Ecosystems and Water Mission Areas

NWC Annual Meeting
September 18-20, 2024

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

USGS Interdisciplinary Science

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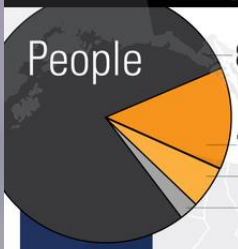
USGS by the Numbers

People



- **8,190** Employees
- **1,356** Contractors
- **564** Emeriti
- **257** Volunteers

Science and Monitoring

- **165,000+** Publications (since 1879)
- **54,000** 7.5-minute Quadrangles (Topographic Maps)
- **200** Threatened/Endangered Species Studied
- **25** Active Patents (85 since 1996)
- **1** Research Reactor
- **~20,000** USGS-operated Groundwater Wells in U.S. to Deliver and Monitor Water Levels and Water-quality Data
- **11,500+** USGS-operated Streamgages
- **3,800+** USGS-operated Earthquake Sensors in U.S.
- **~70** U.S. Volcanoes Directly Monitored of 161 Considered Active
- **14** Geomagnetic Observatories
- **3** Satellites
- **150M** Remotely-sensed Data Products Distributed (including Landsat)
- **100%** Interferometric Synthetic Aperture Radar (IfSAR) Data Collected in Alaska
- **94.7%** National Coverage of 3DEP High-resolution Elevation Data
- **55%+** U.S. Coverage of Geologic Maps (Detailed to Intermediate Scale)
- **171** Geologic Provinces USGS Assesses for Undiscovered Oil and Gas Resources
- **~100** Mineral Commodities for which USGS Collects National Data for 180 Countries

Locations

405 Facilities

In all 50 states and 2 territories (Guam and Puerto Rico)

487 Laboratories

68 Science Centers *(7 Regions)*

22 Programs *(5 Mission Areas)*

10 Climate Adaptation Science Centers

1 National - 9 Regional

Partnerships

4,300 Partners/Cooperators

4,675 Contracts (FY21)

43 Cooperative Research Units

54 Water Resources Research Institutes

Funding

- **$1,578M** FY25 President's Budget Request
- **$646M** FY23 Reimbursables
- **$69.0M** FY25 Bipartisan Infrastructure Law

Feb 2024

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USGS Science Supports:

- Sustainable management of natural resources
- Adaptation and mitigation
- Collaborative assessment and prediction of water resource availability
- Risk management and restoration
- Integration of human dimensions into land and water multi-use management decisions
- Forecasting and responding to extreme events
- Restoration of the function of iconic landsca

OBSERVE - UNDERSTAND - PREDICT - DELIVER

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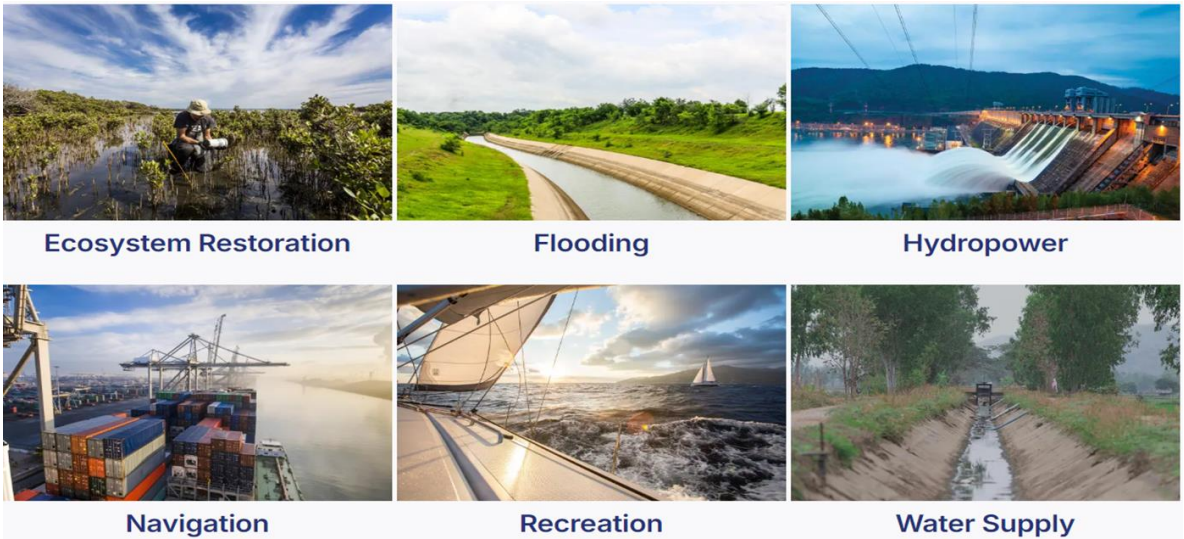
Alignment with NWC members

USGS Science Supports Waterways Key Issue Areas:



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USGS Flood Science and Innovation

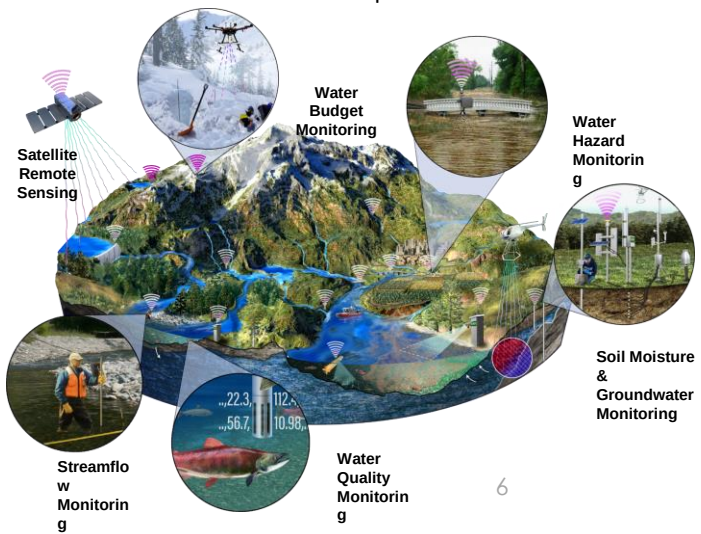
Goals of the Next Generation Water Observing System (NGWOS):

1) **Provide increased spatial and temporal resolution real-time water data** to support improved regional and National modern water prediction (ie floods) and assessments.

2) Provide an **innovation incubator** for new water observing methods and instrumentation development. Transition to our National observing network operations

Approach:

- **Filling of monitoring 'gaps'** in space and time;
- Improved **integration of multi-platform remote sensing** and in-situ data;
- **Technology transition** through need-driven R&D and testbeds;
- **Modernized and timely data delivery and storage** including non-standard or "fit-for-purpose" data.



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Reducing Flood Impacts

- Nearly 12,000 real-time streamgages providing critical information for flood-related planning, infrastructure design, prediction and response
- Nature-based solutions and ecosystem restoration
  - Wetland restoration
  - Riparian buffer enhancement
  - Floodplain reconnection
  - Fish and aquatic species habitat restoration
  - Green infrastructure
  - Ecosystem services assessments

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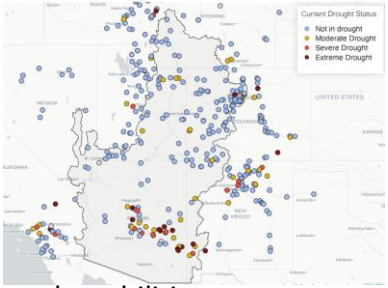
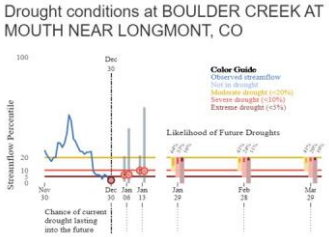
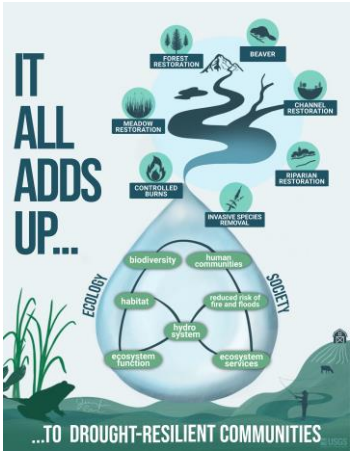
Drought Science





- **Data Collection and Integration**
- **Communicating Drought Risk**
  - Develop integrated models that allow a user to prioritize socioeconomic and ecological risk factors and identify where vulnerabilities are exacerbated by drought.
- **Drought Planning and Capacity Building**
  - Apply data-driven national models to predict the onset, duration, and severity of streamflow drought up to 3 months in advance
  - Innovate by adding new capabilities, such as predicting groundwater drought
  - Provide future drought trends and drivers, in addition to characterizing past hydrologic droughts.
- **Watershed Restoration**



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USGS Strategic PFAS Research Activities

- **Methods Development**
  - Developing field and laboratory methods to identify and quantify PFAS presence and concentrations in water, soils, sediment, passive sampler extracts, and animal tissue (e.g. fish plasma)
- **Understanding Occurrence**
  - National sampling to determine the concentration of PFAS in estuaries, lakes, streams, springs, wells, wetlands, rivers, aquifers, and soil.
  - Survey for ecological exposure to PFAS, with a priority in determining direct human exposure through drinking water.
  - Mapping of spatial associations between potential PFAS sources and drinking water sources.
  - Ecological exposure and bioaccumulation studies.

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USGS Harmful Algal Bloom and Toxins Science

- Developing field and laboratory methods to identify and quantify harmful algal blooms and associated toxins.
- Understanding occurrence, causal factors, environmental fate and transport, ecological processes, and effects of environmental exposure.
- Developing tools to help predict occurrence and inform management decisions.

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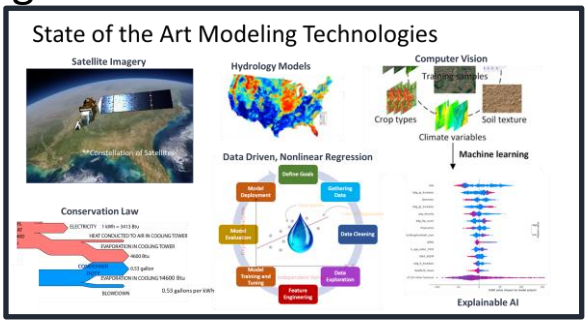
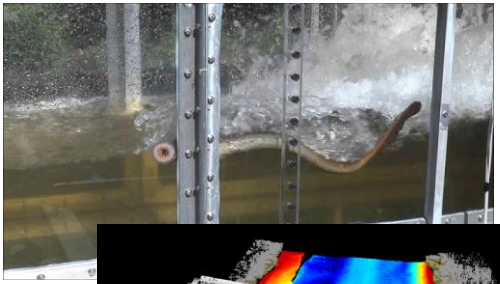
USGS Water Use Modeling – developing advanced approaches for higher resolution datasets in support of water supply management

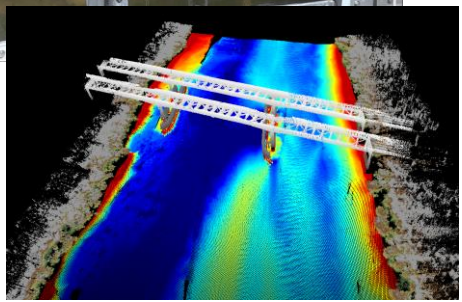


Water-use category	Water use variable	temporal resolution	spatial resolution	Data range	Sciencebase Link
Public supply	withdrawals	monthly	12-digit hydrologic unit code level and water service area boundary	2000-2020	https://doi.org/10.5066/P9FUL880
Public supply	consumptive use	monthly	12-digit hydrologic unit code level and water service area boundary	2009-2020	https://doi.org/10.5066/P9FUL880
Irrigation	withdrawals	monthly	12-digit hydrologic unit code level	2000-2020	https://doi.org/10.5066/P9LGISUM
Irrigation	consumptive use	monthly	12-digit hydrologic unit code level	2000-2020	https://doi.org/10.5066/P9YWR0OJ
Thermoelectric	withdrawals	monthly	power plant	2008-2020	https://doi.org/10.5066/P9ZE2FVM
Thermoelectric	consumptive use	monthly	power plant	2008-2020	https://doi.org/10.5066/P9ZE2FVM

USGS Science and Hydropower Innovation

- **Hydropower Challenges:**
  - Barriers to fish migration (native and invasive).
  - Altered upstream and downstream ecosystems due to flow regime changes.
  - Aging infrastructure requiring critical upgrades.
  - Biofouling
- **USGS Contributions:**
  - **Streamflow and water-quality monitoring**
  - **Interdisciplinary Expertise:** USGS hydrologists, engineers, and fish biologists collaborate to understand and mitigate the environmental impacts of dams.
  - **Innovative Solutions:** Science for designing the next generation of hydropower dams.
  - **Ecosystem Management:** Data to balance energy production with the preservation of aquatic ecosystems





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USGS Ecosystem Restoration Science

USGS's Role:

- USGS science plays a crucial role in addressing ecosystem restoration in watersheds across the nation.
- By providing critical data and insights, USGS supports decision-makers in maintaining and restoring healthy ecosystems.

USGS's Role:
Thin-layer sediment addition to an existing salt marsh to combat sea-level rise and improve endangered species habitat in California, USA

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Working with USGS

Joint Funding Agreement (JFA)

USGS uses Joint Funding Agreements (JFAs) to collaborate with various non-federal partners, such as state, local, and tribal governments, as well as private organizations. These agreements help share the costs of work like streamgaging, water quality monitoring, and other scientific research

Cooperative Research and Development Agreement (CRADA)

A CRADA allows Federal and non-Federal parties to share services, equipment, or other resources to accomplish a mutually beneficial research and development project. Under a CRADA, the partner can provide funds to the USGS, but the USGS cannot provide funds to the partner. Parties may codevelop new intellectual property through a CRADA. Projects should have a mission value to the USGS and commercial potential for the partner.

License Agreement (LA)

An LA is a contract that authorizes one party to use solely or jointly developed Government technology (patents) or other intellectual property in some commercial undertaking. An LA is a long-term contractual agreement that allows the USGS (licensor) to give exclusive or nonexclusive use rights to the user (licensee) in exchange for express commitments to develop the technology, make annual and royalty payments based upon a negotiated formula, undertake patent defense in the case of infringement, and, finally, insulate the Government from liability for the technology's use in any licensee product.

Material Transfer Agreement (MTA)

An MTA allows parties to exchange a quantity of a unique material (natural or synthetic) for research purposes only. An MTA does not transfer title to the material, and at the conclusion of time-limited use, the material is either returned or destroyed.

Facility Use/Service Agreement (FUSA)

A FUSA allows a non-USGS party to use unique USGS laboratory facilities, equipment, or capabilities that are not available from the private sector.

Military Interdepartmental Purchase Request (MIPR)

USGS uses Military Interdepartmental Purchase Requests (MIPRs) to accept funding from DoD to conduct work like streamgaging, water quality monitoring, and other scientific research.

Collaborative Agreement (CA)

A CA is similar to a TAA, except that a CA does not allow for the development of intellectual property and requires that all generated data be placed into the public domain.

Technical Assistance Agreement (TAA)

A TAA allows a Government laboratory and its researchers to provide focused technical or research efforts to a non-Federal party with or without reimbursement. Typically, the development of intellectual property is not anticipated. A TAA requires that the project have a mission value to the USGS and some technical or commercial significance for the partner. A TAA can also be collaborative, with both parties providing technical or scientific expertise to accomplish a mutual objective.

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More Info:

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