



Rio Grande Basin

Basin Overview

The Rio Grande flows 1,896 miles from its headwaters on the eastern side of the San Juan Mountains of southern Colorado south through New Mexico to Texas where it forms the international boundary between the United States and the Republic of Mexico for 1,250 river miles. The river drains a total of approximately 182,200 square miles in the United States and Mexico. Along with international jurisdictions, 20 Native American Tribes in New Mexico and two Tribes in Texas rely on water from the Rio Grande Basin. The river supports agricultural, recreational, municipal, and industrial users, as well as endangered species and a unique riparian ecosystem along much of its length.

Future Changes in Climate and Hydrology

Temperature

Temperatures throughout the basin are projected to increase by an additional 4 to 10°F (degrees Fahrenheit) over the course of the 21st century. Evaporation from surface reservoirs is high and increasing as temperatures warm.

Precipitation

Climate projections suggest that annual precipitation in the Rio Grande Basin will remain variable over the next century. Precipitation in both the Rio Grande and the Pecos River Basins will likely change in total volume, spatial distribution, and timing.

Snowpack, Runoff, and Streamflow

Winter snowpack is decreasing at an accelerating pace, which leads to changes in runoff and flow timing. In addition, any snow that does accumulate in the mountains often melts off earlier in the season, and will likely do so more quickly in the future due to an increased likelihood of rain-on-snow events.

Water Management Impacts

Several studies have evaluated the impacts from the potential changes to temperature, precipitation, snowpack, runoff, and streamflow on water deliveries,

hydropower, flood risk management, fish and wildlife, recreation, and water quality. Below are some of the potential impacts for the basin:

- Crop demands, as well as other outdoor water demands, are increasing and are expected to increase further. The seasonal volume of agricultural water demand could further increase if growing seasons become longer.
- Increased wildfire severity could increase water quality issues as fire scars can lead to washing ash and large volumes of debris and sediment into rivers and reservoirs.
- Reduced supplies, altered timing of flows, and increased variability will change the availability and nature of recreational opportunities within the basin.

Adaptation Strategies

Adaptation strategies have been developed to address future water needs in the basin and to adjust future water infrastructure operations to changing hydrologic conditions. An example of one of these strategies is described below.

Water Management Strategy for Increased Drought Resilience

Operational flexibility in the Middle Rio Grande Conservancy District was evaluated in the district's drought contingency planning process, funded under Reclamation's WaterSMART Drought Response Program. The district's Board of Directors approved a step-wise

program of operational flexibilities to help the district weather increasingly intense droughts.



Elephant Butte Reservoir in New Mexico

Innovations

A variety of innovative projects and research have occurred within the Rio Grande Basin since the 2016 SECURE Water Act Report. Two examples are presented below:

Reservoir Evaporation Monitoring

Real-time tracking of open-water evaporative losses is critical to Reclamation's real-time water management and ability to best balance stakeholders' needs, especially during droughts. To address this significant need, Reclamation water managers are collaborating with experts inside and outside of Reclamation to deploy and test technologies to improve real-time evaporation monitoring.

Snowmelt Jiggles

To mimic the flow pulses that historically occurred naturally on the Rio Grande, Reclamation works with water management partners, including the U.S. Army Corps of Engineers, the State of New Mexico, irrigation districts, Tribes, and municipalities to engineer pulses that create overbank flows in key river reaches to support the spawning of the endangered Rio Grande silvery minnow, without significant impact to irrigators. These innovative water operations produce silvery minnow spawns in the river and allow biologists to capture eggs to raise in hatcheries so that minnows can be released back to the river during better flow conditions.



Endangered Rio Grande silvery minnows

Next Steps

For next steps in the Rio Grande Basin, Reclamation has projects in progress to increase water conservation and efficiency, protect ecosystems and ecosystem services, reduce risk, address aging infrastructure, and participate in partnerships.

To see the full basin report and other components of the 2021 SECURE Water Act Report, please visit:
<https://www.usbr.gov/climate/secure>