BUREAU OF RECLAMATION

New FY 2026 Science and Technology Research Projects

Improving Water Clarity of Grand Lake, CO via Management of Invasive Mysis Shrimp, Year 1 Funding: $155,809

Reducing the population of an invasive species, the opossum shrimp (Mysis diluviana or Mysis) is a promising approach for improving the clarity of Grand Lake. This species occurs at high density and is known to alter aquatic food webs in a manner that increases algae production and reduces water clarity. Reclamation's Eastern Colorado Area Office will study how Mysis affect water clarity and evaluate the potential to reduce Mysis populations as a management strategy.

Automated Smart Trap for Species-Selective Fish Management, Year 1 Funding: $129,000

This proposal furthers the development of an automated, selective fish trapping technology that can identify and trap particular fish species for long periods of time without human input. First, researchers will build an image library of all fishes in the Colorado River Basin and use these images to train an artificial intelligence (AI)-based fish identification system. Next, they will deploy automated smart traps at select locations on the San Juan River and the Colorado River. The project will assess the traps' effectiveness at using the image library to identify, sort, and trap invasive non-native fish species, such as channel catfish, smallmouth bass and green sunfish. Ultimately this project aims to create a new fisheries management tool.

Next-Generation Self-Healing Concrete Research: Laboratory Testing, Field Trials, and Comparative Technology Assessment for Aging Dams and Canals, Year 1 Funding: $128,760

Reclamation's concrete structures face ongoing cracking, freeze-thaw damage, and costly recurring repairs. Previous studies have demonstrated that bacteria-based self-healing concrete can seal cracks up to 0.031 inches, remain active for decades, and extend project service life by 20-30%. This project builds on earlier laboratory research by evaluating an improved version of self-healing concrete technology and assessing its performance under realistic conditions.

Long-Term Landscape-Level Springs Monitoring and Groundwater Research in the Grand Canyon, Year 1 Funding: $150,000

The project will install new tools to monitor Grand Canyon Springs between Glen Canyon Dam and Lake Mead. This work would benefit both the Upper and Lower Colorado River Regions by providing crucial information needed to better predict and model water quantity and quality within this region.

Physics-Informed Artificial Intelligence / Machine Learning Technique for River and Watershed Simulation: $85,000

This project will develop a physics-informed artificial intelligence (AI) and machine learning (ML) technique and related tools for computational hydraulic and hydrologic (H&H) modeling. Traditional computer models have long runtimes. After training, the proposed AI/ML technique will significantly reduce the runtime of typical H&H modeling – an increase in speed of up to 100 to 1000 times is expected. The AI/ML tools will especially benefit projects where many model runs are needed, such as emergency management, uncertainty quantification and risk assessment.

Acoustic and Seismic Techniques for Monitoring Bedload in Ephemeral Gravel Bed Streams in the American Southwest: $207,419

Knowledge of the quantity, size, and timing of the sediment delivered to rivers is critical to the design of infrastructure such as surface diversions, reservoirs, fish ladders, and pump stations. This research will expand acoustic and seismic monitoring methods developed in sandy riverbeds to systems with coarser grained beds and evaluate their ability to provide sediment load data to support infrastructure design.

Assessing Next-generation Geospatial Artificial Intelligence Workflows, Methodologies, and their Application to Reclamation, Year 1 Funding: $58,880

GeoAI offers a transformative leap beyond traditional GIS by automating complex spatial tasks like land cover classification and object detection using machine learning. Unlike rule-based GIS workflows that rely heavily on manual input and predefined logic, GeoAI adapts to patterns in data, enabling predictive modeling and large-scale analysis. This makes it especially valuable for applications like remote sensing, environmental monitoring, and infrastructure assessment where speed, scalability, and accuracy are critical. This project will undertake a literature review, examine past and current GeoAI applications, and identify strategies to expand the use of GeoAI within Reclamation.

Investigation of quagga mussel reproduction genes for biocontrol, Year 1 Funding: $121,130

The project will characterize genes of the invasive quagga mussel that could be targets for genetic biocontrol. Specifically, we will focus on genes involved in reproduction, which have been the primary target for biocontrol tools in other pest species. To date there has been a lack of knowledge of the mechanisms controlling reproduction in quagga mussels, but recent work in our laboratory has identified genes that likely play key roles. This project will perform detailed analyses of the candidate genes to evaluate them as targets for development of genetic biocontrols.

Advancing Near-term Reservoir Water Quality Forecasting on Lake Powell by Leveraging Hydroinformatics, Multi-model Integration, and Cloud Computing Technologies, Year 1 Funding: $160,000

This project will modernize water quality forecasting capacity, specifically for temperature and conductivity, for Lake Powell and the Colorado River downstream of Glen Canyon Dam (GCD). The overarching goal is to implement methods that improve near-term water quality forecasts for informing and optimizing economically costly experimental flows at GCD. In addition, a forecast dashboard will be developed to communicate water quality information with stakeholders of the

Glen Canyon Dam Adaptive Management Program (GCDAMP), the Glen Canyon National Recreation Area (GLCA), and other interested parties.

Development and Evaluation of Ensemble Reservoir Evaporation Projections at Lake Powell using Variable Infiltration Capacity Land-surface Modeling, Year 1 Funding: $142,543

This research project focuses on understanding and projecting water loss due to evaporation from Lake Powell, a crucial reservoir in the Colorado River Basin. Evaporation from storage reservoirs represents a major source of water loss, but our understanding of how this process may change in the future is limited. This project aims to study historical evaporation losses and estimate future evaporation trends until the end of the century. This research will help to improve Reclamation's Consumptive Uses and Losses reporting, inform operational tools such as Colorado River Simulation System (CRSS), meet regulatory obligations, and support decision-making across the Colorado River Basin.

Developing Geochemical Methods for the Non-lethal Reconstruction of Natal Origins and Anadromy from Oncorhynchus mykiss (steelhead/rainbow trout) Fish Scales, Year 1 Funding: $175,932

As a listed species affected by Central Valley Project operations (water storage, release, temperature blending), Oncorhynchus mykiss (steelhead/rainbow trout) growth and survival depends on flow and temperature management. We hypothesize life history patterns are linked to these operations and are vital information for increasing steelhead abundance. This project will develop a non-lethal method using geochemical signatures in fish scales to reconstruct natal origins and migratory behavior, providing insights beyond current visual scale assessment. Once validated, this method offers a promising alternative to monitor populations, evaluate operations and habitat restoration, and inform fish and water management decisions.

Assessing Phosphorus Storage and Release from the Las Vegas Wash to Lake Mead, Year 1 Funding: $78,130

This project will study how much phosphorus, a nutrient that can trigger harmful algal blooms, is stored in the sediments of the Las Vegas Wash and how it might be released into Lake Mead. Researchers will collect sediment and groundwater samples from multiple sites along the lower Las Vegas Wash, analyze them for phosphorus and related elements, and combine the results with existing data to improve predictions of phosphorus movement. The findings will help water managers better understand nutrient sources and develop strategies to protect water quality in Lake Mead and the lower Colorado River. This work directly supports efforts to prevent harmful algal blooms and ensure safe, reliable water supplies for the region.

Leveraging NISAR Data for Enhanced Snow Water Equivalent Estimation, Year 1 Funding: $134,452

Water resources in the western United States depend on snowmelt. Historically, snow has been measured at discrete locations, but advancements in technology, such as airborne lidar and gridded statistical models, have enhanced our understanding of the distribution of snow across complex landscapes. In July 2025, a new satellite was launched that has the potential to provide spatially distributed measurements of the amount of water in the snowpack (snow-water equivalent). This research will compare these satellite-derived measurements with airborne lidar data and ground-based observations to evaluate the satellite's accuracy in estimating changes in snow water equivalent.

Remote Sensing and Targeted Herbicide Application for Drone Program Missouri Basin Region, Year 1 Funding: $54,000

Dam faces are frequently sprayed with herbicides to ensure vegetation does not damage infrastructure or impede operations. Using drones to apply herbicides is faster and safer than using backpacks, ATVs, UTVs, trucks, or airplanes. This project will expand the Missouri Basin Region herbicide drone spraying program by incorporating surveys derived from remotely sensed imagery and GIS information. This information can be used to investigate standard operating procedures or best management practices that can enhance integrated pest management programs.

Groundwater Management Practices Evaluating Drainage and Human Use Effects on Aquifer Systems with Flow Modeling, Year 1 Funding: $35,000

The Yuma Area Office is working to improve how it manages groundwater near canals, levees, and dams, where water levels can change quickly. Right now, groundwater models rely on outside contractors, which slows down decision-making and increases costs. This study will review existing data and tools to see if Reclamation can build and maintain its own groundwater models for this area, allowing quicker responses to changing conditions and improved planning.

Determining Sluicing Effectiveness by sUAS LiDAR Bathymetry at Imperial Dam, California, Year 1 Funding: $59,000

Completed in 1938, Imperial Dam diverts Colorado River water into the All-American Canal and Gila Gravity Main Canal, supplying water to southeast California and southwest Arizona. Sediment management at the dam includes desilting Colorado River water before it enters the canals via an approximately 3,000-foot-long sluiceway channel, the California Sluiceway. This project seeks to demonstrate that sluicing effectiveness can be determined using a small, unmanned aircraft system (sUAS) collected Light Detection and Ranging (LiDAR) data to accurately map the submerged reservoir bottom within about 800 feet from the dam sluiceway gates and forebay of the California Sluiceway and the bed of Imperial Reservoir. This approach will be validated with a more traditional waterborne sonar topographic/bathymetric survey.

Assessing Energy Loss from Thermally Fused Joints in PVC and HDPE Water Transmission Pipelines, Year 1 Funding: $81,392

This project aims to improve water transmission pipeline designs using PVC or HDPE pipe by investigating the energy loss of pressurized water flow through heat-fusion pipe joints. These joints are commonly used as a low-cost alternative for field assembly. Understanding the hydraulic behavior of fused plastic will inform design practices and help Reclamation engineers evaluate whether current industry standards are sufficient for accurately sizing pumps and appropriately selecting pipe dimensions, thereby ensuring expected delivery pressures at turnouts.