Reclamation provides $1.2 million in grants to improve water modeling and forecasting to support water management

For Release: Aug 25, 2022

WASHINGTON – The Bureau of Reclamation is investing $1.2 million in eight external applied science projects that will develop tools and information to support water management. The projects selected include the development of modeling and forecasting tools, hydrologic data platforms and new data sets to inform decision-making.

"Having the accurate data and quality information is essential for water managers to make critical and timely decisions. We must ensure that we are supply smart," said **Deputy Commissioner David Palumbo**. "Applied science grants support improving water management tools so water managers can make informed decisions and improve their management of water, especially in times of prolonged drought and climate change."

Projects selected include $55,000 for the Agua Caliente Band of the Cahuilla Indians to develop a geospatial data platform to assess and manage Tribal resources. The Coachella Valley Water District will also receive $200,000 to update the Coachella Valley Salt and Nutrient Management Plan in partnership with seven other agencies by developing water management tools to model and forecast nitrate and total dissolved solids.

To view a complete description of all the selected projects, please visit https://www.usbr.gov/watersmart/appliedscience.

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For more than 100 years, Reclamation and its partners have developed sustainable water and power solutions for the West. These grants are part of the Department of the Interior's WaterSMART Program, which focuses on collaborative efforts to plan for and implement actions to increase water supply reliability.

Please visit the Applied Science Grant website for more information about the program.

BUREAU OF RECLAMATION

FY 2022 Applied Science Grants

Arizona

The Nature Conservancy, Verde River Basin Integrated Hydrologic Modeling Project

Reclamation Funding: $64,273 **Total Project Cost: $128,546**

The Nature Conservancy, in conjunction with the Yavapai-Apache Nation, will collaborate with watershed stakeholders to refine and improve an existing hydrologic modeling tool for the Upper and Middle Verde River Basins in Yavapai County, Arizona. The river faces tremendous threats from groundwater pumping, climate change, water policy, and agricultural water use. Without continued monitoring and management, the Verde River will not be able to sustainably support the biodiversity and people that depend on it. The project partners will develop and run modeling scenarios in the Verde River Watershed to promote comprehensive management and collaboration, simulating the cumulative impacts of land and water management choices and conservation strategies to better understand better the impacts of these management choices and changing conditions in the watershed.

California

Agua Caliente Band of Cahuilla Indians, Geospatial Data Platform to Assess and Manage Tribal Water Resources

Reclamation Funding: $55,000 **Total Project Cost: $110,000**

The Agua Caliente Band of Cahuilla Indians (Tribe), located in Riverside County, California, in conjunction with the Agua Caliente Water Authority, will develop an online Geospatial Data Platform (GDP) to store and display geospatial and time-dependent datasets including climate, groundwater, surface water, and water quality data for the Agua Caliente Indian Reservation. The Tribe will use the GDP to integrate the datasets with the Hydrogeologic Conceptual Model (HCM) to support 3-dimensional visualization and assessment based on available well logs, geophysical data, pump tests, and other related hydrogeologic datasets. The GDP tool will allow users to examine changes in the occurrence and movement of groundwater and water quality over time, thereby helping water managers make informed management decisions and promote sustainable groundwater resources.

City of Long Beach, Well Asset and Groundwater Management and Forecasting Tool Project

Reclamation Funding: $200,000 **Total Project Cost: $579,848**

Long Beach Water Department (Department), located in Long Beach, California, will develop and utilize tools and technology to maximize groundwater withdrawal sustainably and reliably. The project includes the development of the tools and procedures necessary to monitor wellfield operations effectively, assess critical factors affecting current and future groundwater production, and provide the foundations for proactive decision-making. Through completion of the project, the Department will improve access and use of water resources data, develop a digital water management tool to help provide short and long-term estimates of groundwater pumping to improve modeling and forecasting capabilities, and perform real-time analytics. Improved knowledge about groundwater will increase and improve the utilization of local water resources, maximizing allowable pumping rates from the aquifer, reducing water imports, and assisting in the sustainable management of groundwater resources.

Coachella Valley Water District, Mission Creek Subbasin Water Quality Model

Reclamation Funding: $200,000 **Total Project Cost: $402,000**

The Coachella Valley Water District (District), located in Palm Desert, California, will partner with seven other agencies in southern California's Mission Creek Subbasin (MCSB) to update the Coachella Valley Salt and Nutrient Management Plan by developing water management tools to model and forecast Nitrate and Total Dissolved Solids (N/TDS). The district's objective is to sustainably manage salt and nutrient loading in the basin to protect its beneficial uses. As part of this project, the district will characterize the N/TDS loading and current groundwater quality, delineate management zones and metrics to characterize beneficial use protection, develop a technical approach and tools to forecast N/TDS concentrations, and establish baseline scenario forecasts of groundwater quality conditions in the future. Upon completion of the project, the model and baseline scenario will be available for use by the partnering agencies to run future scenarios, quantify the relative effectiveness of future mitigation strategies, and ultimately manage water quality in the subbasin to support decision-making and resiliency. Partnering agencies include City of Coachella, City of Palm Springs, Desert Water Agency, Indio Water Authority, Mission Springs Water District, Myoma Dunes Mutual Water Company, and Valley Sanitary District.

Rancho California Water District, Integrated Groundwater Wellfield System

Reclamation Funding: $200,000 **Total Project Cost: $421,119**

Rancho California Water District (District), located in Temecula, California, will create better hydrologic data for the Murrieta-Temecula Groundwater Basin by developing a new water management tool for improving basin management efficiency. Through this project, the district will install new remote sensing equipment on the District's 26 wells within the Pauba Valley in southern California to generate more accurate and frequently available groundwater levels and

well-pumping efficiency data. This information will then be integrated into a new water management tool to assist Rancho Water staff in making decisions on maximizing the efficiency of basin management operations in terms of water production and maintaining the basin's health.

Santa Ana Watershed Project Authority, Cloud Seeding Technology Validation Protocol

Reclamation Funding: $100,000 **Total Project Cost: $200,000**

The Santa Ana Watershed Project Authority (SAWPA), a joint power authority with the support of the Inland Empire Utilities Agency, San Bernardino Valley Municipal Water District, Orange County Water District, and other local public agencies, in collaboration with the Desert Research Institute, will develop a standard protocol for evaluation of cloud seeding benefit to complement a planned pilot-scale program for weather modification (cloud seeding). This effort is expected to provide water agencies standard guidelines and procedures to be undertaken to ensure the benefits of increased precipitation from weather modification programs can be effectively quantified based on the weight of evidence approach. Once the project is complete, water resource agencies across the western United States will be able to use the protocol and validation tool to quantify the benefits of increased precipitation from weather modification, support increased water supply, and enhance stormwater capture.

Nevada

Southern Nevada Water Authority, Robust Updates to Advanced Lake Models to Inform Future Drinking Water Treatment Needs

Reclamation Funding: $193,085 **Total Project Cost: $540,365**

The Southern Nevada Water Authority will expand forecasting functionality in an existing water quality model for Lakes Mead and Mohave. As the drought continues, drinking water intakes may withdraw epilimnetic water, which may be warmer, higher in nutrients, and consequently more difficult to treat, threatening the water supply for over 2.2 million residents and 43 million annual tourists. The model will be used with future planning tools to understand potential changes to water quality before they occur, allowing water managers to take appropriate action to mitigate changes in water quality and maintain treatment and delivery efforts. The project will allow for improved long-term drought resilience in the Lower Colorado River Basin by expanding modeling capabilities leading to more robust projections.

Texas

Post Oak Savannah Groundwater Conservation District, Operations and Management Model to Enhance Sustainability and Climate Resiliency in Central Texas

Reclamation Funding: $200,000 **Total Project Cost: $550,080**

The Post Oak Savannah Groundwater Conservation District, located in central Texas, in collaboration with The Meadows Center for Water and the Environment at Texas State University (Meadows Center), will develop an operations and management model to be used by the district to help establish a comprehensive and consistent set of rules, policies, and strategies to address water resource management challenges in central Texas. Through application of the model, the district expects to enhance its existing capacity to balance conservation of groundwater resources, development of resources to meet growing needs and demands of the State, and protection of private property water rights. The district will generate model simulations to help inform management decisions related to issues including evaluation of permit renewals, long-term aquifer sustainability, improved climate resiliency, development of desired future conditions, curtailment of permits and/or production, and drought management.

Reclamation awards $3.1 million in grants to develop water data, modeling and forecasting tools and information for water managers

Media Contact: Peter Soeth 303-445-3615 psoeth@usbr.gov

For Release: Sep 2, 2021

WASHINGTON - The Bureau of Reclamation selected 20 projects to share $3.1 million in applied science grants to develop tools and information to support water management decisions. These projects in 11 western states include improved water data, modeling and forecasting capabilities.

"Water managers today need more accurate and reliable information to make the best water management decisions in a changing climate," said **Chief Engineer David Raff**. "Applied Science Grants are an important tool to assist water managers getting the information they need so they can make those informed decisions."

Projects selected range from $48,000 for the Big Bend Conservation Alliance in Texas to develop a common data management platform for shared aquifers to several receiving the maximum of $200,000. Texas A&M University-Kingsville is receiving $107,497 to develop a web-based tool to simulate post-wildfire hydrologic changes in Northwest Montana.

To view a complete description of all the selected projects, please visit https://www.usbr.gov/watersmart/appliedscience.

Applied Science Grants are for non-federal entities to develop tools and information to support water management for multiple uses. Selected projects must provide at least a 50% non-federal cost-share. Project types include:

- Enhancing modeling capabilities to improve water supply reliability and increase flexibility in water operations.
- Improving or adapting forecasting tools and technologies to enhance management of water supplies and reservoir operations.
- Improving access to and use of water resources data or developing new data types to inform water management decisions.

For more than 100 years, Reclamation and its partners have developed sustainable water and power future for the West. This program is part of the Department of the Interior's

WaterSMART Program, which focuses on improving water conservation and reliability while helping water resource managers make sound decisions about water use. To find out more information about Reclamation's WaterSMART program, visit https://www.usbr.gov/watersmart.

Applied Science Grant Project Descriptions

BUREAU OF RECLAMATION

Fiscal Year 2021 WaterSMART Applied Science Grants

Arizona

Salt River Project Agricultural Improvement and Power District, Continuous Predictive Hydrologic Model to Inform Salt River Project's Reservoir Operations within the Salt and Verde Watersheds

Reclamation Funding: $155,015 **Total Project Cost: $310,030**

The Salt River Project Agricultural Improvement and Power District in Arizona will develop a real-time reservoir operations model for the Salt and Verde rivers. The model will be used to predict changes to lake levels based on a continuous runoff simulation, enhancing the Salt River Project's ability to analyze and react to forecasted hydrological events in the watersheds that impact operations and infrastructure. The model will forecast streamflow at specified locations that directly impact reservoir operations, informing operations decisions and facilitating early responses to flooding caused by storm events or landscape changes created by wildfire. The Salt River Project is carrying out the project with the support of the Arizona Municipal Water Users Association and the cities of Tempe, Chandler, and Scottsdale.

California

California Water Data Consortium, Advancing an Open-Source Water Accounting and Scenario Planning Platform to Support the Successful Implementation of California's Sustainable Groundwater Management Act

Reclamation Funding: $200,000 **Total Project Cost: $544,031**

California Water Data Consortium, located in Sacramento, California, will partner with the California Natural Resources Agency, Environmental Defense Fund, California Department of Water Resources, State Water Resources Control Board, Sonoma County Water Agency, Pajaro Valley Water Management Agency, and multiple local water authorities and districts, to enhance and expand an open-source Water Accounting Platform to serve as a baseline groundwater accounting and tracking tool available to Groundwater Sustainability Agencies across California. Because California groundwater resources remained largely unregulated until the Sustainable Groundwater Management Act was passed in 2014, most local groundwater management agencies have limited data management infrastructure. This project will facilitate effective accounting and management of available water resources by integrating two established, open-source software tools to improve access to water elevation and extraction data, water

accounting systems, and scenario planning and visualization tools critical for effective groundwater management.

Lawrence Livermore National Security, Improved Recharge Monitoring for Enhanced Conjunctive Management of Ground and Surface Water

Reclamation Funding: $200,000 **Total Project Cost: $400,000**

Lawrence Livermore National Laboratory, located east of Oakland, California, will partner with the Omochumne-Hartnell Water District (OHWD) to improve monitoring of infiltration and groundwater recharge and provide real-time data accessibility to inform water management decisions at OHWD recharge project sites. The District will use conjunctive use of ground and surface water on agricultural lands to help address reduced summer flows that have limited the use of surface water diversions. The project partners will develop a model to simulate groundwater conditions, perform geophysical surveys, install new monitoring wells, incorporate electrical conductivity and soil moisture sensors into an online dashboard for data sharing, and improve estimates for river recharge potential. This new information will directly aid OHWD in the coordinated management of both surface and groundwater systems and guide the expansion of on-farm recharge infrastructure projects.

Social and Environmental Entrepreneurs, Inc., A Data Platform for Urban Water Efficiency in California

Reclamation Funding: $199,977 **Total Project Cost: $399,977**

Social and Environmental Entrepreneurs, a nonprofit organization that sponsors the California Data Collaborative, will develop the California Urban Water Efficiency Data Platform in collaboration with its member agencies, which include local and regional municipal water suppliers. The project location spans across California, with a primary focus on areas served by Urban Retail Water Suppliers, entities providing potable municipal water to more than 3,000 end users, or that supply more than 3,000 acre-feet of water per year. The 2012-2016 drought in California highlighted the need for a single data system to provide timely, accurate information about water production and demand to enable informed water demand management. The data platform will assist local water suppliers with tracking, quality controlling, and analyzing their water production and demand data. The platform will help agencies evaluate their current efficiency levels, identify opportunities for improvement, share data for regional collaboration, and report their data for compliance with California's water efficiency legislation. The software will be made accessible online using technologies common in modern consumer software.

Stockton East Water District, Eastside Groundwater Use Measurement Project

Reclamation Funding: $58,000 **Total Project Cost: $117,080**

Stockton East Water District, with the support of Eastern San Joaquin Groundwater Authority, North San Joaquin Water Conservation District, and Central San Joaquin Water Conservation District, will develop groundwater pumping and recharge volumes using proven, remote sensing techniques, based on evapotranspiration (ET) estimation from NASA's Landsat satellite imagery.

The agencies involved are part of the Groundwater Sustainability Agency responsible for implementing California's Sustainable Groundwater Management Act in the Eastern San Joaquin Groundwater Sub Basin. The Eastern San Joaquin Groundwater Basin is a high priority, critically over-drafted groundwater basin by the California Department of Water Resources. This project will implement the Geospatial Resources of Water Management for Agricultural Systems, an automated portal that uses Landsat imagery and weather data to produce daily, monthly, and annual ET data. The project will help the groundwater sub-basin account for groundwater demand, manage available surface and groundwater resources, allocate costs and document benefits of proposed groundwater banking, storage and conjunctive use projects.

Colorado

Grand Mesa Water Users' Association, Grand Mesa Water Users' Association Efficiency Project

Reclamation Funding: $200,000 **Total Project Cost: $440,000**

The Grand Mesa Water Users Association, located on the Grand Mesa in Delta County, Colorado, will produce digitized capacity surveys for 50 reservoirs. The reservoirs on the Grand Mesa were built to capture and conserve available water from snowpack for irrigation and municipal use. This project includes conducting reservoir capacity surveys using drone technology, installing water measuring sensors at each reservoir to monitor water level heights, and developing a water distribution control system with multiple functions such as an interactive map of the reservoirs, a database with data on the reservoirs, a dashboard showing water administration activity, and a forecasting tool. These tools will enhance the management of water supplies and reservoir operations.

Kansas

University of Kansas Center for Research, Inc., Incorporating Climate Uncertainty into Water Allocations in Kansas

Reclamation Funding: $97,822 **Total Project Cost: $195,648**

The University of Kansas, located in Lawrence, Kansas, will work with the Kansas Water Office (KWO) to include climate uncertainty in the water supply allocation procedure in the State of Kansas. KWO uses a water balance model across the system based 1950's climate, which was an extreme drought period in the state of Kansas, for determining water allocations. This project will develop a procedure for incorporating climate uncertainty into the water allocation process. The process will include quantifying climate uncertainty using historical climate and climate projections, using a hydrologic modeling framework to estimate the uncertainty in streamflow and evaporation, modifying the existing KWO water allocation model to use an ensemble of streamflow and evaporation inputs, and quantifying the uncertainty in future water allocations due to climate based on a Bayesian probabilistic framework. A more robust system accounting for climate uncertainty will allow the state to conduct long-term water supply planning and better anticipate the range of future resource conditions.

Montana

Montana Department of Natural Resources & Conservation, Enhancing Hydrologic Modeling and Water Supply Forecasting in Montana's Upper Yellowstone Basin

Reclamation Funding: $119,009 **Total Project Cost: $405,135**

The Montana Department of Natural Resources and Conservation will develop a water balance, precipitation-runoff hydrologic model, and water supply forecasting tool for the Upper Yellowstone Watershed in south-central Montana. Stakeholders and managers in the watershed are increasingly forced to balance growing demands for water with uncertainty in water supply, driven by climatic shifts towards earlier season snowmelt runoff, warmer temperatures, and persistent drought conditions. This complexity in water management has created tension throughout the community in recent years. This project will develop a modern hydrologic toolset to forecast water supply conditions, enhance water management decision-making, and inform drought planning efforts. Water supply forecasting will be enhanced by incorporating a physical precipitation-runoff technique, which will complement the existing statistical method. Evapotranspiration and crop consumption estimates will also be improved through the use of remote sensing data and existing modeling software. This method has been shown to improve modeling and forecasting accuracy, reduce error, and contribute to a better understanding of watershed hydrology.

Nebraska

Nebraska Department of Natural Resources, Application for Platte River Decision Support System (DSS) of Excess Flow in Nebraska Phase 4 - Water Management Tools and Stakeholder Outreach

Reclamation Funding: $200,000 **Total Project Cost: $400,000**

The Nebraska Department of Natural Resources (NeDNR), the primary surface water permitting agency in Nebraska, will implement the fourth phase of the Decision Support System (DSS) development for the Platte River to better utilize unappropriated water on the Platte River in the wake of increasing climate variability and its impact on water resources. A systematic approach for water allocation decisions during excess flow events increases efficiency, transparency, and accountability while simplifying the process and reducing the regulatory burden on customers applying for excess water use. The DSS will provide a vital tool to Nebraska's water managers to leverage opportunities to re-time water supplies through storage and groundwater recharge to support planning efforts to maintain a balance between water uses and supplies. NeDNR initiated DSS development in 2018 and will complete the Water Management Tools and Stakeholder Outreach Phase (Phase 4) during this project. This phase of the project will increase water supply reliability through forecasting within the Platte River Basin, support NeDNR water administration to avoid water allocation conflicts, and help support the management of the river, including the administration of water rights in periods of surplus water availability.

Nevada

Southern Nevada Water Authority, A Three-Part Modeling Effort to Quantify and Reduce Pathogen Concentration in the Las Vegas Valley Water Supply: Study Case in Las Vegas, Nevada

Reclamation Funding: $199,985 **Total Project Cost: $496,650**

The Southern Nevada Water Authority (SNWA), located in Las Vegas, Nevada, will create a Quantitative Microbial Risk Assessment (QMRA) model that characterizes risk from pathogen exposure in municipal drinking water. Some pathogens of concern for drinking water, including norovirus, adenovirus, and Cryptosporidium, are often present in such low concentrations that they are difficult to measure in finished drinking water, yet still pose a significant risk to public health. This project will use mathematical models to quantify and minimize risks from pathogen contamination in the drinking water system maintained by SNWA. The QMRA will be developed using the Monte Carlo model that samples pathogen concentrations and uses operational scenarios to quantify risk. This project will use an existing water quality model developed for Lake Mead to create distributions for travel time (i.e., pathogen die-off) and recycled water contribution (i.e., blending and dilution) as inputs for the QMRA. The output from the coupled Lake Mead Model and QMRA will inform training data for a machine learning model, increasing the model's ability to recognize and address impacts from potential risk events.

New Mexico

New Mexico Institute of Mining and Technology, NM Water Data Initiative: Improving Water Data Access for Modeling in The Middle Rio Grande

Reclamation Funding: $195,050 **Total Project Cost: $391,710**

The New Mexico Bureau of Geology and Mineral Resources (located at the New Mexico Institute of Mining and Technology), in partnership with the New Mexico Interstate Stream Commission (NMISC), will improve water data access in the middle Rio Grande region of New Mexico. The project will focus data on the area Otowi gage to the Elephant Butte reservoir, particularly related to data associated with Rio Grande flow and irrigation management. Management and operations of water in this region is one of the most challenging endeavors, as it impacts some of the largest population centers of the state, a large irrigation district, several tribal partners, municipalities, and an increasingly fragile river ecosystem. The project will enhance modeling capabilities for the NMISC and provide more reliable and direct access to real-time, near real-time, and historical water data. This project will improve access to and use of water resources data by connecting information from numerous federal, state, and local agencies. The project will produce a robust water data Application Programming Interfaces, with additional descriptive metadata. This project will benefit the 2019 WaterSmart Applied Science Project titled "Developing a Projection Tool for Otowi Index Supply and Elephant Butte Effective Index Supply."

Oklahoma

Norman Utilities Authority, Lake Thunderbird Predictive Lake Level Optimization Tool

Reclamation Funding: $154,781 **Total Project Cost: $309,563**

The Norman Utilities Authority, located in Norman, Oklahoma, will collaborate with the National Water Research Institute to develop a Predictive Lake Level Optimization Tool (PLOT) for the Lake Thunderbird watershed in Central Oklahoma. This new water-balance tool help water managers implement the planned lake augmentation system by providing support for the timing and duration of pumping. Effective management of a reservoir's conservation pool is critical to the survival of any surface water body during prolonged drought periods. The new forecasting tool for lake water-level will play an important role during these periods. The project will seek to establish proof-of-concept for a model that, in subsequent work, can link to real-time data collection, make forecasts of the lake's water balance and the augmentation needed. The PLOT forecasts will consider both near-term precipitation projections and statistical climatological trends to identify the preferred augmentation flows to optimize lake yield, conjunctive groundwater use, drought risk mitigation, and augmentation volumes. The project will further the regional goal of a sustainable, shared water reservoir by constructing a cloud-based tool to allow for transparent, smart augmentation flow pumping to Lake Thunderbird.

Oklahoma State University, Quantifying the Amount and Impact of Agricultural Water Use in the Upper Red River Basin

Reclamation Funding: $135,469 **Total Project Cost: $271,192**

Oklahoma State University, with the support of the Lugert-Altus Irrigation District, will quantify agricultural water use across the Upper Red River Basin, located in southwestern Oklahoma and the Texas panhandle, by combining geospatial analyses, remote sensing techniques, and ground-truthing. This basin has experienced significant drought impacts. During the 2011-2015 drought, water levels in Lake Altus dropped below the intake level of the main canal, halting water deliveries to irrigated farms for several years and devastating the local economy. The University will estimate the acreage of irrigated agricultural lands and identify the types of crops being grown, and apply and evaluate remotely sensed energy balance models to quantify actual crop water use and irrigation application on a distributed basis. This project will benefit water supply reliability by supporting robust water accounting.

Texas

Big Bend Conservation Alliance, Far West Texas Groundwater Districts Adopt Data Management Software and Develop a Data-Sharing Module to See the Bigger Picture of Shared Aquifer Health

Reclamation Funding: $48,000 **Total Project Cost: $96,000**

Big Bend Conservation Alliance, in partnership with Presidio County Underground Water Conservation District, Brewster County Groundwater Conservation District, and Culberson County Groundwater Conservation District, located in west Texas, will establish a common data management software platform in the region enabling them to share data on shared aquifers and to provide for better coordination of region-wide water management goals. The proximity of these counties to the Permian Basin, which is experiencing an explosion of growth in unconventional oil exploration, puts this region at substantial risk for groundwater depletion. The adoption of this software and data sharing module will provide an efficient way to monitor the aquifer levels, groundwater management models, and desired future conditions over time at the district and regional level and facilitate sharing this data with state agencies and other stakeholders.

Southwest Research Institute, Application of a geochemical framework for water resource management in a semi-arid landscape: Trans Pecos Texas, USA

Reclamation Funding: $200,000 **Total Project Cost: $319,998**

Southwest Research Institute, located in San Antonio, Texas, will work with the Middle Pecos Groundwater Conservation District and Reeves County Groundwater Conservation District to conduct a geochemical and statistical analysis to improve understanding of the hydrology of two interconnected spring systems in west Texas, the San Solomon Springs in Balmorhea, and Comanche Springs in Fort Stockton. The analysis and resulting database will be used to identify relative amounts of recharge from different source areas, potential changes in spring hydrochemistry resulting from land use practices, and recharge and discharge rates. Spring systems in arid and semi-arid environments are threatened by changes in land use and development, including irrigation practices and pumping for oil and gas development, as well as changes to recharge from precipitation. This project will help inform several ongoing efforts in the area, including efforts to reduce groundwater extraction to increase spring discharge and restore perennial flows.

Texas A&M University-Kingsville, Making Post-wildfire Hydrologic Change Assessments Efficient by Developing A Web-based Remote Sensing-integrated Hydrologic Modeling Tool

Reclamation Funding: $107,497 **Total Project Cost: $215,220**

Texas A&M University at Kingsville, Texas, in partnership with the City of Missoula, Missoula Valley Water Quality District, Clark Fork Coalition, the Nature Conservancy of Montana, Oak Ridge National Laboratory, USGS, and the US Army Corp of Engineers, will develop an intuitive web-based tool for efficient simulation of post-wildfire hydrologic changes by integrating remotely sensed data in a hydrologic model. Understanding the compound hydrologic effects of recurring fire, drought, and climate projections and their immediate and long-term implications on water management has become time-sensitive for communities across the western United States. This project will use the Clark Fork Basin in western Montana and northern Idaho as a testbed as wildfire is a major disturbance, making it an ideal study area for this project. This project will equip watershed managers and stakeholders with a user-friendly workflow to quickly post-process variables associated with fire and drought, integrate remotely sensed data into a hydrologic model, simulate and analyze the hydrologic flow and sediment transport across a large river network, and visualize input-output data through an interactive map interface.

The University of Texas at Arlington, Adapting Ensemble Inflow Forecasts to Inform Operations of a System of Reservoirs along the Brazos River in Central Texas

Reclamation Funding: $199,656 **Total Project Cost: $399,316**

The University of Texas at Arlington will partner with the Texas Water Development Board and the Brazos River Authority (BRA) to adapt and assess ensemble forecast products from the National Weather Service to support operational decisions at a system of reservoirs in the Brazos River Basin. The project will produce adapted forecasts that can be immediately implemented at National Weather Service (NWS) West Gulf River Forecast Center and climate index-constrained inflow traces to be delivered to BRA to assist with operational planning. The project will also yield operation-specific decision support tools for partnering agencies, including a forecast-based guide on periodic use of a portion of the flood pools for water supply storage and associated changes in flooding risk, a forecast-based planning tool for BRA's planning and operations, and a forecast-driven scenario tool for drought contingency planning. This project is being implemented in coordination with the US Army Corps of Engineers and the NWS West Gulf River Forecast Center.

Utah

Utah Geological Survey, Supplementing Estimates of Evapotranspiration - The Utah Flux Network

Reclamation Funding: $134,518 **Total Project Cost: $280,035**

Utah Geological Survey, located in Salt Lake City, Utah, with support from the Utah Division of Water Rights, the Utah Division of Water Resources, and the Central Utah Water Conservancy District, will establish a network of high-quality eddy covariance flux stations in Utah, including new and existing stations to provide ground-based evapotranspiration estimates. Water scarcity in Utah and the western United States requires effective management of this resource, which in turn requires reliable information describing and quantifying water availability, diversions, returns, and consumptive use. Allocations under the Upper Colorado River Compact are based on consumptive use, the portion of a water diversion that does not return to any surface stream or groundwater aquifer, including evapotranspiration. The evapotranspiration measurements and resulting model grids will be applied to measure consumptive water use by crops to facilitate water conservation efforts and depletion-based water rights management. Improved consumptive use measurements will also support water banking strategies for more efficient irrigation practices and preservation of instream flows, and will can be used in the development of watershed water budgets to improve watershed management.

Utah State University, WaterSMART: A platform for drought forecast in Intermountain West with the optimized multi-model ensemble approach

Reclamation Funding: $129,675 **Total Project Cost: $259,370**

Utah State University, located in Logan, Utah, will work with Bear River Association of Governments, the Salt Lake City Department of Public Utilities, and the Utah Division of Water Resources to develop an improved seasonal forecast that will be disseminated via a web interface supported by the Utah Climate Center. Reliable forecasts of drought conditions allow water resource managers, planners, and decision-makers to take proactive actions in mitigating drought impacts. The improved forecast will build on the North American Multi-Model Ensemble (NAMME) outputs, which provides climate forecasts up to 12 months ahead, but at a coarse spatial resolution. The project team will downscale the spatial resolution of the NAMME forecasts to a more useful geographic scale, and create a user-friendly web-based platform for disseminating drought forecast products through the Utah Climate Center for water resources managers and planners across the intermountain west. This project builds on several previous Reclamation WaterSMART grants that focus on predicting droughts and water shortages.

Western States Water Council, Western Water Rights and Aggregate Water Use Data Access and Analysis Tool

Reclamation Funding: $200,000 **Total Project Cost: $836,581**

The Western States Water Council, whose members include 17 western States and Alaska, will continue developing Western Water Rights and Aggregate Water Use Data Access and Analysis

Tool (WestDAAT), moving it from prototype to full functionality. WestDAAT will enable users to obtain consistent water rights data within its member states to support water resources planning and management. The WestDAAT Team will also work closely with Reclamation to coordinate and enhance its existing water rights database. Making water rights and aggregate water use information easily available will lead to more innovative applications that stretch scarce water supplies, improve drought management, facilitate state water rights administration, raise recognition of federal water right reservations, promote conservation and water marketing, highlight conjunctive ground and surface water use opportunities, and focus initiatives for watersheds, fish and wildlife habitat, and endangered aquatic species protection.

Reclamation invests $3.3 million for internal applied science projects to improve modeling, forecasting and data tools

For Release: September 11, 2020

Understanding and estimating sedimentation in rivers and reservoirs is one of the applied science tools that Reclamation will fund with this announcement.WASHINGTON - The Bureau of Reclamation Commissioner Brenda Burman announced that Reclamation will invest $3.3 million in 21 projects for WaterSMART Internal Applied Science Tools that build technical capacity within Reclamation.

"Information gained from these applied science tools will allow Reclamation and our partners to use best-available science for optimal water management under variable hydrologic conditions," Commissioner Burman said. "The projects announced today will help inform specific water management decisions throughout the West."

This program supports the Department of the Interior's commitment to meeting the President's Memorandum on Promoting the Reliable Supply and Delivery of Water in the West.

A project will assist New Mexico and reservoirs throughout the West. It will receive $199,764 to implement a known model to simulate regional climate and physical processes to estimate daily, monthly and annual evaporation across Elephant Butte Reservoir. These estimates will be compared to alternative estimates. The results will be used by the Albuquerque Area Office to support operations, to facilitate method comparison and identify future planning, operational and research needs on the topic. It will help with the development of alternative evaporation estimation techniques, production of daily evaporation time series at a reservoir and a broadening of weather prediction modeling capabilities.

Another project in Arizona will receive $200,000 to enhance precipitation and soil monitoring information in the Aravaipa watershed northeast of Tucson. Currently, there are only two weather stations within the watershed. The project includes the installation of two stations to monitor precipitation and soil moisture, which will better inform the Natural Resources Conservation Service forecasting models and United States Geological Survey surface water models. The work proposed in this project will help Reclamation and local partners predict flood risk, drought, erosion, and water quality concerns and better plan mitigation of these water management issues.

A third project will receive $120,000 to do predictive modeling to generate maps of invasive quagga and zebra mussel risk. The results will allow Reclamation to dedicate limited resources to high-risk locations and prepare facilities for potential control costs.

To view a complete list of projects, please visit www.usbr.gov/watersmart/appliedscience.

Applied Science Tools are part of the WaterSMART Program. Through WaterSMART, Reclamation works cooperatively with states, tribes and local entities as they plan for and implement actions to increase water supply reliability through investments to modernize existing infrastructure and attention to local water conflicts. Visit www.usbr.gov/watersmart to learn more.

Reclamation awards $3.5 million for 19 projects that will inform water management decisions

Projects in Arizona, California, Colorado, Idaho, Nevada, New Mexico, Oklahoma, Texas, Utah and Washington selected

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WASHINGTON – The Bureau of Reclamation selected 19 projects to receive $3.5 million in WaterSMART Applied Science Grants to develop tools and information that will inform and support water management decisions. These projects will be matched by more than $4.5 million, non-federal cost-match, supporting a total project cost of $8 million.

The projects selected are as follows:

- City of Sierra Vista (Arizona), Web-based Hydrologic Information Portal for the Upper San Pedro Basin, $99,000
- Mojave Water Agency (California), Integrated Model Development and Alternatives Evaluation, $150,000
- Pala Band of Mission Indians (California), Pala Tribe Innovative Practices in Hydrologic Data Acquisition and Use for Water Management, $55,120
- Point Blue Conservation Science (California), California Central Valley Wetlands Water Budget Tool Development, $150,000
- Rancho California Water District (California), Groundwater Modeling Enhancement for the Murrietta-Temecula Groundwater Basin, $195,000
- University of California Agriculture and Natural Resources (California), A California Crop Coefficient Database to Enhance Agricultural Water Demand Estimations and Irrigation Scheduling, $299,627
- University of California, Merced (California), Defining the Rain-Snow Transition Zone in the Northern Sierra Nevada, $299,976
- Colorado Water Conservation Board (Colorado), Arkansas River Colors of Water and Forecasting Tool, $150,000
- The Henry's Fork Foundation (Idaho), Predictive Hydrologic Modeling and Real-Time Data Access to Support Water Resources Management, $273,211
- Idaho Power Company (Idaho), Precipitation Modeling Tools to Improve Water Supply Reliability, $300,000
- Desert Research Institute (Nevada), Quantifying Environmental Water Requirements for Groundwater Dependent Ecosystems, $296,740
- New Mexico Institute of Mining and Technology, New Mexico Water Data Initiative and Regional Pilot Project for Improved Data Management and Decision Support Tool in the Lower Pecos Valley, $300,000

BUREAU OF RECLAMATION

2019 and 2020 WaterSMART Applied Science Grants

Arizona

City of Sierra Vista, Web-based Hydrologic Information Portal for the Upper San Pedro Basin

Reclamation Funding: $99,000 **Total Project Cost: $208,850**

The City of Sierra Vista, located in Southeast Arizona, will develop an interactive hydrologic information portal for the Upper San Pedro Basin. The Upper San Pedro Basin is solely dependent on groundwater and is currently experiencing an estimated overdraft of 5,000 acre-feet per year. The project will provide readily accessible hydrologic information to water managers, decision makers, researchers, and the public to improve spatial and temporal understanding of the groundwater system so that it can be adaptively managed. The City is partnering with multiple entities to conduct this project, including the 21-member Upper San Pedro Partnership, The Nature Conservancy, Cochise County, and the Arizona Department of Water Resources.

California

Rancho California Water District, Groundwater Modeling Enhancement for the Murrieta-Temecula Groundwater Basin

Reclamation Funding: $195,000 **Total Project Cost: $409,050**

The Rancho California Water District, located in Temecula, California, will implement a Groundwater Modeling Enhancement Project for the Murrieta-Temecula Groundwater Basin. The project will enhance an existing groundwater model through updates, refinements, and recalibrations to gain a more accurate representation of the groundwater basin's physical system and better information about current local groundwater availability and production capabilities. Additionally, the project will allow the District to determine the potential for the Murrieta-Temecula Groundwater Basin to be operated conjunctively as a groundwater bank/storage reservoir. This project meets an objective identified in the District's 2005 Integrated Resources Plan.

University of California Agriculture and Natural Resources, A California Crop Coefficient Database to Enhance Agricultural Water Demand Estimations and Irrigation Scheduling

Reclamation Funding: $299,627 **Total Project Cost: $732,213**

Through this project, the University of California Agriculture and Natural Resources, in collaboration with the California Department of Water Resources, will update crop coefficients to improve estimates of the amount of water consumed by the major water-demanding crops in California. Many of the crop coefficients currently used in California to determine the amount of water consumed by specific crops were developed in the 1950's and 1960's and were based on farming and irrigation practices that haves since

changed. Accurate estimates of agricultural water demands are crucial for water budgets, water allocation, storage and delivery, and on farm irrigation practices. This project will build prior work to improve crop coefficient information with broad, industry-wide participation and consensus, and will develop a web repository of the updated crop coefficient information and hold trainings and workshops to support its application.

University of California - Merced, Defining the Rain-Snow Transition Zone in the Northern Sierra Nevada

Reclamation Funding: $299,976 **Total Project Cost: $599,957**

The University of California in Merced, in collaboration with the California Department of Water Resources, will develop an online dashboard to provide accurate, real-time, information about rain-snow data in the Northern Sierra-Nevada to improve flood management and reservoir operations. Recent and large atmospheric river and more intense runoff events in this part of the Sacramento River Basin have demonstrated an immediate need for better on-the-ground information during storms. This project will help provide timely information for scheduling reservoir releases to optimize storage, while providing capacity to accept storm runoff, and will also enable better coordination of releases from multiple reservoirs in area. The system will initially be employed in the Feather and American River Basins, where the Department of Water Resources and other agencies have invested in an on-the-ground network of sensors that provide highly detailed hydrologic information. This will serve as a prototype that can eventually be used in other headwater basins.

Point Blue Conservation Science, California Central Valley Wetlands Water Budget Tool Development

Reclamation Funding: $150,000 **Total Project Cost: $300,000**

The Point Blue Conservation Science, located in Sonoma County, California, will partner with Audubon California and the Grasslands Groundwater Sustainability Agency to generate relevant wetland water use and management data to use in a wetlands water budget tool. To comply with California's Sustainable Groundwater Management Act, Groundwater Sustainability Agencies are required to design and implement Groundwater Sustainability Plans (GSP) to ensure that groundwater pumping and recharge are balanced. Wetlands have not been included in GSP in the past because of a lack of relevant hydrologic data for wetlands, and a lack of technical expertise, resulting in unknown quantifications of the impacts of groundwater pumping in wetlands. The project will remedy data gaps to allow water managers across the state to have accurate, robust estimates of wetlands water use. Point Blue will use the water budget tool to provide monthly estimates of wetland water use and recharge, which will facilitate more accurate groundwater management planning. The water budget tool will also facilitate compliance with the annual reporting and 5-year plan updates mandated by the Sustainable Groundwater Management Act.

Mojave Water Agency, Integrated Model Development and Alternatives Evaluation

Reclamation Funding: $150,000 **Total Project Cost: $300,000**

Mojave Water Agency, located in Apple Valley, California, will partner with the San Bernardino County Flood Control District to develop an integrated groundwater and surface water computer model and to expand and refine MWA's existing groundwater model by including critical regional surface water features. The Agency relies on conjunctive water management where surface water available from the State Water Project and from local rivers and streams are used to recharge the aquifers that are the primary source of

supply for this area. The model will enhance the Agency's ability to conjunctively manage its water resources, as well as improve the integration of operation of the Mojave River Dam for flood control with potential water banking and pumped storage initiatives.

Pala Band of Mission Indians, Pala Tribe Innovative Practices in Hydrologic Data Acquisition and Use for Water Management

Reclamation Funding: $55,120 **Total Project Cost: $111,011**

The Pala Band of Mission Indians, located in San Diego County, California, will use remote sensing technology and satellite imagery to acquire high-resolution hydrologic data and information related to land use and vegetation health conditions on the Reservation. This information will allow the Tribe to quantitatively assign a scale of drought and vegetation conditions which will allow resource managers to identify areas at risk for wildfire and allow the Tribe to compare historical data providing managers an early warning for drought. The project supports the Tribe's participation in San Diego's Groundwater Sustainability Agency.

Colorado

Colorado Water Conservation Board, Arkansas River Colors of Water and Forecasting Tool

Reclamation Funding: $150,000 **Total Project Cost: $300,000**

The Colorado Water Conservation Board, located in Denver, Colorado, will partner with the Colorado Division of Water Resources to increase functionality of an existing web-based forecasting tool that assists water users in making informed decisions related to water use and management. The enhanced forecasting tool will include modeling capabilities and will serve as a communications tool that will portray a "color of water" which will describe the destination, use, type, or purpose of water for the Arkansas River. The enhanced capabilities will allow for a more accurate capture of reservoir releases, increased efficiency, and a reduced potential injury to other users in the basin. The forecasting tool will be generically built to allow for adoption in other basins in Colorado.

Idaho

The Henry's Fork Foundation, Inc., Predictive Hydrologic Modeling and Real-Time Data Access to Support Water Resources Management

Reclamation Funding: $273,211 **Total Project Cost: $561,282**

The Henry's Fork Foundation will partner with the Fremont-Madison Irrigation District to develop hydrologic models and a web-based platform to improve access to hydrologic information within the Henry's Fork of the Snake River watershed, located in eastern Idaho and western Wyoming. In addition to competing water demands for irrigation and fisheries, new concerns about declining aquifer levels in the Eastern Snake Plains Aquifer have added to water management challenges in this watershed. This project builds on a WaterSMART basin study completed in 2015, identifying unmet water needs in the basin that total 350,000 acre-feet per year in dry years, based on the most recent calculations. This project will provide modeling tools and hydrologic data to enhance water management efforts to address the projected shortfalls, including demand-reduction, water marketing, and increasing reservoir carryover.

Idaho Power Company, Precipitation Modeling Tools to Improve Water Supply Reliability
Reclamation Funding: $750,000 **Total Project Cost: $2,890,000**

The Idaho Power Company (IPC), located in Boise, Idaho will partner with the National Center for Atmospheric Research (NCAR) to improve modeling capabilities to forecast winter precipitation and quantify the impact of cloud seeding. IPC uses cloud seeding as a tool to augment winter precipitation and subsequent water supplies as a source of water for hydropower generation. IPC serves more than 560,000 customers in southern Idaho and eastern Oregon and relies on hydropower for approximately half of the power supplied. Through this project, IPC and NCAR will build on a recently developed Weather Research and Forecasting model to improve capabilities to forecast winter precipitation and to better quantify the benefit of cloud seeding to increase water supply reliability. To date, program benefits have been difficult to quantify at a level that satisfies stakeholder, who would prefer benefit estimates by year instead of the multi-year average estimates currently provided. This project is supported by the Idaho Water Resources Board, which has included weather modification as a strategy in the State Water Plan and is partnering with IPC on a cloud-seeding program in the Upper Snake Basin and other parts of Idaho.

New Mexico

New Mexico Institute of Mining and Technology, Developing a Projection Tool for Otowi Index Supply and Elephant Butte Effective Index Supply
Reclamation Funding: $300,000 **Total Project Cost: $600,000**

New Mexico Bureau of Geology and Mineral Resources at New Mexico Institute of Mining and Technology will continue developing a water data delivery service known as the Water Data Initiative (WDI) in response to the passage of the Water Data Act. The goal of the WDI is to build a functional water data service that centralizes numerous water datasets, making them easier to find, more accessible, and with improved interoperability. The project will develop a pilot water-data decision support toolset that will link to a statewide Water Data Service which will enhance short- and long-term water management for irrigation, river flow for endangered species, interstate compact compliance, and other potential water management benefits in the lower Pecos Valley. The pilot project will then become a model for regional data integration and tool development for other regions of New Mexico for improved water resources management and decision making.

Office of the State Engineer/Interstate Stream Commission, Developing a Projection Tool for Rio Grande Compact Compliance
Reclamation Funding: $141,272 **Total Project Cost: $288,310**

The New Mexico Interstate Stream Commission, located in Santa Fe, New Mexico will explore new modeling approaches to develop improved long-range forecasting and streamflow projection tools to inform water managers in complying with the Rio Grande Compact. The Rio Grande is shared by Colorado, New Mexico, and Texas, as well as Mexico, and allocation within the United States is governed by the Rio Grande Compact. Increased temperatures and population growth have led to less predictable streamflows and increased water demands in this basin. This project will generate improved long-range forecasting approaches and a streamflow projection tool to assist water managers in the basin make informed water management decisions and to support Compact compliance.

Nevada

Desert Research Institute, Quantifying Environmental Water Requirements for Groundwater Dependent Ecosystems

Reclamation Funding: $296,740 **Total Project Cost: $593,728**

The Desert Research Institute, The Nature Conservancy, and the University of Wisconsin, in partnership with the Carson Water Sub-conservancy District, will use remote sensing, field data, and hydrologic modeling to generate scientifically defensible estimates of water requirements for groundwater dependent ecosystems in Nevada. Understanding the groundwater needs for ecosystem-dependent vegetation is critical in Nevada, where 20 federally protected species are reliant on such vegetation. This project will result in an interactive web application that can be used by resource managers to support decisions regarding endangered species requirements, maintenance of watershed health, and water rights administration. This project is broadly supported by 11 Federal, state, and local agencies with responsibility for water rights allocation, water and energy delivery, and species and habitat management.

Oklahoma

Oklahoma State University, Improving Seasonal Streamflow Forecasts for Irrigation Districts by Incorporating Soil Moisture Information Derived from Remote Sensing

Reclamation Funding: $88,476 **Total Project Cost: $176,964**

Oklahoma State University, with the support of the Lugert-Altus Irrigation District, the Kansas-Bostwick Irrigation District No. 2, and the Frenchman Cambridge Irrigation District, will incorporate remotely sensed soil moisture data with proven statistical techniques to create seasonal forecasts for rainfall-dominated regions of the Great Plains. The project will utilize remote-sensed soil moisture data, North American Land Data Assimilation System, and NASA's Soil Moisture Active-Passive Satellite. The seasonal forecast tools will inform surface water managers, support improved irrigation water supply management, and enhance the ability of reservoir operators to anticipate and respond to extreme events such as droughts and floods.

Oklahoma State University, Applying Unmanned Systems for Water Quality Monitoring

Reclamation Funding: $150,000 **Total Project Cost: $300,000**

Oklahoma State University, in partnership with the Grand River Dam Authority, will develop a monitoring system that will provide high-spatial resolution datasets of nutrients, sediments, and harmful algae blooms levels in Grand Lake using a variety of unmanned systems for improved decision support. The project will implement unmanned surface vessels for in-situ monitoring of bathymetry, nutrient and algal levels in surface waters, and measure the formation of harmful algae blooms and sedimentation; and interpret observed nutrient and sediment loadings using a watershed model. Upon completion of the project, an established system to identify, forecast, and respond to harmful algae blooms will be in place which will improve water supply reliability, drought management, endangered species requirements, and watershed health.

Texas

Gulf Coast Water Authority, Enhancement of Water Availability Models of the Lower Brazos Basin

Reclamation Funding: $30,000 **Total Project Cost: $60,000**

The Gulf Coast Water Authority is a wholesale water provider for customers in Galveston, Fort Bend, and Brazoria Counties in Texas, including petro-chemical industries in the region. Supply from the Brazos River, the Authority's primary water source, is impacted by both natural streamflow variations and water usage by upstream entities. Through this project, the Authority will enhance their existing water availability model to simulate Brazo streamflow losses, drought curtailment triggers, Brazos Water Master operation methods, and water accounting for upstream junior priority reservoir operations. This project builds on recommendations in the Authority's WaterSMART drought contingency plan by improving the Authority's access to hydrologic information critical to water management, which will allow them to improve drought management activities and water supply reliability.

Texas Water Trade, Modeling Aquifer Properties in the Contributing Zone of Comanche Springs Reclamation Funding: $150,000 Total Project Cost: $300,000

The Texas Water Trade, in partnership with the Middle Pecos Groundwater Conservation District, located in Fort Stockton, Texas will develop a groundwater flow model to increase the District's understanding of the impacts of seasonal groundwater pumping in the Edwards-Trinity Aquifer to spring flows at Comanche Springs in the City of Fort Stockton. This area has experienced conflicts and litigation between surface and groundwater users since the 1950's. Currently, rising demand for water for oil and gas extraction activities and demands from nearby municipalities are adding to these tensions. The District is evaluating the potential for restoration of perennial spring flows at Comanche Springs, exploring pumping in deeper zones in the Edwards aquifer, and developing a water marketing strategy to meet competing demands. This project will provide the District with critical information to further develop these strategies and to make water management decisions that optimize available water resources.

Utah

Utah State University, A Platform Toward an Early Warning System for Shortages in Colorado River Water Supply

Reclamation Funding: $91,078 **Total Project Cost: $91,080**

Utah State University, in partnership with Salt Lake Department of Public Utilities, Utah Division of Water Resources, and Utah Farm Bureau, will build a new platform for monitoring and forecasting Colorado River water supplies. Currently, early drought warning systems can be used to evaluate water supplies several years ahead, but few platforms monitor outlooks of water scarcity for the upcoming year. Using a decadal climate prediction system, the University will build on research showing that multi-year droughts in the basin originate from a specific ocean temperature pattern to develop a monitoring system for this type of precursor that can serve as an early warning for significant shortages in upcoming years. The project products will be made available to water managers through the project website on Utah Climate Center at Utah State University.

Washington

Washington State University, Quantifying the State of Groundwater in the Columbia Basin with Stakeholder-Driven Monitoring

Reclamation Funding: $299,940 **Total Project Cost: $673,247**

Washington State University will partner with the Department of Ecology's Office of the Columbia River to establish a long-term, stakeholder-driven groundwater monitoring network in Eastern Washington. Groundwater provides up to 35% of the region's irrigation water and provides drinking water for more than 1.3 million people. Over the life of the project, a minimum of 50 groundwater wells will be identified in areas with known or suspected groundwater decline and a groundwater monitoring program will be developed that includes field data collection and long-term data management. This information will help the Department understand how groundwater supplies have been changing over time and the connectivity of ground and surface water. Additionally, Department of Ecology staff will train local and interested stakeholders on how to collect groundwater level measurements and will supply users with the appropriate equipment to measure groundwater beyond the life of the project. The project will also establish baseline information and monitoring techniques for tracking groundwater levels. Results from this project, which will be made available to the public upon completion of the project, include GIS layers of aquifer extent and depth. The project is within Reclamation's Columbia Basin Project.