## Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Editor's Note</td>
<td>1</td>
</tr>
<tr>
<td>Around O&amp;M</td>
<td>1</td>
</tr>
<tr>
<td>Underwater Inspections</td>
<td>2</td>
</tr>
<tr>
<td>Clear Creek Tunnel Inspection</td>
<td>4</td>
</tr>
<tr>
<td>Funding Opportunities for Major Rehabilitation and Replacements</td>
<td>6</td>
</tr>
<tr>
<td>Certified Cost Estimate Executive Summary</td>
<td>8</td>
</tr>
<tr>
<td>Imperial Diversion Dam: Gila Gravity Headworks Trunnion Block Replacement Project</td>
<td>10</td>
</tr>
<tr>
<td>Q&amp;A: Clyde Thomas</td>
<td>12</td>
</tr>
<tr>
<td>Updates and Due Dates</td>
<td>14</td>
</tr>
</tbody>
</table>

### Bulletin Mission Statement

This *Water Operations and Maintenance Bulletin* is published quarterly through the Asset Management Division of the Dam Safety and Infrastructure Directorate. It serves as a medium to connect personnel who operate and maintain Bureau of Reclamation water supply systems.

### Bulletin History

The *Water Operations and Maintenance Bulletin* has been published quarterly since 1952. Past issues may be read and downloaded at [Water Operations and Maintenance Bulletins](#), where you can also search the entire bulletin database by subject.

### Contact

We welcome suggestions for future issue topics, contributing authors, and comments on the *Bulletin*. Please direct all inquiries to [drowateroandm@usbr.gov](mailto:drowateroandm@usbr.gov).

Cover photo: Yellowstone River near northern boundary of Yellowstone National Park (Reclamation/C. Worley)
Editor’s Note

We’re excited to share this latest issue of the Bulletin with you. Whether you’ve been able to return to the office more regularly or are still working entirely from home, we hope that the Bulletin continues to help you stay engaged with what’s happening in the O&M community. And thank you for your feedback on the Bulletin’s redesign and reintroduction in June.

This “Inspections and Improvements” issue looks at inspections being done in the field and funding opportunities and procedures to improve facilities. The “Underwater Inspections” and “Clear Creek Tunnel Inspection” articles describe ways in which Reclamation performs inspections on out-of-the-way, typically unseen, or inaccessible assets. “Funding Opportunities for Major Rehabilitation and Replacements” outlines resources Reclamation partners can pursue to meet demands on infrastructure. “Certified Cost Estimate Executive Summary” reviews tools implemented by the Estimating Process Review Program to support consistency and efficiency with cost estimates. And the “Imperial Diversion Dam: Gila Gravity Headworks Trunnion Block Replacement Project” article shares how multiple organizations have successfully partnered to maintain delivery of Colorado River water throughout the desert Southwest.

We are also featuring a Q&A with Clyde Thomas of the Upper Colorado Basin Region, in addition to news on the latest happenings and upcoming programs and deadlines. Enjoy!

Darion Mayhorn, P.E.
Supervisor, Operations and Maintenance Asset Management Division

Andrew Daigle, Ph.D.
Writer-Editor
Dam Safety and Infrastructure

Around O&M

- In August 2021, Reclamation announced $9.7 million in Federal Lands Transportation Program (FLTP) funding for projects across Reclamation.
  - The nine selected transportation projects included a mix of Reclamation-maintained assets (reserved works) and managing partner-maintained assets.
  - The next FLTP call for projects is scheduled for spring 2022.
- The first three asset classes within the Enterprise Asset Registry (discussed in the Summer Bulletin) have been completed.
  - All Reclamation employees have access to asset information for dams, urban canals, and reservoirs through Tessel. Users can view a summary dashboard for each asset class by searching in Enterprise Geospatial Operations (eGO).
  - These asset classes are under development and will be released in Fiscal Year 2022: hydropower, water conveyance (lines), levees, transportation, and lands.
- The Guidelines for Developing Reservoir Sedimentation Monitoring Plans are now available to Reclamation users on the Asset Management Division (AMD) intranet site.
  - A regular program of reservoir sedimentation monitoring will help ensure that Reclamation is using up-to-date tables of surface area and storage capacity and predict when sedimentation may impact facilities and reservoir operations.
  - The Technical Service Center’s River Hydraulics and Sedimentation Group developed the guidelines to help Reclamation region and area offices prepare sedimentation monitoring plans for their reservoirs.
- Reclamation’s Long Range Transportation Plan (LRTP) was finalized in June 2021 and distributed to the Reclamation Leadership Team.
  - The development of the LRTP started back in 2018 during our first Reclamation transportation workshop and continued with the GIS transportation needs assessment and many other goal-setting workshops.
  - The LRTP can be found here on the AMD website.
- AMD thanks Missouri Basin Regional Staff (Matt Gappa, MB-2400) and the Montana Area Office for accommodating our staff and allowing them to join on inspections at Tiber Dam and St. Mary Diversion Dam and Canal.
  - We can only grow stronger with opportunities like these to learn side-by-side from one another.
Underwater Inspections

Kevin Kelly, Ph.D.
Research Chemist, Technical Service Center

The Bureau of Reclamation (Reclamation) has been performing underwater engineering and environmental inspections of its facilities since the 1960s. These inspections are essential to provide a thorough evaluation of Reclamation dams and associated appurtenances. Reclamation maintains in-house capabilities for underwater inspections with qualified engineers and scientists performing collateral dive duties 10 percent of their time. This has the added benefit of applying in-house knowledge and expertise during underwater condition assessments of normally inaccessible features of facilities. The ability to evaluate changing underwater conditions of Reclamation facilities while maintaining continuity of engineering and technical expertise through years of routine inspections has proven invaluable in spotting deterioration of underwater features, scheduling timely repairs or monitoring, and providing for the safety of water delivery structures.

Reclamation currently has two underwater inspection teams: the Columbia-Pacific Northwest Regional Underwater Inspection Team headquartered in Boise, Idaho (with divers located in both Boise and at the Technical Service Center in Denver), and the Lower Colorado Region Dive Team headquartered in Boulder City, Nevada. Approximately 75 percent of underwater inspections are engineering-based and 25 percent are environmental-based.

The underwater inspection teams routinely perform examinations of normally inaccessible features in support of various programs, including Comprehensive Reviews (CRs), Periodic Facility Reviews, and Reviews of Operations and Maintenance. Features inspected include intake structures, gates, stilling basins, and power plant tailraces. In addition, underwater inspection teams also support other mission-critical activities such as construction oversight, environmental surveys, inspection of bridges, removal of debris, and small repairs or maintenance jobs. Project offices and senior members of the inspection teams coordinate annual schedules and logistics of site-specific underwater examinations.

Reclamation’s underwater inspection teams collectively perform 200–400 dives per year. Team members are trained beyond recreational diving to have similar skills and qualifications as professional divers. Members of the inspection teams may also serve as technical leads for full facility reviews such as CRs, environmental compliance and management projects, design construction specifications, or inspections of construction activities. The dual roles of team members help provide for closed-loop management of Reclamation facilities that ties together the assessment of underwater conditions, repair or maintenance recommendations, and technical inspection of construction or environmental projects.

Deterioration of a chute block and floor in outlet works stilling basin at Twin Lakes Dam (CO).
Underwater inspections are performed by one or more of the following modes: 1. A buddy pair of divers utilizing SCUBA (Self-Contained Underwater Breathing Apparatus), 2. Surface-Supplied Air (SSA), and 3. Remotely Operated Vehicle (ROV). SCUBA offers greater mobility for divers to explore a larger area underwater. In addition to typical recreational dive gear, SCUBA divers are equipped with dry suits for environmental protection and full-face masks for wireless communication. SSA is utilized when a diver is tethered to the surface for penetration dives, enhanced safety, and communications.

The Regional Dive Advisory Committee (RDAC) manages the day-to-day operations of the underwater inspection teams. The committee is also responsible for managing membership of the teams, equipment selection, and the biennial dive training. Reclamation-wide oversight of all dive teams is performed by the Reclamation Dive Safety Advisory board (RDSAB), which is made up of regional representatives. The board maintains the Dive Safety Practices Manual, reviews Dive Hazard Analyses (which must be prepared and approved before diving on any structure), reviews incidents and proposed waivers, and offers support for dive-related issues.
Clear Creek Tunnel Inspection: January 27–29, 2020

Laurie Larson, P.E.
Supervisory Civil Engineer, Northern California Area Office

The Clear Creek Tunnel is a 10.8-mile-long, concrete-lined tunnel with a finished diameter of 17.5 feet. It was constructed to transfer water from Lewiston Reservoir on the Trinity River basin to the Sacramento River basin. Water from this tunnel then passes through Judge Francis Carr (JF Carr) Powerplant, Whiskeytown Reservoir, the Spring Creek Tunnel to the Spring Creek Powerplant, Keswick Reservoir and Keswick Powerplant, and ultimately ends up in the Sacramento River after generating power three separate times.

Access to the tunnel is through a shaft 100 feet downstream of the intake structure with a 12-foot by 8-foot opening. The vertical distance from the ground surface to the invert of the tunnel is 37 feet. To enter or exit the tunnel at the intake shaft, hoisting equipment is required. Secondary access to the tunnel is through the Crystal Creek Bypass, a 6-foot diameter concrete tunnel that intersects the Clear Creek Tunnel 8.6 miles downstream from the intake.

Planning for the inspection started four months prior in October 2019 with coordination meetings and a call out against a Blanket Purchase Agreement for a confined space rescue team.

Coordination of the inspection involved the following groups at the Northern California Area Office (NCAO):

- **Civil Engineering** – Planning, job hazard analysis (JHA) preparation and inspection
- **Safety** – JHA review, PPE procurement, air monitoring, and confined space entry
- **Operations** – Clearance requests, lock out/tag out of facilities
- **Mechanical Maintenance** – Rigging support during lifting operations
- **Civil Maintenance** – Maintenance of Kubotas, crane operations, delivery of generators/fans/equipment, fueling of generators, and drivers of Kubotas during inspection
- **Electricians** – Maintenance of ventilation fans, onsite support to connect fans to generators and monitor during inspection activities
- **Communications and Instrumentation** – Set up of microwave communications, monitoring during inspections, and providing 900 MHz radios
- **Project Management/Planning** – Contract management for rescue team procurement, planning, and purchasing/renting equipment
- **Purchasing/Warehouse** – Procurement support for all divisions

Additionally, assistance was provided by the California-Great Basin (CGB) Regional Industrial Hygienist in air sampling, noise dosimetry monitoring, and confined space entrant support.

One week prior to the inspection, the tunnel was taken out of service and drained. The tunnel was properly locked out with access points secured. It was ventilated for two days prior to inspections using two 32,000 cfm fans installed at the intake structure. Ventilation continued throughout the inspection.

The inspection team consisted of employees from Reclamation’s NCAO and Technical Service Center. One rescue service personnel accompanied the inspection team as part of the confined space entry and rescue plan established by contract prior to the inspection.
Due to the length of the tunnel and weight of necessary safety and inspection equipment, the inspections were conducted using two diesel-powered Kubota off-road vehicles, owned by NCAO. The Kubotas had been previously modified by NCAO with additional LED lighting, additional exhaust scrubbers, an odometer (on one Kubota), clear plastic roofing to reduce the amount of water entering the vehicles, and bench seating in the bed. The vehicles carried three personnel each, safety gear, communications equipment, and inspection gear. Equipment and personnel (in a man-skip) were then lowered into the tunnel using a Grove crane.

Both vehicles were placed in the tunnel facing downstream. This allowed the front vehicle to be used as an inspection vehicle with the back vehicle housing the communications and rescue equipment and personnel. Near the downstream end of the tunnel, the vehicles were turned around for forward travel in the upstream direction on inspection day two.

Communication with the entrants from the outside was continuous by way of a microwave radio system. A communication truck at the intake was hard-wired to an antenna set up in the tunnel and pointed downstream towards the inspection vehicles. 900-MHz radios were used as a backup and provided clear communication with personnel staged at the Bypass/Tunnel intersect.

Communication between the two inspection vehicles was by project radios or direct communication. And communication and air quality checks were performed every 15 minutes throughout both inspection days.

Atmospheric testing in the tunnel included: Oxygen (O2), Lower Explosive Limit (LEL), Hydrogen Sulfide (H2S), Carbon Monoxide (CO), Carbon Dioxide (CO2), and Sulfur Dioxide (SO2). Protocols were established in the event there was an atmospheric monitor alarm, medical emergency, or communications or ventilation failure. Support staff was staged at the intake and Crystal Creek bypass throughout the entry to the tunnel by the inspection team.

The tunnel was inspected from the intake structure to the butterfly valves at the upstream end of the penstocks to JF Carr Powerplant during the first day. A concurrent inspection of the penstocks was conducted by the Rope Access Team during this outage. The inspection team was looking at the overall condition of the concrete lining and adequacy of weep hole drainage throughout the tunnel.

The report indicated 48 areas of serious or significant distress/damage within the tunnel. As a result, an extraordinary maintenance project is near the end of its design phase with plans to execute construction in November 2022. Future inspections are scheduled to occur every 5 years. Previous inspections of the tunnel were performed in 2013, 2000, 1989, and 1972.

The safe and successful execution of this inspection was a true team effort involving nearly 30 personnel from all branches of the O&M division and several branches of the Administrative division at NCAO.
Funding Opportunities for Major Rehabilitation and Replacements

Madeline Franklin
Program Analyst, Asset Management Division

The Bureau of Reclamation’s (Reclamation) infrastructure endures through preventive maintenance programs and substantial investment in major rehabilitation and replacement (MR&R) activities. Exploring funding opportunities can help Reclamation and its partners to meet the challenges presented by new and competing demands on the Nation’s water and power infrastructure.

This article explores Federal grant and loan programs that fund water, power, recreation, and related infrastructure improvements and new construction. However, most states also have funding opportunities for infrastructure improvements and new construction. Water, environmental, natural resource, park, transportation, and commerce agencies are often good starting points. Local resources at the county or municipal level may be available as well.

Federal Loan Programs

In alignment with current policies held by the Congressional Budget Office (CBO) and Office of Management and Budget (OMB), Federally-owned facilities are not eligible for Federal loans. However, Reclamation partners may benefit from Federal loan programs to support construction at associated and non-Federal facilities. Opportunities for these partners to benefit from Federal loan programs may be expanded if Federal facilities are suitable for title transfer under the John D. Dingell, Jr. Conservation, Management, and Recreation Act (PL 116-9) or through individual acts of Congress.

For eligible facilities, some of the largest loan programs are administered by the Environmental Protection Agency (EPA), the Army Corps of Engineers (USACE), and the Department of Transportation (DOT). EPA and USACE have established credit assistance programs for eligible water and wastewater infrastructure projects under the Water Infrastructure Finance and Innovation Act of 2014 (PL 113-121). To date, the EPA program has closed on 45 loans, offering a total of $9 billion in financing. The USACE program is just getting underway and will limit its first loans to dam safety projects.

Similarly, the DOT offers secured loans and lines of credit for large surface transportation projects through the Transportation Infrastructure Finance and Innovation Act Program (P.L. 114-94).

Federal Grant Programs

For eligible facilities, some of the largest grant programs are administered by Reclamation, DOT, and the U.S. Department of Agriculture (USDA). Reclamation offers various grant opportunities through the WaterSMART program, which competitively awards funding to non-Federal entities for water quality and water conservation activities. Most of these funding opportunities, except for Title XVI, may be used to conduct work on Federally-owned assets.

DOT has transportation grant opportunities for Federal, state, and local entities. Reclamation and its transferred works entities currently receive funds for roads and bridges through the Federal Lands Planning Program (FLPP) and Federal Lands Transportation Program (FLTP).
The Natural Resources Conservation Service (NRCS) of the USDA also offers several grant programs for water infrastructure and planning. The Regional Conservation Partnership Program (RCPP) fosters partnership among watershed stakeholders and provides grant funding to public entities for watershed planning and activities to improve water resource management. The Watershed Protection and Flood Prevention Act (PL 566) Watershed Operations Program offers grant funding for studies, construction, and land treatment activities that prevent flood damage or further the conservation, utilization, or disposal of water. Reclamation transferred works entities have been recipients of both grant programs at NRCS.

McKay Dam, part of the Crooked River Project. Although the dam is not part of the rehabilitation project, the Ochoco Irrigation District has successfully received P.L. 566 (USDA) funds for a project on these Reclamation-owned facilities.

**Federal Funding Opportunities**

This list of Federal funding programs should not be considered comprehensive, and funding availability is annually subject to change. For more information about program eligibility and requirements, please visit individual program pages or contact the Asset Management Division of the Dam Safety and Infrastructure Directorate.

**The Department of the Interior**

**The Bureau of Reclamation**

- WaterSMART Grants
  - Water and Energy Efficiency Grants
  - Small-Scale Water Efficiency Projects
- Drought Resiliency Projects
- Title XVI Water Reclamation and Reuse Program
- Desalination Construction Program
- Cooperative Watershed Management Program
- Colorado River Basin Salinity Control Program
- Native American Affairs Technical Assistance Program

**The National Park Service**

- Land and Water Conservation Fund

**The Department of Agriculture**

**The Natural Resources Conservation Service**

- Regional Conservation Partnership Program
- Watershed and Flood Prevention Operations Program

**USDA Rural Development**

- Water & Waste Disposal Grants to Alleviate Health Risks on Tribal Lands and Colonias
- Water & Waste Disposal Loan & Grant Program
- Water & Waste Disposal Predevelopment Planning Grants
- Revolving Funds for Financing Water and Wastewater Projects

**The Environmental Protection Agency**

- Water Infrastructure Finance and Innovation Act Program
- Clean Water State Revolving Fund
- Drinking Water State Revolving Fund

**The Department of Commerce**

- Public Works Program

**The Department of Defense**

**The Army Corps of Engineers**

- Corps Water Infrastructure Financing Program
- Project Partnership Agreements

**The Department of Energy**

- Title XVII Innovative Energy Loan Guarantee Program

**The Department of Homeland Security**

**The Federal Emergency Management Agency**

- Hazard Mitigation Assistance Grants

**The Department of Housing and Urban Development**

- Community Development Block Grant Program
- Indian Community Development Block Grant Program

**The Department of Transportation**

- Surface Transportation Block Grant Program
- Transportation Infrastructure Finance and Innovation Act Program
- Federal Lands Transportation Program
- Federal Lands Access Program
Certified Cost Estimate Executive Summary

Jim Jetton, P.E.
Estimating Process Review Program Manager, Policy and Programs

The Estimating Process Review (EPR) Program originated in 2016 and has been working to provide a vehicle for communication, consistency, transparency, and accountability in estimates throughout the Bureau of Reclamation (Reclamation). In 2020, the Reclamation Leadership Team (RLT) tasked the EPR Program to develop a formal document to represent official Reclamation cost estimates. The EPR Program addressed this task while working under the guidance of the Director of Policy and Programs, the Chief Engineer, and in conjunction with the Director of the Technical Service Center (TSC). The EPR Program benefited from program team representation from all Reclamation regions, the TSC, Program and Budget, Dam Safety and Infrastructure, and Policy and Programs directorates to complete a milestone of the task.

This milestone was the Certified Cost Estimate Executive Summary (CCEES). An introductory memorandum for this formal document was distributed on March 31, 2021. The CCEES was initially implemented for all Reclamation planning-level cost estimates (preliminary, appraisal, and feasibility) prepared as part of a planning study. Since the initial implementation, the EPR Program Team has been evaluating when and where the application of the CCEES – outside of planning-level studies – will benefit Reclamation.

To understand when and where the application of the CCEES will provide benefits to Reclamation, the EPR Program began by defining the following problem statements:

- Why did the RLT task the EPR Program to develop a formal document to represent official Reclamation cost estimates?
  - Total Project Costs: In several instances, incomplete total project or feature costs have been used for budgeting purposes and for updating budgets.

- Use of Cost Estimates: Reclamation-specific cost estimating terminology is not well understood and has not been consistently used across our organization.
- Consistency: Cost estimates are not always developed consistently nor appropriately in selected instances. Varying formats of reporting costs and budgets are used across Reclamation.
- Accessibility: Non-contract cost data is not readily available, and it may take time to gather all the necessary information when requested. Therefore, the ability to compute total project or feature construction costs is not readily available, and it may take time to gather all the necessary information when requested.

- EPR Charter, Amendment No. 1 dated November 10, 2020, states in the Strategic Plan the following summary statement: The EPR Program will provide a vehicle for communication, consistency, transparency, and accountability in estimates throughout Reclamation.
  - The CCEES supports three of the four keywords in the summary:
    - Communication: Complete project or feature costs are provided and state that they follow Reclamation Manual Directives and Standards.
    - Consistency: All Reclamation regions and offices know, understand, and use specific Reclamation cost estimate terminology and report costs in the same format.
    - Accountability: Having three signatures on the CCEES provides accountability that the estimate contains all required key elements for a Reclamation cost estimate.
As with any new policy and procedure, there will be adjustments made with the future implementation of the CCEES to other programs and estimate levels in Reclamation. The current CCEES template lists a version number and date in the bottom right corner. Version control will allow revisions to be made to the CCEES as it is used and vetted across Reclamation. A PDF example and the Excel template are located at https://intra.usbr.gov/dso-dec/epr/index.html. The Excel template contains guidance and definitions to aid in the execution of the CCEES. A training module is being developed to assist in understanding when the form is to be used and how the Excel template is formatted.

Questions and comments pertaining to the CCEES should be directed to your Regional EPR Program Executive Committee Team member, the Manager of the TSC’s Estimating Services Group, or the EPR Program Manager.

Those individuals are listed below:

- Dam Safety & Infrastructure: Dam Safety Office: Dawn Munger
- Dam Safety & Infrastructure: Asset Management Division: Sita Egan
- Policy & Programs: DSO/DEC/VP, Team Chair: James (Jim) Jetton
- Policy & Programs: Law Administration Division: Caroline (Carrie) Diroll
- CGB Region: Richard Welsh
- CPN Region: David Denton
- LCB Region: Theresa (Terri) Saumier
- MB & ART Region: Norris (Dave) Skinner
- UCB Region: Patrick (Pat) Page
- TSC: Estimating Services Group: Daniel (Dan) Maag
- TSC: Economic Analysis Group: Paula Engel

The CCEES is not intended to add any additional workload or requirements to Reclamation employees. The CCEES formalizes and standardizes work that should already be performed in Reclamation. The EPR Program Team worked with representation across many offices within Reclamation to develop the CCEES. The CCEES will support the RLT’s task and provide benefits across Reclamation.
Imperial Diversion Dam: Gila Gravity Headworks Trunnion Block Replacement Project

Samuel Garcia, P.E.
Supervisory Civil Engineer, Yuma Area Office

One of the most vital agricultural centers is not typically thought to be in the barren desert Southwest of the United States, but it is. The final stretch of the Colorado River, before entering Mexico, feeds the Coachella, Imperial, and Yuma Valleys, which produce the majority of the country’s winter vegetables and are collectively known as the Lettuce Capital of the world.

How is this possible? There are several reasons that make the desert Southwest a prime location for agriculture, but water resource management has arguably been the key reason. Since its inception in the early 1900s, Reclamation aimed to make the western states more enticing for development and quickly realized that water resource management would play a big role. This need yielded the implementation of the 1928 Boulder Canyon Project Act, which authorized the construction of Hoover Dam, Imperial Diversion Dam, and the All-American Canal. The Imperial Diversion Dam is located approximately 20 miles northeast of Yuma, Arizona, straddles the Arizona-California border, and was constructed from 1936 to 1938. The dam diverts the Colorado River water to the All-American Canal to the west, to the Gila Gravity Main Canal to the east, and releases flows into the Colorado River to provide deliveries to Mexico.

Due to the age of the Imperial Diversion Dam, a capital improvement plan was developed through the Technical Service Center (TSC) and is implemented by Imperial Irrigation District on behalf of the Imperial Dam users. These projects have included major electrical upgrades and replacement of infrastructure, and future projects extend more than 10 years to retain the dam’s structural integrity to allow for its continued use in providing vital water deliveries. In 2017, during work on a project being completed at the dam, a worker stepped on the web section of one of the gate arms at the Gila Headworks. The web deteriorated under his foot as he put pressure on it. This led to a thorough inspection of the gate arms, gate, and the trunnion pin connection for each of the three gates at the Gila Headworks.

Upon further examination, it was determined that the gates had significant corrosion issues at the trunnion connection, and they were in desperate need of repair. A significant amount of coordination has taken place due to the need for water deliveries to be sustained without outage during construction. One of the critical milestones in completing the repair was being able to install stop logs in front of the gates. Due to hard pack sedimentation the stop logs were not able to properly seal. Furthermore, the condition of the stop log guides was unknown beneath the sediment; therefore, the need for sediment removal was required prior to awarding a repair contract. With the sediment being located adjacent to the face of the dam, the option of manual dredging using divers was preferred to reduce risks of undermining or striking the dam.

Video monitoring of Army Dive Team hand dredging and removing debris and sedimentation from the dam gates.
The Yuma Area Office (YAO) successfully removed approximately 400 CY of debris and sediment with aid from Imperial Irrigation District personnel and with an active Army Dive Team. An Inter-Agency Agreement was awarded and executed that yielded a win-win situation for both YAO and the Army Dive Team, as the Army Dive Team treated the hand dredging and removal of debris as a training exercise and YAO achieved the intended goal at a reduced cost.

The Trunnion Repair Project addresses the issues previously mentioned. The project consists of removing the current trunnion connections, demolition of the concrete along the pins of the trunnion, installation of new gate anchors into the concrete pier, and construction of a concrete corbel to reduce the potential for future corrosion. The project was awarded to Oraway Engineering Inc. by the Imperial Irrigation District (IID), which is responsible for operations and maintenance of the dam. Oraway mobilized in mid-June 2021 and has begun demolition of the concrete on one of the piers. The project is scheduled to be completed by August 2022. A concurrent project is also being worked on to replace the Gila Headworks gates with a separate contract that has been awarded to Gracon, LLC.

As these projects commenced, further coordination was required for stakeholders as a reduction in maximum flows to the Gila Gravity Canal had to be implemented during construction. This meant water deliveries needed to be altered in order to avoid placing the construction crews at risk.

The Gila Gravity Canal Users met internally with their counsel so that many users made changes to their water deliveries and no one district solely took the impact of the reduced deliveries. In tandem with this effort, the IID worked with Oraway to develop a solution to raise the box where construction was being completed, which added to the delivery capacities in the Gila Gravity Canal. Though IID is not a user of the Arizona side of the dam, they were excellent partners in helping mitigate construction impacts for those users.

Imperial Dam is just one of many facilities approaching a hundred-year life in the Yuma area. This and other facilities are critical to water deliveries and are shared by many users. Each user has their own needs in mind but understands that sacrifices and coordination are critical to ensure integrity of infrastructure and continued success of winter agriculture in the Yuma area. Together, all of the users are willing partners in funding and orchestrating these repairs, ensuring the success of water deliveries for the agricultural community of the desert Southwest.
Clyde Thomas has worked in the Upper Colorado Basin Region for over 30 years. Just days before his retirement from Reclamation, he talked to us about his roles in Salt Lake City and Provo, his passion for dam safety, and the importance of partnership in the field.

Can you provide a high-level summary of your work in the private sector before Reclamation?

I had a variety of civil engineering design experiences in my first 10 years of work. I did work as a laborer for a concrete contractor and as a soils lab technician while in college. My first permanent job was as a civil/structural engineer designing coal and mineral handling facilities. I moved on to work in municipal engineering with water and wastewater treatment plants and related civil engineering. I helped design facilities for a rocket motor plant. It was a fast-track design, as-you-build project. That was high pressure. I applied at Reclamation and was hired and began work in January 1990.

What brought you to Reclamation?

I needed to make a job change because of a big drop in national defense in 1989 due to the fall of communism in eastern Europe. A friend at work had left and went to work for Reclamation. I contacted him. I was aware of what Reclamation did and was excited to become involved in such great work and facilities.

I started in the UCB Regional Office design group [in Salt Lake City]. It was very good experience. However, in the early 1990s Reclamation was going through a transformation with the end of design and construction of large projects. The Provo Area Office wanted me to come work in Provo. After transferring, I did planning, design, and project management of recreation rehabilitation projects at reservoirs and other civil engineering projects. In 2001, the design group was reorganized. The supervisor asked if I would transfer back. My parents who lived in Salt Lake were getting older, and I decided to make the change. In 2007, I was selected as the design group supervisor. That same year the Dam Safety Group needed a dam safety coordinator. I wanted to spend the rest of my career doing that. In 2018, I became the supervisor of the Security and Dam Safety Group in the UCB Regional Office. My work in dam safety and O&M has been the most meaningful work of my career.
What does your position entail?

What are the biggest challenges the Upper Colorado Basin Region faces?
Right now, drought is a big challenge. But in my work, the safety and proper function of the dams, canals, and other facilities is critical. To make sure our facilities perform under unusual conditions such as hydrologic, seismic, and dangerous situations that can develop under normal use is very important.

What dam safety issues do you work on?
I have worked on numerous dam safety modifications due to seismic liquefaction and internal erosion issues on embankment dams and concerns with dam spillways. With our aging dams and canals there are maintenance issues. There have been refinements in the dam safety process, but the basics have been about the same over the 20 years I have been involved. The process is driven by the safety risk of failure of a dam.

Can you share a success story about a project you’ve been involved with?
One of my first field assignments in 1990 was to solve a problem with a new water diversion intake plugging up with Mancos shale. When my supervisor sent me to the field to look at the problem and meet with people from the water district, I was a bit nervous. When I got to the site, I asked the people who worked with the facility what they would recommend. One of them went to his vehicle and pulled out some drawings. It was basically a concrete settling basin that the Mancos shale would settle in, and it could easily be cleaned out. I finished the design, they did the construction, and I was there with them when we placed the concrete. We gained respect for each other and how we could work together.

Who have been your mentors in Reclamation?
I had many wonderful mentors at Reclamation. Specifically, my first mentor was the person that hired me, Richard Jensen. I will always appreciate his encouragement and how he believed in me. A second mentor was Dan Grundvig. He had a great respect for and understanding of the dam safety process and the people in the Technical Service Center and Denver Dam Safety Office. Dan taught me that we should challenge each other’s thinking but never undermine our team as we work to solve critical issues.

What advice can you share with those just starting careers in Reclamation?
I believe strongly in our mission. Work hard, have a good attitude, work well with people, and be optimistic looking for opportunities and they will come. Learn about the mission and history of Reclamation. It is an exciting one. The storage of water and production of electricity is critical to just about everything we do.

Clyde Thomas at Silver Lake in Brighton, Utah. Clyde grew up recreating and working around Brighton, and his dad was instrumental in helping the Federal Government buy back Silver Lake in the 1960s.
Updates & Due Dates

Through WaterSMART, Reclamation leverages Federal and non-Federal funding to work cooperatively with states, Tribes, and local entities as they plan for and implement actions to increase water supply reliability and drought resiliency. As the West continues to cope with climate change and drought impacts, WaterSMART plays a critical role in helping communities increase water supply sustainability.

The WaterSMART program is currently offering three funding opportunities on grants.gov: Drought Resiliency Projects, Water and Energy Efficiency Grants, and the new Environmental Water Resources Projects. Eligible applicants are invited to cost-share with Reclamation on conservation, drought, and environmental water resources projects.

**Drought Resiliency Projects**

Drought Resiliency Projects provide funding for on-the-ground projects and modeling/decision-making tools that increase water supply reliability or improve water management and are supported by an existing drought plan or planning effort. Drought Resiliency Projects require a minimum 50% non-Federal cost-share, and Federal funding availability includes up to $500,000 for projects that can be completed in two years and up to $2,000,000 for projects that can be completed in three years. **Applications are due October 5, 2021.** [View Opportunity](#).

**Water and Energy Efficiency Grants**

Water and Energy Efficiency Grants are one of the longest-running parts of the WaterSMART Program. Grants are available for projects that conserve and use water more efficiently, increase renewable energy production, enhance drought resilience, and mitigate risk of future water conflict. Applicants receive additional consideration for delivery system improvements that complement on-farm enhancements supported by the Natural Resources Conservation Service. This program requires a minimum 50% non-Federal cost-share, and Federal funding availability includes up to $500,000 for projects that can be completed in two years and up to $2,000,000 for projects that can be completed in three years. **Applications are due November 3, 2021.** [View Opportunity](#).

**Environmental Water Resources Projects**

Environmental Water Resources Projects is a new funding category under WaterSMART. Projects that benefit plant and animal species, fish and wildlife habitat, riparian areas, and ecosystems directly influenced by water resources management are eligible. Project types can include water conservation and efficiency projects to improve the environment through quantifiable and sustained water savings, mitigation of drought-related impacts, and watershed management or restoration projects with a nexus to water resources or water resources management. Projects under this new category may be eligible for up to 75% Federal funding, not to exceed $2,000,000. **Applications are due December 9, 2021.** [View Opportunity](#).