

HFF WaterSMART Applied Science Grant

Rob Van Kirk, Melissa Muradian, Christina Morrisett, Amber Roseberry, Heidi Blischke
Henry's Fork Foundation

Henry's Fork Watershed Council
March 14, 2023



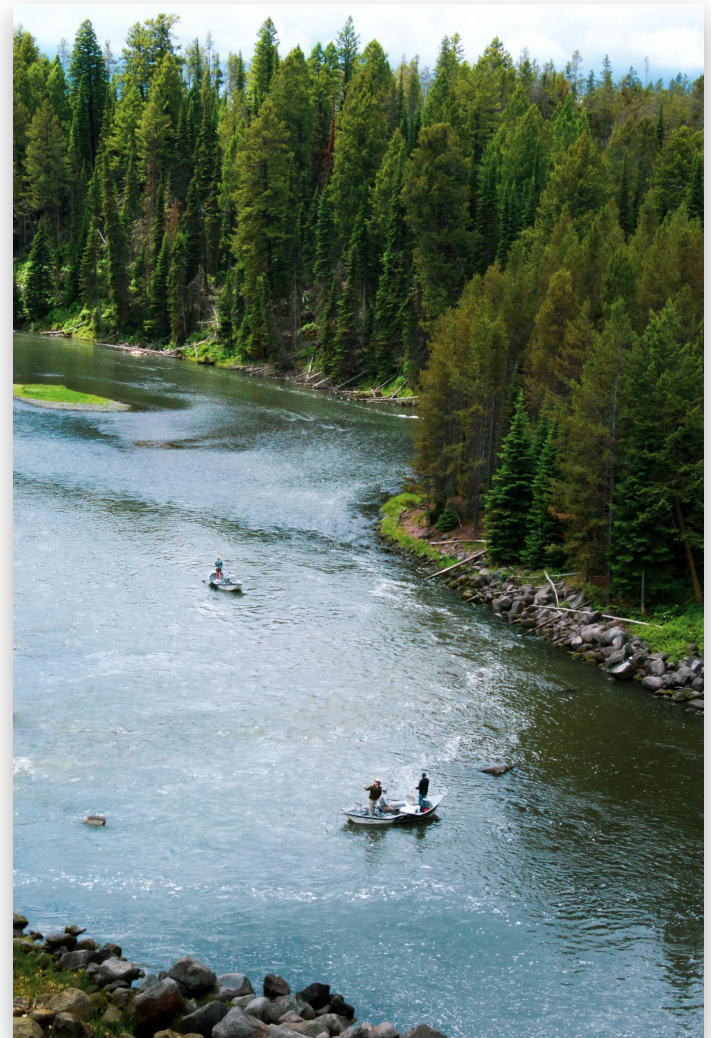
Outline

- Project orientation
- Goal and objectives
- Major deliverables
- Status updates
- Specific contributions
- Live demo



Project orientation

- USBR WaterSMART Applied Science grant:
“funding to non-federal entities for the development of tools and information to support water management for multiple uses”
- \$561,000 awarded to the Henry’s Fork Foundation for FY2021-2023
 - \$273k federal
 - \$183k HFF
 - \$105k third-party in-kind
- Project began October 2020
- Project is scheduled to complete September 30



Goal and objectives

- **Goal:** *Improve water-management precision to...*
 - Meet irrigation demand
 - Maintain fisheries
 - Recover aquifer levels
- **Objectives:**
 - Develop hydrologic models
 - Apply models to specific scenarios
 - Develop website for data and models



Major deliverables

Streamflow gages (3)

1. Buffalo River
2. Henry's Fork at Parker
3. Teton River at Harrops

Models (4)

1. Teton River GW-SW model
2. Lower Henry's Fork GW-SW model
3. Future scenario predictive model
4. Water-management optimization model

Data Website (1)

1. Hydrology data website for public use



Status updates

Where are we at with major grant components?

Status Update: Streamflow gages

- Buffalo is installed and working in real time
 - Rating curve calibrated to flows <450 cfs
- Parker and Harrops Bridge were installed and working in real-time in Nov. 2022, prior to winter removal
 - Rating curve construction in progress for each site



Status Update: Models

01

Teton Valley GW-SW Model

- Model components complete ✓
- Model is currently being calibrated to 2001-21 data

Status Update: Models

01

Teton Valley GW-SW Model

- Model components complete ✓
- Model is currently being calibrated to 2001-21 data

02

Lower Henry's Fork GW-SW Model

- Consists of response functions from ESPAM 2.2 applied to 1) Egin Lakes & MAR delivery canals and 2) lower watershed areas that could be used for flood irrigation as incidental recharge tool

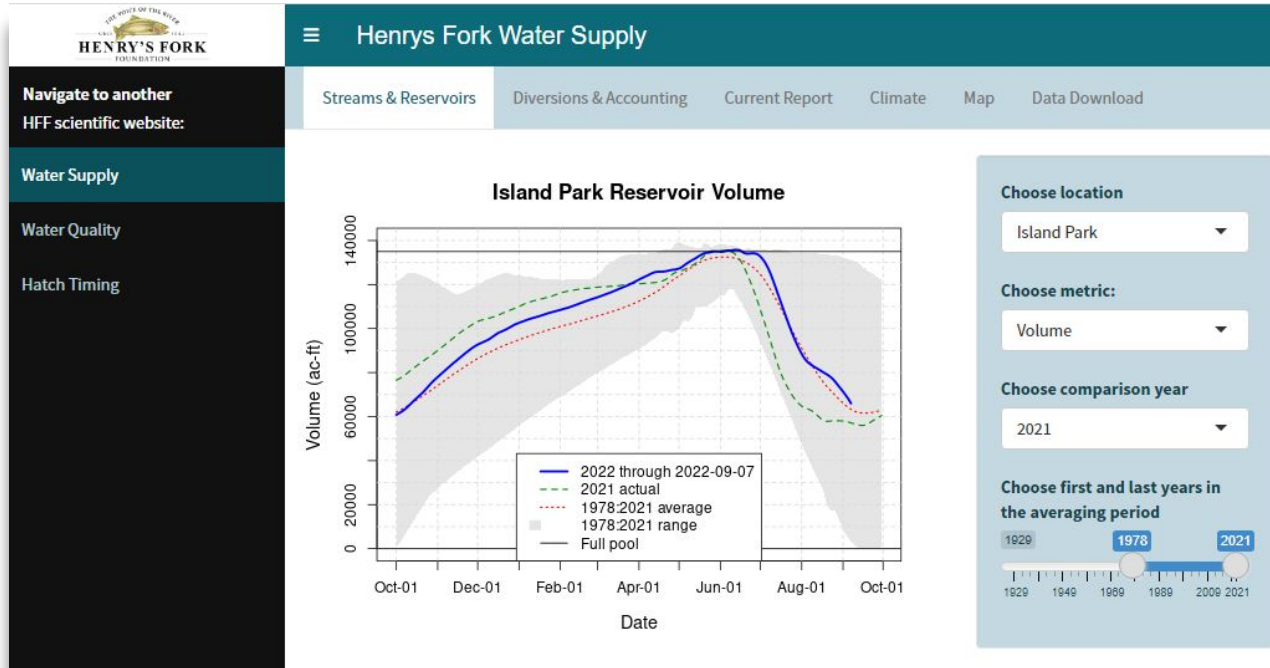
Status Update: Models

01	Teton Valley GW-SW Model	• Model components complete ✓ • Model is currently being calibrated to 2001-21 data
02	Lower Henry's Fork GW-SW Model	• Consists of response functions from ESPAM 2.2 applied to 1) Egin Lakes & MAR delivery canals and 2) lower watershed areas that could be used for flood irrigation as incidental recharge tool
03	Future Scenario Predictive Model	• 30-year projections of climate trends + streamflow ✓ • Daily-scale irrigation + reservoir management ✓ • Includes user-defined options for flow targets, exchange wells, out-of-basin needs, res. management

Status Update: Models

01	Teton Valley GW-SW Model	- Model components complete ✓ - Model is currently being calibrated to 2001-21 data
02	Lower Henry's Fork GW-SW Model	Consists of response functions from ESPAM 2.2 applied to 1) Egin Lakes & MAR delivery canals and 2) lower watershed areas that could be used for flood irrigation as incidental recharge tool
03	Future Scenario Predictive Model	30-year projections of climate trends + streamflow ✓ - Daily-scale irrigation + reservoir management ✓ - Includes user-defined options for flow targets, exchange wells, out-of-basin needs, res. management
04	Water-management Optimization Model	- Scaled back to winter IP Reservoir optimization - Predictive model contains a rough version of decision rules from stakeholder work sessions

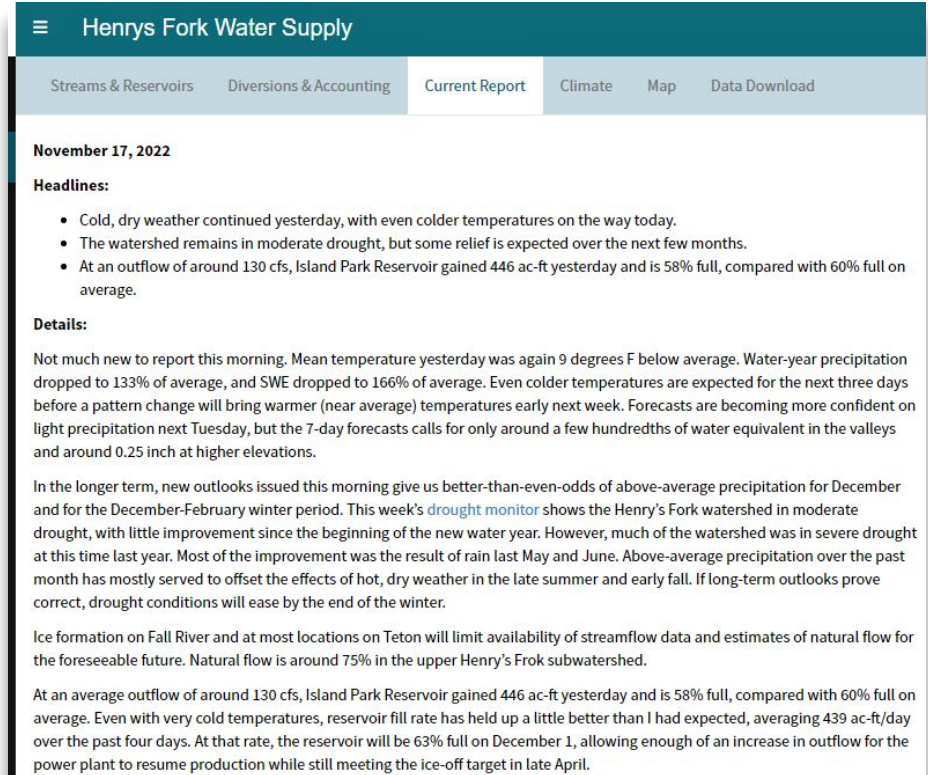
Status Update: Hydrology data website



- We have a functioning version of the user interface (Melissa will demo)

Status Update: Hydrology data website

- All components of water report, real-time stream gaging, and hydrologic data archiving are run every day semi-automatically from a local machine



The screenshot displays the Henry's Fork Water Supply website. The header is teal with a hamburger menu icon and the text "Henry's Fork Water Supply". Below the header is a navigation bar with links: "Streams & Reservoirs", "Diversions & Accounting", "Current Report" (which is highlighted), "Climate", "Map", and "Data Download". The main content area is white and features a date "November 17, 2022" followed by a "Headlines:" section with three bullet points. Below this is a "Details:" section with two paragraphs of text. The first paragraph discusses the current weather and precipitation, while the second paragraph discusses the longer-term outlook for the winter period. A third paragraph mentions ice formation on the Fall River and its impact on streamflow data. The final paragraph provides an update on the Island Park Reservoir's fill rate and the power plant's status.

Henry's Fork Water Supply

Streams & Reservoirs Diversions & Accounting **Current Report** Climate Map Data Download

November 17, 2022

Headlines:

- Cold, dry weather continued yesterday, with even colder temperatures on the way today.
- The watershed remains in moderate drought, but some relief is expected over the next few months.
- At an outflow of around 130 cfs, Island Park Reservoir gained 446 ac-ft yesterday and is 58% full, compared with 60% full on average.

Details:

Not much new to report this morning. Mean temperature yesterday was again 9 degrees F below average. Water-year precipitation dropped to 133% of average, and SWE dropped to 166% of average. Even colder temperatures are expected for the next three days before a pattern change will bring warmer (near average) temperatures early next week. Forecasts are becoming more confident on light precipitation next Tuesday, but the 7-day forecasts calls for only around a few hundredths of water equivalent in the valleys and around 0.25 inch at higher elevations.

In the longer term, new outlooks issued this morning give us better-than-even-odds of above-average precipitation for December and for the December-February winter period. This week's [drought monitor](#) shows the Henry's Fork watershed in moderate drought, with little improvement since the beginning of the new water year. However, much of the watershed was in severe drought at this time last year. Most of the improvement was the result of rain last May and June. Above-average precipitation over the past month has mostly served to offset the effects of hot, dry weather in the late summer and early fall. If long-term outlooks prove correct, drought conditions will ease by the end of the winter.

Ice formation on Fall River and at most locations on Teton will limit availability of streamflow data and estimates of natural flow for the foreseeable future. Natural flow is around 75% in the upper Henry's Fork subwatershed.

At an average outflow of around 130 cfs, Island Park Reservoir gained 446 ac-ft yesterday and is 58% full, compared with 60% full on average. Even with very cold temperatures, reservoir fill rate has held up a little better than I had expected, averaging 439 ac-ft/day over the past four days. At that rate, the reservoir will be 63% full on December 1, allowing enough of an increase in outflow for the power plant to resume production while still meeting the ice-off target in late April.

Status Update: Hydrology data website

- We have developed cloud storage and computing procedures needed to run all of this automatically from the cloud
 - HFF water quality website was transitioned a few months ago and runs near-flawlessly
 - The hydrology data website will be moved to the cloud implementation this summer





Specific contributions

**These products provide resources that are not readily available to all stakeholders*

Specific contributions

- Streamflow data from locations that have never been or are no longer gaged by USGS
 - Buffalo River
 - Teton River at Harrops Bridge
 - Henry's Fork at Parker
- Statistically estimated streamflow at other locations
 - Ex. Henry's Fork at Coffee Pot
- Natural streamflow estimates at numerous points around the watershed



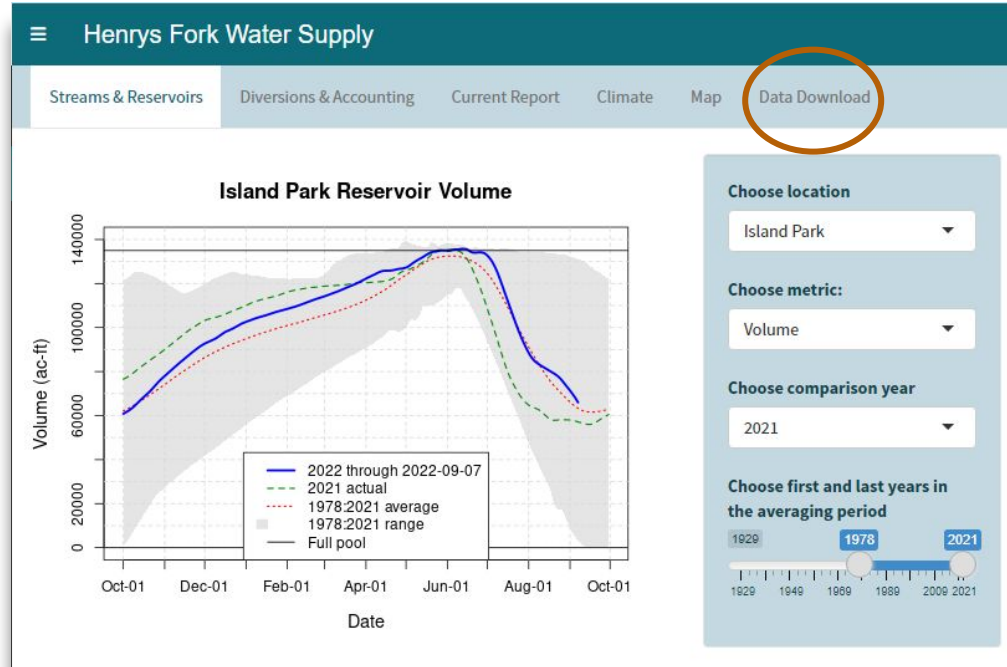
Specific contributions

- Key hydrologic information needed for precise management, for example:
 - Streamflow in Henry's Fork downstream of Consolidated Farmers canal
 - Reservoir gain/loss from/to precipitation/evaporation
- Predictive models with user input capabilities



Specific contributions

- Available for download: Water- and irrigation-year format data and summaries for a variety of streamflow, diversion, water-rights accounting, reservoir, and other hydrologic parameters



A scenic view of a river with rapids and a rocky shoreline under a blue sky. The foreground shows a rocky bank with smooth, rounded stones in various shades of brown, tan, and grey. The river flows from the left towards the right, with white water rapids visible in the middle ground. The far bank is covered in dense green trees and shrubs. The sky is a clear, bright blue with a few wispy clouds.

Live demo

with Melissa Muradian, HFF

Questions?

Contact: rob@henrysfork.org

