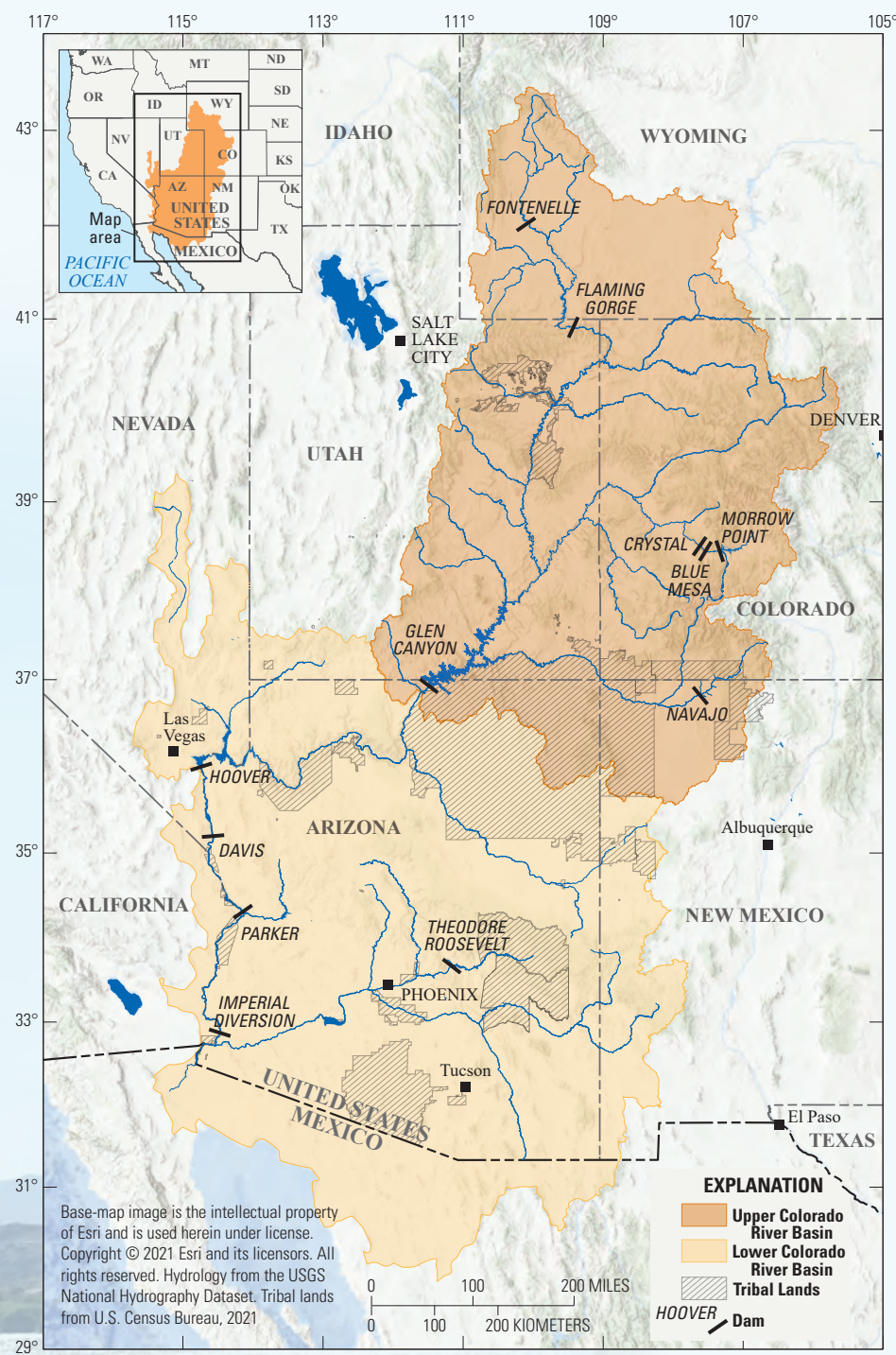


# Addressing Stakeholder Science Needs for Integrated Drought Science in the Colorado River Basin

The Colorado River Basin is experiencing increased demand and competition for natural resources, increased risk from natural hazards, and increased impacts of climate change. Stakeholders in the basin need data, scientific information, and predictions of how the Colorado River Basin will be impacted by drought.

## Vision

The USGS vision is to lead the Nation in 21st century integrated research, assessments, and prediction of natural resources and processes to meet society's needs. To fulfill the vision of integrated science capabilities, the USGS initiated a multiyear project, kicked off by the Rocky Mountain Region Science Exchange in 2020 (Tillery and others, 2022), to evaluate USGS drought science across all disciplines in the Colorado River Basin (fig. 1) and streamline the delivery of science to basin stakeholders. The Colorado River Basin Actionable and Strategic Integrated Science and Technology (ASIST) Pilot Project was formed to demonstrate the effectiveness of addressing complex problems through stakeholder involvement and use of 21st century technology to deliver integrated science. This project aims to deliver services and products at the leading edge of both science and technology to our partners, with greater efficiency and timeliness, and reduced costs and uncertainty.

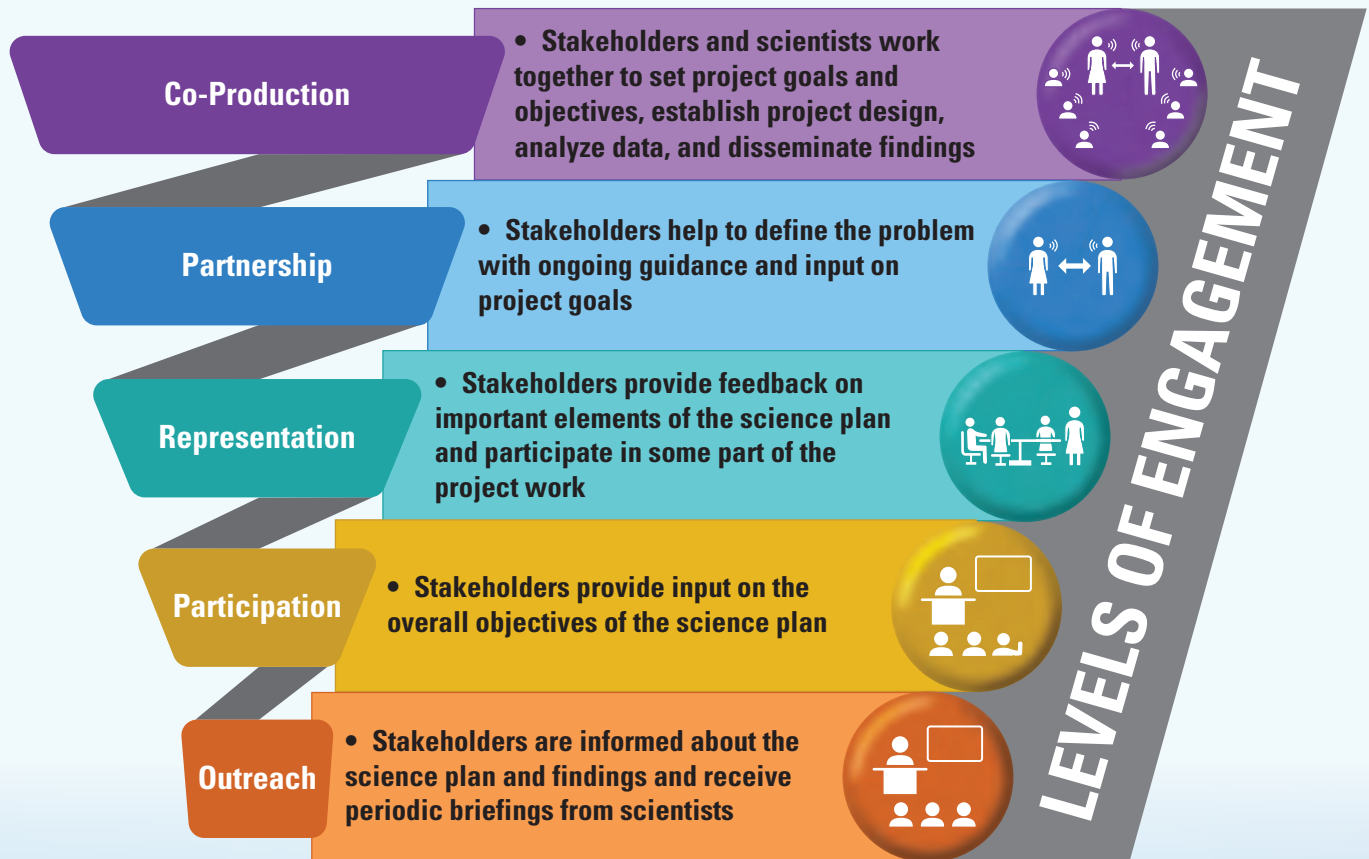


**Figure 1.** The Colorado River Basin is approximately 246,000 square miles and lies within seven states. More than 25 Tribal Nations are located in the basin and more than 50 percent of the land within the basin is federally managed.



## Stakeholder Driven Science

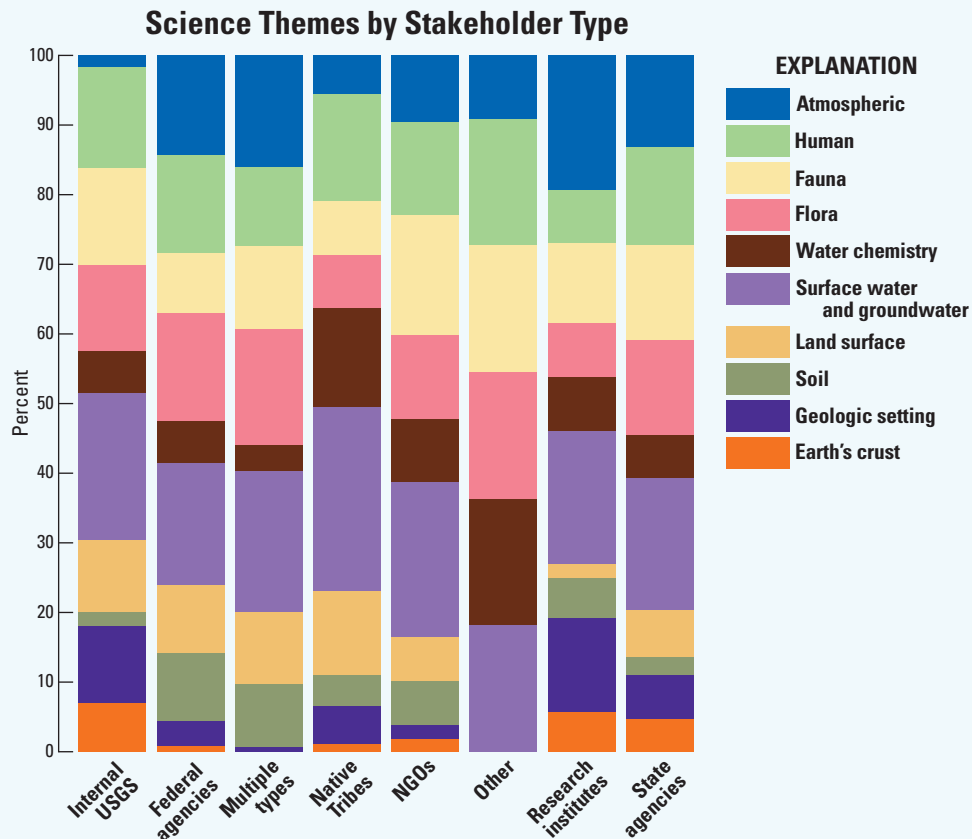
A stakeholder is anyone with a vested interest in a resource or a location (fig. 2). Many stakeholders represent, protect, use, and manage resources in the Colorado River Basin. These stakeholders include land and resource management agencies of Federal, State, Tribal, and local governments. Stakeholders also include nongovernmental organizations that represent groups with specific concerns about the environment, recreation, or economic interests. Such stakeholders include industries that supply materials and services, associations that connect and inform agencies about resources, and research institutes that study features of the basin to help inform management decisions.



**Figure 2.** Continuum of levels of stakeholder engagement. Stakeholders can move seamlessly from lower levels of engagement to higher levels as interest and investment changes.

## Momentum

Since the inception of the ASIST Pilot Project in the Fall of 2020, the project team has worked to bring into reality the ambitious vision of streamlining the delivery of fully integrated science to stakeholders. Early team efforts included a stakeholder needs assessment, summarizing published and known stakeholder science needs related to drought in the Basin. By identifying stakeholders of all types and their science needs (fig. 3; Frus and others, 2021), the project team is better able to prioritize integrated science and design science delivery systems to support better adaptation and management measures for the long-term drought occurring in this basin.



**Figure 3.** Stacked bar chart showing proportion of science needs by stakeholder type (Frus and others, 2021). [NGOs, nongovernmental organizations]

Stakeholder needs will be used to guide long-term strategies and identify avenues for informing stakeholders about science capabilities and products. The project team is working internally through collaboration workshops with USGS subject-matter experts to discuss science delivery to stakeholders focused on the identified integrated science priorities. Additional collaboration workshops are planned that will focus on the 21st Century technology needed to deliver actionable information at the speed needed for timely decision making.

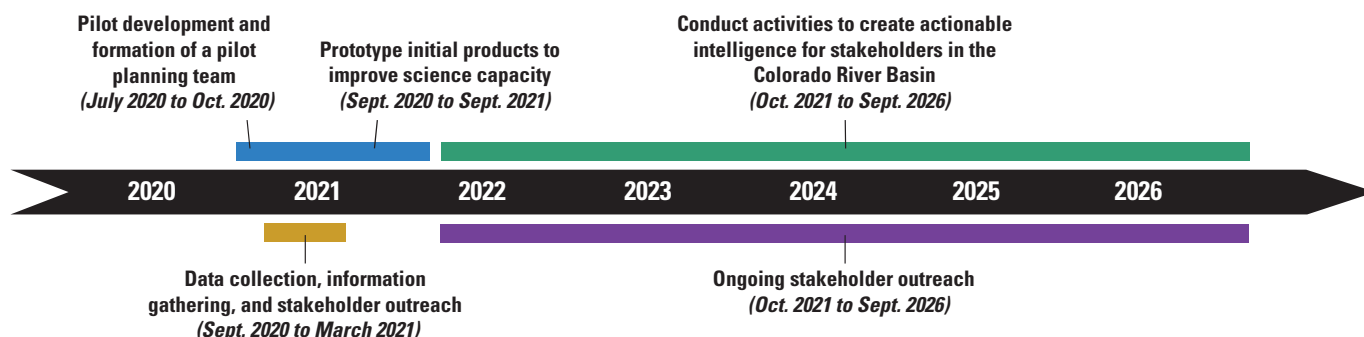
The environmental, technological, and societal trends that will play out over the coming decades, as identified through stakeholder needs assessment and used as topical themes for internal USGS science and technology networking sessions, include:

- Colorado River Basin Drought Prediction, Integrated Predictive Modeling, and Early Warning Indicators;
- Integrated Science to Address Climate Change Impacts to Drought Conditions in the Colorado River Basin;
- Groundwater Dependent Streams, Ecosystems, and Research in the Colorado River Basin;
- Wildfire Risk and Post-Fire Impacts in The Colorado River Basin;
- Impacts of Drought at High Elevations in The Colorado River Basin: Landcover, Forest Health, Snowpack, and others;
- Integrating Ecosystem Responses to Drought and Climate Change in the Colorado River Basin; and
- Impacts of Drought on The Human System and Development in the Colorado River Basin.



The team has identified and supported current science in the Basin by funding ongoing efforts, and is continuing to seek funding opportunities to align science priorities with science needs (fig. 4). The project team is conducting outreach and coordination with stakeholders to meet the current and future science and technology needs in the basin and fulfill the USGS vision of integrated drought science throughout the Basin.

As the USGS works to streamline the approach to share integrated drought science in the Colorado River Basin, the project is looking for input, involvement, and collaboration to ensure we provide science that works for you.



**Figure 4.** Timeline of Colorado River Basin pilot project activities.

## References Cited

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- Tillery, A.C., Anderson, P.J., Andrews, W.J., Dahm, K., Haines, S.S., Horton, R.J., O’Leary, D., Taylor, R.D., Thomas, K.A., and Torregrosa, A., 2022, Rocky Mountain Region Science Exchange 2020—EarthMAP and the Colorado River Basin: U.S. Geological Survey Circular 1483, 10 p., accessed February 15, 2022, at <https://doi.org/10.3133/cir1483>.

## For More Information

Colorado River Basin: Actionable and Strategic Integrated Science and Technology (ASIST) <https://go.usa.gov/xtmAn>

Region 7: Upper Colorado Basin <https://go.usa.gov/xFFqY>

Region 8: Lower Colorado Basin <https://go.usa.gov/xFFqc>

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Photograph credits:

**Page 1 banner** The Colorado River near Moab, Utah. (Photograph by Matt Miller, U.S. Geological Survey).

**Page 1** The Colorado River at the Imperial National Wildlife Refuge near Cabin Lake, Arizona (Photograph by Alissa Coes, U.S. Geological Survey).

**Page 2** The Colorado River near Moab, Utah. (Photograph by Matt Miller, U.S. Geological Survey).

**Page 4** View of Colorado River confluence with the Little Colorado River taken from the rim of Marble Canyon (Photograph by the U.S. Geological Survey).