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Colorado River Basin Actionable and Strategic Integrated Science and Technology (ASIST)

The Colorado River Basin Actionable and Strategic Integrated Science and Technology project is accelerating interdisciplinary science and application of advanced information management technology for complex stakeholder driven challenges.

Proof of Concept

The U.S. Geological Survey (USGS) is initiating a study approach focused on building cross-disciplinary connections to weave together the scientific knowledge related to drought conditions and effects in the Colorado River Basin (fig. 1). The basin is experiencing the worst drought in recorded history, posing unprecedented new challenges in the basin and in areas relying on water from the basin. Science is continually advancing, and there is an increasing need to interpret the connections between studies to predict the effects of drought and other changes affecting the Earth system.

The USGS primarily works in independent disciplines and science centers to provide cutting-edge science to advance research and science applications worldwide. The complexity and volume of research that has been conducted related to drought in the Colorado River Basin is difficult to quantify. To complicate matters, studies, models, and datasets are cataloged and may be available in multiple, unrelated locations, across various internal systems, data repositories, and local offices. Furthermore, there are limited interactions and interfaces between scientists and partners working in different science disciplines; in many cases, individual science products require stakeholders to integrate complex interdisciplinary data across geographical and topical extents. The diverse array of interdisciplinary science and science products produced by the USGS highlights the need for a wide ranging collaborative support structure.

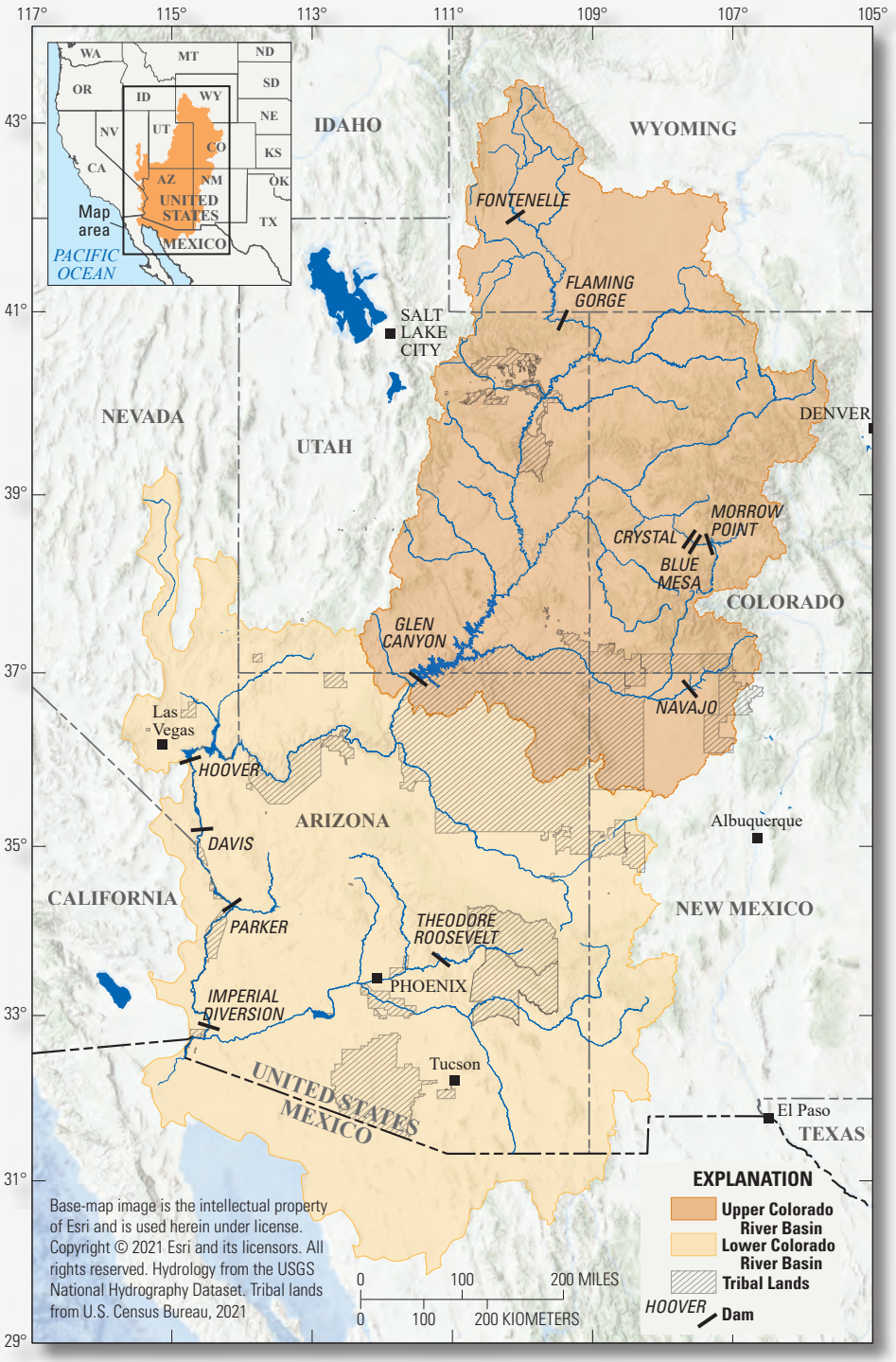

Figure 1. Colorado River Basin Actionable and Strategic Integrated Science and Technology (ASIST) project map. The major water resources of the Colorado River Basin are shown in blue.

Project Objective

The principal objective of the Colorado River Basin Actionable and Strategic Integrated Science and Technology (ASIST) project is to increase the amount of interdisciplinary science conducted by the USGS in the Colorado River Basin and to evaluate the wide-ranging effects of drought by supporting collaboration between stakeholders, scientists, and technology specialists. The complexity of drought effects on human and natural systems in the Colorado River Basin requires the USGS to use interdisciplinary science to provide the data and tools needed to address multiple cross-cutting stakeholder scientific priorities. This project unifies USGS expertise, capabilities, and stakeholder relationships in the Colorado River Basin through the incorporation of advanced information management technology needed to improve science integration and delivery of actionable information at the speed and scales needed for stakeholder decision making.

Project Coordination

An interdisciplinary team of scientists in the USGS Rocky Mountain Region and Southwest Region is working with a diverse group of projects to implement the capabilities and resources (fig. 2) needed to support interdisciplinary projects in the following stages.

Development—Work with the scientific community to translate ideas for making complex stakeholder driven science challenges into conceptual plans.

Enhance—Expand science across the realm of USGS expertise and create connections with decision makers to support the transition of research results for use in resource-management decisions.

Initiate—Turn interdisciplinary science and technology concepts into reality by working with partners to initiate new projects.

Sustain—Continue support for ongoing interdisciplinary projects with the best available resources and connections.

Accelerate—Accelerate early-stage projects to increase the pace of interdisciplinary science and technology projects.

Grow—Identify new partners, resources, and applications to expand the range and use of science or program products with partners.

Figure 2. Toolbox to support and accelerate diverse interdisciplinary projects.

Focus Areas and Resources

This project is designed to provide dedicated support for individual scientists, groups of scientists, science centers, programs, partners, and stakeholders seeking to expand and codevelop interdisciplinary science and technology projects related to drought in the Colorado River Basin. In 2021, the project developed an interdisciplinary science toolbox (fig. 3) of diverse capabilities and resources, which will continue to evolve to meet project needs.

Examples of Featured Resources

The Colorado River Basin ASIST project has developed resources to accelerate how interdisciplinary science is conducted and has connected scientists with information management technology to provide the actionable science needed to address complex, stakeholder-driven, resource management decisions. The following section provides examples of recent research completed through the project to accelerate interdisciplinary science related to drought in the Colorado River Basin.

"A Snapshot of Stakeholder Science Needs Related to Drought in the Colorado River Basin"—Stakeholder science needs were determined by reviewing more than 200 recently published literature items and web pages from Colorado River Basin stakeholders. These stakeholder communications were used to characterize more than 400 stakeholder science needs by reviewing their priorities, strategies, issues, missions, and concerns related to drought in the Colorado River Basin (Frus and others, 2021).

Engaging Stakeholders to Produce Integrated Science in the Colorado River Basin—Colorado River Basin stakeholders have indicated that integrated science is needed to understand the effects that drought will have on the landscape in the basin. To prepare for future stakeholder engagement activities, the project team developed a stakeholder engagement plan with a conceptual model of different engagement processes. This plan provides an approach to stakeholder engagement for addressing challenges at the large spatial and temporal scales needed to understand drought and to inform a large contingent of diverse stakeholders and interest levels about the causes, effects, and possible adaptation measures to long-term drought in the basin.

"Addressing Stakeholder Science Needs for Integrated Drought Science in the Colorado River Basin"—The USGS has thousands of publications, datasets, and resources freely available to the public, resource managers, and the science community, but accessing and interacting with this large, diverse body of information can be challenging. If you are interested in being involved with the project, the project team is looking for input, involvement, and collaboration with stakeholders in the Colorado River Basin (Tillery and others, 2022). Please reach out to the USGS project team at https://www.usgs.gov/unified-interior-regions/region-7/science/colorado-river-basin-pilot-project-team-members.

"Colorado River Basin Actionable and Strategic Integrated Science and Technology (ASIST)—Information Management Technology Plan"—The Colorado River Basin ASIST project is developing a transformative approach to support integrated science collaborations conducting complex projects that require application of advanced information management technology. The information management technology plan identifies steps to leverage new and existing technologies, data, models, and knowledge to support integrated science projects across the Colorado River Basin (Dahm and others, 2022). Continued advancement of USGS science and services depends on being agile and adopting new technologies as they become available.

"Colorado River Basin Actionable and Strategic Integrated Science and Technology (ASIST)—Science Strategy"—The USGS is evaluating an approach focused on opportunities to build cross-discipline and cross-center connections that bring together expertise from across the organization to address complex Earth-science challenges. This science strategy outlines a whole organization approach for integrated science and technology to answer increasingly complex Earth-systems questions related to long-term drought in the Colorado River Basin (Dahm, and others, 2023).

Figure 3. Colorado River Basin Actionable and Strategic Integrated Science and Technology (ASIST) project toolbox capabilities.

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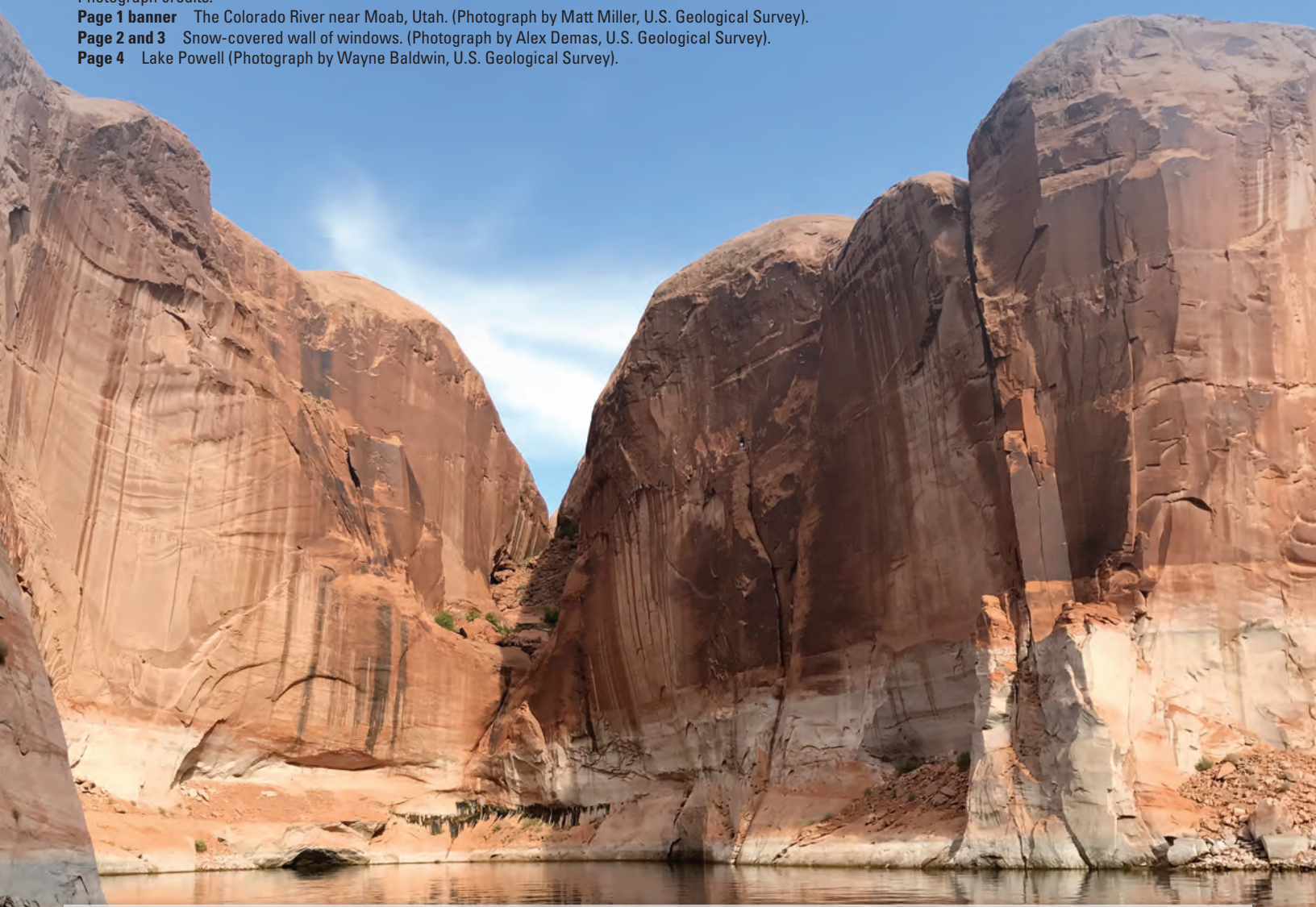

For More Information

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Region 7: Upper Colorado Basin https://go.usa.gov/xFFqY
Region 8: Lower Colorado Basin https://go.usa.gov/xFFqc

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