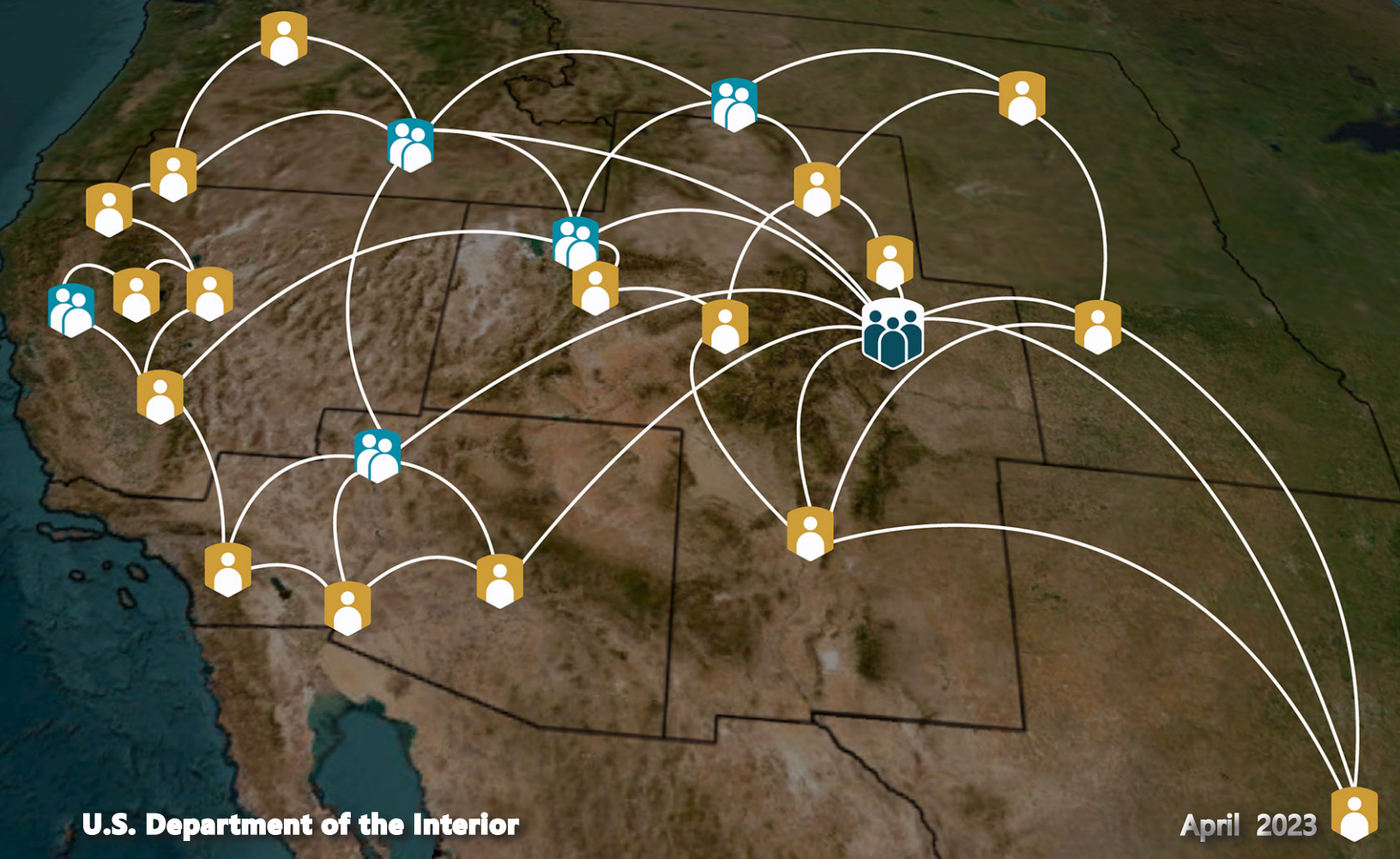
BUREAU OF RECLAMATION

Knowledge Stream

Research and Development Office

Collaboration Builds Reclamation GIS



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Message from R&D

Welcome to the Spring 2023 issue of the *Knowledge Stream*! In this issue, we highlight the use of Geographical Information Systems (GIS) at the Bureau of Reclamation (Reclamation). GIS is a powerful data management platform used to organize and manipulate geographical information for research and operational aspects of Reclamation's mission. GIS capabilities allow scientists, engineers, technicians, and managers to collect, analyze, interpret, and communicate data on a host of topics ranging from species surveys to infrastructure assets to hydrologic conditions. Robust data management practices and geospatial capabilities are cornerstones of the Geospatial Data Act of 2018, the Open, Public, Electronic, and Necessary (OPEN) Government Data Act of 2018, and the Modernizing Access to our Public Lands (MAPLand) Act of 2022. Through administration of Reclamation's GIS program, the Research and Development (R&D) Office determines requirements to comply with those laws and supports Reclamation's GIS community by providing coordinated GIS services and other technical resources, training, and planning to enhance Reclamation capabilities.

Included in this issue you'll find articles about:

- An overview of GIS at Reclamation
- The Department of Interior (DOI) and Reclamation data programs
- Example of GIS applications for Reclamation
- New GIS field data collection capabilities
- Reclamation's GIS systems and roles
- Reclamation's GIS Program

About the *Knowledge Stream*

The *Knowledge Stream*, published by the Bureau of Reclamation's Research and Development Office, is a quarterly magazine bringing mission-critical news about the agency's innovations in the following:

- Science and Technology Program
- Desalination and Water Purification Research Program
- Prize Competitions Program
- Snow Water Supply Forecast Program
- Open Water Data Program
- Reclamation Geographic Information System Program
- Technology Transfer...and more

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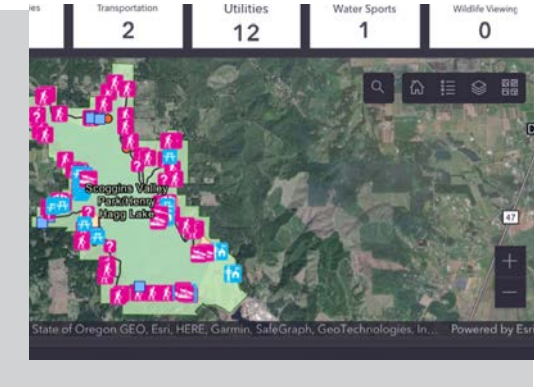
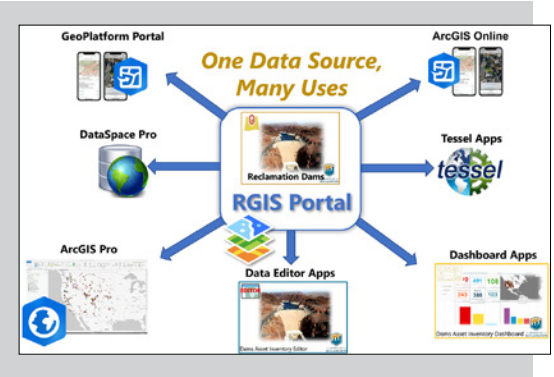


Reclamation GIS Applications: It's Time to Get Outside with Mobile GIS

pg. 9



Reclamation GIS Community: GIS Data Managers

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Front Cover: Image of a map showing Reclamation's GIS networking within the 17 Western United States.

Back Cover: Collage of photos from six different GIS challenges; Research and Innovation, Emergency Management, Asset Management, Infrastructure, Conservation, and Recreation.

The information being offered herein represents the opinion of the author(s) and is not a statement of fact about Bureau of Reclamation findings or conclusions.

Community Needs

Collaboration Builds Reclamation GIS Program

By Lisa Johnson
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As the Bureau of Reclamation (Reclamation) celebrates 120 years, the Bureau is managing extreme drought, large infrastructure investments, significant workforce transitions, and more. Meanwhile, demand for water, power, and related resources is increasing across the west. "Achieving Reclamation's mission in the 21st century requires more effective geospatial data management and services to enhance operational agility and reduce uncertainty" (Levi Brekke, Senior Advisor for R&D).

This overview introduces the relatively new Reclamation Geographic Information System Program (GIS) and an enterprise geospatial data management platform sharing technology, data, and services through and with those serving Reclamation.

We hope to inspire you to move beyond GIS as a software used to make maps and propose it as a powerful solution that directly supports business and mission operations. By streamlining data and presenting it in an accessible and scalable format, the platform allows everyone to explore many complex relationships influencing Reclamation to support policymaking, management, research, planning, and reporting — **one data source, many uses.**

Find GIS resources and applications using Enterprise Geospatial Operations (eGO), a one-stop searchable catalog of web-accessible GIS content that includes map explorers via Tessel, dashboards, and other information.

What is the GIS Program?

The Reclamation GIS Program, established in 2019, is building momentum following reorganization under the R&D Office and supports Reclamation by:

- Sharing geospatial resources and solutions to common problems
- Identifying common data or service needs
- Assessing Reclamation GIS capacity and capabilities to meet growing demands
- Investing in GIS training and emerging technology
- Informing best practices to improve data management
- Building the Reclamation GIS community to enable GIS staff and users to help each other

Did you know? Reclamation GIS goes back to 1984 as Esri's 12th customer. Esri, best known for its ArcGIS products, has over 100,000 licensed customers across the globe today.

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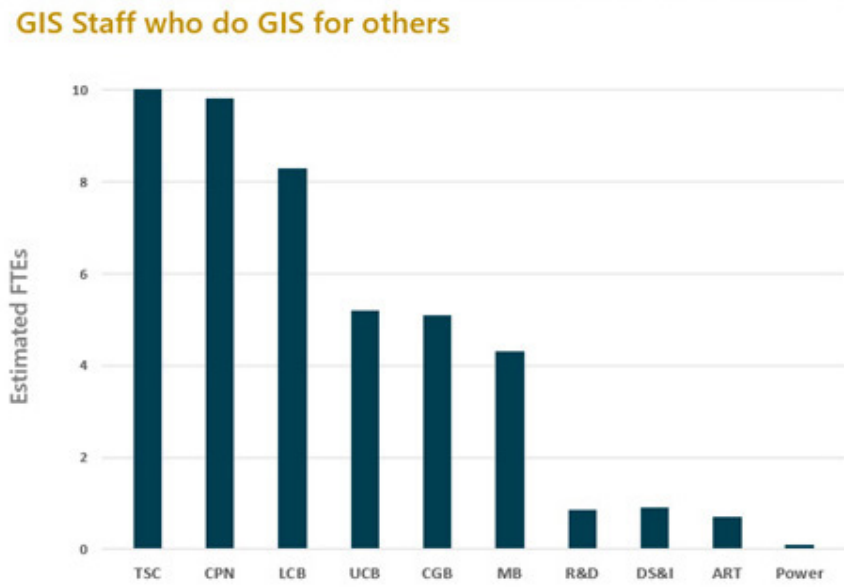
Known Reclamation GIS Service Providers



Estimated full-time employee positions by directorate in December 2022. The Geographic Information System (GIS) Program collaborates with other programs, offices, and regions to assess Reclamation's GIS capacity, capabilities, and common service needs to prioritize future investments.

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Activities are conducted in collaboration with Reclamation customers and are coordinated through the **Reclamation Geospatial Advisory Council** (RGAC), a group of GIS data managers and coordinators whose members represent all directorates.

The Asset Registry Project (VPN required) is a flagship example demonstrating the power of Reclamation's geospatial data management and workflow development to meet the customer's need for an authoritative inventory. These data inventories serve many uses and help Reclamation's Asset Management Division answer foundational questions such as the number and locations of Reclamation dams by State or the total reservoir storage capacity by basin, and supporting business functions such as asset inventory, facility inspections, and maintenance planning.

The GIS Program also coordinates with DOI's Geospatial Advisory Committee and other Reclamation data programs to streamline data governance policy and inventory data resources. The common goal is to make it easier to discover and share geospatial data while avoiding duplication, as required by the OPEN Data Act of 2018, the Geospatial Data Act of 2018, and the MAPLand Act of 2022.

Building the GIS Community

Reclamation's geospatial initiatives began by a small group of GIS professionals dedicated to solutions that are growing into Reclamation-wide priorities. There is tremendous potential for improvement as functional roles and communication channels form in the highly distributed network. For example, it is challenging to estimate the current capacity and capabilities of Reclamation GIS service providers — those who do GIS for others — to identify gaps and inform strategic planning.

Investments in **GIS training** enhance capabilities as Reclamation staff gain proficiencies with ArcGIS Pro, mobile mapping, geospatial data management, data visualization, and cartographic design. In fiscal year (FY) 2022, the R&D GIS Program hosted 14 trainings for 207 employees throughout Reclamation. FY 2023 GIS trainings are filling fast, see the Reclamation GIS Community SharePoint for links to sign up.

We want to hear from you! Email the GIS Program coordinator (lisajohnson@usbr.gov) to share your favorite geospatial use case, identify GIS training and technical support needs, and share your suggestions to build the GIS community and services.

- Join the Reclamation GIS Community Teams group for communications with GIS professionals and users
- Save eGO (VPN required) in your browser favorites
- Bookmark and follow the Reclamation GIS Community SharePoint for more
- Respond to upcoming surveys to assess geospatial capabilities, uses, and priority needs

Key Perspectives

By Jeff Nettleton
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There are some exciting things going on in the data world. That may sound like a contradiction in terms but when you consider how important quality data is to our work and the decisions we make, it's easy to see why making data more dependable, easier to use, and accessible is very important, even exciting! Recent legislation, including The Foundations for Evidence-Based Policy Making Act of 2018 and the Geospatial Data Act of 2018 both provide direction and authority for many of the efforts currently underway, and momentum is building!

The Department of Interior (DOI) staffed the DOI Chief Data Officer position in August of 2019 to provide oversight and guidance for all DOI data activities and to chair the DOI's Data Governance Board (DGB), which began to operate in September of 2019. In August of 2021 Reclamation staffed another new position, the Associate Chief Data Officer (ACDO), to serve on the DGB, to provide oversight and guidance for all Reclamation data activities, and to chair the Reclamation Data Council (RDC). Each of the eleven bureaus and five offices of the DOI has an ACDO or equivalent on the DOI DGB.

DGB working groups are developing guidance and an Enterprise Data Inventory that will facilitate harvesting metadata from the DOI bureau's inventories. The Enterprise Data Inventory will serve to make data more discoverable, utilizing open access protocols and standardized machine-readable formats in keeping with Findable, Accessible, Interoperable, and Reusable (FAIR) principles – making data more useful. Another DGB working group has developed an OPEN Data Plan that provides guidance to bureaus for selecting priority data sets and for making those data sets open and accessible, both internally and for the public.

Similarly, the Reclamation ACDO reestablished the RDC in April of 2022 with representatives from the key business lines and directorates across Reclamation. The RDC has established working groups in two key areas of development:

1. Reclamation data inventory – to create guidance and data standards for the inventory that will enhance discoverability, access, consistency, and openness of Reclamation data; and to facilitate collection and entry of data into the DOI – Enterprise Data Inventory.
2. Data management training – to advance data management concepts and data literacy, including common vocabulary and terminology; to advance clear communication about data; and to complement DGB initiatives on Data Literacy.

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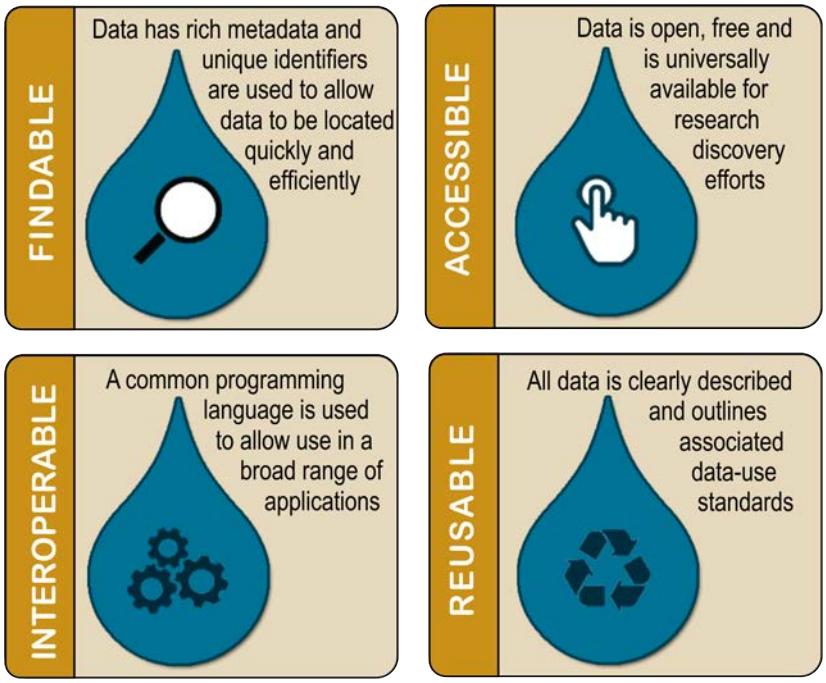
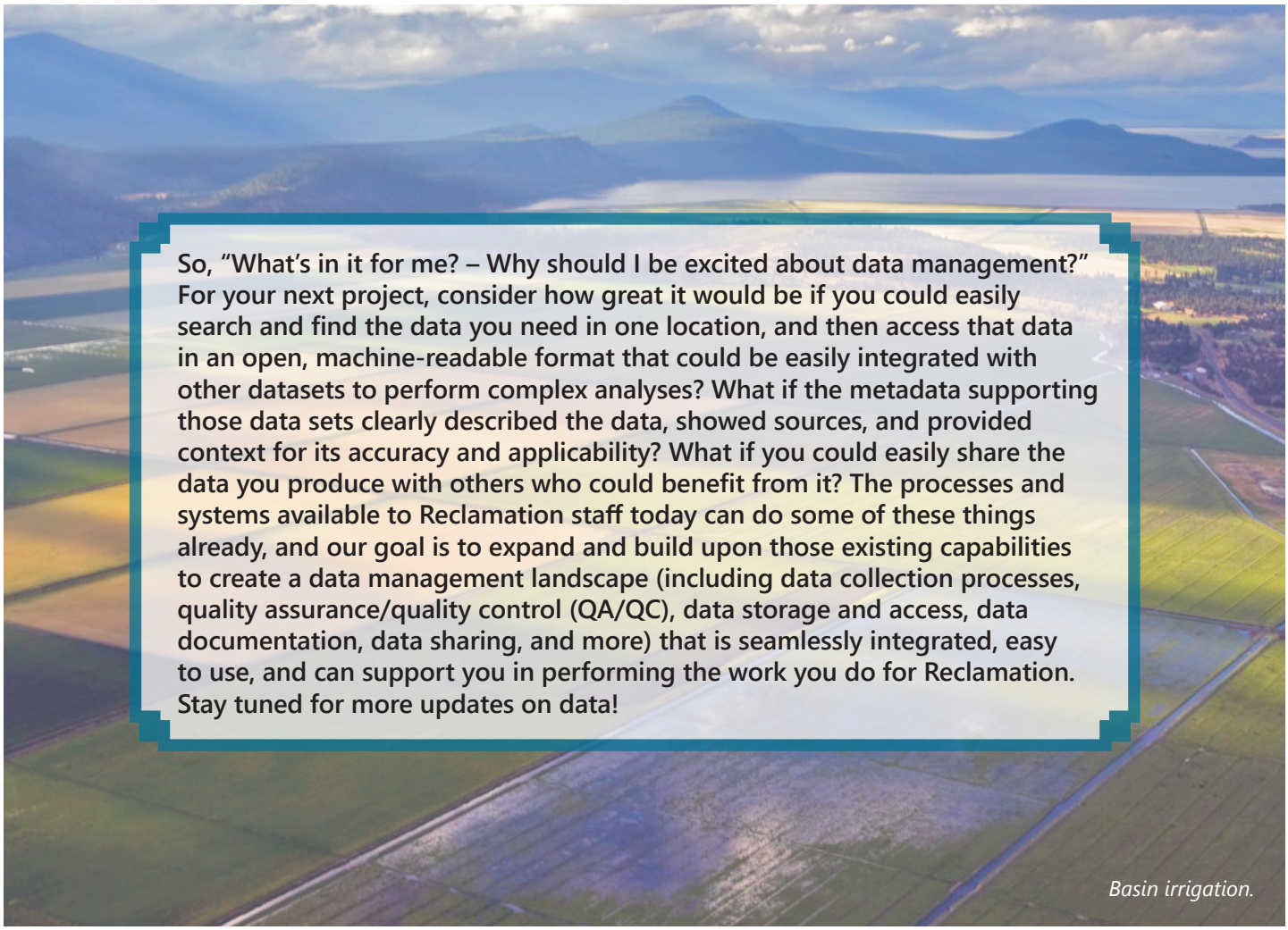
The ACDO also coordinates between Reclamation programs and offices on data management to ensure consistency and avoid duplication of efforts. Examples of ongoing coordination activities include:

- Coordination with the OPEN Data Program regarding data sharing and dissemination utilizing the Reclamation Information Sharing Environment (RISE)
- Coordination with the GIS Program on geospatial data management and ongoing development of the BORGIS system
- Coordination with the Asset Management Division for ongoing development of the Asset Registry Project to inform an assessment of data and systems maturity to develop a Master Data Management Plan



FAIR Data Principles schematic.

- Coordination with the Power Resources Office regarding management of power data and potential to leverage data to optimize Operations and Maintenance scheduling.



So, "What's in it for me? – Why should I be excited about data management?" For your next project, consider how great it would be if you could easily search and find the data you need in one location, and then access that data in an open, machine-readable format that could be easily integrated with other datasets to perform complex analyses? What if the metadata supporting those data sets clearly described the data, showed sources, and provided context for its accuracy and applicability? What if you could easily share the data you produce with others who could benefit from it? The processes and systems available to Reclamation staff today can do some of these things already, and our goal is to expand and build upon those existing capabilities to create a data management landscape (including data collection processes, quality assurance/quality control (QA/QC), data storage and access, data documentation, data sharing, and more) that is seamlessly integrated, easy to use, and can support you in performing the work you do for Reclamation. Stay tuned for more updates on data!

Basin irrigation.

Reclamation GIS Applications

Reclamation Celebrates 120 Years and Invests in Aging Infrastructure

By Katie Schultz, Adam Ricks, Lindsay Grabner, & Madeline Franklin
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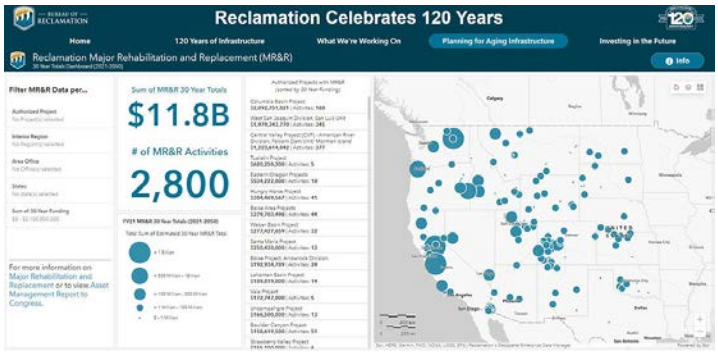
In 2022, Reclamation celebrated 120 years of building water and power infrastructures. Since 1902, Reclamation assets have provided secure and reliable water supplies for irrigation, people, and the environment to ensure outdoor recreation opportunities, provide green energy for homes and businesses, and fulfill Tribal commitments in the western 17 states. These water and power projects led to homesteading and promoted social and economic development in the west.

Most of Reclamation's facilities are over 50 years old and some dams are more than 100 years old. Drought and hydrologic conditions have become more extreme and variable with climate change and Reclamation is undertaking thoughtful planning to improve aging infrastructure. With resources made available through the Bipartisan Infrastructure Law (BIL), Reclamation has been able to prioritize and accelerate projects that will maintain and create water supplies. The longevity of Reclamation's infrastructures and assets is dependent on preventative maintenance programs, capital improvement planning, and investments in major rehabilitation and replacement projects to continue the safe and reliable delivery of water and power.

What We're Working on: Action Construction Projects Dashboard.



Planning for Aging Infrastructure: MR&R Dashboard.

The landscape of the American west has changed dramatically since 1902. To better capture the scale of these impacts and changes to the land, Reclamation developed an interactive web map where users can watch a visual time lapse of dams constructed over the decades. Users can even learn the story behind dams in a dynamic historical story map by clicking throughout the map and scrolling through short facts in the 120 Years of Infrastructure.

Reclamation has over 480 ongoing major construction activities across the west with investments totaling over $10 billion in support of our mission and programs to modernize and maintain Reclamation's infrastructure. Check out the Reclamation Active Construction Projects Dashboard to see just how many projects per region Reclamation is working on.

Future planning is critical to Reclamation's mission to deliver reliable and secure water for the American people. With support from other non-Federal entities, Reclamation is working to identify, categorize, and record major rehabilitation and replacement (MR&R) needs. This reporting is required by the Congress every other year and captures needs spanning 30 years to accurately reflect facilities' long-term major repair needs. Learn more about Reclamation's MR&R efforts by State or region with the MR&R dashboard which shows the estimated 30 year totals for MR&R activities in all western 17 states. In accordance with the 2021 Asset Management Report to Congress, there are 2,800 ongoing MR&R activities with an estimated total of $11.8 billion over the next 30 years.

It's Time to Get Outside with Mobile GIS

By Erin Bell
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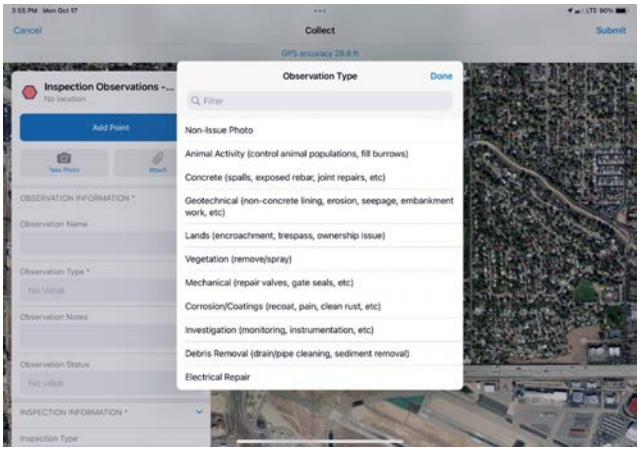
Is your office still working in the dark ages, using outdated Global Positioning System (GPS) devices to capture field data, or even worse, using a pencil and paper? With Mobile GIS, we can help you transform your office's most archaic field methods into an efficient workflow with a significant return on investment. Reclamation GIS is now providing field to enterprise solutions that allow you to capture important information about our assets, including inspection observations, condition assessments, and other field notes. Along with detailed attribute information, you can attach photos or documents to your GIS features that can be utilized in field reports, and there is so much more.

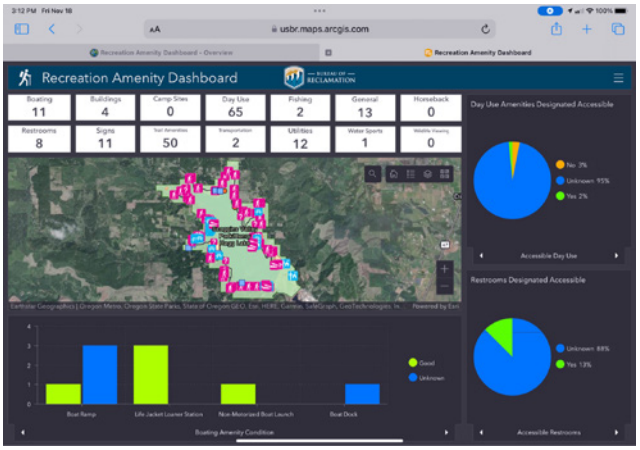
A mobile device is required to perform any field GIS data collection. The Department of Interior (DOI) allows the purchase of iOS devices only (i.e., iPhone or iPad) with an integrated line of service. Both IRM and supervisory approval are required to purchase a mobile device. Depending on the type of GIS data being collected in the field, GPS location accuracy and precision may be important. To improve the GPS accuracy, you can purchase external GPS receivers that connect to your mobile device via Bluetooth technology and can acquire GPS accuracy at the sub-meter level.

One concern many field workers have, is not having reliable network service in remote areas. There is no need to worry because the two Esri mobile apps available, ArcGIS Field Maps and ArcGIS Survey123, allow GIS data to be checked out for offline work before heading into the field and then synced back to the cloud after returning to an area where service is available again.

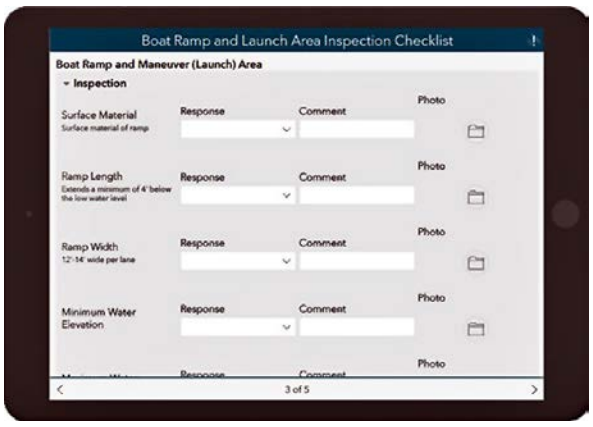
There are so many great use-cases for mobile GIS, so if you are curious or see a need for an upgrade to your office's field workflows, please contact Mobile GIS Development Team leads; Erin Bell (ebell@usbr.gov, CPN), Mike Potter (mpotter@usbr.gov, LCB), or your local GIS specialist for more information. Also, join the Reclamation GIS Community Teams Mobile GIS group for communications and resources.



Facility O&M engineers use ArcGIS Field Maps to capture water conveyance facility inspection observations. They note the type of observation, status of the observation, ancillary notes, and attach a photo of the issue observed. This information is used in their annual review of operation and maintenance (RO&M) facility examination reports.



This dashboard displays the completed recreation asset inventory collected at Scoggins Valley Park (Henry Hagg Lake) using ArcGIS Field Maps. The amenity information is used to contribute to national data calls, meet national recreation and accessibility standards, and apply for funding to repair or replace features.



Recreation planners and engineers in the Columbia-Pacific Northwest (CPN) Region use an ArcGIS Survey123 form to capture inspection details of boat ramps and launch areas. These inspections supplement the recreation site Comprehensive Condition Assessments performed on a five-year schedule.

Enterprise Asset Registry Project

By Dan Staton
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The Enterprise Asset Registry Project is a long-term effort aimed at helping Reclamation organize its asset information in a consistent, accessible way to allow asset management refinement and advancement in the future. The project originated as a solution to meet multiple needs, including the need for an up to date, verified working inventory of Reclamation assets with locational, functional, and engineering data at a consistent granularity. This is accomplished by coordinating with subject matter experts (SMEs) across Reclamation, developing requirements and processes for data stewardship, establishing an initial inventory, validating the inventory with local SMEs, and ultimately publishing asset class data and editor applications across Reclamation for over 18 asset classes.

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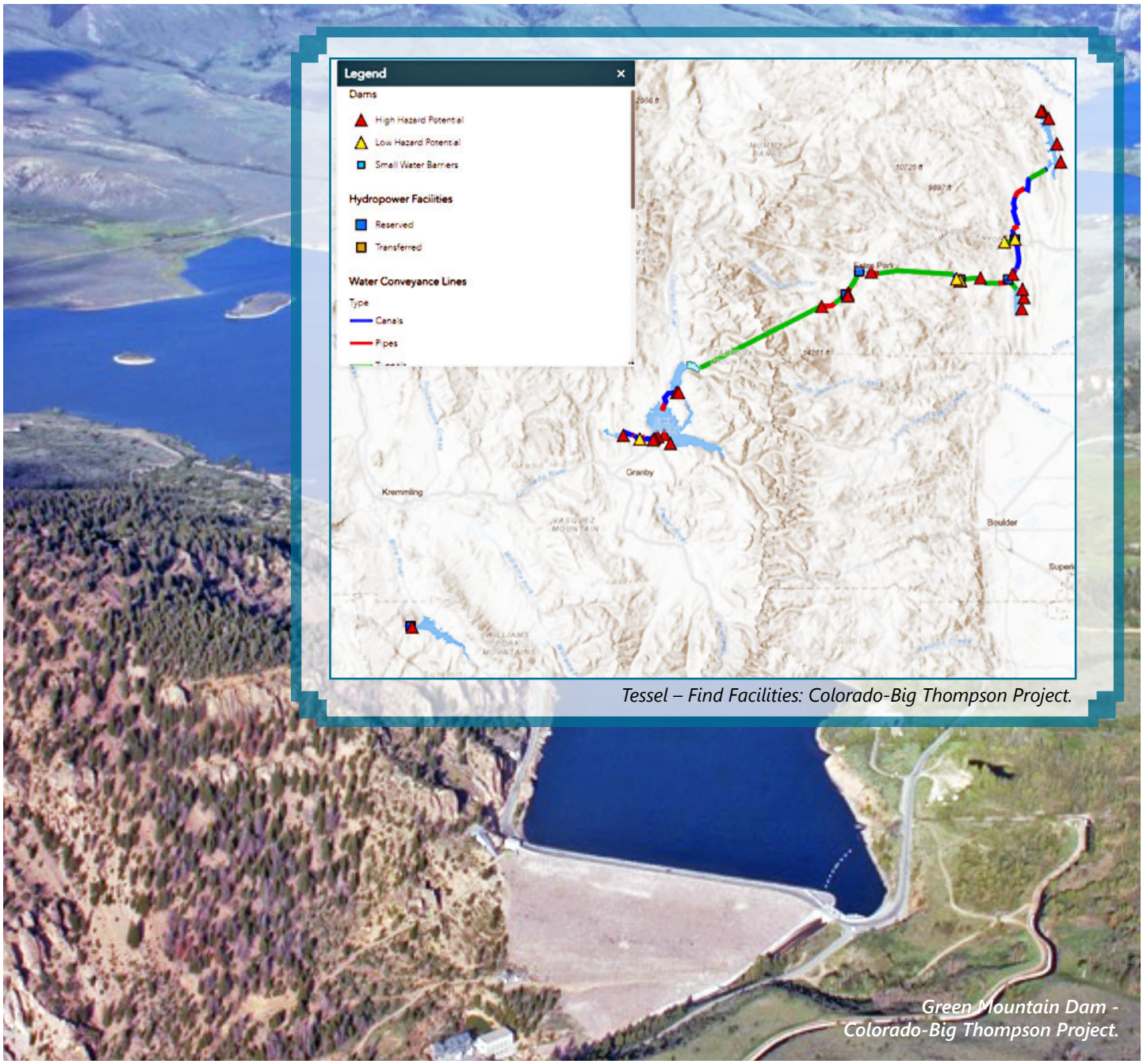

Tessel – Find Facilities: Colorado-Big Thompson Project.

Green Mountain Dam - Colorado-Big Thompson Project.

The Enterprise Asset Registry uses BORGIS as the data repository. One of the goals of the Enterprise Asset Registry is to provide a common data source for existing asset information systems to avoid duplicating asset information in numerous systems (e.g., Dam Safety Information System (DSIS), Power Resources Information System (PRIS), Capital Investment and Repair Needs (CIRN), Capital Asset and Resource Management Application (CARMA), Federal Real Property Profile (FRPP)). The GIS Program continues to be an instrumental part of the Enterprise Asset Registry.

The project began in FY 2021 and is scheduled to be completed in FY 2024. Reclamation is developing and deploying asset classes sequentially with three to five asset classes in various phases of development at any time. In FY 2021, the dams, urban canals, and reservoirs asset classes were completed. In FY 2022, the hydropower facilities, levees, and conveyance lines asset classes were completed. The conveyance lines asset class was a major undertaking for the agency. Conveyance lines consist of canals, pipes, tunnels, and flumes. Historically, Reclamation has reported approximately 8,000 miles of conveyance features based on past data calls. This has grown to almost 11,000 miles of Reclamation-owned conveyance assets via the Enterprise Asset Registry's regional review process. However, there is still considerable work to be done and likely thousands more miles to be added. Adding these missing facilities requires continued, long-term coordination between O&M and GIS staff within regional and their area offices.

Asset class	Estimated completion	Asset class	Estimated completion
Dams	Complete	Transportation	Complete
Urban canals	Complete	Bridges	
Reservoirs	Complete	Roads & parking	April 2023
Hydropower facilities	Complete	Boat ramps	April 2023
Conveyance lines	Complete	Trails	September 2023
Levees	Complete	PCCP	September 2023
Recreation Phase 1	April 2023	Buildings	December 2023
		Wells	August 2023
Phase 2	January 2024	Water treatment	January 2024
Pumping plants	April 2023	Conveyance points	April 2024
Transmission	September 2023	Fish structures	July 2024
Lands	September 2023	Misc. assets	September 2024

Also in FY 2022, work continued on the lands, bridges, and roads asset classes, and the recreation, boat ramps, pumping plants, trails, and transmission asset classes were initiated. The bridge asset class was finalized in early FY 2023 and the recreation and boat ramps asset classes will be going out for SME review in early FY 2023 with pumping plants, transmission, and trails coming later in FY 2023. In addition, the team developed a process to share completed asset information externally through the RISE. This allows select asset information to be shared externally for matters like Reclamation's 120th Anniversary Celebration or collaboration with partners.

As the Enterprise Asset Registry continues to grow, we encourage the Washington, Denver, regional, and area offices to use and promote this resource. All information can be found on the Enterprise Asset Registry website. The site contains links to Tessel where all completed asset classes can be viewed in a map by anyone in the Reclamation. There are also summary dashboards for each asset class that allow users to filter information to their area of interest. The Tessel-Find Facilities tool enables users to filter for all assets within a region or area office, authorized project, or maintained by a certain operating entity. Other information on the site includes documentation, recorded trainings, and editor applications for authorized SMEs in each region and area office.

Explore WaterSMART Data and Opportunities

By Avra Morgan & Adam Ricks
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> *"The data portal is a fantastic tool for seeing in real time where all of Reclamation's work and review processes translate into funded projects, and how those funded projects translate into more reliable water supplies for our partners. The Calendar and Dashboard functions on the data portal are 'must use' resources that I take advantage of every week."*
>
> *— Mat Maucieri, Assistant Deputy Commissioner, Operations*

Through WaterSMART (Sustain and Manage America's Resources for Tomorrow), the Bureau of Reclamation (Reclamation) works cooperatively with States, Tribes, and local entities as they plan for and implement actions to increase water supply through investments to modernize existing infrastructure and attention to local water conflicts.

The WaterSMART Program Data Portal is a new application to explore the WaterSMART Program data. The Data Portal integrates WaterSMART webpages, a funding opportunity calendar, Bipartisan Infrastructure Law (BIL) and program dashboards, and tools to explore data into a one-stop shop.

The homepage features continually updated WaterSMART news from Reclamation or Department of the Interior. Featured under the news are the major programmatic themes: Water Efficiency and Conservation, Title XVI Water Reclamation and Reuse, Drought Response Program, Climate Change and Applied Science, Restoration, and Planning — hover over a theme and the corresponding WaterSMART programs are presented with link to more information.

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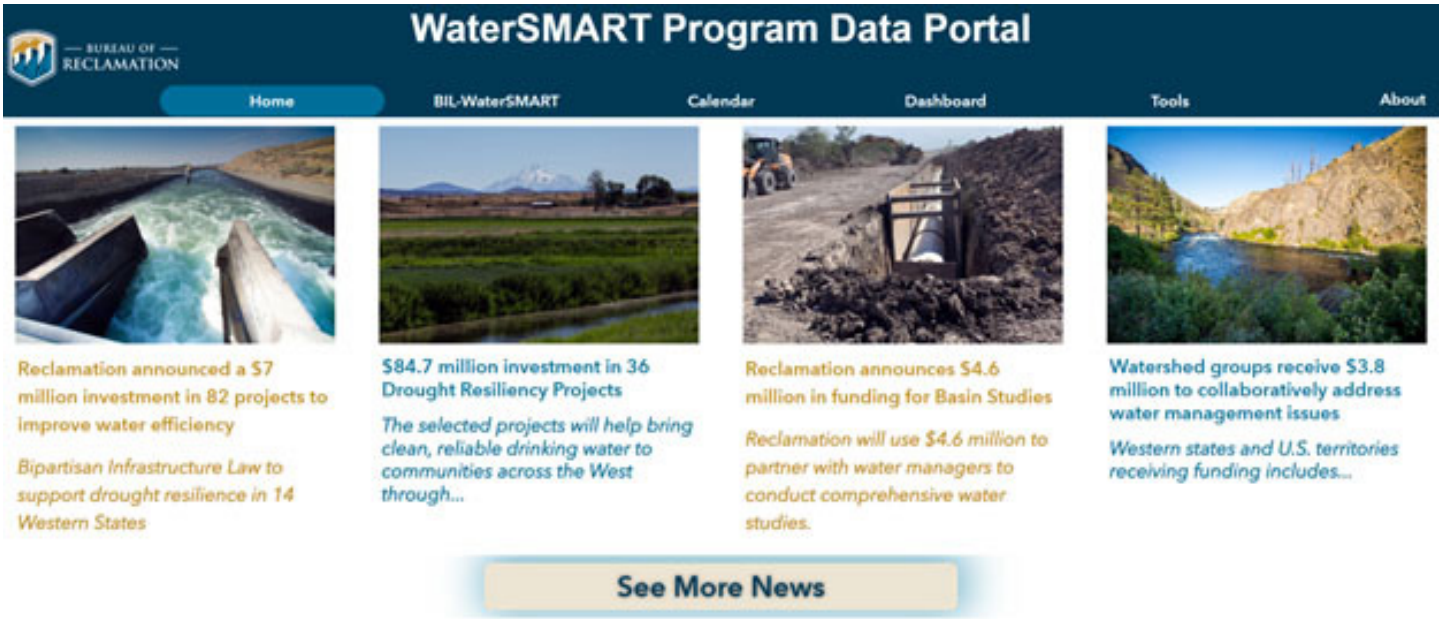
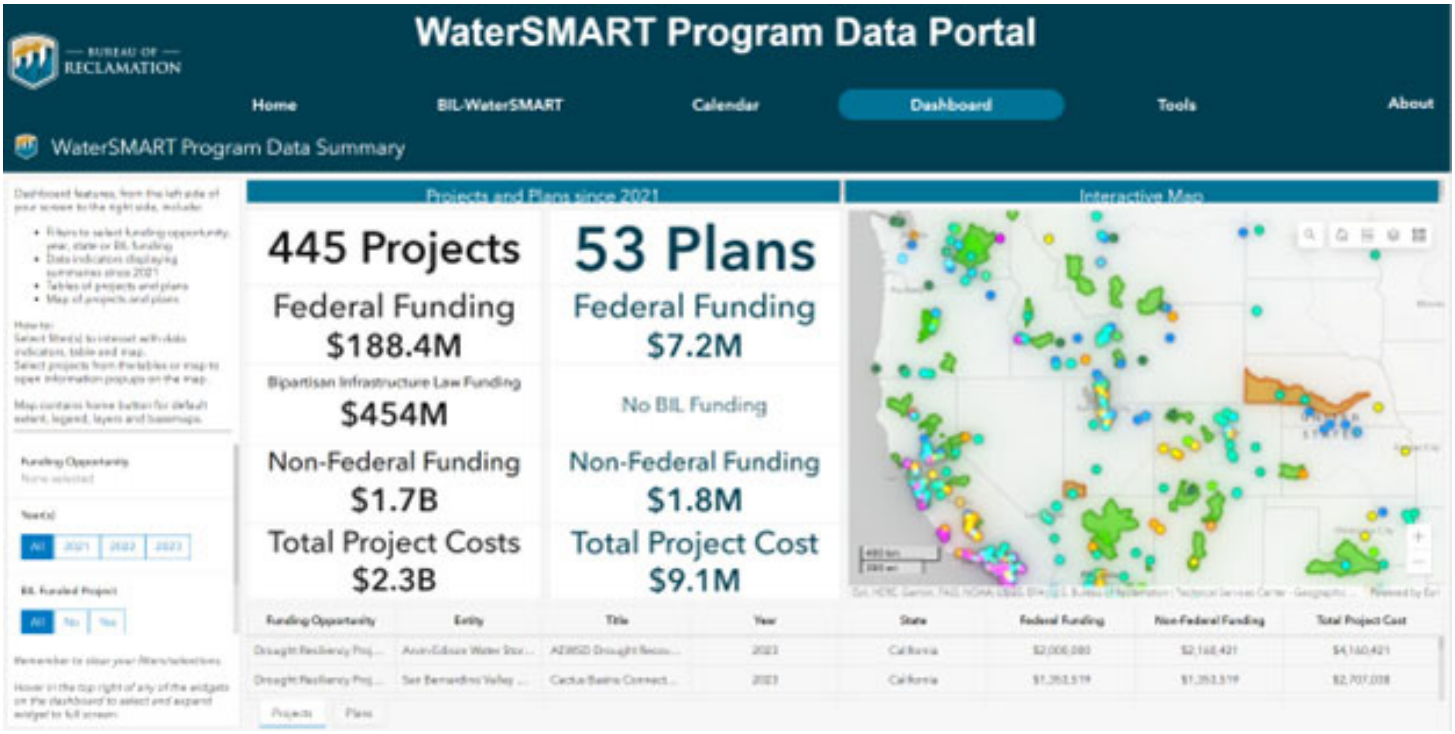


The WaterSMART Portal is a one-stop shop to explore program related data, funding opportunities, news, and more.



The Dashboard tab presents a WaterSMART Program Data Summary featuring WaterSMART projects and plans since 2021.

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The BIL-WaterSMART tab depicts programs identified to receive BIL investments, including WaterSMART Grants, Water Reclamation and Reuse, Large Scale Water Recycling, Desalination Projects, Cooperative Watershed Program, Aquatic Ecosystems Restoration and Protection Projects, and Multi-Benefit Projects to Improve Watershed Health. A chart depicts the funding spend-plans lower down these programs and shows the 2022 funding, 2023 funding, and the 2024-2026 funding amounts.

The Calendar tab highlights the Notice of Funding Opportunities Schedule. You can quickly see the upcoming funding opportunities and the status of past opportunities, whether applications are being accepted, under review, or have selections been announced.

The Dashboard tab presents a WaterSMART Program Data summary featuring WaterSMART projects and plans since 2021. The dashboard features filters to select funding opportunity, year, State, or BIL funded project. Data indicators displaying summaries since 2021 for number of projects and plans, Federal funding, BIL funding, non-Federal funding, and total project costs. An interactive map and tables show the projects and plans (view in the map or view the attribute information in the table); select filter(s) to interact with data indicators, tables, and the map; or select projects in the tables or map for information popups. The map contains a home button for default extent, legend, layers, and basemaps. For example, if you wanted to see the California projects, funded in 2022 and funding source was BIL—select Year 2022, BIL is Yes and State of California and the indicators; map and table will filter the data to your query and zoom the map.

The Tools tab features other Visualizations and Dashboards like the WaterSMART Data Visualization, Addressing Drought Across the West, Reclamation Celebrates 120 Years, and more.

Using GIS to Communicate Drought and Reservoir Conditions

By Ken Nowak
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Drought has always been a reality of the west and water managers have long contended with the associated hydrologic variability. However, in recent years, the frequency, extent, and intensity of drought has had record impacts on communities and economies across the Reclamation domain. To better communicate Reclamation's efforts to manage and mitigate the impacts of drought, Reclamation's Addressing Drought Across the West web application was established in 2021. The site uses ArcGIS Experience Builder and focuses content on: Collaborations, Drought Actions, Current Conditions, and Climate Change. The site is the product of input from multiple offices and programs, brought to life by Reclamation GIS professionals. This article highlights the **Current Conditions** page and how those contents leverage GIS tools and capabilities to communicate reservoir operations data. The two components focused on reservoir conditions are a PDF map and an interactive ArcGIS Dashboard, both of which update daily.

The PDF map shows 12 major reservoirs or reservoir systems as teacup diagrams overlaid with the most recent U.S. Drought Monitor GIS layer. The map quickly shows current storage relative to capacity. It also shows the 30-year historical average storage for a given day as context for current conditions. The Major Reclamation Reservoirs map can easily be included in a presentation or printed for distribution at a meeting. The base map is created with an automated process using GIS tools and staff expertise. Teacups are generated using custom scripting that overlays those images on the base map and publishes it to the drought current conditions page. This highlights the value and potential of GIS tools and Reclamation staff capabilities.

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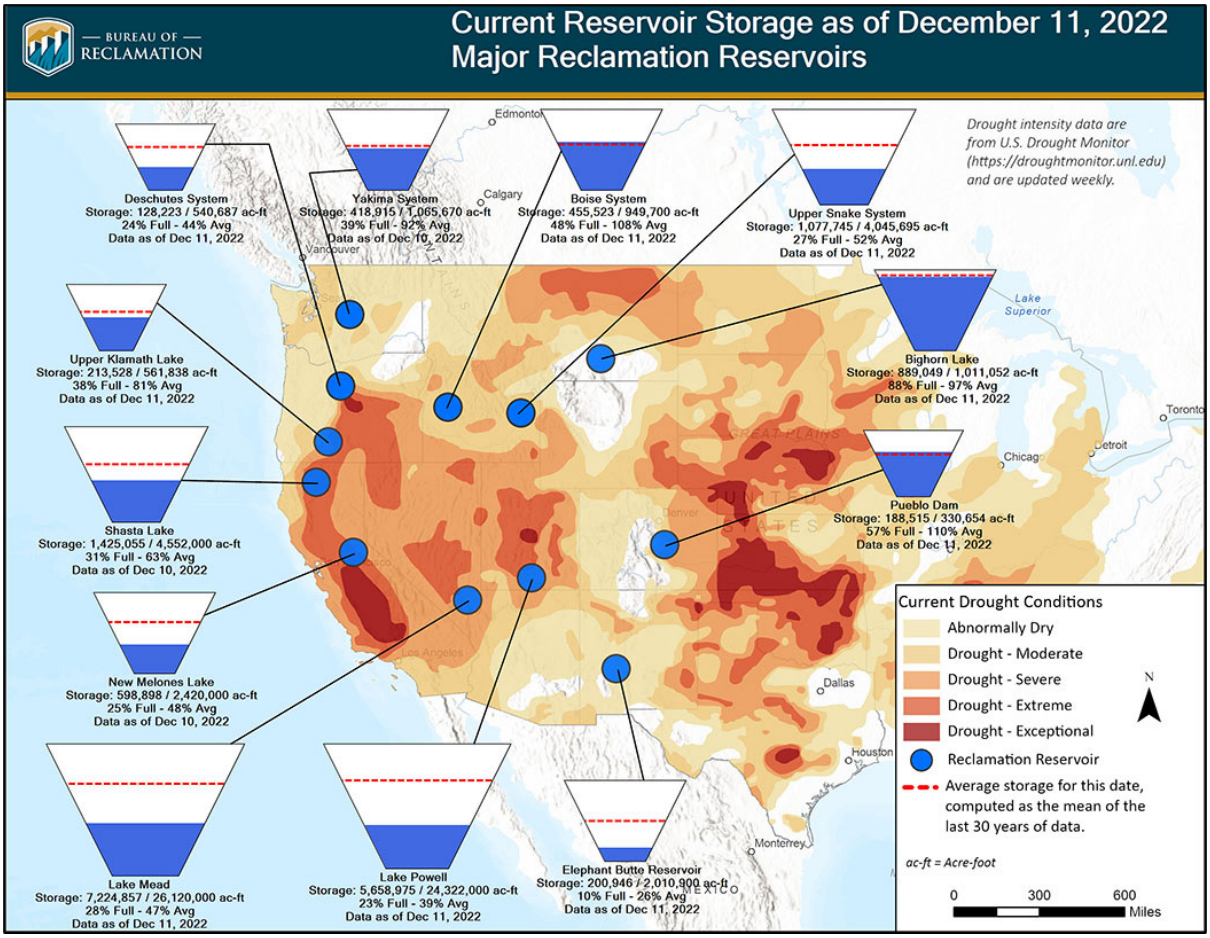

Summary map of current conditions for major Reclamation reservoirs or reservoir systems with drought monitor data.

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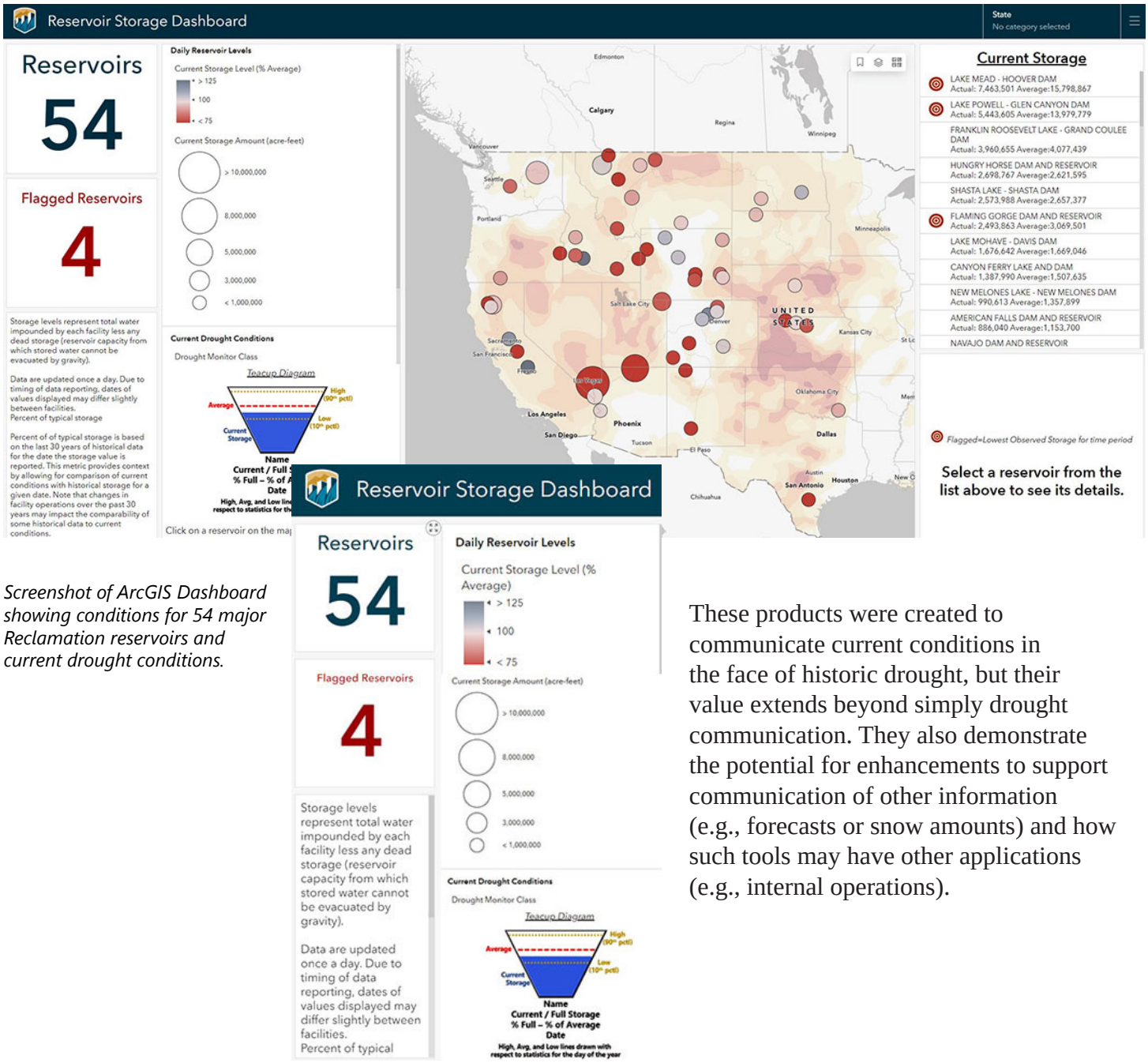
As a complement, the interactive ArcGIS Reservoir Storage Dashboard communicates similar current conditions at major Reclamation reservoirs. However, the interactive map allows for additional locations and information to be included that would not be feasible in a static map. Current conditions for 54 major Reclamation reservoirs are updated each day. The dashboard represents each location as a circle where the size of the circle represents the amount of storage, and the color indicates how current conditions compare to historical storage for the date (red indicates less storage than historical conditions and blue indicates more storage than historical conditions). Adjacent to the map view of the dashboard are highlighted reservoirs that are experiencing a 30-year low in storage for that date. When a location is selected, a pop-up appears with a teacup diagram, like the PDF map, but with additional distributional statistics on historical storage. The most recent U.S. Drought Monitor layer can also be toggled on or off, like a PDF map, this resource is the product of GIS tools and staff expertise, coupled with advanced scripting that automatically aggregates, processes, and formats reservoir storage data to locations in the ArcGIS Dashboard.



Screenshot of ArcGIS Dashboard showing conditions for 54 major Reclamation reservoirs and current drought conditions.

These products were created to communicate current conditions in the face of historic drought, but their value extends beyond simply drought communication. They also demonstrate the potential for enhancements to support communication of other information (e.g., forecasts or snow amounts) and how such tools may have other applications (e.g., internal operations).

Reclamation GIS Community

Reclamation Geospatial Advisory Council (RGAC)

Who are RGAC Coordinators and how do they serve Reclamation GIS?

By Barbara Simpson
bsimpson@usbr.gov (retired December 2022)

The Reclamation Geospatial Advisory Council (RGAC) provides subject matter expertise, coordinates with the Department of Interior (DOI) Geospatial Advisory Council and the RDC on various initiatives, develops policy and guidance, promotes geospatial data stewardship best practices, and presents training to support the Reclamation mission efficiently and effectively. Chaired by the R&D Office's, GIS program coordinator, the RGAC consists of GIS coordinators or data managers from each region and directorate who bring a cadre of expertise and knowledge to the table. RGAC collects and combines information from working groups and considers the best way to serve the Reclamation's current and future geospatial needs.

RGAC coordinators are vital to ensuring geospatial related activities and communications represent multidisciplinary perspectives from across Reclamation programs.

Region GIS Coordinator

- Coordinate GIS activities and services for the Region
- Coordinate with area offices and region programs on GIS data requirements and services
- Participate as a member of RGAC
- Participate as member of Reclamation Data Council (RDC)
- Communicate activities, guidance and policy related to RGAC, RDC, and the GIS Program to regional staff

GIS coordinators serve an essential role in each region. They maintain a large network within their region and Reclamation, along with Federal and State agencies. They serve as a central contact for GIS specialists and GIS end users; a coordinator can quickly identify and connect GIS experts for specific information and answers. Together, coordinators form a nexus that can serve as a link between various levels of technology and learned knowledge, between working groups and their projects, and present the latest geospatial capabilities with comprehension of geospatial policy and programs within Reclamation and DOI. Many of the coordinators also serve on various RGAC working groups, such as Mobile GIS development, Enterprise Data Management, Training and Communications, and more. Coordinators develop knowledge of how GIS is used, what issues there may be, and share these to the RGAC members. As a perspective: A day or week in the life of a coordinator can go like this, the morning starts with a team chat from a user needing help with a software application, another teams call from a staff member wanting to know how to use an iPad and collect data in the field, by afternoon the coordinator connects with a GIS specialist at the State to obtain information on the next hydrography update, a call to IT regarding a server issue, then the coordinator attends a workgroup meeting followed by an RGAC meeting.

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Meet your RGAC Coordinator:

Research & Development Office – GIS Program (Chair)

Lisa Johnson

R&D - Reclamation Data Program

James Nagode

R&D GIS Program – BORGIS

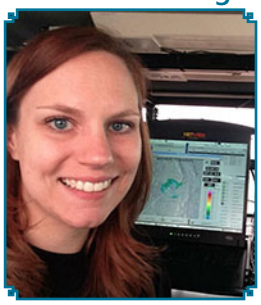
Greg Gault

R&D GIS Program – BORGIS

Adam Ricks

R&D GIS Program - GIS Training

Katie Schultz



Missouri Basin

Paul Martin (Acting)

Upper Colorado Basin

Troy Ethington

Lower Colorado Basin

Mike Potter

Columbia-Pacific Northwest

Michele Porter

California-Great Basin

Andrew Minks (Acting)

Dam Safety & Infrastructure Office

Dan Staton

Hydropower/Power Resources Office

Clark Bishop

Technical Service Center

Bruce Whitesell

Information Resources Office

vacant

Mission Support Office

vacant

Policy & Programs

vacant

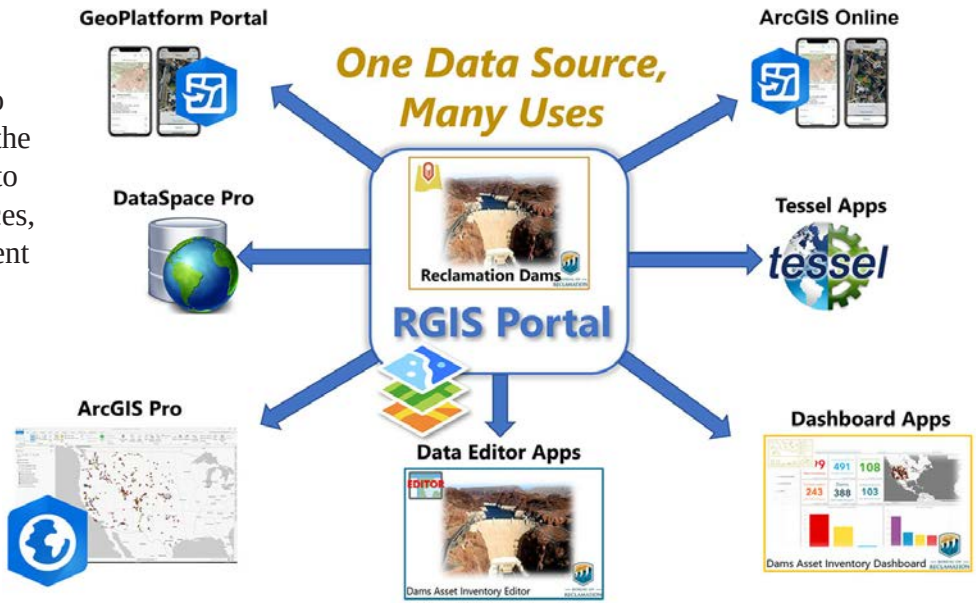
GIS Data Managers

Leveraging Local Expertise for the Greater Good with Enterprise GIS Data Management

By Adam Ricks
aricks@usbr.gov

Enterprise Data Management…does hearing those words make you want to channel surf? Stay tuned to hear how the art of data management is imperative to selecting the right technologies, services, and solutions and how data management can maximize the impact of your important work and save you time.

In Reclamation, enterprise geospatial data management starts with GIS data managers leveraging RGIS Portal (ArcGIS enterprise software technology). RGIS integrates and disseminates data from numerous geospatial data services allowing users to visualize information in novel ways to ask new questions (and answer old ones).



Enterprise GIS – One data source, many uses.

We learn more every day to improve data management processes, documenting the best practices that guide our enterprise geospatial data framework and streamline workflows. Best practices utilize data views to provide secure and repeatable management of Reclamation data layers. Data views facilitate different data editing workflows organized per audience and function to edit either tabular and/or geometry needs in a collaborative workspace. These workflows enable Reclamation's enterprise and regional GIS data managers to publish and manage data for Reclamation and share data accurately and securely among offices, regions, and programs. Multiple data views and workflows all from a singular data repository; delivering curated real-time data layers you can have trust and confidence in.

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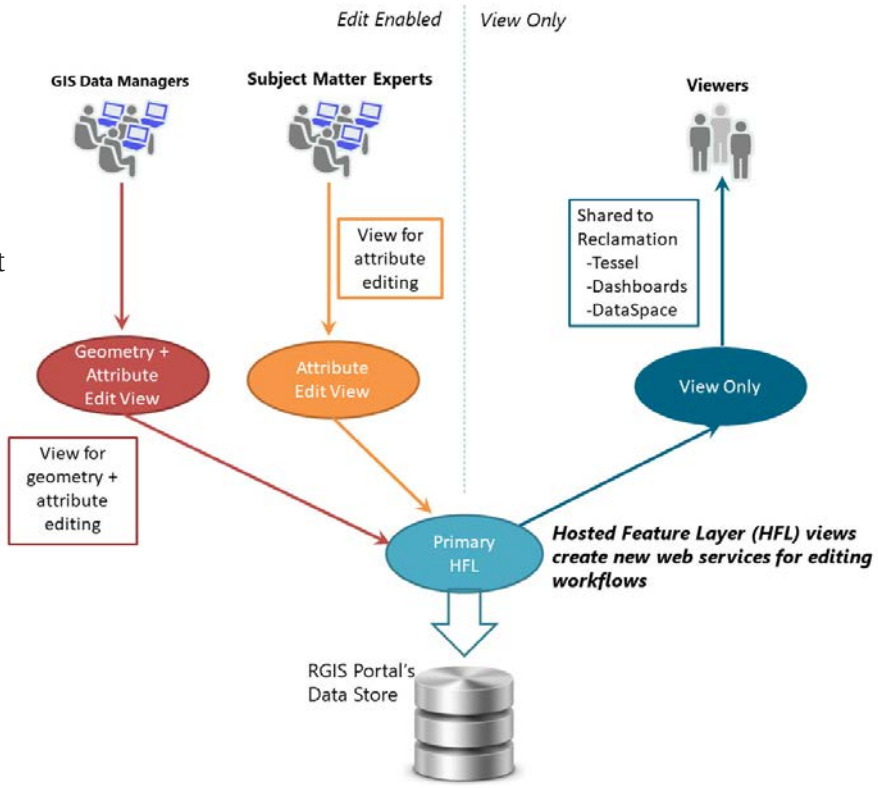

Enterprise GIS – One data source, many uses.

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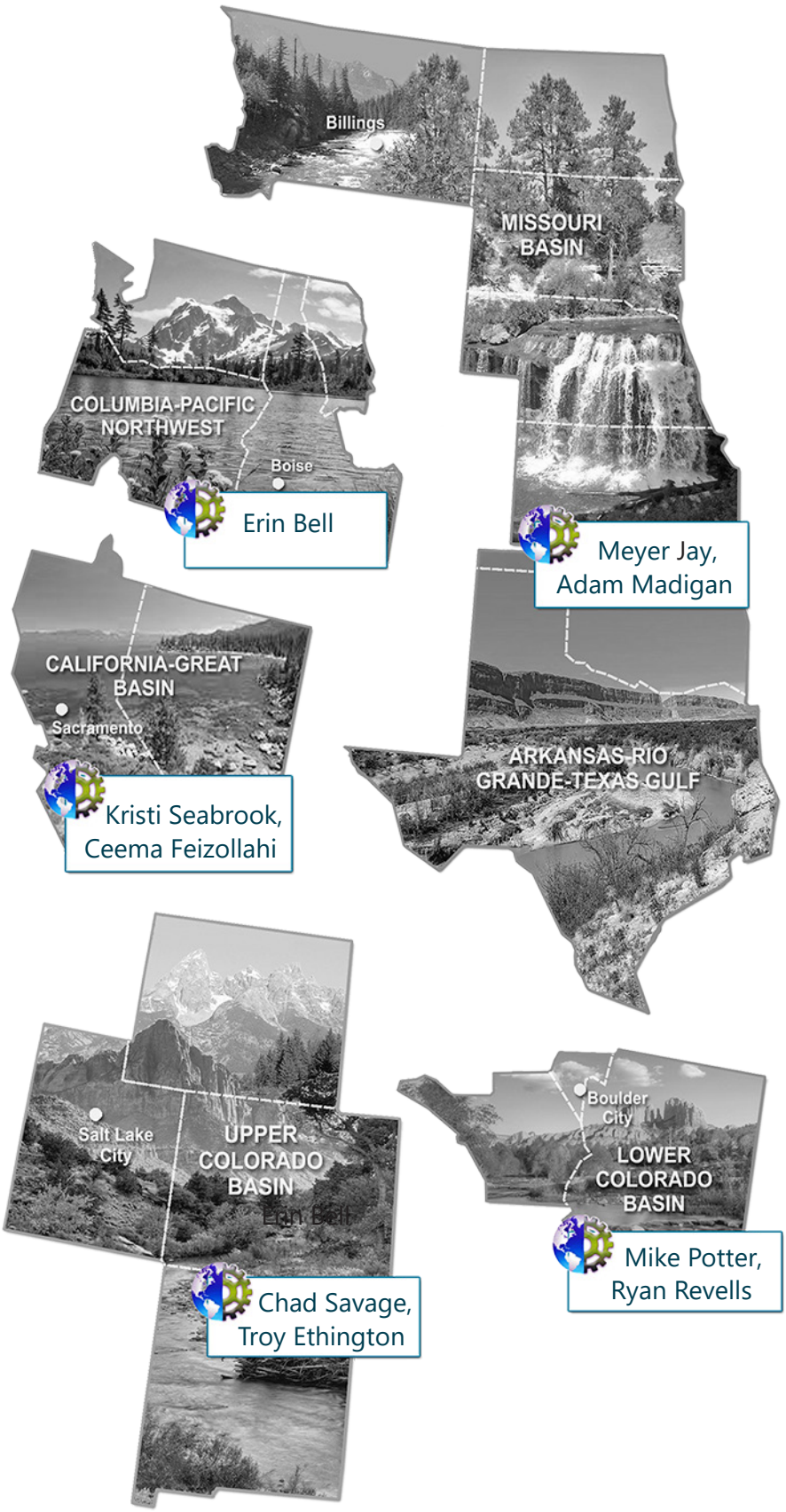
ArcGIS enterprise technology enables us to share data into other portals, like BORGIS GeoPlatform (see the *GIS as a Platform* article in this issue), and Reclamation's ArcGIS Online. Collaborating data views into GeoPlatform enables field-to-enterprise workflows, allowing workers in the field to edit geospatial data on mobile devices. BORGIS GeoPlatform in the cloud extends capability to external Reclamation partners to view and edit geospatial data services. Sharing data to ArcGIS online allows users to view, interact, and curate maps and apps for their projects, programs, and offices.

The scope of enterprise data management is Reclamation-wide; on the other hand, GIS data managers work locally. This data management strategy enables a diverse and distributed group of SMEs from across Reclamation to collaboratively develop data with data managers. They know their offices, regional, and program activities, and are best suited to integrate the standards, best practices, and procedures of data management into their workflows. GIS data managers support SMEs to share their context-rich and tacit knowledge from the local to the region to all of Reclamation. GIS data manager engagement spreads the local knowledge from the field to the enterprise roll-up providing a unique view for Reclamation's leaders, managers, scientists, technicians, and engineers to draw new insights.

GIS data managers have supported forward progress of Reclamation geospatial data management demonstrated by the completion of seven asset classes (i.e., dams, reservoirs, and conveyance lines) since 2021, with several more in progress through the Enterprise Asset Registry Project. Momentum is building as additional data and maps to serve Reclamation's roll out quarterly (see the *Asset Registry Project* article in this issue).

Regional GIS data managers integrate local data and expertise into a Reclamation-wide platform, enabling web services for everyone in the organization.



Reclamation GIS Systems

BORGIS and BORGIS GeoPlatform

By Greg Gault
ggault@usbr.gov

'System' has always been in the acronym GIS. Today, a GIS not just a piece of software, it's a collection of mainstream information technologies assembled into a platform designed to support the storage, management, processing, analysis, and delivery of geospatial data. When combined with people and purpose, a GIS allows us to visually explore our world in the context of the complex relationships between features in the physical world around us and their characteristics, or attributes, in ways that enhance comprehension and understanding. In 2003, Reclamation developed and implemented an enterprise IT system — a collection of servers distributed in the Denver and region data centers hosting the ArcGIS Enterprise platform — named Bureau of Reclamation Geographic Information System (BORGIS), which has evolved to become the primary platform for geospatial data services and web mapping applications. In 2022, a companion system, BORGIS GeoPlatform, was implemented on DOI cloud hosting services. This new system realizes the concept of field-to-enterprise geospatial data solutions.

There are three enterprise GIS platforms available to Reclamation staff. From a GIS users' perspective, the choice of platform depends on the nature of the work. Contact your region's GIS data manager or region's GIS coordinator to learn more (see GIS Community articles in this issue).

In practical terms, the two systems support workflows in which Reclamation staff can use mobile devices to access and edit data in the field that, in near real time, can be viewed and used by staff and managers in the office. Further, BORGIS GeoPlatform opens the door to extending data maintenance workflows to Reclamation's operators and partners allowing them to directly collaborate and contribute their knowledge of transferred works assets, a mutual benefit.

There are three enterprise GIS platforms available to Reclamation staff. From a GIS users' perspective, the choice of which platform to use depends on the nature of the work. BORGIS serves as the foundation internal platform and shares data to the two external GIS platforms. A summary of the primary content and use of each platform is illustrated below. The best way to find out more about how best to leverage these platforms is to contact your Region GIS Data Manager or Region GIS Coordinator (see the Reclamation GIS Community articles in this issue).

Featured Faces

New GIS Program Coordinator
Lisa Johnson

lisajohnson@usbr.gov

Lisa joined Reclamation in the R&D Office late in FY2022 after coordinating the U.S. Geological Survey's (USGS) Protected Areas Database of the United States (PAD-US) and the Federal Geographic Data Committee, Federal Lands Working Group, for over a decade. Lisa is motivated to collaboratively define and communicate an inspiring, yet achievable vision for Reclamation GIS to meet needs and solve problems. She is proud to serve the American people with the talented, dedicated, and supportive professionals at Reclamation.

Lisa's education and work history focused on water resource planning, research, and management with GIS used as an essential platform to facilitate collaboration and decision-making. She earned a Master of Science and Bachelor of Science in Environmental Science from Washington State University with an emphasis in limnology, researching nutrient cycling and food web interactions between fish and plankton to improve lake water clarity. Lisa also worked for the Nez Perce Tribe in Idaho as a conference planner and technical writer, publishing subbasin management plans for the Northwest Power and Conservation Council. Her work with the U.S. Forest Service Rocky Mountain Research Station included coordinating with experts and synthesize the cumulative watershed effects of fuels management for National Forest Hydrologists and others.

In her free time, Lisa enjoys exploring Boise, Idaho (where she works remotely), through the eyes of her daughter Ashley (7). Mountain biking, rafting, hunting, walking dogs, gardening, and audiobooks also make her smile. Her favorite vacations are spent camping with her husband Eric, and Ashley, on their property near Deary, Idaho, or at the beach near Westport, Washington.

Featured Faces *–continued*

New Associate Chief Data Officer (ACDO)

Jeff Nettleton

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Jeff started in the Reclamation Chief Data Officer position in 2021, a new role and position for Reclamation. His goal in this position is to make data more useful, open, and accessible for all Reclamation employees, and for other agencies, stakeholders, and the public. Previous to this role, he served as the Klamath Basin Project, Area Manager, since 2016.

Jeff is a native of Colorado and received a Bachelor of Science in Civil/Geotechnical Engineering from the University of Colorado, Boulder, in 1984. He worked briefly in mining and consulting engineering prior to joining Reclamation's Technical Service Center in the Geotechnical Division, Embankment Dams Branch in Lakewood, Colorado, in 1985. Prior to his ACDO role, his career included design/analysis work at the TSC; project engineer for the Trinity River Restoration Program, California; manager of the San-Juan Chama Project, New Mexico; O&M and Engineering Division Chief for Reclamation's Dakotas Area Office, North and South Dakota; and Area Manager of the Klamath Basin Project, Oregon and California.

Jeff says that the greatest things about his Reclamation career are the interesting and diverse projects and the many wonderful and talented people. One of Jeff's favorite personal projects is applying the conservation and engineering principles learned throughout his Reclamation career to develop and protect riparian and wildlife habitat on their farm. He has built small dams to develop about half a mile of duck ponds and wetland habitat, planted food plots, and fenced out about 75 acres of riparian and creek habitat to benefit wildlife.

Jeff and his wife Jackie will celebrate 40 years of marriage in 2023. They have two grown children and two grandchildren - and their faithful lab Ranger. They enjoy the outdoors -- especially hiking, biking, beaches, hunting, fishing, working their farm, travel, and spending time with family and friends.

Featured Faces *–continued*

BORGIS Wizard
Gregory Gault

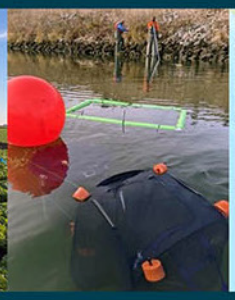
ggaualt@usbr.gov

Greg has over 25 years of experience with geospatial data and technologies working in the private, academic, and public sectors. He joined Reclamation as the Regional Geospatial Data Administrator in the Pacific Northwest Region in 2000. Within a few years, he had evolved his position into designing GIS systems and geospatial data solutions serving as the system architect and manager for BORGIS, Reclamation's enterprise GIS system. Greg's diverse background and experience began with a Bachelor of Science degree in landscape architecture (1984) at Texas A&M University, after which he spent 10 years managing projects that applied GIS to environmental studies for Dames & Moore, an international environmental and engineering consulting firm. Intrigued by how GIS could be used to analyze proposed changes in the landscape, Greg completed a Master of Science degree in renewable natural resource studies (1997) from the University of Arizona, minoring in GIS. He then landed the position of Director of the Digitally Integrated Geographic Information Laboratory (DIGIT Lab) at the University of Utah, where he created practical opportunities for masters students and PhD candidates to apply their knowledge and skills in the areas of spatial analysis, database design, application development, and geospatial system design.

Since joining Reclamation, Greg's primary goal has been to design, build, and continuously enhance the enterprise GIS systems; to provide a robust array of geospatial services and applications that can be applied in data solutions supporting the comprehensive scope business functions and operations that are Reclamation's mission. Greg balances his work with family life and a few passions that are more hands than mind. He enjoys driving and fixing cars, remodeling homes, and cooking. Growing up in a U.S. Air Force family inspired a love for travel and exploration. A passion he intends to indulge with his wife in the not too distant future. In the meantime, Greg is content hiking, mountain biking, and snowboarding in Idaho.

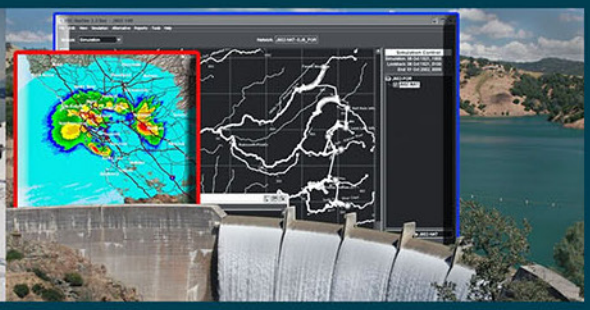
Research & Innovation






Emergency Management





Asset Management