

National Surface Water Monitoring Network

Design Strategy

USGS surface water information, currently collected at about 8,000 streamgages nationwide, provides the scientific basis for protecting, managing, and sustaining freshwater that is safe and available for drinking and other uses, such as irrigation, energy production, industrial activities, recreation, and maintenance of healthy ecosystems. Most of this surface water information is available in “real time” (generally within 0.25 to 4 hours), which is particularly useful to minimize the loss of life and damage to property from water-related hazards, such as floods, droughts, and debris flows. “Surface water” includes streams, lakes and reservoirs, as opposed to groundwater, atmospheric water and water quality. For convenience and conformity with widely accepted terminology, we will refer to this as the **USGS Streamgage Network**.

The USGS (and its stakeholders) place high value on the quality and consistency of its streamgage measurements across the USA for the real-time, actionable information provided to many agencies and citizens as well as the baseline intelligence that our scientists and managers need to position our nation for a future that holds unanticipated challenges.

Approximately 3,000 of the active USGS streamgages meet strategic, long-term priorities established in the National Streamflow Information Program (NSIP) design, which was reviewed by the National Academy of Science and authorized by Congress. The five NSIP priorities are to maintain long-term stable monitoring at selected locations for: flood forecast warnings, mapping and models; monitoring flows across international, interstate, and tribal borders; tracking flow in major river basins, such as those discharging into key estuaries or draining heavily populated areas; identifying and understanding climate impacts to water resources, and assessing water-quality conditions. Each of the NSIP streamgages meets at least one of these five priorities, but most serve several of them.

The other 5,000+ streamgages in the USGS Streamgage Network are not specifically included in the NSIP design, but are necessary to meet national priorities related to hazard mitigation and water availability for human and aquatic system health, as well as to facilitate operational and management responsibilities of localities, states, tribes, and other federal agencies, which include: water supply management; irrigation withdrawals; hydroelectric power production; wastewater discharges and reservoir releases; preservation of our stream’s aquatic habitats; water quality standards; recreation; and infrastructure designs for highways, bridges, culverts, dams, levees, and wetlands.

Those 5000+ streamgages are also necessary (supplementing the NSIP) in providing the “robustness” to cover a broad range of watersheds, hydrologic conditions and water issues across different regions of the USA. It is not feasible to measure all rivers and watersheds at all the most important points, so the 8,000 streamgages are vital to support statistical modeling that allows scientists and water managers to estimate streamflow at ungaged locations.

The existing USGS Streamgage Network (i.e., that portion of the design that has been funded and implemented) provides for many national streamflow information needs, however it does not fully meet any of them. In order to meet design objectives (and the Congressional direction), an additional 1,500 streamgages are required for flood forecasting and more complete representation for “sentinel” watersheds.

The USGS Streamgage Network (like many USGS water programs) depends in part upon partner funding; specifically, about two-thirds of the funds needed to sustain the 8,000 existing streamgages comes from about 850 local, state, tribal, and federal partners. The funding that USGS provides comes from several different program budgets, including the NSIP, the Cooperative Water Program, National Water Quality Assessment Program, Hydrologic Networks Program, and the National Research Program. Most USGS streamgages provide information for more than one use. Shared funding ensures the engagement of all levels of government in the network operation, ensures that the network remains relevant, and enhances cost-effectiveness through network optimization and leveraging.

Many of the local, state, tribal, interstate and federal agencies who partner with USGS to sustain the USGS streamgage network also collect surface and groundwater data themselves at many more locations for a wide variety of purposes. The usefulness of the data they collect is greatly enhanced by the consistent, long-term, high quality monitoring network operated by the USGS, and the high quality, compatibility, and accessibility of the national USGS water database.