

# Snow Water Supply Forecasting Projects

## **Quantitative and economic evaluation of emergent snow products using next-generation statistical and AI-based operational water supply forecast systems: \$150,000**

This project will examine ways to integrate emergent snow measurement technologies (e.g. ASO lidar surveys) into data-driven water supply forecast (WSF) systems, which are the most widespread WSF approach in the western US. The aim is to quantitatively characterize the potential WSF skill improvement these monitoring technologies may be able to yield. Additionally, WSF improvements will be evaluated from an economic perspective to quantify benefits, identify potential trade-offs between technologies, and assess synergies between technologies.

## **Enhancement of San Joaquin Snow Monitoring Program: \$305,822**

Operations for Millerton Lake (Friant Dam) have utilized Airborne Snow Observatory (ASO) data for five consecutive years, pairing this remote sensing with snowpack modeling, improvements to ground-based stations, and an innovative approach to synthesizing data that is like Forecasted-Informed Reservoir Operations (FIRO). The project will augment planned ASO surveys for winter/spring 2021.

## **A Testbed for Harnessing and Benchmarking Snow Data Observations and Watershed Modeling for Water Supply Prediction: \$150,000**

This study will develop a snow data and water supply forecasting testbed to provide insight on optimal strategies for harnessing new snow datasets together with model-based WSF, and a platform for testing and benchmarking new data and methods as they become available.

## **Comparing Airborne Snow Observatory Data to Current River Forecasts in the Truckee-Carson Basins: \$450,000**

The Truckee-Carson Basins require forecasts that provide reliable information, no matter if conditions are wet, dry, or average. LBAO proposes using ASO to complete two snow-on LiDAR flights and snow dynamic modeling that results in a high precision streamflow forecast.

## **Quantifying the Value of the Natural Resources Conservation Service's SNOwpack TELEmetry (SNOTEL) Network to Water Supply Forecasting and Data Planning: \$150,000**

This study seeks to quantify the impact of the SNOTEL network on seasonal water supply forecasts developed by the CBRFC by comparing the skill of CBRFC's hydrologic model under different calibrations with systematic variations in the numbers and locations of SNOTEL stations used in the calibration process.

## **Partnership with NRCS to enhance in-situ snow monitoring network: \$300,000**

This project is a partnership between NRCS and Reclamation to collaboratively pursue network design, enhancement, and sensor evaluation across the Western United States. The project team will engage Regional staff for input on basins/areas of interest. Specifically, this work will involve enhancing existing snow course locations by adding a co-located SNOlite station.

### **Assessing the Utility of New Satellites to Advance State of the Art Snow Forecasting Capabilities: \$165,000**

This proposal aims to demonstrate and test the utility of integrated satellite-based altimetry data techniques to enhance snow and water supply forecasting. Specifically, this project will develop and test capabilities to measure SWE using InSAR data from the forthcoming NISAR satellite mission and demonstrate the utility of integrated satellite-based altimetry data techniques (photogrammetry from commercial sub-meter stereo imagery).

### **Evaluating new technologies to extend the temporal and spatial coverage of ASO: \$100,000**

This work builds on a previous project that explored information regarding spatial snow distribution from dozens of ASO flights in the Tuolumne River Basin. The analysis in the Tuolumne will be extended to evaluate potential benefits of adding stereo-optical snow depth data and spatial patterns from the Sierra Nevada Snow Reanalysis product. An additional component of this proposal is to expand the knowledge from the Tuolumne efforts to available ASO SWE and stereo-optical depth data in Colorado.

### **Exploring the Utility of CU-SWE Estimates for Water Supply Forecasting in the Colorado River Basin: \$300,000**

This project will work with the Colorado Basin River Forecast Center (CBRFC) and researchers at the University of Colorado to evaluate the utility of the spatially distributed CU-SWE snow product for improving water supply forecasts.

### **Baseline Airborne Snow Observatory (ASO) Flights for Sub-Basins with Poor Existing Coverage: \$250,000**

This proposal seeks to catalog, identify and fund ASO flights for sub-basins in snow-melt driven watersheds within all Reclamation Regions which have no or infrequent ASO dataset coverage. Basins will be identified based on considerations such as poor existing terrestrial snow data coverage associated with lack of SNOTEL stations due to wilderness classification.

### **Reclamation Snow Processing Server: \$100,000**

This project will build a central repository and database for importing, processing, and storing snow related datasets. The goal is to develop a flexible framework that can accept inputs from any gridded data source and process those inputs based on any user-defined zone or area for use in water supply forecasting and water management.

### **Integrated Modeling and Remote Sensing of Snow to Improve Runoff Forecasts in High Elevation Basins: \$125,500**

This project expands and enhances work currently underway that simulates SWE at a fine spatial resolution using the SnowModel snow evolution modeling system, and snow-covered area (SCA) data based on multispectral data from a combined Landsat (30-m resolution) and Sentinel 2 (10- to 20-m resolution) product is assimilated to constrain and guide the model simulation.