

# FULL NSIP IMPLEMENTATION

2 AUGUST 2007

A large and diverse coalition of stakeholders has organized in the last few years to support the USGS streamgaging programs based upon:

- concern for the steady loss of capacity they have suffered;
- the need for the objective and reliable water resource data and science; and
- the lack of any viable, alternative source for this information as we anticipate a clear need to support intelligent management decisions under increasingly complex circumstances.

Having studied and worked with both the Cooperative Water Program (CWP) and the National Streamflow Information Program (NSIP) for many years, we appreciate the questions that Congress raised in 1997-98 and the assessment of our national streamgaging network and plans for the NSIP that USGS prepared in response. Since the NSIP was initially authorized, inadequate funding has deprived our national streamgaging network of the relief that the Congress and USGS sought. For several years, a growing coalition of stakeholders has urged additional support for both the NSIP and the CWP; the Interior Department, White House Office of Management and Budget and the Congress have responded favorably, but the cost of inflation is still degrading the capability of these programs faster than new resources are becoming available.

Federal support for the NSIP has been so limited that approximately 80% of the federal network streamgages must be operated with funding appropriated for the Cooperative Water Program, which has its own, essential function and value. Therefore, the coalition of stakeholders is now urging full implementation of the NSIP plan, as envisioned and reported in 1999 and 2004 and as reviewed by the National Research Council in 2004, along with steady support for the CWP at its current level of capability.

## BACKGROUND

The House Appropriations Subcommittee on Interior asked the USGS for an assessment of their streamgaging network, which resulted in a November 1998 Report<sup>1</sup>. The Report identified five key categories of federal interests (outlined below) and evaluated the adequacy of the existing streamgage network to support them. The Report concluded that the degree of attainment of the Federal needs rose steadily through the 1960-70s and then leveled off or declined. As of 1996, the Report indicated that some goals were less well supported than they had been during the 1950-60s. During the 1990s, the number of streamgages significantly decreased and funding from the USGS became a smaller component of the collaborative network; the shrinking proportion of USGS funding for the network caused a reduction of the streamgaging capability to support the federal interests.

In the 1998 report, the USGS identified the best locations for streamgages needed to meet the federal needs, compared those with the location of existing streamgage locations (as of 1996) and identified the minimum number of streamgages needed to adequately serve all **five federal needs**.

- Interstate and International Boundaries: 186 (56%) of the 331 crossing points were adequately gaged;
- Major Basin Water Budgets: 252 (77%) of the 329 basins were adequately gaged;
- Flood Forecast/National Flood Insurance Program: 2,124 (73%) of the 2,929 National Weather Service stations were adequately gaged;
- Water Quality: 573 (85%) of 677 degraded watersheds were adequately gaged; and
- Long-Term Change: no number specified, but reported that 85% of the ecoregions had streamgaging stations in at least half of the river basins within the ecoregion

In 1999, the USGS produced a Plan<sup>2</sup> for the NSIP and Congress appropriated \$8.3M in new funds to USGS for the NSIP beginning in 2001. The 1999 Plan summarized a USGS committee's report; implementation details were presented in the 2004 Design for the NSIP<sup>3</sup>. The major initiatives would include:

- **Streamgaging Network** –the NSIP is described as an umbrella program that would
  - Cover the “**fixed cost**<sup>4</sup>” of the entire USGS streamgaging network and the “**marginal cost**<sup>5</sup>” of the “**federal network**,” a subset of about 4,300 streamgages (2,331 active plus 2,080 new and reactivated stations) needed to meet the five specified federal objectives (“core needs”);
    - for the streamgages outside the federal network<sup>6</sup>, the “marginal” cost was to be covered by the CWP (and its funding partners) or by the federal agency needing the particular streamgage(s)
  - Modernization to provide continuous, real-time data and flood-hardening to withstand estimated 200-year flood conditions for all existing streamgages in the “federal network;” and
  - Annual report to Congress on the status and effectiveness of the streamgaging program, including:
    - description of its goals and methods used to quantify the performance metrics,
    - evaluation of the success of the streamgaging network in meeting its goals,
    - summary of the funds contributed to the streamgaging program by USGS and its funding partners, and
    - recommended adjustments to NSIP, such as changes in the highest priority goals.
- **Assessment of Streamflow Characteristics** –USGS proposed to establish a permanent, federally funded program of regional and national streamflow assessments to address site-specific streamflow characterization, trend analysis, and “regionalization<sup>7</sup>.” The assessment program will have a strong national, interpretive focus, will run on a staggered 10-year cycle (assessments for one or more regions will be underway continuously), and will include analyses of numerous streamflow characteristics. Regional assessments will investigate the potential to derive useful information on the stream environment from all available environmental information, such as rating curves, velocity distributions, climate data, and land-use information. Assessments will include an evaluation of the presence of trends and other deterministic controls on temporal variations in streamflow
  - Information from the assessment program will be used to continually refine the streamgaging network so that the base federal needs are more fully met, particularly with regard to “regionalization” and trends

The 2004 Design included an NSIP “**implementation plan**” that indicated:

“Incremental new resources should be applied to changes in the information system organization, data delivery, and regional and national assessments first. Expansion of streamgaging stations should be a second-order priority after information delivery and software system upgrades are implemented.

As new funding for NSIP becomes available, it should be applied to three major program components in the following order:

- Redesign and upgrade of data collection, storage, and distribution systems as described in this report. Assessment and evaluation of regional and national flow characteristics capability of the current streamgaging station program.
- Partial coverage of the fixed costs for operating a national streamgaging network, in proportion to the number of streamgages operated in the District compared to the national program.
- Partial coverage of the marginal costs for operating a federal-base streamgaging network.”

Since 2004, the USGS has continued its assessment of streamgages needed to fulfill the 5 specified federal needs in consultation with the National Weather Service, the USGS Water Science Centers and others. As a result, the minimum number of streamgages needed to meet the five “core” federal needs is now estimated to be about 4,770. This increase of 470 streamgages (about 11%, compared with the 2004 Design, which was based on the streamgage network configuration in 1996) continues to be the subject of careful attention by the USGS; program managers want to assure sufficient coverage while constraining the federally-funded backbone network to its minimum size.

In 2007, USGS provided a summary of benefits that would result from full implementation for the NSIP. In March 2007, USGS estimated that full implementation would cost \$117M<sup>8</sup>, and the cost of O&M in future years was estimated at \$108M/year<sup>9</sup>. The following categories were identified by the USGS in recent assessments of benefits that full NSIP implementation would result in:

1. reactivating discontinued streamgages that have been identified as necessary to meet “core” federal needs,
2. installing new NSIP gages identified as necessary to meet “core” federal needs
3. flood-hardening forecast streamgages,
4. updating equipment and instrumentation so that all existing and reactivated stations identified as necessary to meet “core” federal needs can provide continuous, real-time data,
5. improving infrastructure for streamflow information delivery, scientific analysis related to water supply, floods , and droughts and how they are changing, and
6. enhancing the share of the total streamgaging system cost that the USGS is investing in the network to relieve some of the excessive burden that has been placed on funding partners in recent years.

## ENDNOTES:

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<sup>1</sup> “*A New Evaluation of the USGS Streamgaging Network: A Report to Congress*,” USGS, November 30, 1998.

<sup>2</sup> “*Streamflow Information for the Next Century: A Plan for the National Information Program of the US Geological Survey*,” USGS Open File Report 99-456, 1999

<sup>3</sup> “*Design of a National Streamflow Information Program*,” Report with Recommendations of the USGS National Streamflow Information Program Committee (J.D. Bales, J.E. Costa, D.J. Holtschlag, K.J. Lanfear, S. Lipscomb, P.C.D. Milly, R. Viger, and D.M. Wolock), USGS Open File Report 04-1263, 2005

<sup>4</sup> The “**fixed**” or **indirect cost** includes the expenses required to maintain and enhance a national capability to gage streams and store and disseminate streamflow data, regardless of the size of the program. These are the “overhead” expenses of the streamgaging program, which include computer hardware and software, communication systems, equipment testing, data-management staff, research and development associated with streamgaging operations, management and supervision, quality control and assessment, and regional and national analysis. Fixed cost is estimated to be 40-50% of the total annual cost for O&M of an average gage station.

<sup>5</sup> The “**marginal**” or **direct cost** includes those expenses that depend directly on the number of streamgages in the program, such as the streamgaging equipment, travel expenses for streamgage site visits and the hydrographer’s field and office time to service the streamgaging station, make discharge measurements, and process, compute, and publish the record.

<sup>6</sup> The 2004 Design includes a Table 2, showing a need for 2,080 new (and reactivated?) stations required to meet the “core” federal needs and a Table 3, showing that USGS operated 2,331 stations in 1996 that are essential to support the five federal needs, another 1,432 stations that redundantly support the federal needs and another 2,830 stations that support federal goals other than the “core” needs. Combining these numbers gives the estimate of 4,300 stations included in the NSIP at full implementation and 4,262 (= 6,593 total active stations – 2,331) to be covered by the CWP or by federal funding partners.

<sup>7</sup> Because the number of small, ungaged stream basins is so much greater than the number of gaged basins, “**regionalization**” is a crucial component of the overall USGS program of streamflow information processing. Current (1999) methods of regionalization typically estimate streamflow characteristics for ungaged basins with a standard error in the range of 40 to 70 percent.

<sup>8</sup> The estimate of \$117M as the up-front investment needed to complete implementation of the NSIP was based on reactivation of about 971 discontinued stations, installation of 433 new streamgages, flood-hardening and updating existing stations to provide continuous, real-time data.

<sup>9</sup> The estimate of \$108/year for O&M is based on the “fixed cost” of maintaining the network of 4,780 streamgages in the “federal network,” supporting the assessment of streamflow characteristics, flood and drought activity, improved information delivery and R&D to improve accuracy and reduce program cost.