plan Guidance Surface Water and Groundwater Assessment Design (Lab Schedule worksheet). The NWQL will track planned versus submitted samples and requested analytical schedules. Water Science Centers that exceed their planned sample allocation, submit unapproved samples, or submit samples from additional sites will be charged directly by the NWQL for any additional analytical costs.

Consistent with the WMA program restructuring, changes in program funding codes for the new programs have dictated a new BASIS+ project/task structure that will also improve alignment of related activities within the NWQP. For example, up through FY2015, budget planning for surface water quality activities in NAWQA, NASQAN, NMN, and HBN was performed across four different BASIS+ projects comprised of two different fund sources in two different cost centers. Beginning in FY2016, these activities will be planned and budgeted under a single, new BASIS+ project in the NWQP cost center with a single fund source. Details on the new NWQP BASIS+ project/task structure and instructions for WSCs regarding establishment of working budgets and linking new WBS accounts will be communicated later in June. Questions regarding the NWQP BASIS+ structure should be directed to Carise Barbour (cbarbour@usgs.gov; 703-648-5716).

PLANNING TIMELINES

Groundwater Assessment, Surface Water Assessment, and Hydrologic Systems Components

The timeline and action items for responding to the FY2016 NWQP WPG for the Groundwater, Surface Water Assessment (excluding NADP and NPSWQP), and Hydrologic Systems components are identified in Table 1.

Table 1. Planning timeline and action items concerning the development of FY2016 NWQP work plans and budgets for the Groundwater Assessment, Surface Water Assessment, and Hydrologic Systems components. [NWQP, National Water Quality Program; WSC, Water Science Center; WPG, Work Plan Guidance; RNPO, Regional NWQP Program Officer]

Deadlines (all dates 2015)	Action
June 2	Final WPG memorandum distributed by the NWQP Coordinator to component leaders and WSC contacts.
On or before July 2	RNPOs and component leaders request preliminary WSC budgets.
August 15	Final work plans and budgets due to NWQP Sharepoint Site .
July 1 – August 1	Component leaders should: • summarize budgets and compare subtotals to sub-targets • compare the overall cost to their component study target • identify and resolve issues by initiating communications among WSC staff, RNPOs, and themselves
On or before August 15	Component leaders submit: • planned sample counts by analyses, by WSCs for National Water Quality Laboratory • planned sample counts by analyses by WSCs for “Other Labs” Planned sample template will be available by June 29. Submit planned sample counts to GS-W NAWQA OPS.
August 1	Component leaders submit list of planned FY 2016 requisitions for new (or modifications to existing) contracts, grants, cooperative agreements, Federal inter-agency agreements to GS-W NAWQA OPS.
September 1	Component leaders review project budgets and RNPOs review and finalize component budgets applicable to studies in their areas with the

	NWQP Operations Team during scheduled WebEx sessions.
October 1	Initial allocations frozen pending passage of FY2016 NWQP appropriation. Note: Other funding allocations to cost centers will be made using Change of Allocation procedures following distribution of the initial allocations.

National Atmospheric Deposition Program & National Park Service Water Quality Partnership Components

In FY2016, NWQP funding is budgeted for NADP and NPSWQP activities at their FY2015 funding levels. Although the planning approach for these activities is different than other NWQP components, the general planning timeline is consistent with the goal of identifying planned FY2016 initial allocations by the start of the fiscal year (Table 2). The principal differences are that a national USGS-NPS panel meeting in late July determines the distribution of project funding for FY2016 start NPSWQP projects and an interagency budget committee meets in mid-late August to finalize NADP funding distributions for site operations.

Table 2. Planning timeline and deadlines for action items concerning the development of FY2016 NADP and NPSWQP work plans and budgets. [NADP, National Atmospheric Deposition Program; NPSWQP, National Park Service Water Quality Partnership; NWQP, National Water Quality Program; WSC, Science Center; WPG, Work Plan Guidance]

Deadlines (all dates 2015)	Action
June 2	Final WPG memorandum distributed by the NWQP Coordinator to component leaders and WSC contacts. Includes draft NADP and NPSWQP FY2016 allocations by project and WSC. FY2016 funding levels for FY2014 and FY2015-start NPSWQP projects are firm, FY2016-start (new) NPSWQP projects are placeholders for estimated total funding amounts only - no WSC identification for FY2016-start NPSWQP projects.
July 31	NPSWQP National panel concludes and selects new projects for FY16 funding. Principal Investigators and WSCs are informed of selection or non-selection for proposed FY2016 funding immediately following the end of national panel.
August 21	NADP budget meeting concludes with final list of USGS supported NADP sites and costs settled.
September 1	Component leader updates project budgets and allocations with results from NPSWQP National panel and NADP interagency budget meeting.

SPECIAL REMINDERS & ANNOUNCEMENTS

- 1) **NWQP Operations Contacts:** Questions regarding NWQP operations can be directed to Steve Moulton, Assistant Chief, NWQP for Operations (smoulto@usgs.gov; 703-648-6874) or the NAWQA Ops email alias (GS-W NAWQA Ops). Other points of contact include:
 - a) Carise Barbour (cbarbour@usgs.gov; 703-648-5716) for:
 - i) Management of NWQP accounts and BASIS+ projects and tasks
 - ii) Management and tracking of samples with National Water Quality Laboratory and other USGS laboratories. Carise will serve as the primary point of contact between groundwater and surface water component leaders and laboratory representatives.
 - iii) Assist with preparation and distribution of annual work plan guidance documents.
 - b) Kelly Ruhl (kesmith@usgs.gov; 703-648-5719) for:
 - i) Maintenance of NAWQA bibliography and reports portfolio
 - ii) Support to HQ staff for Information Product Data System (IPDS)
- 2) **Training:** WSC requests for NWQP funded field training [Field Water-Quality Methods for Groundwater and Surface Water (2 week); Water-Quality Field Methods Refresher (1 week); NWQP Ecology Field Methods; and Electrofishing] should be included as part of the center's budget request.
- 3) **Publications:** NWQP component leaders are reminded to announce new reports following the Program's [internal core distribution guidance](#). The distribution alias is **GS-W NAWQA Internal Core Distribution**.