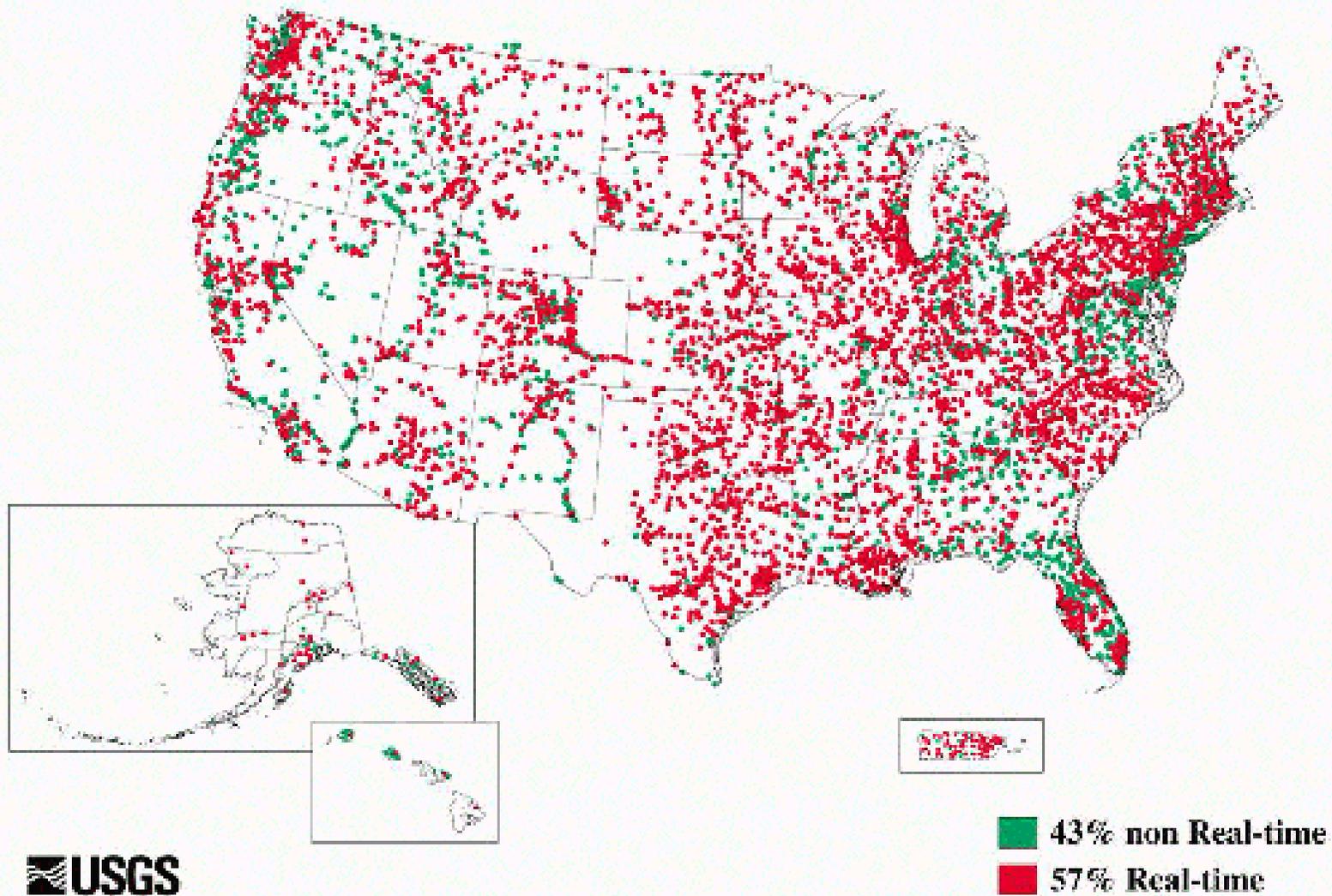


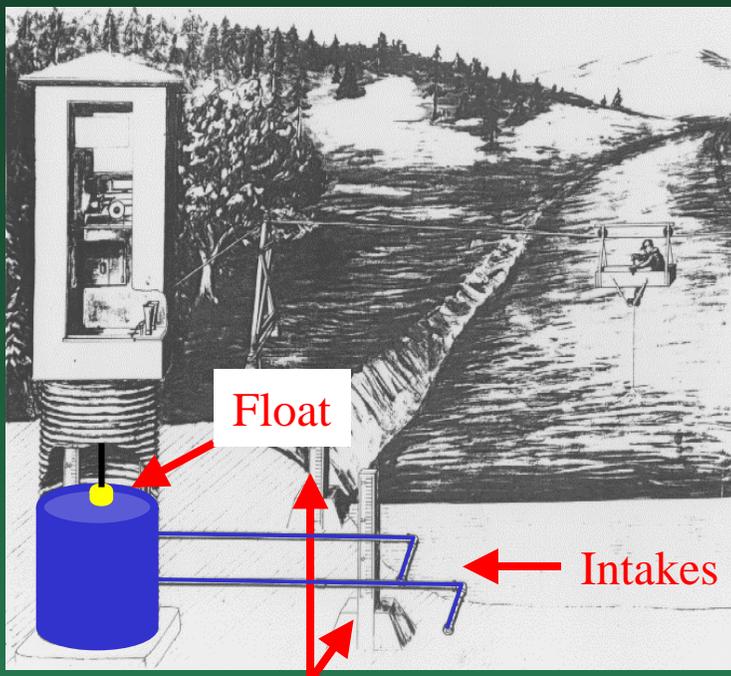
Streamflow Information for the Next Century

- Background
- Why a new plan is needed
- National Streamflow Information Program
- Progress to date
- Where do we go from here?

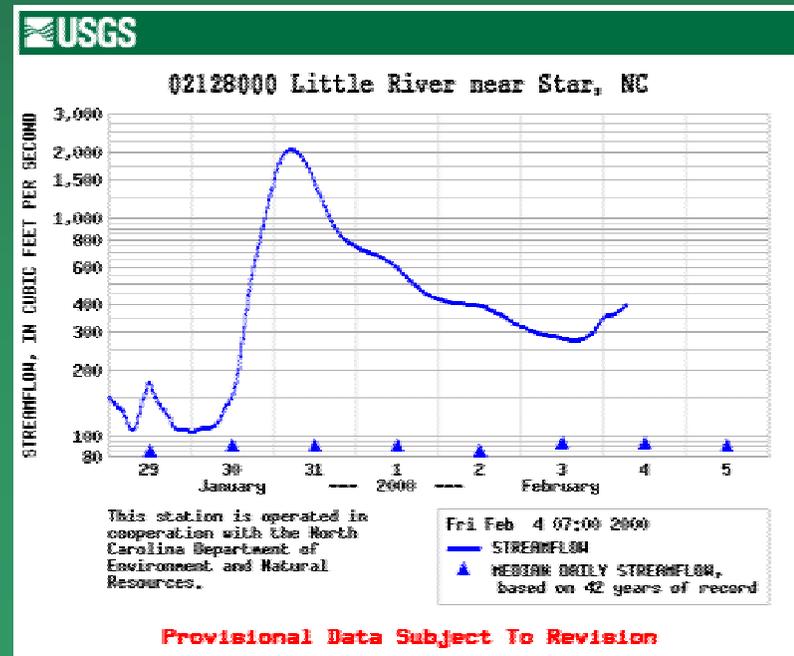
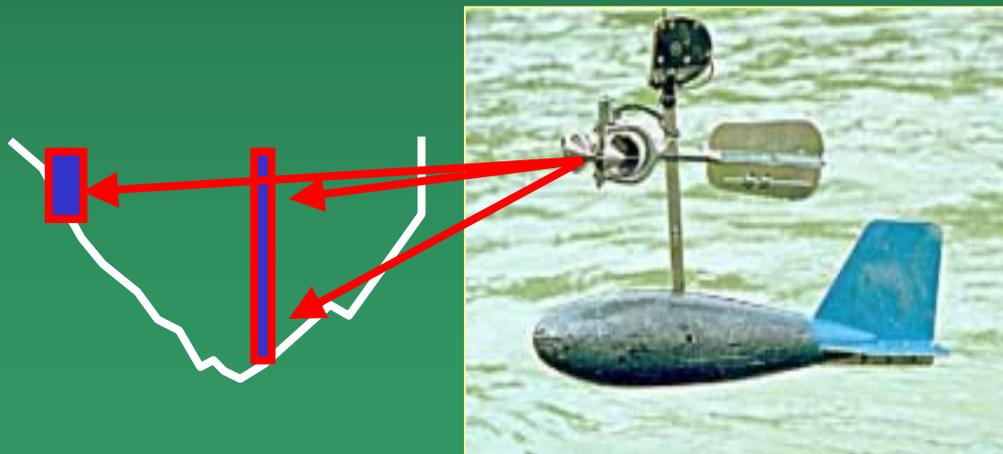
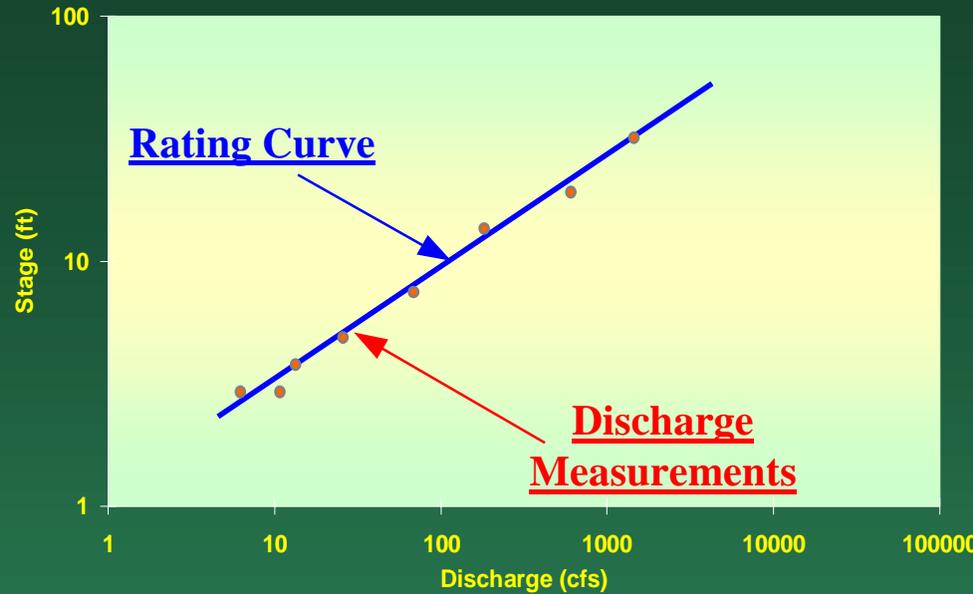


USGS Streamgaging Network





Outside reference gages



Expanding Uses of Streamflow Information

- Resource appraisal and allocation
- Design of Nation's water infrastructure
- Flood hazard planning and forecasting
- Reservoir operations
- Water quality management
- Instream flows for habitat assessment
- Understanding changes of streamflow
- Recreational safety

Guiding Principles of the Streamgaging Network

- Many partners contribute funding
- All data are freely available
- USGS operates the network on behalf of all

National Streamflow Information Program



A New Evaluation of the USGS Streamgaging Network

A Report to Congress
November 30, 1998

U.S. Department of the Interior
U.S. Geological Survey



Streamflow Information for the Next Century

A Plan for the National Streamflow Information Program
of the
U.S. Geological Survey



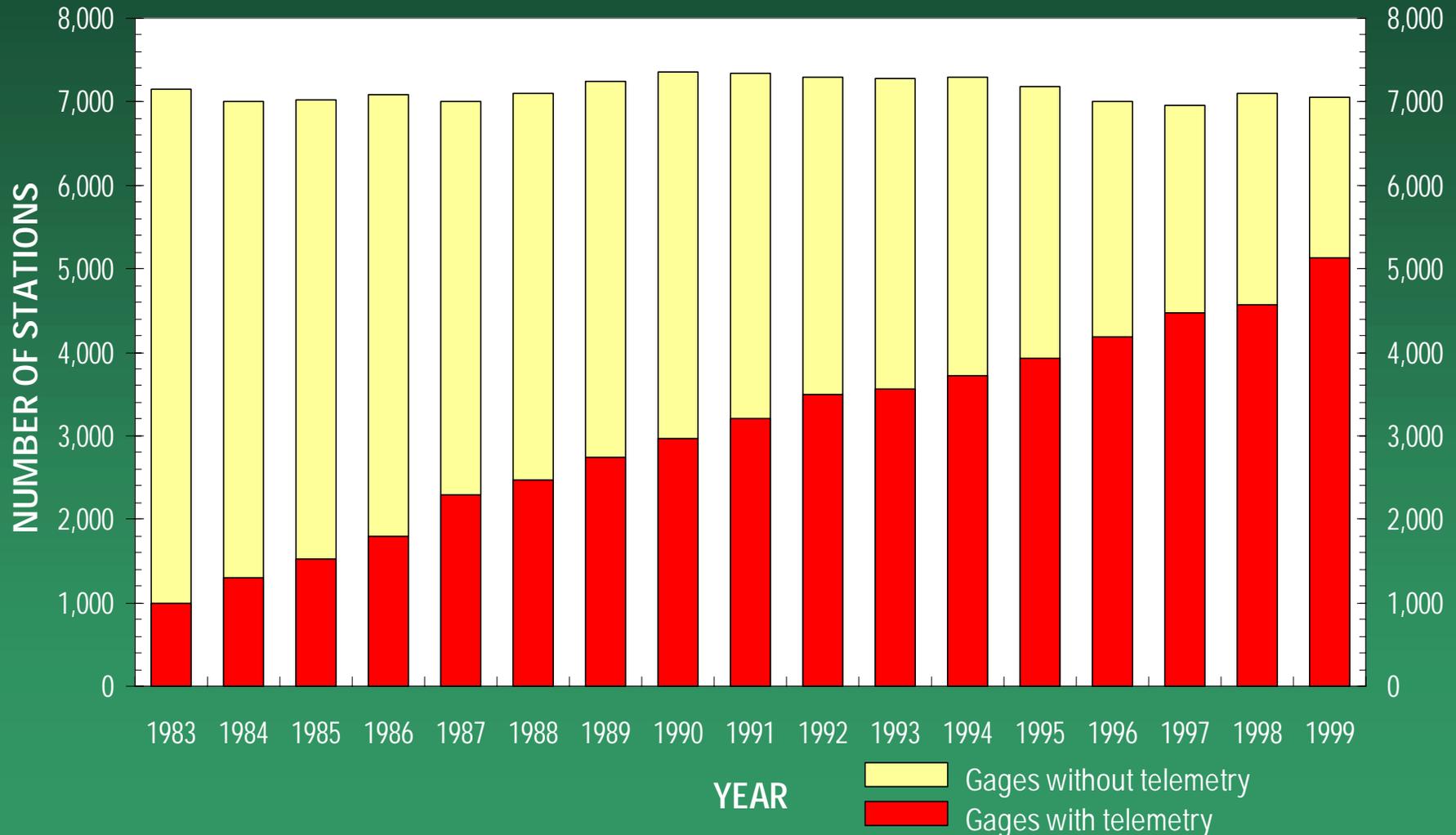
A Proposed Plan

- To increase the level of streamflow information for National needs;
- To improve the way streamgaging stations are funded and located;
- Of new ways to collect, store, and distribute streamflow information.

U.S. GEOLOGICAL SURVEY
Open-File Report 99-456



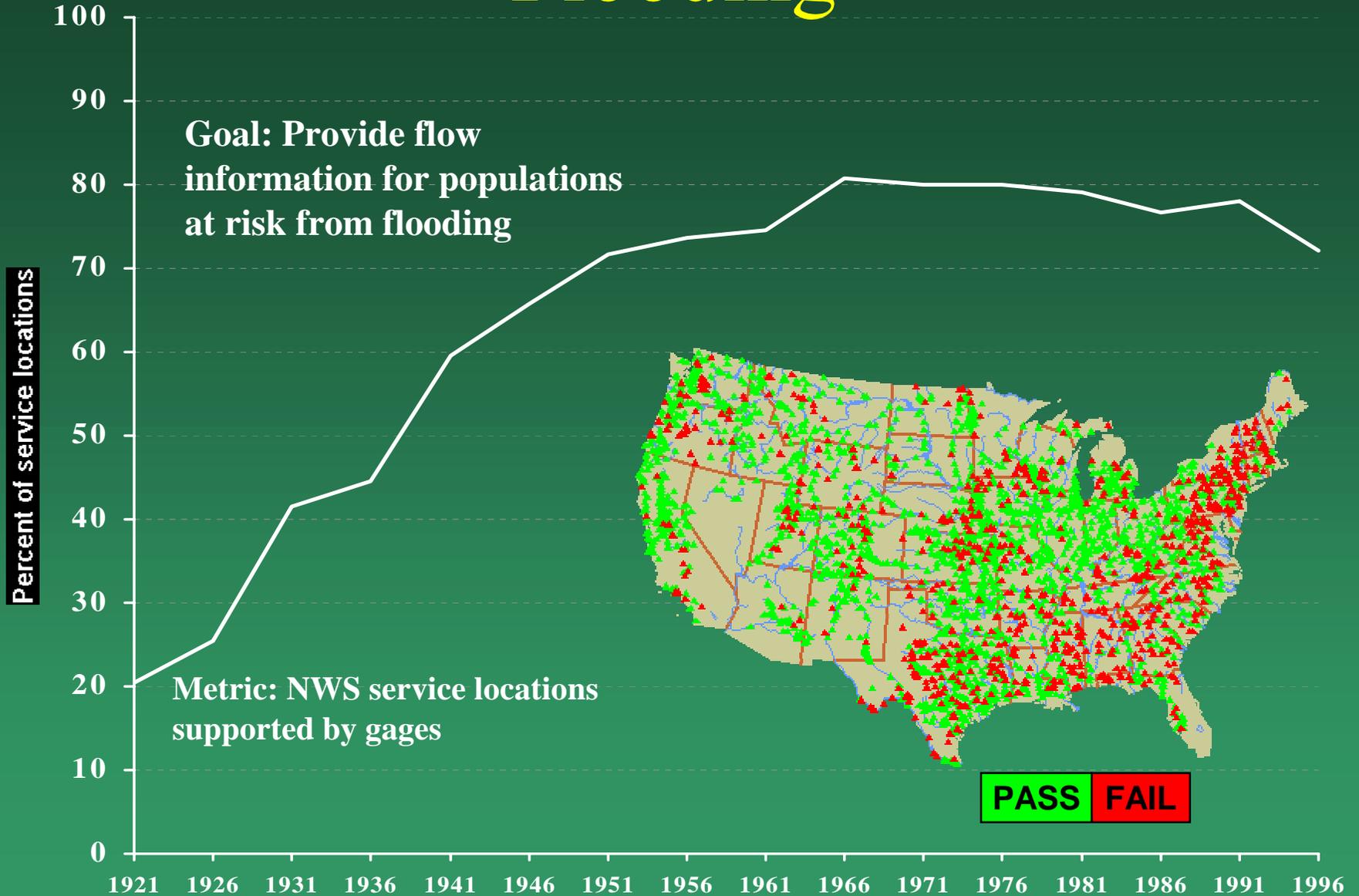
USGS Streamgaging Stations



Federal Interests Evaluated

- Interstate and international transfers
- Water budgets
- Flooding
- Water quality
- Long-term changes

Flooding



Streamgauge Population Dynamics

Inactive

Active

> 30 years

Inactive streamgages, with at least 30 years of record

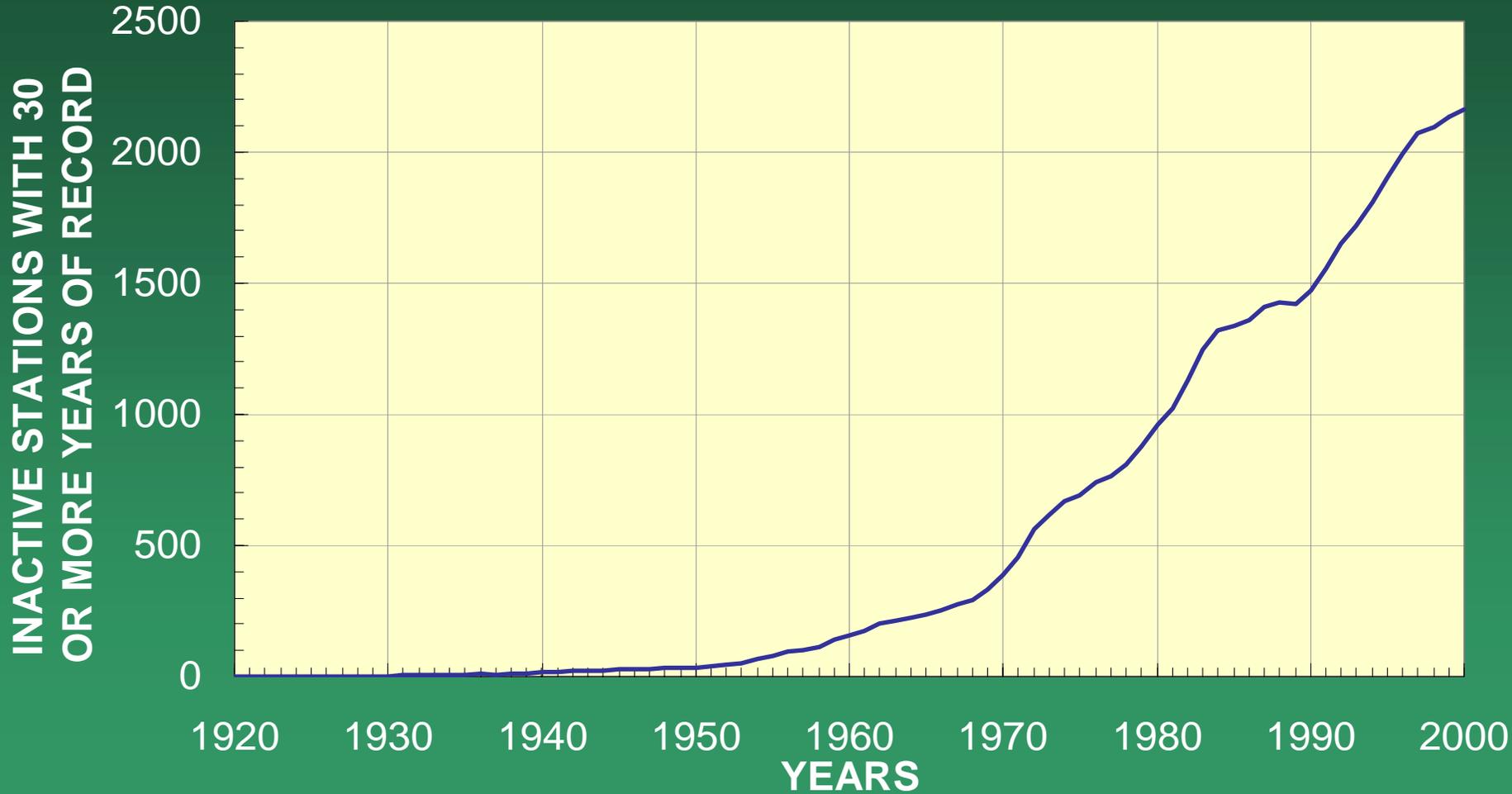
Active streamgages, with at least 30 years of record

< 30 years

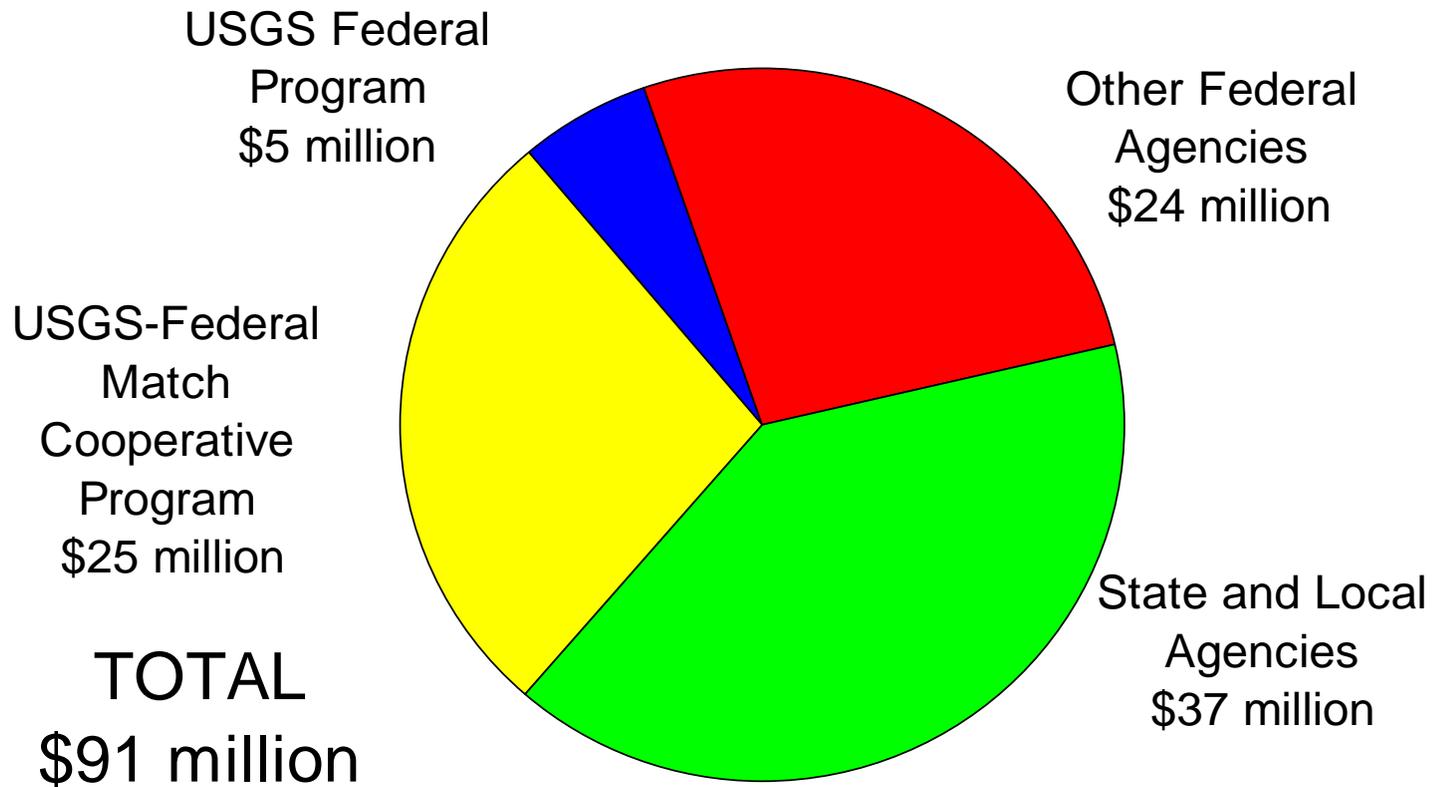
Inactive streamgages, with less than 30 years of record

Active streamgages, with less than 30 years of record

Number of Inactive Long-Record Streamgages



Fiscal Year 1999 Funding Sources for USGS Streamgaging Program



What are the Issues?

- Network's ability to meet long-standing Federal goals has declined because of:
 - an absolute loss of streamgages
 - and our declining ability to continue operating high-priority streamgages when partners discontinue funding
- New issues and new technology have increased the demand for streamflow information.

What are the Issues? (2)

- New technologies are needed to:
 - Improve reliability
 - Decrease costs
 - Decrease uncertainty

National Streamflow Information Program



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A Proposed Plan

- To increase the level of streamflow information for National needs;
- To improve the way streamgaging stations are funded and located;
- Of new ways to collect, store, and distribute streamflow information.

U.S. GEOLOGICAL SURVEY
Open-File Report 99-456



National Streamflow Information Program

1. Enhanced nationwide **streamgaging network**
2. Intensive data collection during major **floods and droughts**
3. Periodic **regional and national assessments**
4. **Streamflow information delivery** to customers
5. Methods development and **research**

#1 Streamgaging Network

- Federal Network for 5 basic Federal goals
- Aim for full support from Federal funds
- Cooperative Network for additional goals – shared costs by USGS, State and local agencies and other Federal agencies
- Full support for network infrastructure from Federal funds – (40% savings)

#2 Floods and Droughts

- Temporary streamgages
- Characterize the event: Precipitation, Stage, Discharge, Sediment, Water Quality, Ground Water
- Document changes in channels and riparian zones

3 Regional & National Assessments

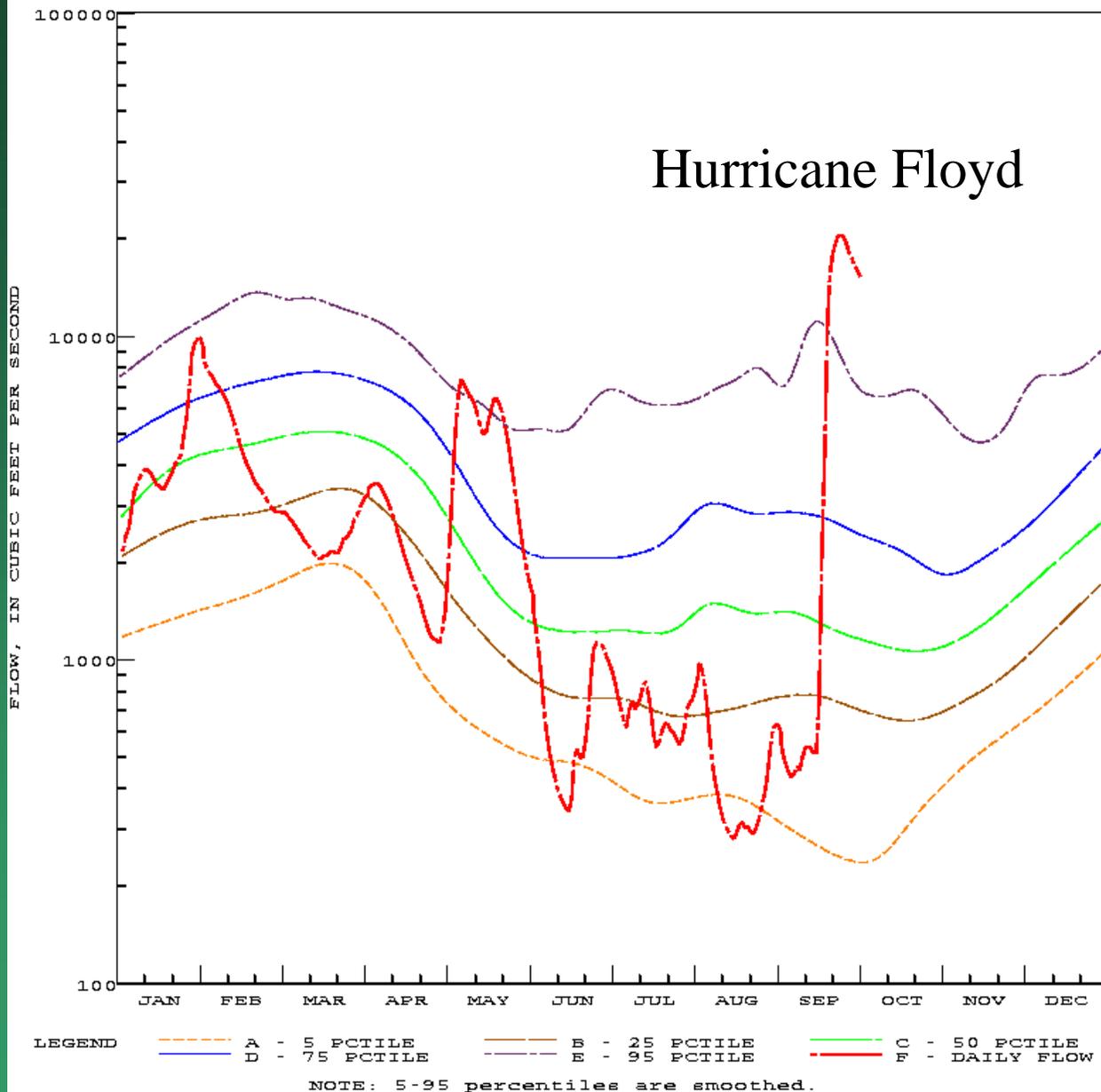
- Regional studies for low-flow and flood statistics: updated every decade to include new data and changing conditions
- National studies of streamflow trends: related to climate and land-use factors

#4 Information Delivery

- Improve reliability through “mirror” servers
- Complete geospatial framework for rivers (NHD) and watersheds (hydrologic units)
- “Point and click” streamflow characteristics
- Make data available at time resolution of actual data collection (e.g. 15-minute)

Long-Term Daily Flow Statistics Little Pee Dee River, SC

STATION 02135000, LITTLE PEE DEE RIVER AT GALLIVANTS FERRY, SC
US GEOLOGICAL SURVEY PROVISIONAL DATA - SUBJECT TO CHANGE
UNREGULATED FLOW
DRAINAGE AREA = 2,790 SQUARE MILES
YEAR=1999 NUMBER OF YEARS=57.8 DATE OF PLOT=10/01/99 7Q10=310.0

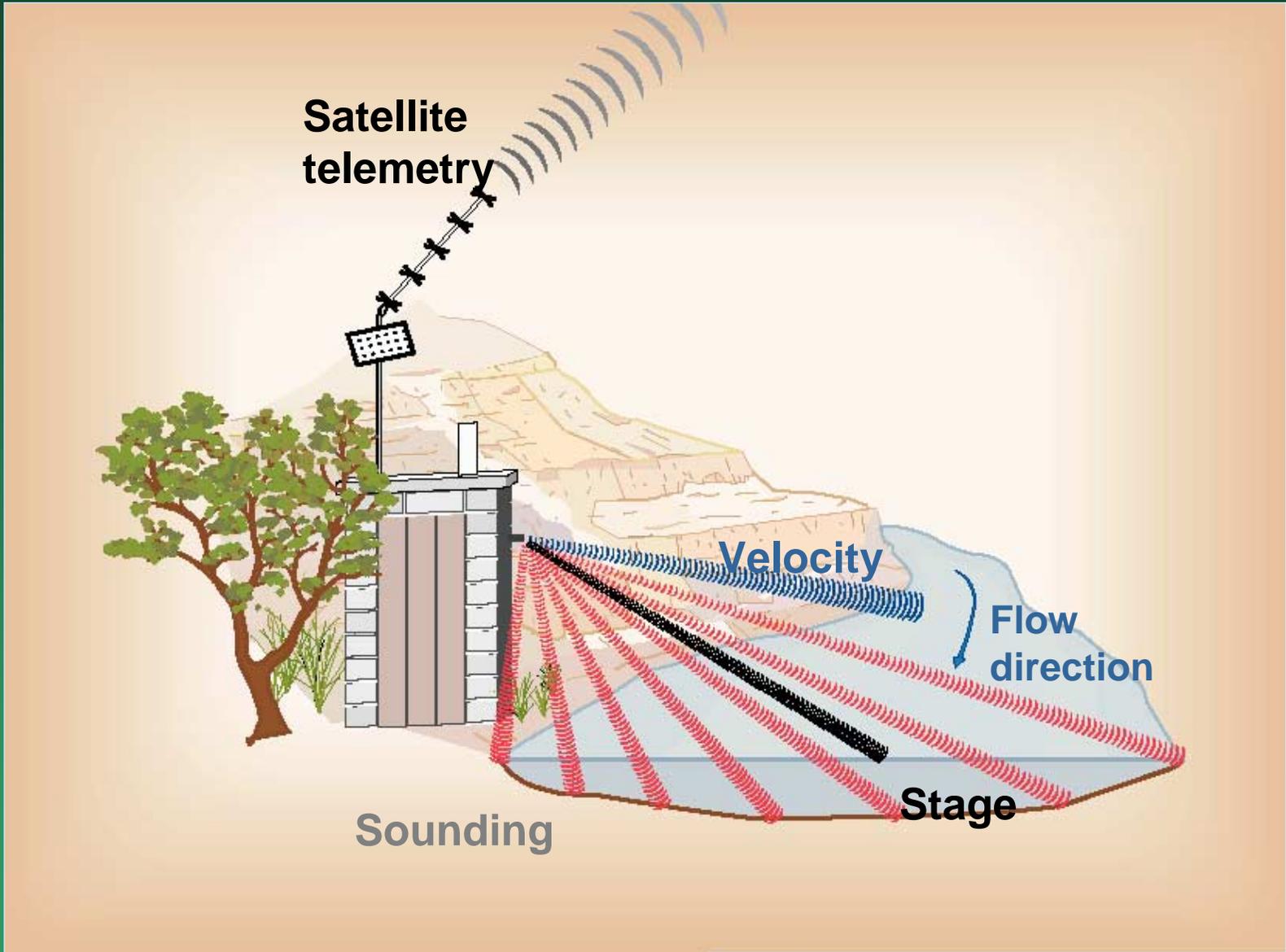


Mean daily flow in relation to Q_{5-95} , Q_{25-75} , and Q_{50} .

#5 Research & Development

- Non-contact streamflow measurement
- Improve use of acoustic methods
- Improve methods for characterizing uncertainty
- Make streamflow calculation process more effective: more use of models and graphics

#5 - Methods Development and Research



NSIP Composed of Two Networks

- **Federal Network**

- Streamgages needed to meet the 5 Federal Goals, funded entirely by the USGS

- **Cooperative Network**

- Streamgages needed to meet other Federal needs and State and local needs, funded by other Federal, State, and local agencies and the USGS Cooperative program

Five Federal Interests To Be Met By the NSIP Federal Network

- Interstate and International Waters
- Flood Forecasts
- River Basin Outflows
- Sentinel Watersheds
- Water Quality

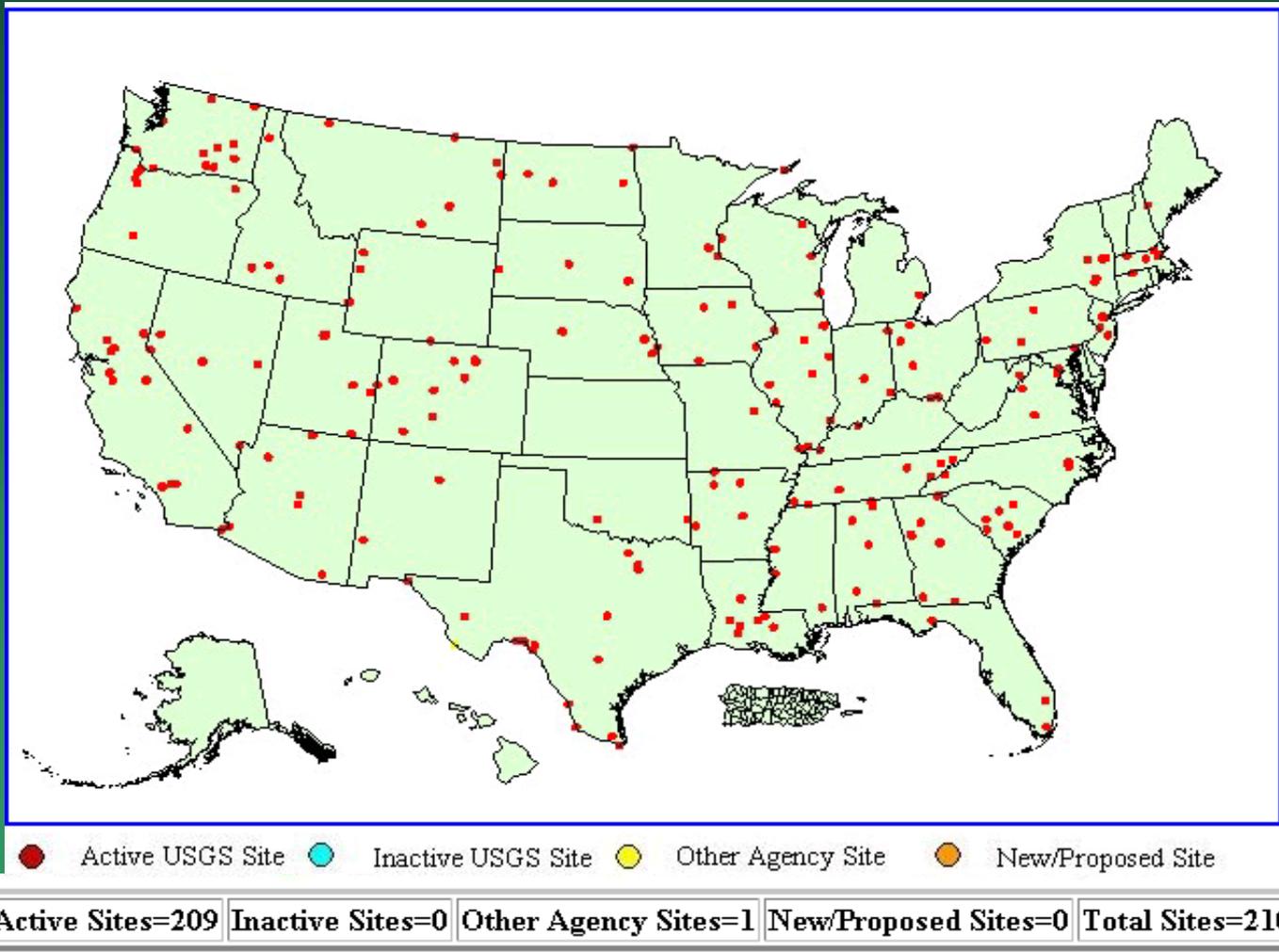
Goal 1 – Supporting National Water Quality Networks

Water-quality data with associated streamflow information is more valuable because fluxes can be determined.

Metric

Operate a streamgage at or near each site in USGS water-quality monitoring networks: Hydrologic Benchmark, NASQAN, and NAWQA Low-Intensity Phase.

NSIP Water Quality Streamgaging Stations



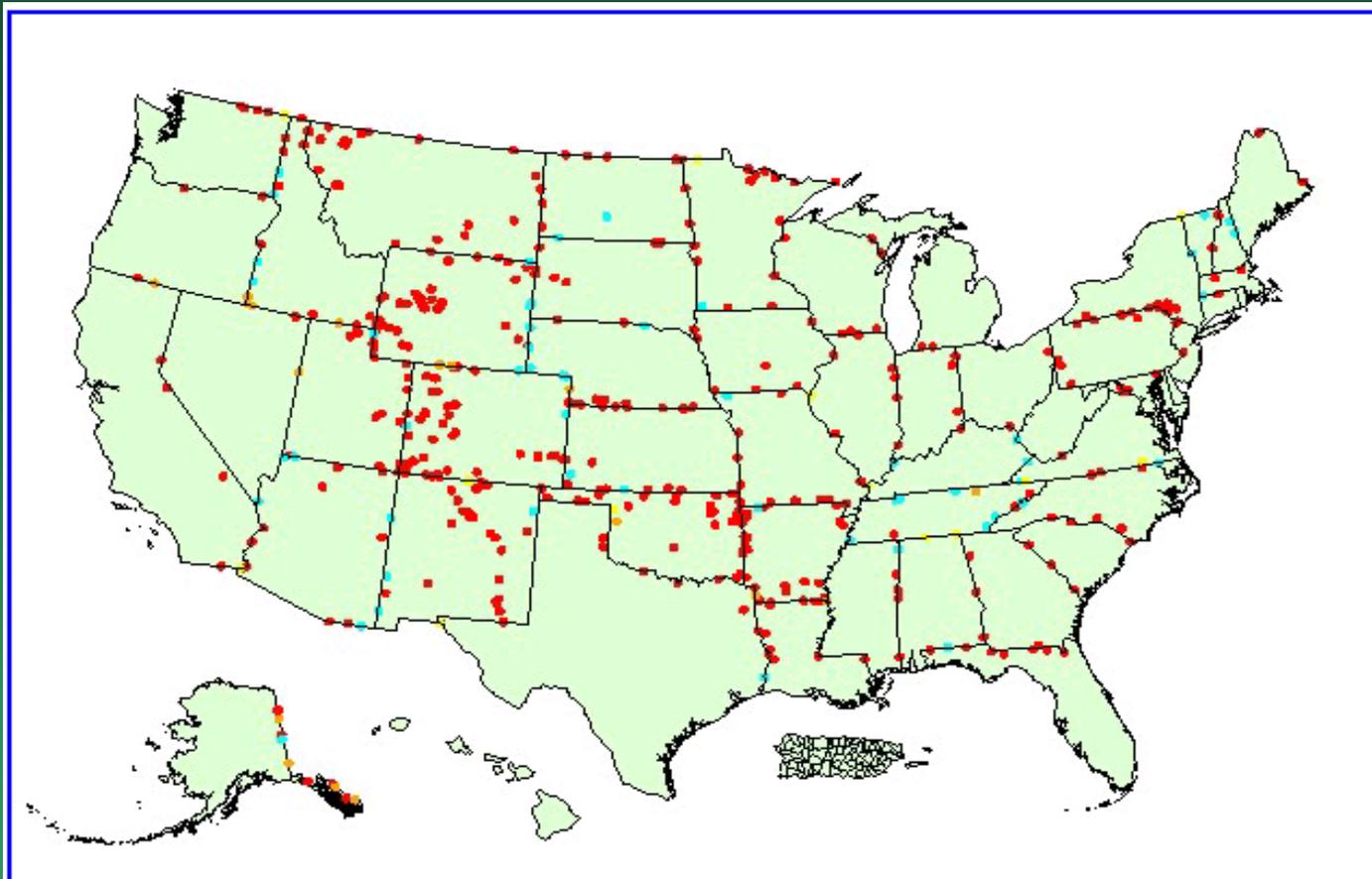
Goal 2 -- Streamflow Information for Borders and Compacts

Information on streamflow crossing State and International borders is used for many water rights activities. Treaties and compacts establish measuring points for water distribution and allocation.

Metric

Operate a streamgage on the RF1 reach mandated in all compacts and decrees, and on all rivers with drainage areas greater than 500 sq. mi. at State and International boundaries.

NSIP Compact/Border Streamgaging Stations



● Active USGS Site ● Inactive USGS Site ● Other Agency Site ● New/Proposed Site

Active Sites=413 Inactive Sites=61 Other Agency Sites=15 New/Proposed Sites=17 Total Sites=506

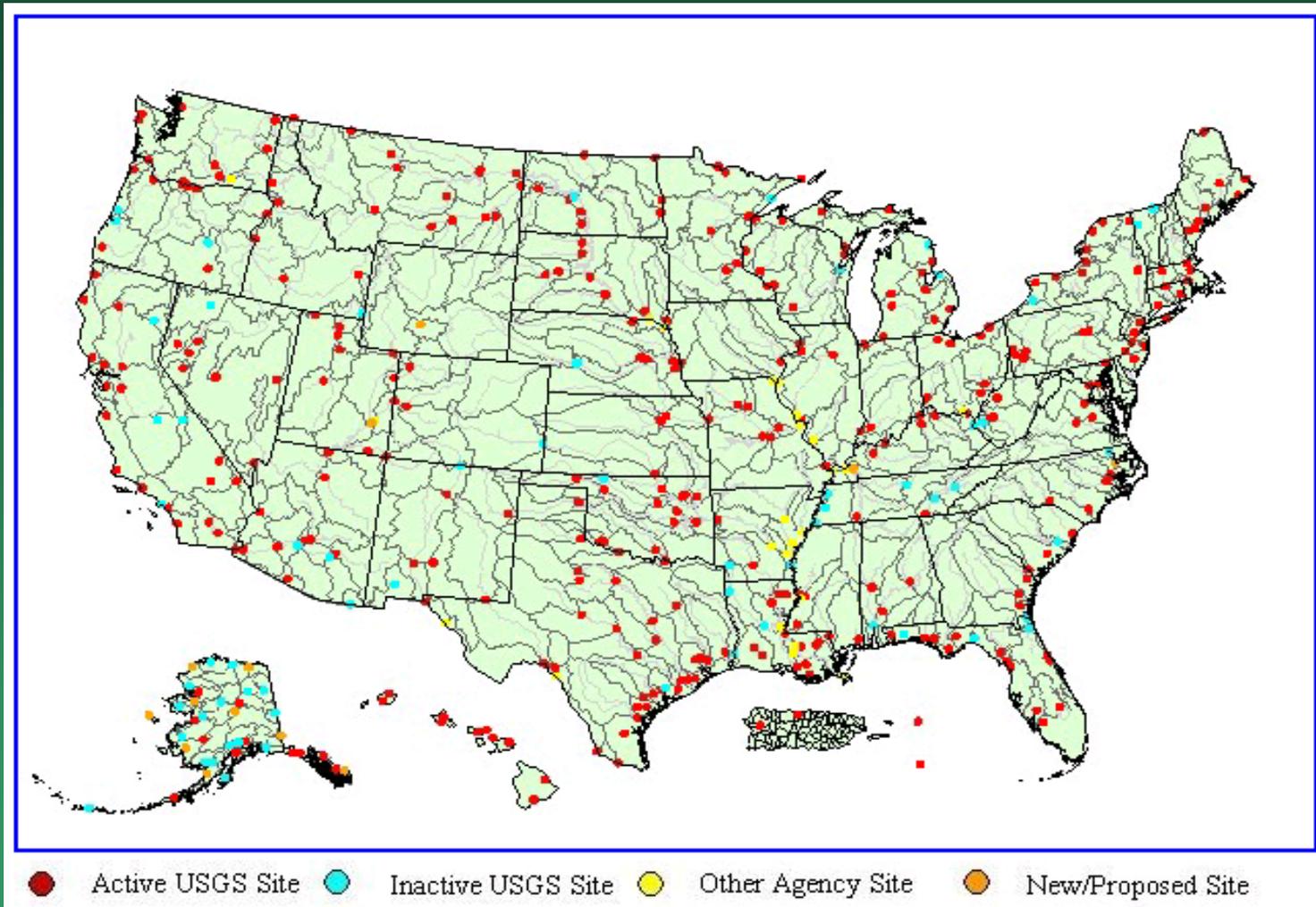
Goal 3 -- Quantifying flow from Major River Basins

Outflows from the 335 major river basins are important to understanding water yield and flux to the ocean, estuaries, and Great Lakes.

Metric

Operate 1 or 2 stations that provide representative streamflow data for at least 50 percent of the drainage area of each hydrologic accounting unit (6-digit HUC).

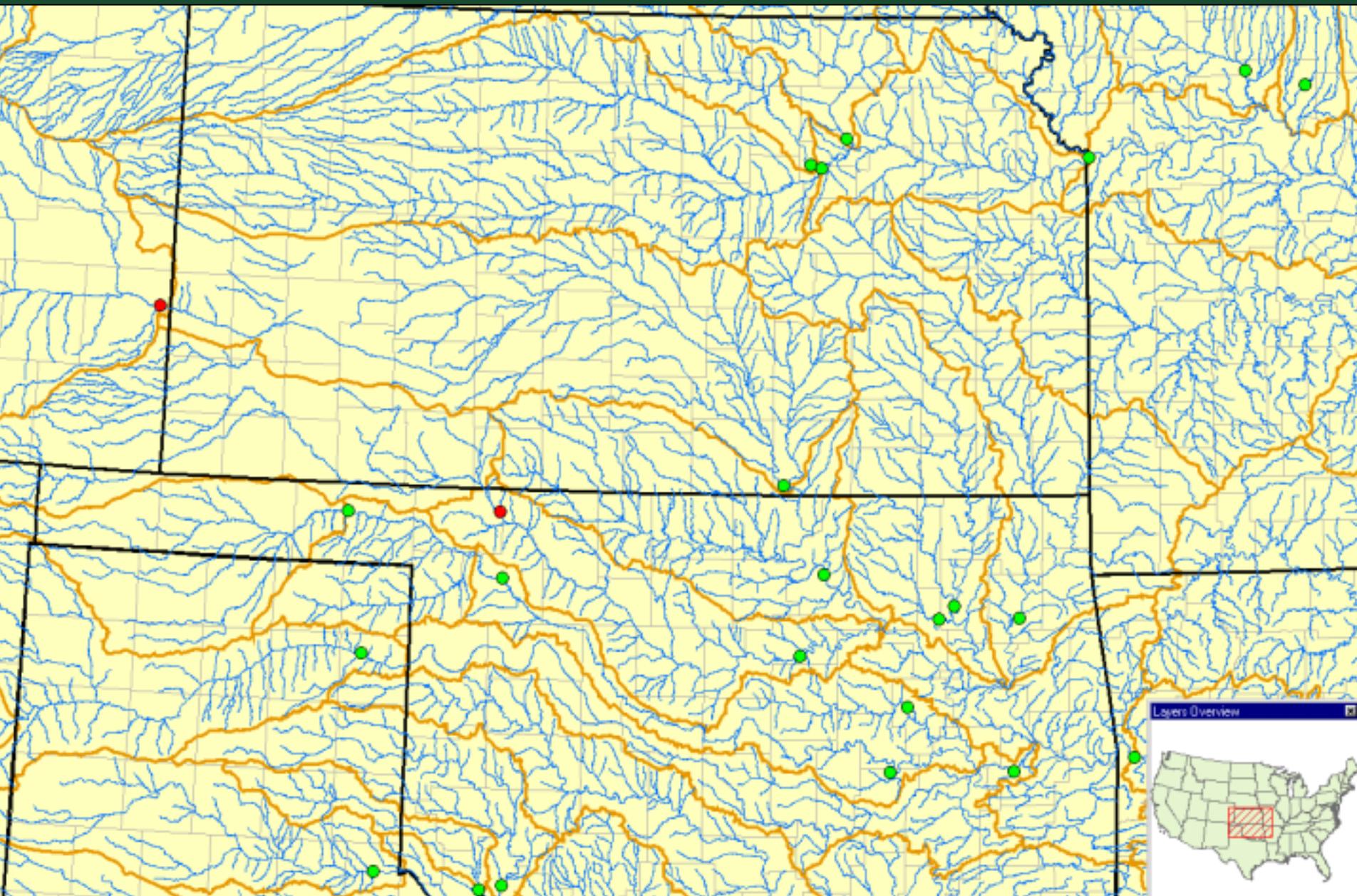
NSIP Key River Basin Streamgaging Stations



Active Sites=342 Inactive Sites=66 Other Agency Sites=24 New/Proposed Sites=13 Total Sites=445

NSIP Key River Basin Sites - ● Active ● Inactive ● Other Agency ● Proposed

Major Basins outlined in orange



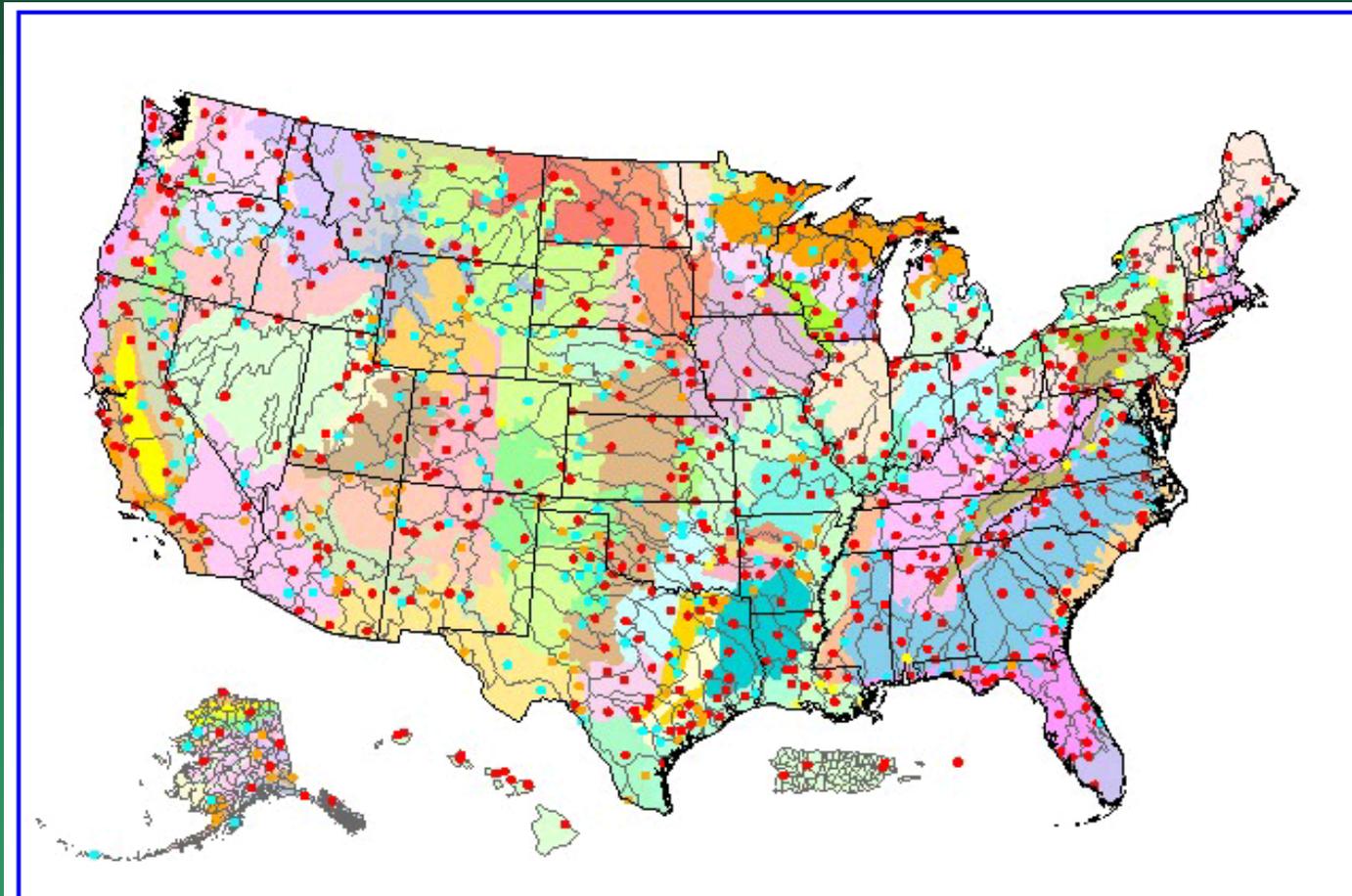
Goal 4 -- Estimating Regional Trends in Streamflow Characteristics

Streamgages with long-term record, unaffected by regulation or diversion, are necessary to evaluate impacts of changing climate and land use.

Metric

Provide streamflow data for “Sentinel Watersheds” that typify regional natural streamflow conditions by operating a streamgage in each area of 100 sq. mi. or greater formed by the intersection of hydrologic accounting units and Ecological Regions. At least 80% of the basin is within the ecoregion.

NSIP Sentinel Watershed Streamgaging Stations

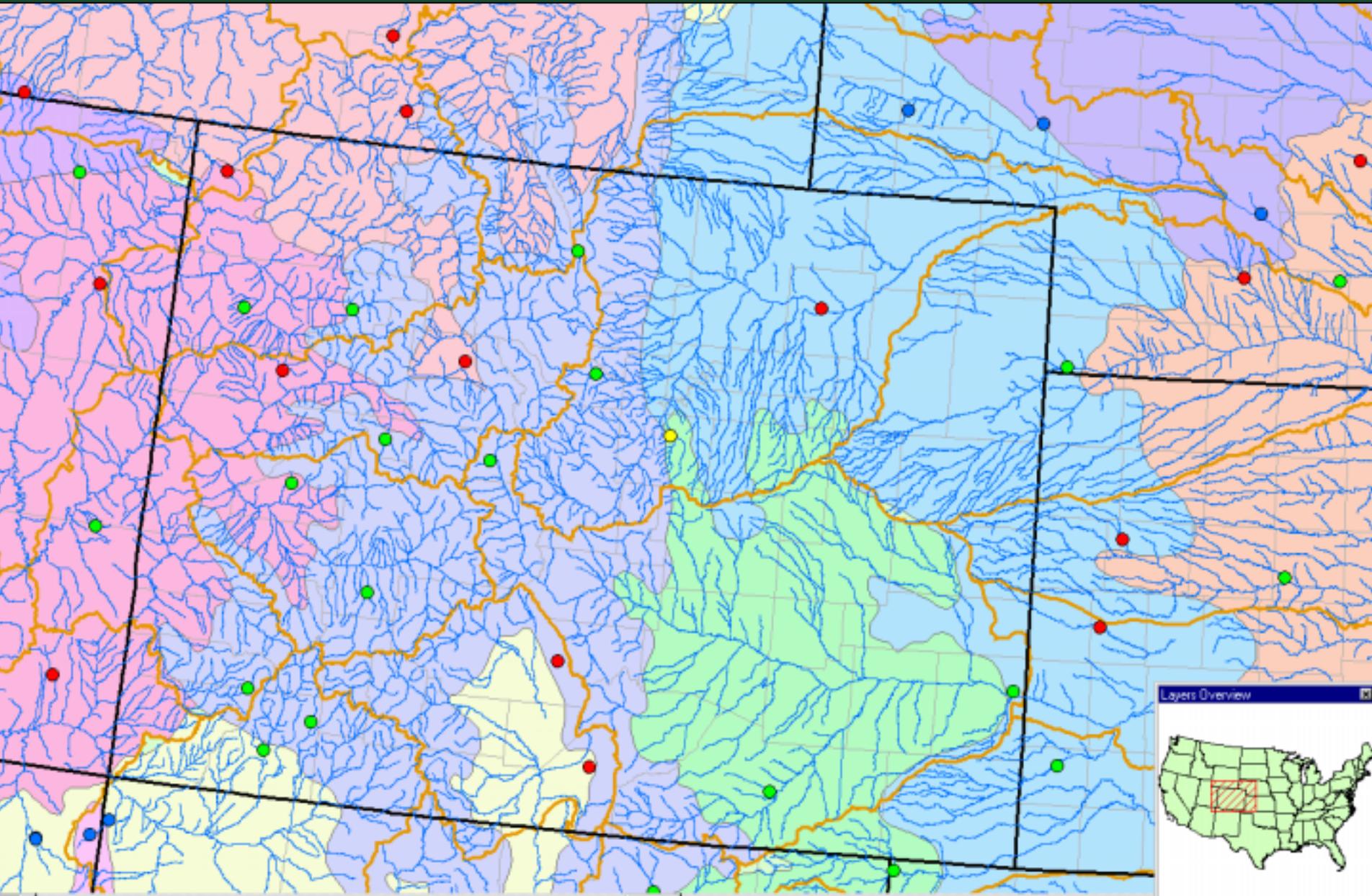


● Active USGS Site ● Inactive USGS Site ● Other Agency Site ● New/Proposed Site

Active Sites=527 Inactive Sites=208 Other Agency Sites=16 New/Proposed Sites=77 Total Sites=828

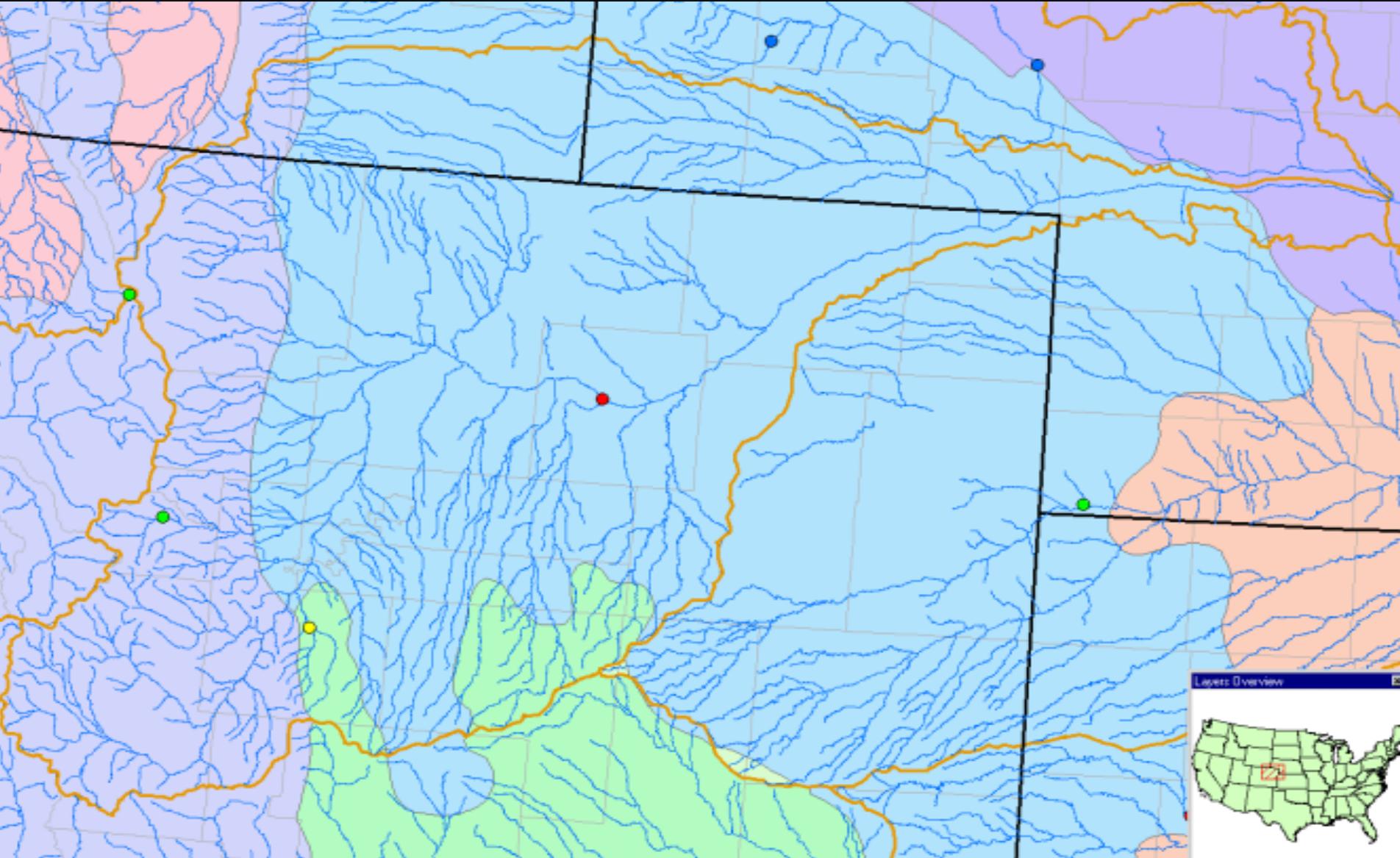
NSIP Sentinel Sites - ● Active ● Inactive ● Other Agency ● Proposed

Ecoregions (colored) and Major River Basins (outlined in orange)



NSIP Sentinel Sites - ● Active ● Inactive ● Other Agency ● Proposed

Ecoregions (colored) and Major River Basins (outlined in orange)



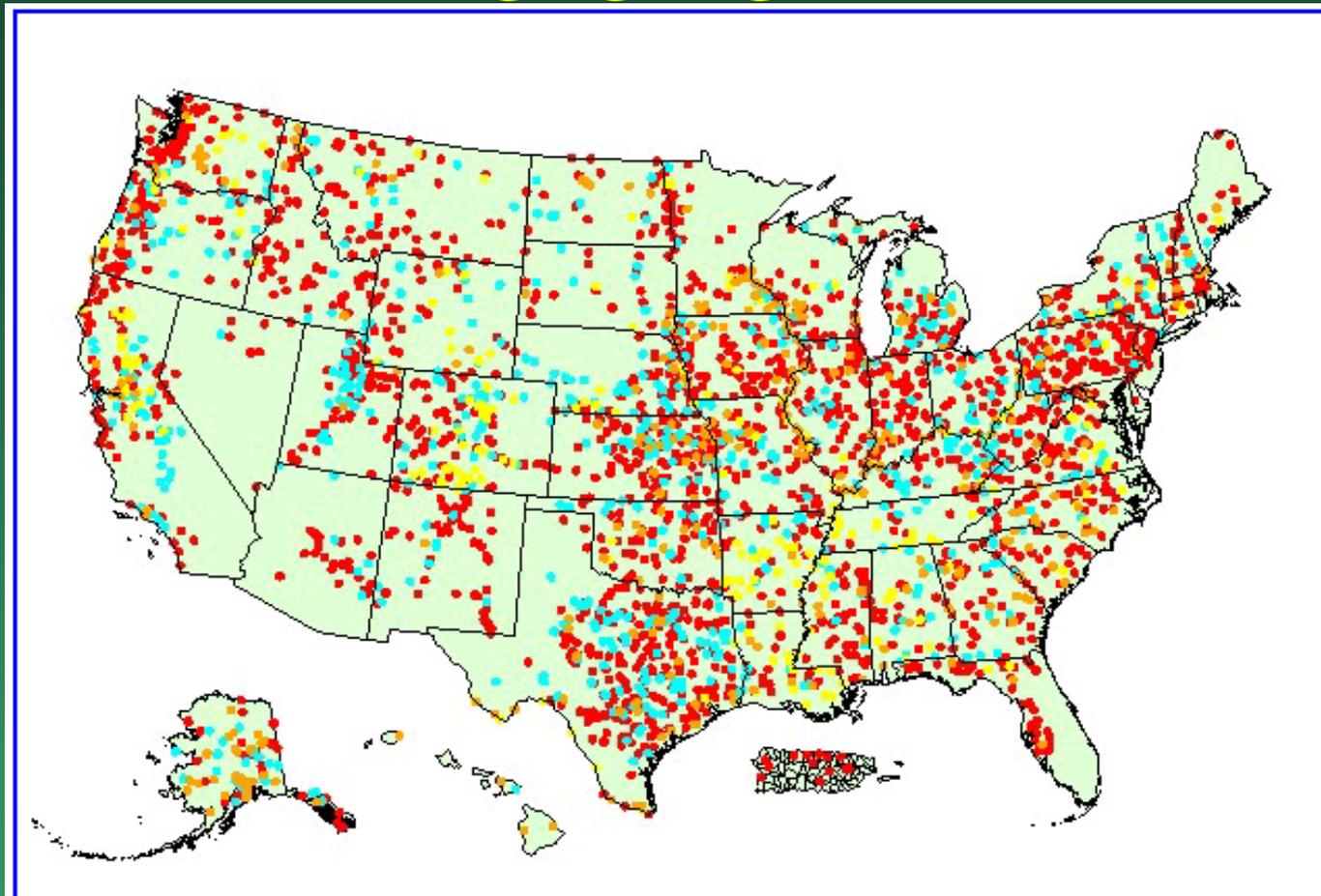
Goal 5 -- Supporting Flood Forecasting and Warning

Streamflow data are used to develop and calibrate forecasting models and make flood forecasts for rivers and streams across the nation.

Metric

Operate a streamgage at or near each National Weather Service forecast site.

NSIP Flood Forecasting Streamgaging Stations



● Active USGS Site ● Inactive USGS Site ● Other Agency Site ● New/Proposed Site

Active Sites=1981 Inactive Sites=610 Other Agency Sites=234 New/Proposed Sites=339 Total Sites=3164

Federal Network

Preliminary Design: January 2001

Federal Interest Goals	Total number of streamgages required	New streamgages needed	Reactivated streamgages needed	Other agency streamgages requiring upgrades
Interstate and International Waters	506	17	61	15
Flood Forecasts	3,164	339	610	234
River Basin Outflows	445	13	66	24
Sentinel Watersheds	828	77	208	16
Water-Quality	210	0	0	1
Sum	5,153	446	945	290
Total Needed	4,299	439	876	278

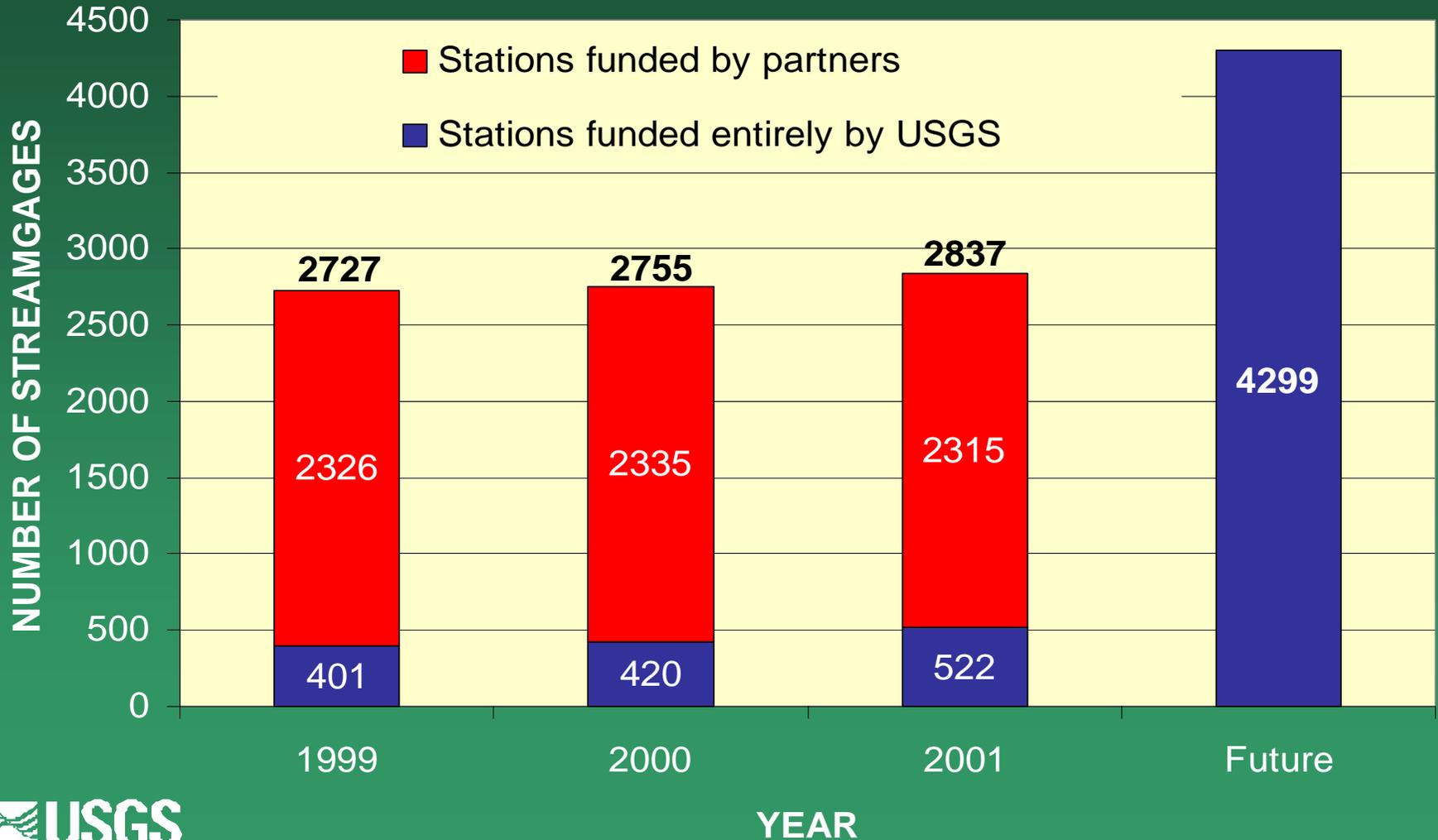
ACWI National Cooperative Goals

- **Base flood discharges for National Flood Insurance Program**
- **Flow monitoring at tribal boundaries**
- **Flow monitoring for major NPDES permits**
- **Flow information for stream recreation**
- **Flow monitoring of rivers draining Federal lands**
- **Flow monitoring of rivers with major diversions**
- **Monitoring of reservoir inflows and outflows**
- **Flow information of coastal rivers supporting migratory fish**
- **Flow information for rivers with commercial navigation**

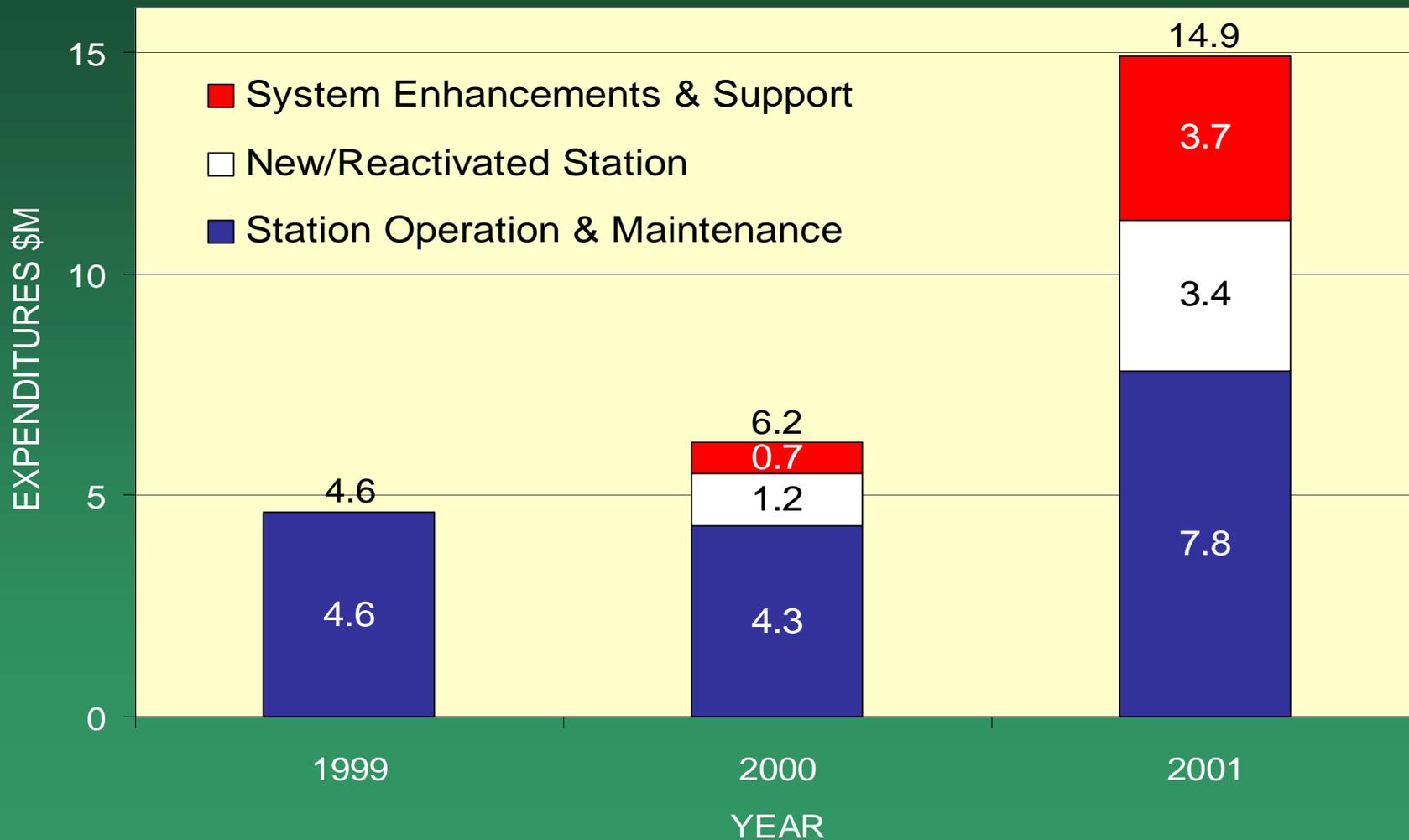
Progress Towards NSIP in FY2000 and FY2001

- 37 new streamgages;
- 73 reactivated streamgages;
- 127 streamgages with upgraded equipment;
- 15 flood-hardened streamgages;
- 40 streamgages with extended rating curves;
- ~ 100 existing streamgages with full USGS funding.

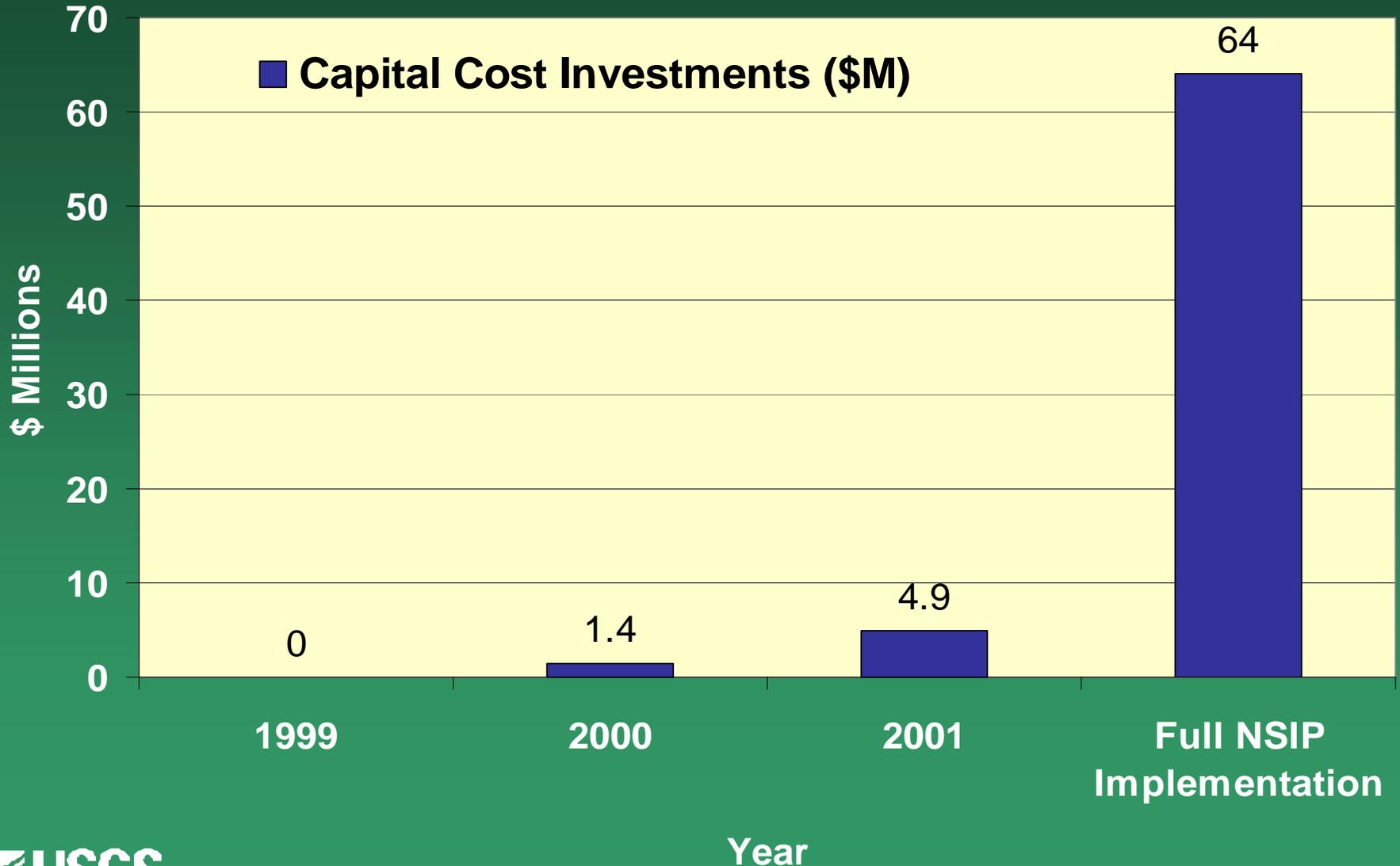
Active Federal Network Stations



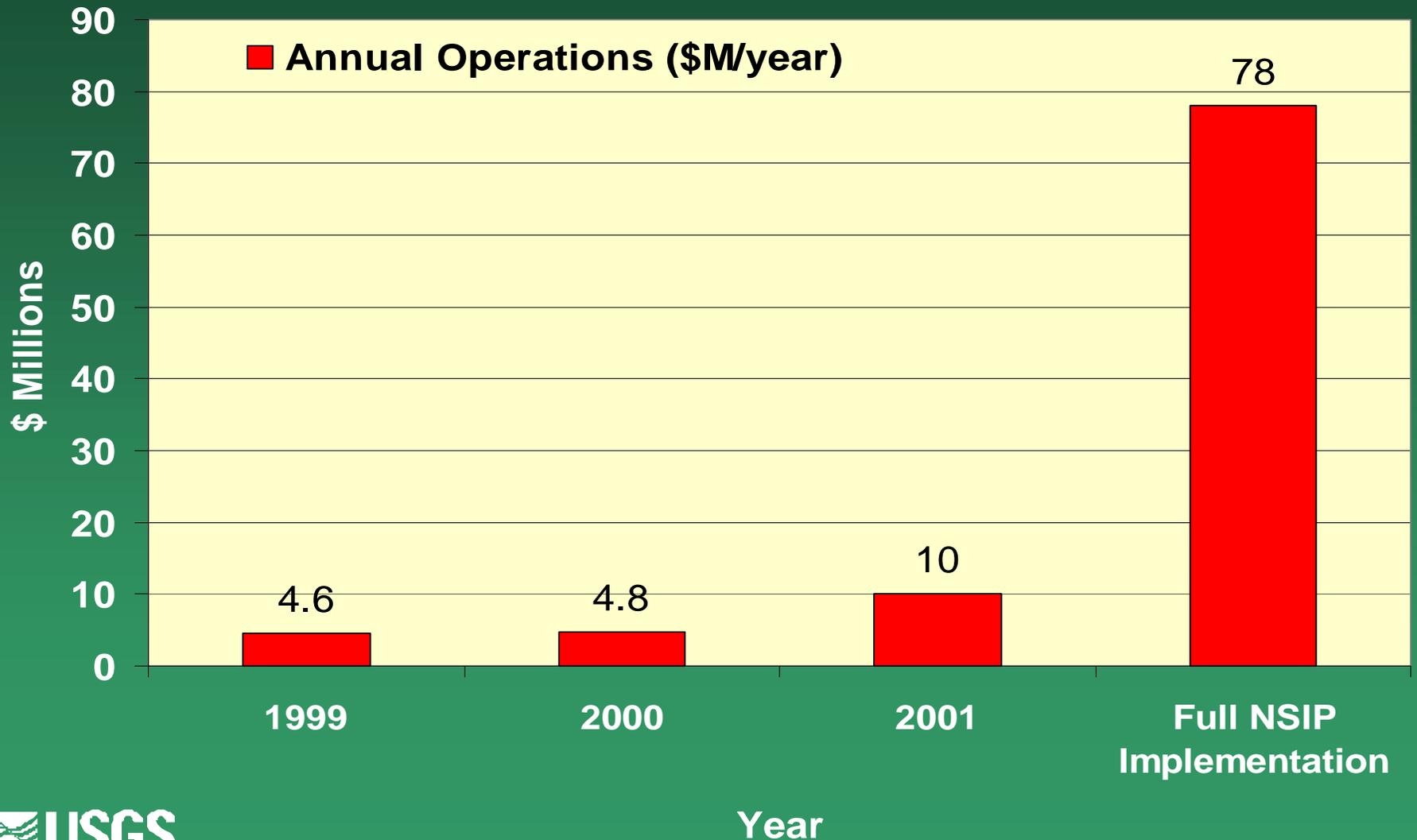
NSIP Funding



NSIP Funding: Capital



NSIP Funding: Operations



Where To Invest Future Federal Funding Increases?

- Initiate and support new or reactivated streamgages in the NSIP Federal Network
- Provide USGS Federal funding for more stations in the NSIP Federal Network
- Cover more of the infrastructure costs for all streamgages with USGS Federal funds

Partnerships Will Be Essential to Meet the Goals of NSIP



US Army Corps
of Engineers ®



State
Highway
Departments



State Natural
Resource
Agencies

