

BUREAU OF LAND MANAGEMENT



A Framework for Improving the Effectiveness of the Colorado River Basin Salinity Control Program, 2018-2023

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A Framework for Improving the
Effectiveness of the Colorado River Basin
Salinity Control Program
2018-2023

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BLM Salinity Control Program

Mission Statement

The BLM Salinity Control Program protects water quality by reducing the transport of salt and sediment from its public lands to the Colorado River within the Colorado River Basin. The BLM meets this responsibility through its mandates under the Federal Land Policy and Management Act to (1) manage public lands according to multiple use and sustained yield and (2) provide for compliance with pollution control laws or other standards or implementation plans.

Guiding Principles

- (1) The BLM Salinity Control Program develops and maintains comprehensive and dynamic modeling tools to quantify the effectiveness of BLM management activities in retaining salt and sediment on public lands.
- (2) The BLM Salinity Control Program is collaborative in nature and engages with various federal and state partners and stakeholders.
- (3) The BLM Salinity Control Program requires information and data of sufficient quantity and suitable quality to assess the effectiveness of salinity control efforts and evaluate progress in meeting water quality standards promulgated under the Clean Water Act.
- (4) The BLM Salinity Control Program promotes efforts to improve awareness of its goals, capabilities, and accomplishments.
- (5) The BLM Salinity Control Program recognizes the changing needs of the BLM's evolving workforce and develops and distributes relevant training materials and supporting information.
- (6) Since the BLM Salinity Control Program's effectiveness relies upon watershed management concepts, the program interacts with numerous BLM management activities to minimize soil erosion and salt transport caused by surface disturbance across public lands.



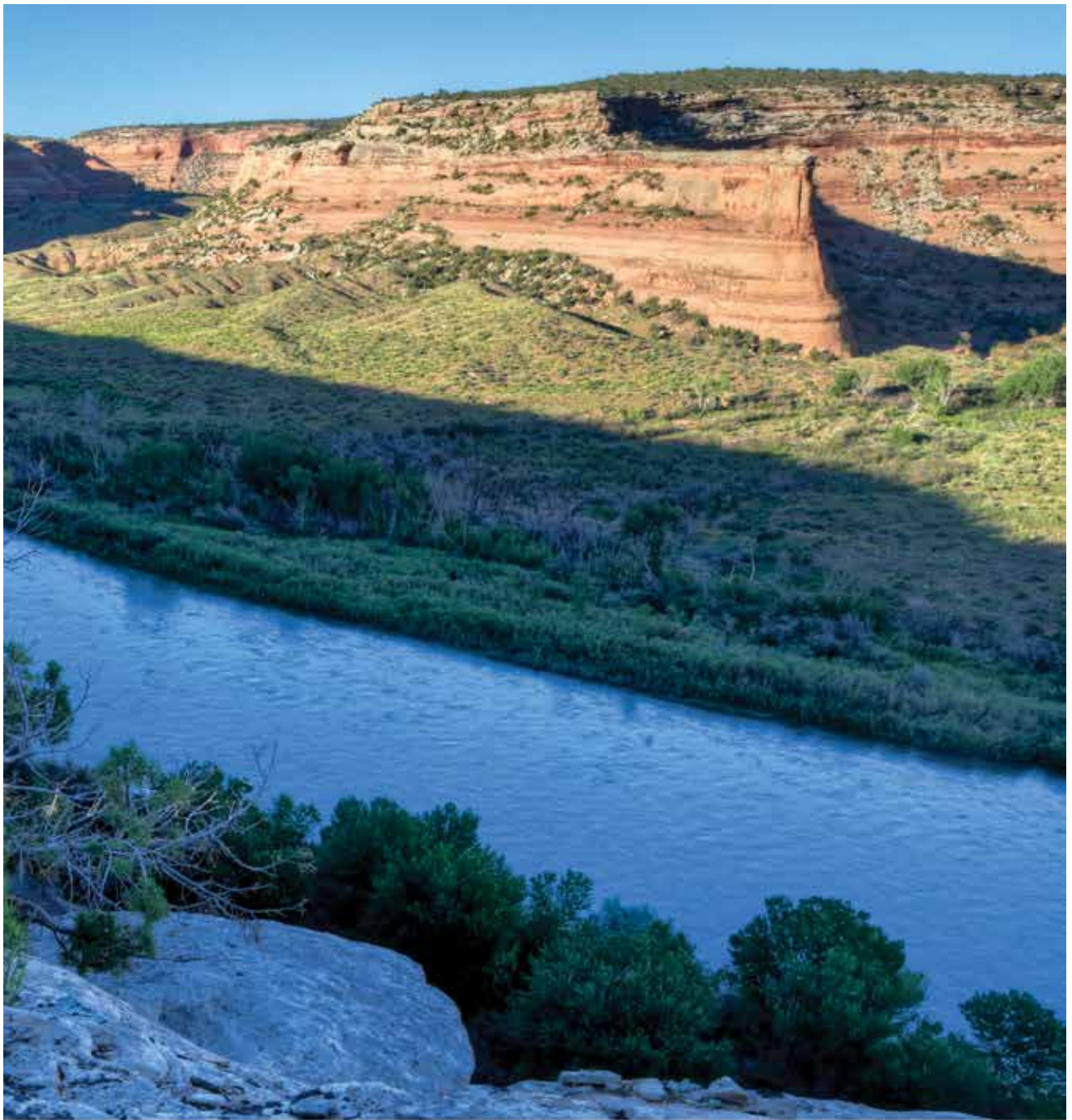


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Executive Summary

The Colorado River is an important source of water for about 40 million people in portions of seven western states (Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming). This water provides irrigation to almost 5.5 million acres of agricultural crops, sustains habitat for numerous aquatic and riparian species, and provides abundant recreational opportunities to residents and visitors. A variety of natural processes and human uses cause dissolved salt concentrations in the river to increase from about 50 milligrams per liter (mg/L) near its headwaters in the Rocky Mountains to almost 850 mg/L near the border with Mexico. Excessive salt concentrations can result in substantial environmental and economic damages. Associated costs include loss of ability to irrigate some types of crops, increased water treatment costs for domestic users, increased water treatment costs for utilities to comply with Clean Water Act discharge permit requirements, and increased costs for industry to maintain boilers and treat water to meet manufacturing needs. Recent analyses by the Bureau of Reclamation indicate quantifiable damages from excessive salt concentrations are about \$382 million per year.

Congress passed the Colorado River Basin Salinity Control Act of 1974 (the Act) to address concerns by water users about increasing salt concentration in the Colorado River, help resolve a longstanding dispute with Mexico about the quality of water delivered under

an international treaty, and provide a framework to assist states with administering Clean Water Act amendments passed in 1972. The Act relies upon a unique partnership of federal and state agencies that continues to work cooperatively with numerous regional water management agencies, hundreds of local companies, and thousands of individual water users to reduce and maintain salt concentrations in the river at an acceptable level as determined by numerical water quality standards. As an integral component of the partnership, the Bureau of Land Management (BLM) is responsible for about 53 million acres within the Colorado River Basin and is required to reduce salt transport from these lands under subsequent amendments to the Act.

This framework identifies priority activities that the BLM will focus on from 2018 to 2023 to improve management effectiveness of the Colorado River Basin Salinity Control Program. Specific objectives include: (1) Continue implementing activities to reduce salt and sediment transport; (2) Develop additional capabilities to quantify and report effectiveness of management activities; (3) Strengthen partnerships and increase collaboration with federal partners, states, and other stakeholders; (4) Improve availability and access to monitoring data; and (5) Enhance and maintain technical expertise and project management capabilities.



Introduction

The Colorado River is an important source of water for about 40 million people in portions of seven western states (Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming). This water is used to irrigate almost 5.5 million acres of land. The Colorado River also sustains habitat for numerous aquatic and riparian species and provides abundant recreational opportunities. The Colorado River flows more than 1,400 miles from its headwaters in the Rocky Mountains, through the Southwest, and then through a portion of Mexico before it discharges into the Gulf of California. A variety of natural processes and human uses cause dissolved salt concentrations in the river to increase along its flow path, increasing from about 50 milligrams per liter (mg/L) near its headwaters to almost 850 mg/L near the border with Mexico.

Excessive salt concentrations can result in substantial environmental and economic damages. Recent analyses by the Bureau of Reclamation indicate quantifiable damages from excessive salt concentrations are about \$382 million per year. Damages include loss of ability to irrigate some types of crops, increased water treatment costs for domestic users, increased water treatment costs for utilities to comply with Clean Water Act discharge permit requirements, and increased costs for industry to maintain boilers and treat water to meet manufacturing needs.

Congress passed the Colorado River Basin Salinity Control Act in 1974 to address concerns by water users about increasing salt concentrations in the Colorado River, help resolve a longstanding dispute with Mexico about the quality of water delivered under an international treaty, and provide a framework to assist states with administering Clean Water Act amendments passed in 1972. The Colorado River Basin Salinity Control Act relies upon a unique partnership of federal and state agencies that continues to work cooperatively with numerous regional water management agencies, hundreds of



The Colorado River Basin covers portions of seven western states.

local companies, and thousands of individual water users to maintain and improve water quality in the Colorado River.

BLM Management Perspective

The Bureau of Land Management (BLM) is responsible for about 53 million acres of public lands in the Colorado River Basin; this represents almost one-third of the total area of the basin (approximately 155 million acres). The BLM has been a partner in salinity control efforts since the 1970s and has relied on a comprehensive, three-pronged approach for reducing salt transport to the Colorado River. This approach incorporates: (1) controlling point sources of salinity, such as discharges from abandoned wells and

mines; (2) controlling nonpoint sources of salinity, such as by reducing sediment transport from past activities through a number of land management programs and watershed restoration activities; and (3) preventing nonpoint sources of salinity from ongoing, authorized activities through land use planning, permit stipulations, best management practices, and related conservation actions.

For many years, the BLM has lacked the capability to adequately quantify and report the amount of salt and sediment pollution prevented through erosion control measures. Factors contributing to this difficulty include limited understanding of processes controlling the transport of salt and sediment from terrestrial upland areas to tributary streams and rivers; variable and inconsistent management metrics for assessing

effectiveness achieved by numerous programs contributing to management of public lands and natural resources; and lack of access to watershed and water quality models with sufficient capability and spatial resolution needed to simulate, predict, and assess impacts of management activities on such a large watershed with highly complex and variable characteristics. This lack of capability to quantify the amount of salt and sediment retained by management activities on public lands has been of significant concern to other agencies cooperating on salinity control programs within the basin. This type of information is important to understanding cumulative effectiveness of salinity control efforts towards maintaining and improving water quality in the Colorado River and evaluating progress in meeting numerical water quality standards.



The Bureau of Land Management is responsible for about 53 million acres of public lands (dark yellow) in the Colorado River Basin.

Purpose and Need for the Framework

Through its Soil, Water, and Air Management Program, the BLM is developing capacity and improved tools needed to quantify the effectiveness of management activities in retaining salt and sediment on public lands and to assess cumulative effectiveness of salinity control efforts towards maintaining and improving water quality in the Colorado River. The priority for salinity control efforts will focus on reducing erosion and sediment transport to streams, which is consistent with the BLM mission to manage public lands under principles of multiple use and sustained yield. The BLM also has identified additional tasks and activities to increase the effectiveness of project management, maintain relationships with key partners and stakeholders, and improve communications and awareness of its salinity control program.

Partnership Roles and Responsibilities

- The **Colorado River Basin Salinity Control Forum** was created in 1973 and is an organization comprised of members from the seven Colorado River Basin states. The Governors of each state appoint forum members. The forum provides executive oversight of salinity control efforts, coordinates with federal agencies on implementation of the Colorado River Basin Salinity Control Act, works with Congress on program authorization and funding issues, acts to disseminate information on salinity control efforts, and works to otherwise promote efforts to reduce salt loading to the Colorado River. The forum maintains a work group comprised of technical representatives from the states with a designated chair appointed by the forum. The work group studies technical issues, manages and tracks implementation of program activities, and coordinates efforts between states, federal agencies, and local organizations involved in the program.
- The **Colorado River Basin Salinity Control Advisory Council** is a federal advisory committee created by the Act in 1974. The advisory council is charged with providing recommendations to the Secretary of the Department of the Interior, Secretary of the Department of Agriculture, and Administrator of the Environmental Protection Agency on matters related to implementation of the Colorado River Basin Salinity Control Program. The Governors of each of the seven basin states appoint advisory council members, which are generally the same members appointed to the Colorado River Basin Salinity Control Forum. The advisory council maintains a Technical Advisory Group to research issues and provide recommendations. The Bureau of Reclamation provides federal support to the advisory council.
- The **Bureau of Reclamation** is the lead federal agency and supports Colorado River Basin Salinity Control Program objectives principally by funding and implementing improvements to off-farm irrigation water delivery systems through its Basinwide Program, which provides grants to users in response to funding opportunity announcements.
- The **Natural Resources Conservation Service (NRCS)** supports Colorado River Basin Salinity Control Program objectives by providing technical assistance and funding to agricultural producers to improve on-farm irrigation practices through the NRCS Environmental Quality Incentives Program (EQIP).
- The **Bureau of Land Management** supports Colorado River Basin Salinity Control Program objectives primarily by requiring and implementing measures to reduce or avoid surface water runoff and sediment transport associated with use and disturbance of public lands from authorized activities.
- The **U.S. Geological Survey (USGS)** supports Colorado River Basin Salinity Control Program objectives by providing state and federal agencies with the scientific information, tools, and expertise necessary to administer and assess watershed management activities in the basin.
- The **U.S. Fish and Wildlife Service** supports Colorado River Basin Salinity Control Program objectives by providing expertise and oversight to ensure compliance with the Endangered Species Act for wildlife populations and habitats impacted by salinity control programs.
- The **Environmental Protection Agency** oversees implementation and maintenance of water quality standards for the Colorado River as promulgated under the Clean Water Act and delegates to state water quality management agencies.



Framework Objectives



OBJECTIVE 1: Continue implementing activities to reduce salt and sediment transport.

Many land use activities, such as livestock grazing, energy development, mining, recreation, timber production, utility transmission, and road management have the potential to increase erosion and sediment transport. The BLM attempts to avoid or reduce these impacts by using best management practices; incorporating terms, conditions, and stipulations in land use authorizations; and requiring actions to restore lands upon completion of authorized activities. The BLM also engages in many activities to restore degraded ecosystems that contribute excessive sediment and salts to Colorado River Basin watersheds. These activities include constructing and maintaining grade-control structures, spreader dikes, and retention structures; participating in emergency stabilization and rehabilitation efforts after wildfires; removing invasive plant species; conducting channel stabilization and other riparian enhancements; maintaining road culverts; remediating abandoned mine lands; and conducting fuels reduction treatments.

In support of this objective, the BLM will:

- Continue funding on-the-ground projects that reduce transport of salts and sediment to streams. Congressional appropriations direct the BLM to expend at least \$1.5 million per year from the Soil, Water, and Air Management Subactivity in support of the Colorado River Basin Salinity Control Program. A priority for use of these funds is on projects within watersheds having moderate to high saline soils. Funding also is available through many other BLM management programs for related land management and watershed management activities.
- Continue efforts to comply with provisions of the Clean Water Act and other water quality regulations as mandated by the Federal Land Policy and Management Act. Examples of these efforts include ensuring authorized users of public lands obtain necessary permits when required, sharing water quality information with state regulatory agencies, and cooperating with the Colorado River Basin Salinity Control Forum on triennial reviews of water quality standards submitted to the Environmental Protection Agency.
- Continue efforts to minimize the transport of salts and sediment from surface disturbances resulting from new and ongoing land use authorizations. Examples of these efforts include using appropriate stipulations and best management practices; reducing disturbance of additional land through existing land use planning practices; and managing to achieve land health standards.

OBJECTIVE 2: Develop additional capabilities to quantify and report effectiveness of management activities.

Many BLM management activities occur on terrestrial upland areas located a great distance from perennial streams that discharge into the Colorado River. The BLM has lacked capability to quantify and report the effectiveness of its management activities in these areas because of many factors, including (1) the lack of acceptable watershed and water quality models; (2) limited understanding of processes controlling the transport of sediment and salt from upland areas to perennial streams; (3) insufficient water quality monitoring and soil chemistry data; (4) inconsistent practices and coordination between different programs working across administrative boundaries; and (5) decentralized data management practices.



In support of this objective, the BLM will:

- Continue collaborating with the Agricultural Research Service (ARS) on efforts to develop and refine regional watershed and water quality modeling tools needed to quantify and assess sediment and salt transport. The BLM and ARS initiated work in 2014 to develop these modeling tools using the Agricultural Policy/Environmental eXtender (APEX) model and the Rangeland Hydrology and Erosion Model (RHEM). A working version of the modeling tools, with limited capability, became available in the fall of 2015, but additional work remains to calibrate, validate, and refine the models.
- Continue collaborating with partners, such as the ARS, USGS, NRCS, and universities, on scientific studies to improve understanding of sediment and salt transport processes. Examples of ongoing studies include a series of site-specific rainfall-runoff experiments to measure parameters needed to refine the APEX and RHEM modeling tools.
- Continue working with numerous BLM resource management programs on efforts to integrate available information into the APEX and RHEM modeling tools and to provide capability for quantifying and reporting benefits obtained by a broad range of BLM management programs. The BLM also has initiated a number of agency-wide initiatives to centralize data management for many programs, geospatially enable many legacy data systems, and develop additional data systems to meet new management needs. As information from these centralized systems and new data systems becomes available, it will be integrated into the APEX and RHEM modeling tools.

OBJECTIVE 3: Strengthen partnerships and increase collaboration with federal partners, states, and other stakeholders.

Collaboration between the BLM, other federal agencies with Colorado River Basin Salinity Control Program responsibilities, state and regional water resource management agencies, science partners, and other stakeholders is essential to effective watershed management and ensuring water quality standards for the Colorado River are maintained. The Colorado River Basin Salinity Control Forum, Advisory Council, and supporting work groups provide substantial capacity for coordinating efforts and maintaining effective communications, but the BLM maintains working relationships with stakeholders throughout the Colorado River Basin that can be used to advance program objectives.

In support of this objective, the BLM will:

- Continue attending and actively participating in Colorado River Basin Salinity Control Forum and Advisory Council meetings, work group meetings, Science Team meetings, and other relevant events.
- Continue efforts to identify additional opportunities, such as joint scientific studies, for collaborating with other Colorado River Basin Salinity Control Program participants to improve understanding of nonpoint salt and sediment transport processes. Also, identify additional opportunities for using restoration and reclamation of areas on BLM-managed lands to support broad, cross-jurisdictional partnerships.

- Improve access to BLM information through the BLM website and other media and through efforts to exchange information and reports through the Colorado River Basin Salinity Control Forum's Work Group and Science Team, Advisory Council's Technical Advisory Group, etc.

OBJECTIVE 4: Improve availability and access to monitoring data.

The BLM requires sufficient water quality monitoring and soil chemistry data in many remote areas of the Colorado River Basin to quantify and assess the effectiveness of management activities, determine if existing water quality standards are being met, and calibrate and refine the APEX and RHEM modeling tools to fully support management objectives. The BLM lacks sufficient monitoring data as a result of many factors, including: (1) variable performance metrics and management objectives mandated by the numerous programs used by the BLM to manage public lands; (2) a lack of resources to collect and analyze an adequate number of samples to fully characterize water and soil on 53 million acres of BLM-managed lands in the Colorado River Basin; (3) and a lack of resolution and types of information available through national soil survey and vegetation datasets.

In support of this objective, the BLM will:

- Obtain chemical analyses of water and soil samples from selected project sites on BLM-administered lands. This information will be used to help quantify the effectiveness of salinity control projects and develop and improve watershed modeling tools. The BLM previously provided funds to purchase analytical instruments that are located in an ARS laboratory; through in-kind services, the ARS will operate and maintain the instruments and provide chemical analyses of water and soil samples collected by BLM field offices. BLM field offices benefit from this partnership by not having to fund sample analyses, not having to procure services through separate contracts with commercial analytical laboratories, and receiving centralized data management of analytical results with quality control and quality assurance.
- Increase the number of Colorado River Basin salinity control projects funded through the Soil, Water, and Air Management Subactivity which include provisions for collecting samples needed to characterize site conditions, quantify the effectiveness of the project in retaining sediment and salt, and help refine and calibrate the APEX and RHEM modeling tools.
- Coordinate efforts with other BLM programs and stakeholder agencies to share common datasets, ensure relevant information is integrated into the APEX and RHEM modeling tools, and promote efficient data management practices.

OBJECTIVE 5: Enhance and maintain technical expertise and project management capabilities.

The effectiveness of the Colorado River Basin Salinity Control Program depends upon managers and staff in numerous state and field offices. Like many federal agencies, the BLM is experiencing a period of substantial workforce demographic change. As a result, there is significant turnover in managers and staff in many of these offices. The BLM recognizes there will be changing needs with its changing workforce, specifically in areas such as awareness of Colorado River Basin Salinity Control Program priorities, basic training to build and maintain technical expertise and project management skills, and communicating and networking with other offices and stakeholders.



In support of this objective, the BLM will:

- Develop relevant information about the Colorado River Basin Salinity Control Program and distribute to new managers and staff in state and field offices as part of orientation efforts. The information will be provided through a variety of methods and media (websites, fact sheets, social media, webinars, personal communications, etc.) depending on specific needs and communication effectiveness.
- Develop and deliver training to managers and staff on topics such as water quality laws and regulations, water quality chemistry and transport, use and application of watershed and water quality modeling tools, etc.
- Promote awareness of Colorado River Basin Salinity Control Program priorities, reporting requirements, use of consistent approaches and methods for collecting and analyzing chemical samples, etc., by developing and distributing technical support documents.



Summary

In addition to our multiple use mission, the Federal Land Policy and Management Act of 1976 directs the BLM to sustainably manage water resources on public lands and provide for compliance with federal and state antipollution laws, such as the Clean Water Act. The Colorado River Basin Salinity Control Act of 1974, as amended, provides the BLM with an important management framework, collaborative network, and programmatic structure for addressing salt and sediment issues—a serious economic and environmental concern in the Colorado River Basin. The Colorado River provides water for about 40 million users, supports billions of dollars of economic activities, and sustains riparian and aquatic ecosystems.

The BLM has been a partner in salinity control efforts since the 1970s and has relied on a comprehensive, three-pronged approach for reducing the transport of salt to the Colorado River that incorporates: (1) controlling point sources of salinity, such as discharges from abandoned wells and mines; (2) controlling nonpoint sources of salinity by reducing sediment transport from past activities through a number

of land management programs and watershed restoration activities; and (3) preventing nonpoint sources of salinity from ongoing, authorized activities through land use planning, permit stipulations, best management practices, and related conservation programs. The BLM has lacked the capability to adequately quantify and report on the effectiveness of many of these efforts but is developing regional watershed and water quality models with sufficient resolution to address this need.

This framework identifies priority activities that the BLM will undertake over the next 5 years to further improve the BLM's contributions to the Colorado River Basin Salinity Control Program. Specific objectives include: (1) Continue implementing activities to reduce salt and sediment transport; (2) Develop additional capabilities to quantify and report effectiveness of management activities; (3) Strengthen partnerships and increase collaboration with federal partners, states, and other stakeholders; (4) Improve availability and access to monitoring data; and (5) Enhance and maintain technical expertise and project management capabilities.





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