Conant Creek Canal lining, head gate remote control, and flow meters to benefit Conant Creek summer flows and Island Park Reservoir carryover

U.S. Bureau of Reclamation WaterSMART Water and Energy Efficiency Grant Proposal

November 3, 2021


APPLICANT
Henry's Fork Foundation
P.O. Box 550
Ashton, ID 83420

PROJECT MANAGER
Daniel Wilcox
Farms and Fish Program Manager, Henry's Fork Foundation
P.O. Box 550
Ashton, ID 83420
daniel@henrysfok.org
208-520-2137

D.2.2.3. Table of Contents

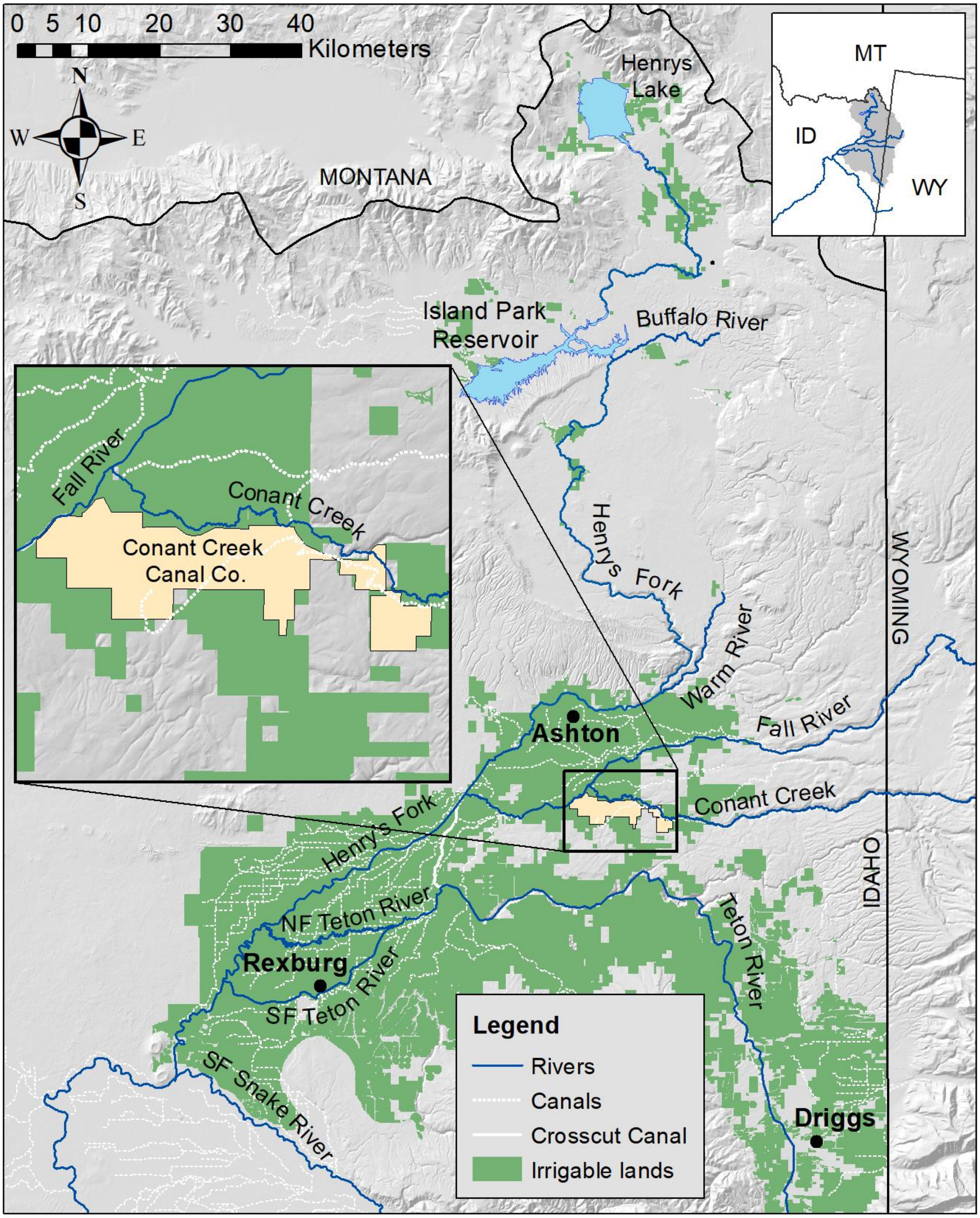
D.2.2.4. Technical Proposal and Evaluation Criteria

DI.2.2.4.1. Executive Summary

The Henry's Fork Foundation, a 501(c)3 nonprofit watershed conservation organization located in Ashton, Fremont County, Idaho, proposes to partner with the Conant Creek Canal Company and Fremont-Madison Irrigation District to improve existing irrigation infrastructure that diverts water from Conant Creek southeast of Ashton, Idaho. The goal of these efforts is to increase the efficiency and precision of water delivery to water users, saving 1,987 ac-ft/year of storage water in Island Park Dam, the crux of the Henry's Fork Watershed for water management and fisheries health. In particular, the project will line 5.7 miles of canal, change the point of diversion for water delivery, and establish supervisory control and data acquisition and automation (SCADA) equipment at diversion head gates and spillback locations. This project, in conjunction with on-the-farm Natural Resource Conservation Service (NRCS) water savings projects being simultaneously implemented on land under the Conant Creek Canal Company, is estimated to eliminate 2,850 ac-ft/year in canal seepage and increase flows in Conant Creek by 13 cfs (~ 39% increase during irrigation season); improving aquatic conditions for cold-water species in both Conant Creek, Fall River, and the Henry's Fork River. This project is anticipated to begin in Fall 2022 and be completed by Spring 2023. The proposed project is not located on a Federal facility.

D.2.2.4.2. Project Location

Conant Creek is located roughly 5 miles southeast of Ashton, Idaho in Fremont County. Conant Creek originates in the Teton Mountain Range near the Idaho-Wyoming border where it flows roughly 31 miles west before flowing into Fall River. The specific project latitude is 44.004875° N and longitude is -111.396346° W


0 5 10 20 30 40
Kilometers
N
S
W
E
MONTANA
Henrys Lake
Island Park Reservoir
Buffalo River
Henrys Fork
Warm River
Fall River
Conant Creek
WYOMING
IDAHO
Ashton
Rexburg
Driggs
Henrys Fork
NF Teton River
SF Teton River
Teton River
SF Snake River
Fall River
Conant Creek
Conant Creek Canal Co.
MT
ID
WY
Legend
Rivers
Canals
Crosscut Canal
Irrigable lands

D.2.2.4.3. Technical Project Description

All work on this project will be closely coordinated with the Conant Creek Canal Company, with the Henry's Fork Foundation completing the work on behalf of the Conant Creek Canal Company to meet mutually beneficial objectives.

Work to be completed:

Pre-Project Monitoring – Starting immediately, the Henry's Fork Foundation will build on its field measurements of the Conant Creek Canal system. This will be accomplished by researching and selecting a site to install a YSI Exo 3 sonde with probes installed to record pressure (depth), temperature, dissolved oxygen, conductivity, chlorophyll, and blue-green algae. These are standard measurements for the Henry's Fork Foundation water quality monitoring network. The YSI sonde will be located between the Conant Creek Canal diversion and the canal spillback site six miles downstream. After selecting the site, Henry's Fork Foundation staff will utilize a Teledyne StreamPro ADCP (acoustic doppler current profiler) to take up to seven stream flow measurements each year and utilize the information to build a stream flow rating curve for the site (combining the information with the pressure/depth probe on the YSI instrument). HFF has eight years of experience with the YSI sondes and three years of experience taking multiple stream and canal flow measurements each week utilizing the ADCP unit. HFF measures discharge using the standard method of two passes across the stream/canal in each direction.

Building on the monitoring and information base, a temperature and pressure logger will also be installed very near the mouth of Conant Creek on Fall River. A rating curve utilizing the same ADCP process will be established at this site.

Canal flow measurements utilizing the ADCP unit will also be obtained each time the HFF staff collect stream flow measurements on Conant Creek. This schedule will start in 2022 and continue through the life of the program for a minimum of five additional years although the stage recorders within the canal diversion and spillback will eventually take the place of ADCP measurements for the canal.

Phase 1 – HFF, coordinating closely with the Conant Creek Canal Company, hopes to gather two additional bids beyond what has been supplied by Golden West Irrigation Company for the lining of 5.7-6.0 miles of Conant Creek Canal utilizing 40 MIL HDPE 35-foot-wide canal liner. The current bid includes use of an excavator for installation and splicing necessary for the project. The bids would be obtained in the spring of 2022. Upon funding of the project, the Henry's Fork Foundation and Conant Creek Canal Company will contract with the bid winners to install the canal liner starting in October 2022. Weather permitting, the installation could continue through November and be completed in the spring of 2023. There is usually a period between spring melt at the worksite and high elevation snow melt that would allow for work prior to spring irrigation season. HFF and Conant Creek Canal Company will jointly sign all bids and contracts for the project.

Phase 2 – An important component of the project beyond the lining of the canal is the remote control of the headgate diversion and spillback. Previous WaterSMART funding provided to Fremont-Madison Irrigation District for installation of remote control headgates and real time monitoring have proven to be extremely important to the Henry's Fork Basin in precisely managing water supplies, benefiting both wild trout and farmers. Aging infrastructure is also a problem across the Henry's Fork Basin. Phase 2 of the Conant Creek Canal project would build new concrete diversion, headgate, and spillback structures while also providing real time flow information, including standardized staff gages. Additionally, a telemetered remote-control apparatus will allow the Conant Creek Canal Company watermaster to change diversion and spillback rates to meet demand on a much finer scale than past operations. HFF has installed numerous remote-controlled motorized gates in conjunction with FMID within the last few years. FMID will host the real time monitoring data on their SCADA system pending an agreement with the Conant Creek Canal Company.

The project partners would begin to solicit bids for design of the new diversion, headgate, and spillback in 2023 with the hopes of installing the new structures in the fall of 2023, although work may be pushed into 2024 based upon snowpack, the need for cofferdams, and the needs of the irrigators. The project partners have experience working with many engineering firms in the area.

Phase 3 – Critically important to the Henry's Fork Foundation is the on-farm component of this project. While the flow meters to be installed on the irrigation pumps are not directly on-the-farm, they provide a critical first step in determining how future management and agricultural practices can reduce consumptive use of water or allow for greater production utilizing historic amounts of water (no increase in irrigation). The flow meters will be installed in conjunction with the Conant Creek Canal Company shareholders.

D.2.2.4.4. Evaluation Criteria

E.1.1. Evaluation Criterion A—Quantifiable Water Savings (28 points)

1) Describe the amount of estimated water savings. For projects that conserve water, please state the estimated amount of water expected to be conserved (in acre-feet per year) as a direct result of this project.

Please include a specific quantifiable water savings estimate; do not include a range of potential water savings.

The project will eliminate 2,850 ac-ft/year in canal seepage loss, increasing conveyance efficiency in the top 5.7 miles of the canal from 44% to 99%. We estimate that an average of 147 ac-ft/year of this savings will be used for irrigation demand that is currently not met in dry years due to insufficient physical water supply. The remaining 2,703 ac-ft/year will be left in

Conant Creek. The water savings will increase streamflow during the month of July by an average of 13 cfs, a 39% increase in over current conditions. In addition to increasing streamflow in Conant Creek, the project will save an average of 1,987 ac-ft/year of storage water in Island Park Reservoir (1.5% of reservoir capacity).

2) Describe current losses: Please explain where the water that will be conserved is currently going and how it is being used. Consider the following:

a. Explain where current losses are going (e.g., back to the stream, spilled at the end of the ditch, seeping into the ground)?
b. If known, please explain how current losses are being used. For example, are current losses returning to the system for use by others? Are current losses entering an impaired groundwater table becoming unsuitable for future use?
c. Are there any known benefits associated with where the current losses are going? For example, is seepage water providing additional habitat for fish or animal species?

Current losses are due to canal seepage in a 5.7-mile reach of unlined canal. These losses seep into the ground and contribute to a regional aquifer hosted in Yellowstone rhyolites, Snake River Plain basalts, and overlying Quaternary alluvial and glacial deposits (IDEQ 2011). Fine-scale assessments of groundwater flow pathways in the project area have not been done, but larger-scale analysis shows the aquifer to be highly variable in hydrogeologic properties, depending on the thickness of the various aquifer layers, elevation, and topography. In general, groundwater flows generally from east to west, toward Fall River and the Henry's Fork (Figure 1).

Discharge points of this aquifer have not been identified, but it is reasonable to assume that the aquifer discharges to rivers down-gradient of the project area or to the regional Eastern Snake Plain Aquifer (Apple 2013). Statistical analysis shows that groundwater discharge to the Henry's Fork is highly correlated with surface-water diversion into the ~490-mile canal system within the watershed (USBR 2012, Van Kirk 2020). Groundwater returns to the river average around 200,000 ac-ft/year. However, at the smaller scale of Fall River and the Henry's Fork upstream of the Fall River confluence, no such relationship exists (Henry's Fork Foundation, unpublished data). This suggests that groundwater response to canal seepage in the Fall River drainage in and near the project area is attenuated to such a high degree that it has no measurable effect on local streamflow. If fully attenuated, the mean gain in streamflow from the annual seepage of 2,850 ac-ft is around 4 cfs and distributed spatially across the watershed. For reference, mean annual natural flow is 968 cfs in Fall River and 3,520 cfs in the Henry's Fork. Thus, although canal seepage in the project area most likely returns to the surface water system somewhere within the Henry's Fork watershed and is therefore available for subsequent diversion by other water users, the volume and rate of return to the surface system are small enough that they are not measurable, particularly in Conant Creek and Fall River. Extensive wetlands—some presumably associated with irrigation seepage and return flow—have been documented along the Henry's Fork and lower Fall River down-gradient of the project site (Jankovsky-Jones 1996). Any contribution of canal seepage in the project area to these wetlands is also small.

3) Describe the support/documentation of estimated water savings: Please provide sufficient detail supporting how the estimate was determined, including all supporting calculations. Note: projects that do not provide sufficient supporting detail/calculations may not receive credit under this section. Please be sure to consider the questions associated with your project type (listed below) when determining the estimated water savings, along with the necessary support needed for a full review of your proposal.

In addition, please note that the use of visual observations alone to calculate water savings, without additional documentation/data, are not sufficient to receive credit under this section. Further, the water savings must be the result of reducing or eliminating a current, ongoing loss, not the result of an expected future loss.

We used direct measurements of discharge in the canal to identify the reach with greatest seepage loss and then validated estimated loss rate in that reach by comparison with loss rates measured directly by two previous watershed-scale studies. After validating our estimate of loss in the reach identified for lining, we used observed streamflow, diversion, and reservoir data over irrigation years 2001-2020 to model expected year-to-year variability in savings and mean effect of water savings on streamflow in Conant Creek and storage carryover in Island Park Reservoir.

The Conant Creek Canal consists of two primary reaches: 1) the point of diversion from Conant Creek to a control structure that allows spill of canal water back to the creek, and 2) the spillback to the end of the canal (Figure 2). Because of inaccessibility and long water travel time to the places of use, the headgate at the point of diversion is used only for coarse delivery of water in the canal system and is adjusted only a few times per irrigation season. Precise delivery to the water users is controlled by adjustment of a gate at the spill point. Water spilled back to the creek is not counted as part of the canal company's water use. Diversion into the canal for the purposes of water-rights administration is measured by the Idaho Department of Water Resources (IDWR) immediately downstream of the spill structure but upstream of all user withdrawals. The majority of withdrawals occur from a terminal pond at the bottom of the canal system.

Field measurements.

On 20 August 2019, during a period of typical mid-summer operations, we measured discharge in the canal system at four points: diversion, immediately upstream of the spill structure, immediately downstream of the spill structure, and immediately upstream of the terminal pond. No water was being withdrawn from the canal between the spill structure and the terminal pond. We measured discharge with an Acoustic Doppler Current Profiler (ADCP), using the standard method of two passes across the canal in each direction. We measured 27 cfs at the point of diversion, 13 cfs immediately upstream of the spill, 9 cfs immediately downstream of the spill, and 9 cfs immediately upstream of the terminal pond (Table 1).

Table 1. Conant Creek canal measurements.

Date time	Location	Discharge (cfs)	ADCP error (coefficient of variation)
2020-08-20 14:30	Point of diversion	27	18.5%
2020-08-20 12:45	Upstream of spill	13	2.0%
2020-08-20 11:45	Downstream of spill	9	9.2%
2020-08-20 10:45	Terminal pond	9	51.0%

Based on these measurements, we determined that loss downstream of the spill was negligible, and thus treatment of that reach of the canal would not produce measurable water savings. Our estimate of loss in the upper (treatment) reach of the canal was 14 cfs, with a range of 9-20 cfs after accounting for measurement error. As an independent validation of our estimate, we used measurements of canal loss from two watershed-scale studies that reported a large number of canal loss measurements across different canal sizes, diversion rates, time of year, and local soil/geology types. Wytzes (1980) reported loss rates of 2.0-3.5 ft/day (ft^3/day of loss per ft^2 of wetted canal area) for canals in the Rexburg area (Figure 1). The interquartile range of loss rates collected and reported by Peterson (2011) and Apple (2013) for canals in the Fall River and Henry's Fork area was 1.2-6.3 ft/day, with a mean of 2.7 ft/day (standard error = 0.5). Of that net loss, less than 1% was attributable to evaporation from the canal surface and transpiration from canal-side vegetation. Thus, we consider total loss to be essentially equal to seepage loss. The treatment reach of Conant Creek Canal is 5.7 miles long, as measured from IDWR hydrography data. The mean canal width is 12 feet, as estimated from our field measurements and analysis of aerial imagery (method detailed in Peterson 2011). Applying the 2.7 ft/day seepage rate to the total area of the reach yields a loss of around 11 cfs when the canal is fully wetted, well within the range of ADCP measurement error. Given this independent validation, we used the field observation of a 14-cfs seepage loss in the treatment reach of the canal in subsequent calculations.

Modeling of annual and inter-annual variability

We used analysis of existing data over irrigation years 2001-2020 to extrapolate instantaneous canal loss to whole irrigation seasons. This range of years was chosen because irrigation practices and surface-water diversion in the watershed changed substantially in 2001 but have been very consistent since then (Van Kirk 2020). We assume that hydrologic conditions over the life of the project will be similar to those over 2001-2020. We assumed that the treatment reach of the canal was fully wetted and losing 14 cfs when observed mean daily flow at the IDWR accounting point was greater than 0 cfs. For all such days during the irrigation season, we calculated the total net diversion from Conant Creek as the reported IDWR diversion rate plus the 14 cfs loss. This is the net amount diverted from the creek downstream of the spill point; the actual amount diverted from the stream at the point of diversion is this amount plus spill back to the creek, but that amount is currently not measured and is expected to remain close to its current value after proposed lining of the treatment reach.

Conant Creek itself is not gaged, but it is the only tributary to Fall River between USGS gages 13047600 and 13049500. Irrigation return and groundwater interactions are minimal in this reach, so a good estimate of current regulated discharge in Conant Creek is the difference in discharge between the two Fall River gages plus total diversion from that reach. Natural flow was estimated as regulated flow plus total diversion from the creek, including that currently lost to canal seepage in the treatment reach of Conant Creek Canal. All diversions except Conant Creek Canal are pumps, with essentially l00% conveyance efficiency. During dry years, the two downstream-most water users on Conant Creek Canal can run short of physical water to fully meet their irrigation demand, on the order of 1-3 cfs. In the modeling, we allocated 3 cfs to those users when current regulated flow in Conant Creek at the Fall River confluence dropped to 3 cfs or less. Net project savings is the 14-cfs seepage loss, less the additional 3 cfs of irrigation delivery. Expected streamflow in Conant Creek at the Fall River confluence as a result of the project is current regulated flow plus savings due to the project. Although there are a few diversions from Conant between the Conant Creek Canal Company spill and Fall River, we expect very little of the additional streamflow resulting from this project to be diverted. There are two reasons for this expectation. First, all of the diversions are pumps, which have limited capacity to take additional physical water beyond what they already take. This is in contrast to canals, which can divert more water when stream stage is higher. Second, savings due to the project will not increase administrative water availability in Conant Creek or elsewhere in the upper Snake River basin water-rights accounting system.

Under current conditions, canal seepage in the treatment reach averages 2,850 ac-ft/year (range = 2,051 – 3,742), resulting in a conveyance efficiency of around 44% for the upper reach of the canal. The project will eliminate that seepage, increasing conveyance efficiency in that reach to around 99%, allowing a small amount for evaporation. Of the total seepage that will be eliminated as a result of the project, an average of 147 ac-ft/year will be delivered to the downstream-most users on the canal, and the remaining 2,703 ac-ft/year will be left in Conant

Creek. The project will increase streamflow from mid-May until early October (Figure 3). On average, Conant Creek streamflow will increase by 13 cfs during the month of July, a 39% increase (Figure 4). Currently, regulated streamflow in Conant Creek is 0 from late June through mid-August in about 25% of all irrigation years. The project is expected to keep at least 11 cfs of flow in Conant Creek all season every year.

In addition to benefitting Conant Creek, water saved by the project is expected to reduce the amount of storage delivered from Island Park Reservoir. Releases from the reservoir deliver physical water to maintain canal diversion from the Henry's Fork and Teton River. Island Park storage water is delivered to the Teton River through the Crosscut Canal, which diverts from the Henry's Fork downstream of the Fall River confluence (Figure 1). Physical draft of Island Park Reservoir coincides with need for delivery to the Teton River through the Crosscut Canal. Applying the additional Conant Creek streamflow to total flow available at the Crosscut Canal during the period of Island Park Reservoir draft will reduce total draft by an average of 1,987 ac-ft/year (range = 1,285-3,229 ac-ft/year). Reservoir carryover at the end of irrigation season over the past two decades has ranged from around 18,000 ac-ft (13% of reservoir capacity) in the driest years to 118,000 ac-ft (87% full) during wet years (Figure 5). Project savings are expected to result in an increase in reservoir carryover of around 2,300 ac-ft (12.7% increase) in dry years to 1,500 ac-ft (1.3% increase) in wet years (Figure 5). Thus, the project has a much larger positive effect on reservoir storage savings in dry years, when reservoir carryover is critical for fisheries, water quality, and water supply.

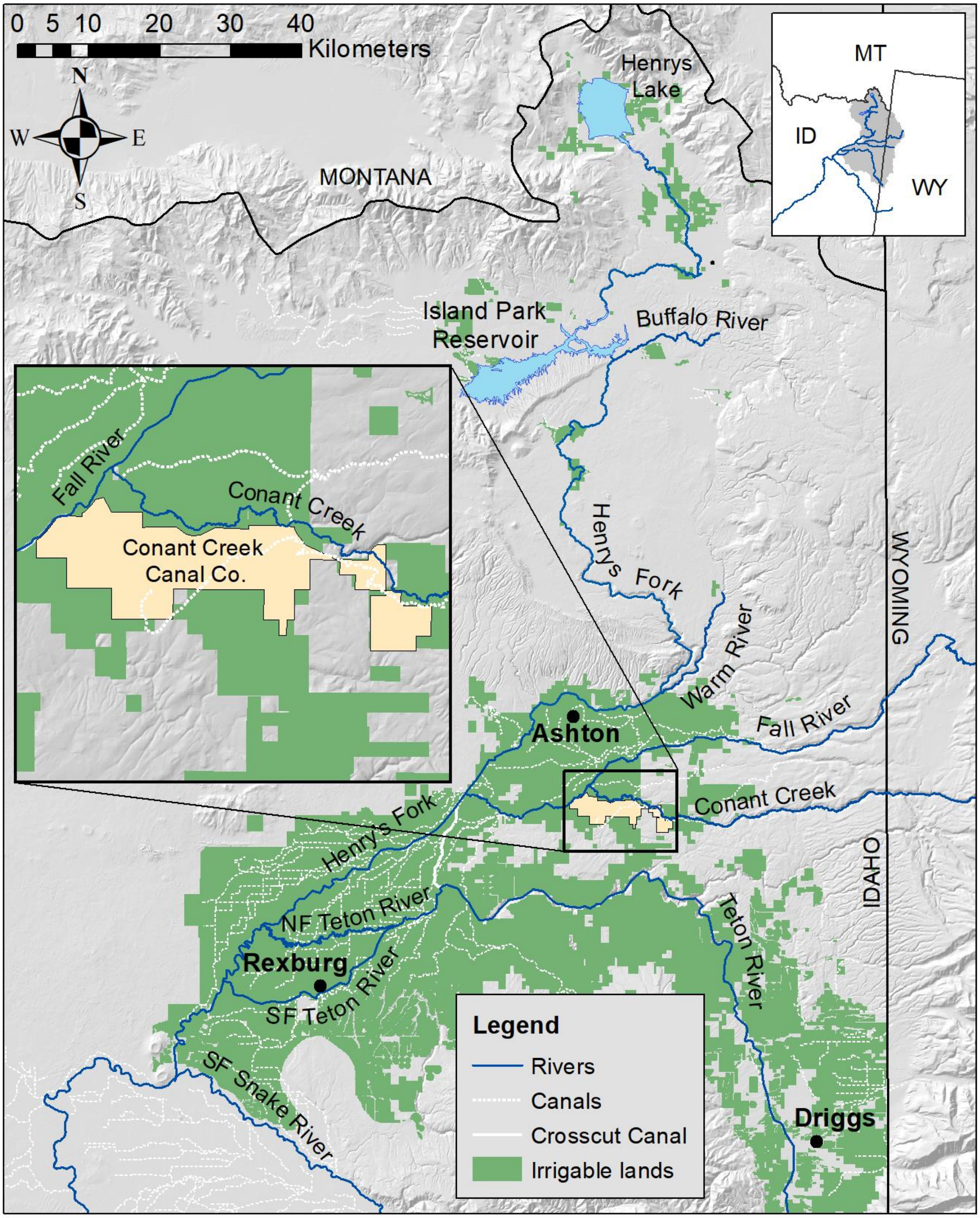


Figure 1. Map of Henry's Fork watershed, showing Conant Creek, Conant Creek Canal Company service area, and Island Park Reservoir.

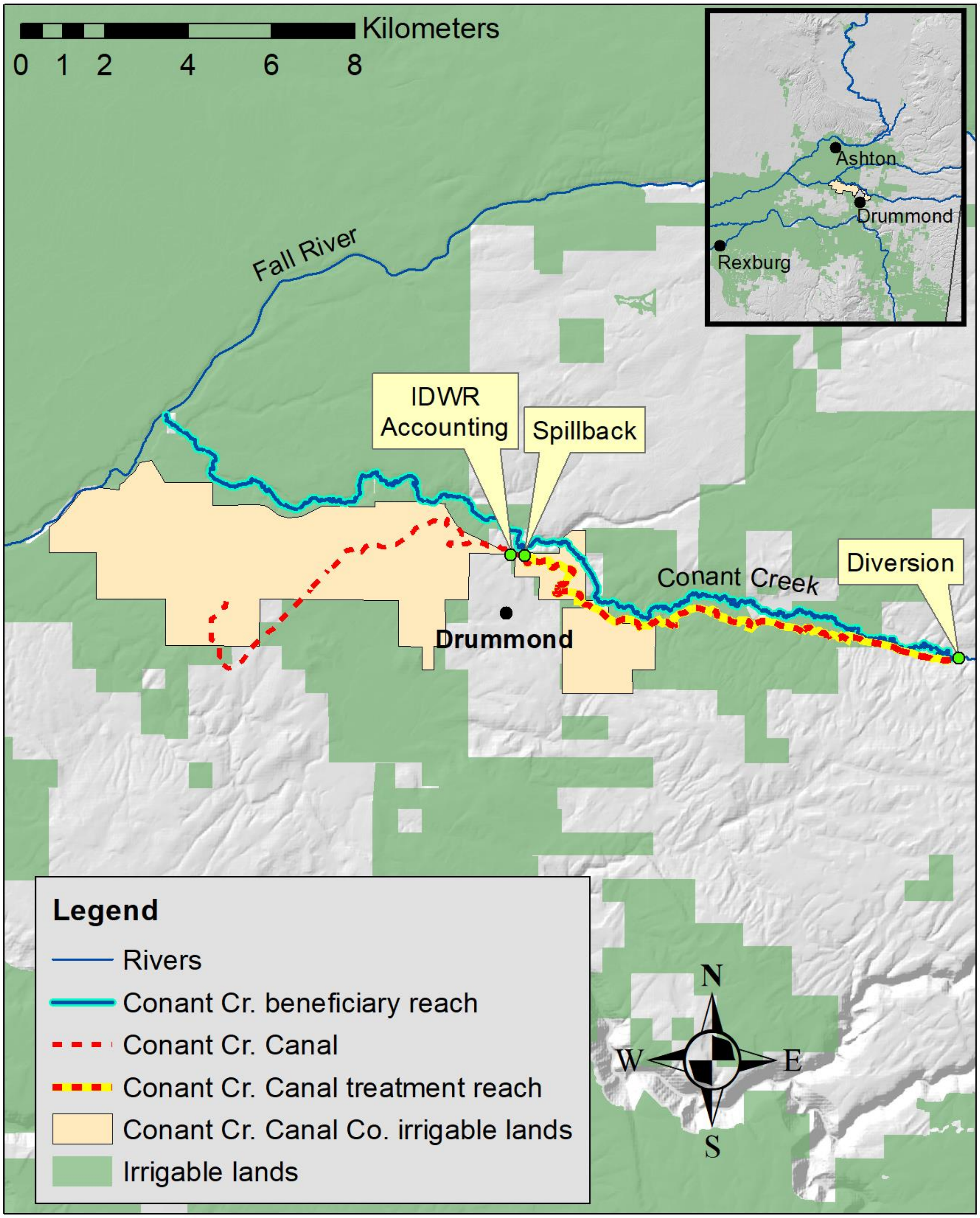


Figure 2. Close-up of Conant Creek, the Conant Creek Canal, and Fall River.

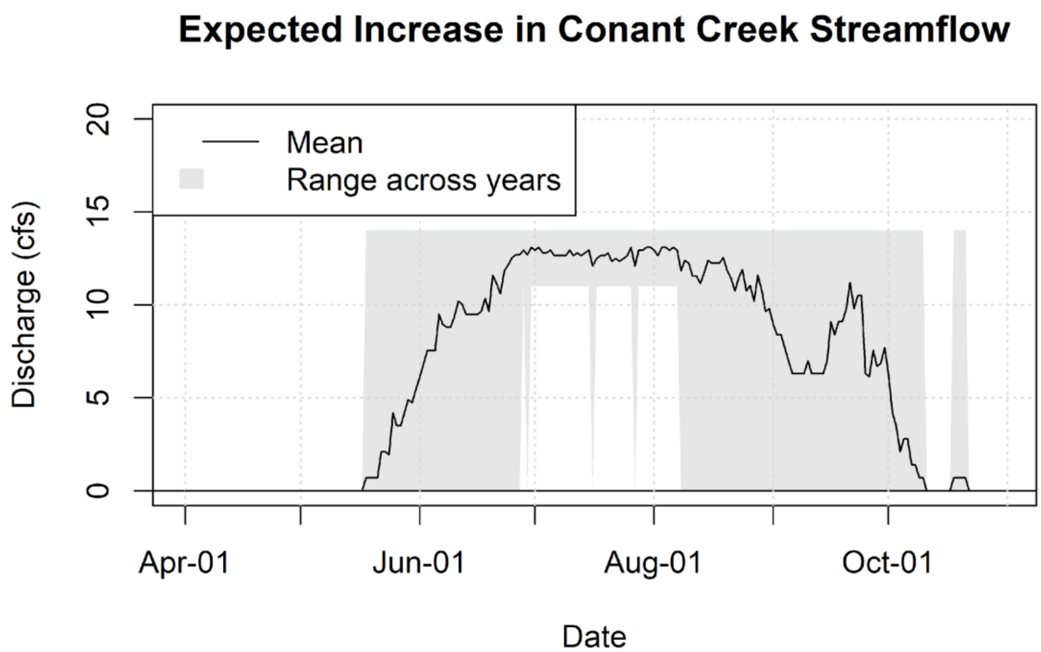


Figure 3. Expected mean increase in streamflow in Conant Creek at the Fall River confluence as a result of the project. The gray shaded area shows the potential range of variability across years, based on observed water availability and canal operations over irrigation years 2001-2020.

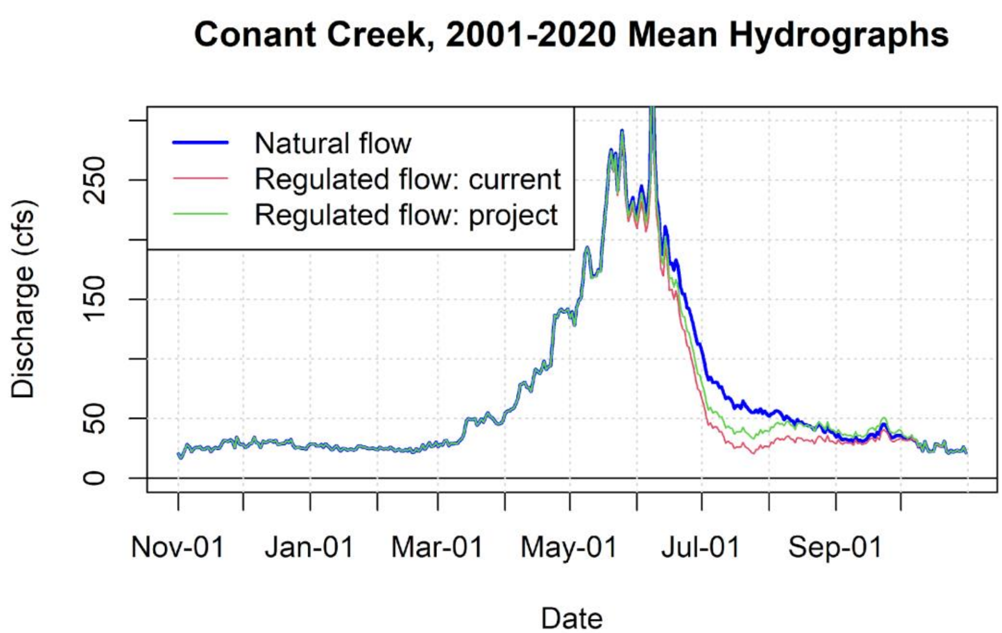


Figure 4. Mean hydrographs for Conant Creek at the Fall River confluence, showing natural flow, current regulated flow, and estimated regulated flow after completion of the project.

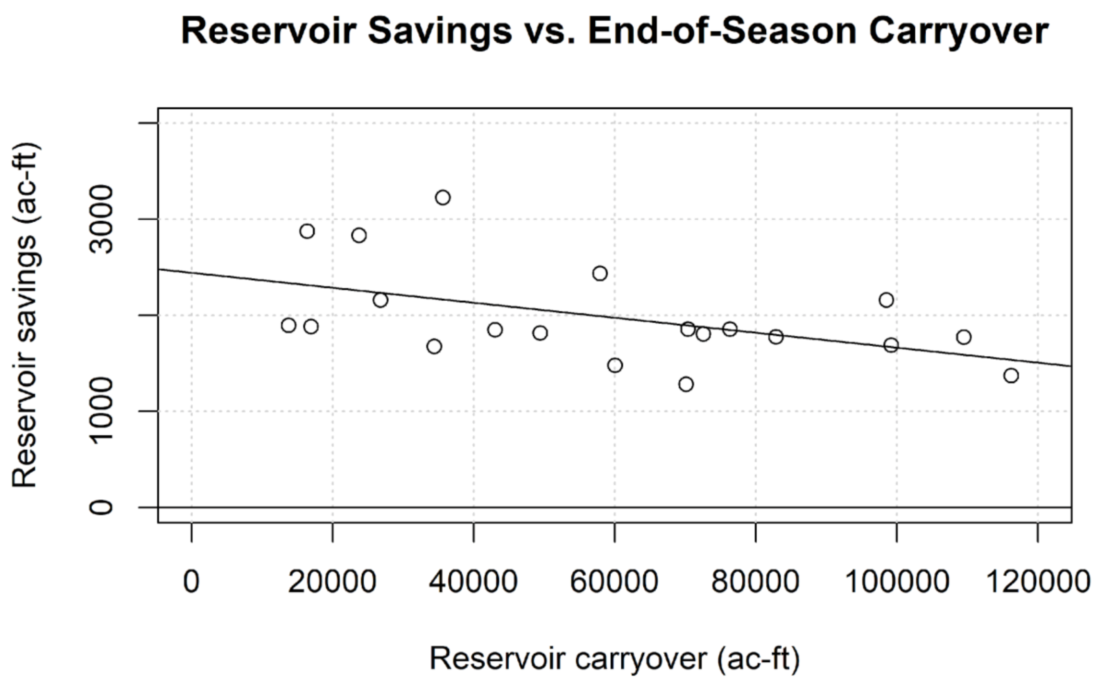


Figure 5. Estimated annual savings in Island Park Reservoir storage from the project as a function of end-of-season reservoir carryover. Estimates are based on observed 2001-2020 water availability and irrigation-system operations.

4) Please address the following questions according to the type of infrastructure improvement you are proposing for funding.

(1) **Canal Lining/Piping**: Canal lining/piping projects can provide water savings when irrigation delivery systems experience significant losses due to canal seepage. Applicants proposing lining/piping projects should address the following:

a. How has the estimated average annual water savings that will result from the project been determined? Please provide all relevant calculations, assumptions, and supporting data.

We used direct measurements of discharge in the canal to identify the reach with greatest seepage loss and then validated estimated loss rate in that reach by comparison with loss rates measured directly by two previous watershed-scale studies. After validating our estimate of loss in the reach identified for lining, we used observed streamflow, diversion, and reservoir data over irrigation years 2001-2020 to model expected year-to-year variability in savings and mean effect of water savings on streamflow in Conant Creek and storage carryover in Island Park Reservoir.

The project will eliminate 2,850 ac-ft/year in canal seepage loss, increasing conveyance efficiency in the top 5.7 miles of the canal from 44% to 99%. We estimate that an average of 147 ac-ft/year of this savings will be used for irrigation demand that is currently not met in dry years due to insufficient physical water supply. The remaining 2,703 ac-ft/year will be left in Conant Creek. The water savings will increase streamflow during the month of July by an average of 13 cfs, a 39% increase in over current conditions. In addition to increasing streamflow in Conant Creek, the project will save an average of 1,987 ac-ft/year of storage water in Island Park Reservoir (1.5% of reservoir capacity).

Fine-scale assessments of groundwater flow pathways in the project area have not been done, but larger-scale analysis shows the aquifer to be highly variable in hydrogeologic properties, depending on the thickness of the various aquifer layers, elevation, and topography. In general, groundwater flows generally from east to west, toward Fall River and the Henry's Fork (Figure 1).

Discharge points of this aquifer have not been identified, but it is reasonable to assume that the aquifer discharges to rivers down-gradient of the project area or to the regional Eastern Snake Plain Aquifer (Apple 2013). Statistical analysis shows that groundwater discharge to the Henry's Fork is highly correlated with surface-water diversion into the ~490-mile canal system within the watershed (USBR 2012, Van Kirk 2020). Groundwater returns to the river average around 200,000 ac-ft/year. However, at the smaller scale of Fall River and the Henry's Fork upstream of the Fall River confluence, no such relationship exists (Henry's Fork Foundation, unpublished data). This suggests that groundwater response to canal seepage in the Fall River drainage in and near the project area is attenuated to such a high degree that it has no measurable effect on local streamflow. If fully attenuated, the mean gain in streamflow from the annual seepage of 2,850 ac-ft is around 4 cfs and distributed spatially across the watershed. For reference, mean annual natural flow is 968 cfs in Fall River and 3,520 cfs in the Henry's Fork. Thus, although canal seepage in the project area most likely returns to the surface water system somewhere within the Henry's Fork watershed and is therefore available for subsequent diversion by other water users, the volume and rate of return to the surface system are small enough that they are not measurable, particularly in Conant Creek and Fall River. Extensive wetlands—some presumably associated with irrigation seepage and return flow—have been documented along the Henry's Fork and lower Fall River down-gradient of the project site (Jankovsky-Jones 1996). Any contribution of canal seepage in the project area to these wetlands is also small.

The Conant Creek Canal consists of two primary reaches: 1) the point of diversion from Conant Creek to a control structure that allows spill of canal water back to the creek, and 2) the spillback to the end of the canal (Figure 2). Because of inaccessibility and long water travel time to the places of use, the headgate at the point of diversion is used only for coarse delivery of water in the canal system and is adjusted only a few times per irrigation season. Precise delivery to the water users is controlled by adjustment of a gate at the spill point. Water spilled back to the creek is not counted as part of the canal company's water use. Diversion into the canal for the purposes of water-rights administration is measured by the Idaho Department of Water Resources (IDWR) immediately downstream of the spill structure but upstream of all user withdrawals. The majority of withdrawals occur from a terminal pond at the bottom of the canal system.

Field measurements.

On 20 August 2019, during a period of typical mid-summer operations, we measured discharge in the canal system at four points: diversion, immediately upstream of the spill structure, immediately downstream of the spill structure, and immediately upstream of the terminal pond. No water was being withdrawn from the canal between the spill structure and the terminal pond. We measured discharge with an Acoustic Doppler Current Profiler (ADCP), using the standard method of two passes across the canal in each direction. We measured 27 cfs at the point of diversion, 13 cfs immediately upstream of the spill, 9 cfs immediately downstream of the spill, and 9 cfs immediately upstream of the terminal pond (Table 1).

Based on these measurements, we determined that loss downstream of the spill was negligible, and thus treatment of that reach of the canal would not produce measurable water savings. Our estimate of loss in the upper (treatment) reach of the canal was 14 cfs, with a range of 9-20 cfs after accounting for measurement error. As an independent validation of our estimate, we used measurements of canal loss from two watershed-scale studies that reported a large number of canal loss measurements across different canal sizes, diversion rates, time of year, and local soil/geology types. Wytzes (1980) reported loss rates of 2.0-3.5 ft/day (ft^3/day of loss per ft^2 of wetted canal area) for canals in the Rexburg area (Figure 1). The interquartile range of loss rates collected and reported by Peterson (2011) and Apple (2013) for canals in the Fall River and Henry's Fork area was 1.2-6.3 ft/day, with a mean of 2.7 ft/day (standard error = 0.5). Of that net loss, less than 1% was attributable to evaporation from the canal surface and transpiration from canal-side vegetation. Thus, we consider total loss to be essentially equal to seepage loss. The treatment reach of Conant Creek Canal is 5.7 miles long, as measured from IDWR hydrography data. The mean canal width is 12 feet, as estimated from our field measurements and analysis of aerial imagery (method detailed in Peterson 2011). Applying the 2.7 ft/day seepage rate to the total area of the reach yields a loss of around 11 cfs when the canal is fully wetted, well within the range of ADCP measurement error. Given this independent validation, we used the field observation of a 14-cfs seepage loss in the treatment reach of the canal in subsequent calculations.

Modeling of annual and inter-annual variability

We used analysis of existing data over irrigation years 2001-2020 to extrapolate instantaneous canal loss to whole irrigation seasons. This range of years was chosen because irrigation practices and surface-water diversion in the watershed changed substantially in 2001 but have been very consistent since then (Van Kirk 2020). We assume that hydrologic conditions over the life of the project will be similar to those over 2001-2020. We assumed that the treatment reach of the canal was fully wetted and losing 14 cfs when observed mean daily flow at the IDWR accounting point was greater than 0 cfs. For all such days during the irrigation season, we calculated the total net diversion from Conant Creek as the reported IDWR diversion rate plus the 14 cfs loss. This is the net amount diverted from the creek downstream of the spill point; the actual amount diverted from the stream at the point of diversion is this amount plus spill back to the creek, but that amount is currently not measured and is expected to remain close to its current value after proposed lining of the treatment reach.

Conant Creek itself is not gaged, but it is the only tributary to Fall River between USGS gages 13047600 and 13049500. Irrigation return and groundwater interactions are minimal in this reach, so a good estimate of current regulated discharge in Conant Creek is the difference in discharge between the two Fall River gages plus total diversion from that reach. Natural flow was estimated as regulated flow plus total diversion from the creek, including that currently lost to canal seepage in the treatment reach of Conant Creek Canal. All diversions except Conant Creek Canal are pumps, with essentially l00% conveyance efficiency. During dry years, the two downstream-most water users on Conant Creek Canal can run short of physical water to fully meet their irrigation demand, on the order of 1-3 cfs. In the modeling, we allocated 3 cfs to those users when current regulated flow in Conant Creek at the Fall River confluence dropped to 3 cfs or less. Net project savings is the 14-cfs seepage loss, less the additional 3 cfs of irrigation delivery. Expected streamflow in Conant Creek at the Fall River confluence as a result of the project is current regulated flow plus savings due to the project. Although there are a few diversions from Conant between the Conant Creek Canal Company spill and Fall River, we expect very little of the additional streamflow resulting from this project to be diverted. There are two reasons for this expectation. First, all of the diversions are pumps, which have limited capacity to take additional physical water beyond what they already take. This is in contrast to canals, which can divert more water when stream stage is higher. Second, savings due to the project will not increase administrative water availability in Conant Creek or elsewhere in the upper Snake River basin water-rights accounting system.

Under current conditions, canal seepage in the treatment reach averages 2,850 ac-ft/year (range = 2,051 – 3,742), resulting in a conveyance efficiency of around 44% for the upper reach of the canal. The project will eliminate that seepage, increasing conveyance efficiency in that reach to around 99%, allowing a small amount for evaporation. Of the total seepage that will be eliminated as a result of the project, an average of 147 ac-ft/year will be delivered to the downstream-most users on the canal, and the remaining 2,703 ac-ft/year will be left in Conant Creek. The project will increase streamflow from mid-May until early October (Figure 3). On average, Conant Creek streamflow will increase by 13 cfs during the month of July, a 39% increase (Figure 4). Currently, regulated streamflow in Conant Creek is 0 from late June through mid-August in about 25% of all irrigation years. The project is expected to keep at least 11 cfs of flow in Conant Creek all season every year.

b. How have average annual canal seepage losses been determined? Have ponding and/or inflow/outflow tests been conducted to determine seepage rates under varying conditions? If so, please provide detailed descriptions of testing methods and all results. If not, please provide an explanation of the method(s) used to calculate seepage losses. All estimates should be supported with multiple sets of
data/measurements from representative sections of canals.

We used direct measurements of discharge in the canal to identify the reach with greatest seepage loss and then validated estimated loss rate in that reach by comparison with loss rates measured directly by two previous watershed-scale studies. After validating our estimate of loss in the reach identified for lining, we used observed streamflow, diversion, and reservoir data over irrigation years 2001-2020 to model expected year-to-year variability in savings and mean effect of water savings on streamflow in Conant Creek and storage carryover in Island Park Reservoir.

On 20 August 2019, during a period of typical mid-summer operations, we measured discharge in the canal system at four points: diversion, immediately upstream of the spill structure, immediately downstream of the spill structure, and immediately upstream of the terminal pond. No water was being withdrawn from the canal between the spill structure and the terminal pond. We measured discharge with an Acoustic Doppler Current Profiler (ADCP), using the standard method of two passes across the canal in each direction. We measured 27 cfs at the point of diversion, 13 cfs immediately upstream of the spill, 9 cfs immediately downstream of the spill, and 9 cfs immediately upstream of the terminal pond (Table 1).

Based on these measurements, we determined that loss downstream of the spill was negligible, and thus treatment of that reach of the canal would not produce measurable water savings. Our estimate of loss in the upper (treatment) reach of the canal was 14 cfs, with a range of 9-20 cfs after accounting for measurement error. As an independent validation of our estimate, we used measurements of canal loss from two watershed-scale studies that reported a large number of canal loss measurements across different canal sizes, diversion rates, time of year, and local soil/geology types. Wytzes (1980) reported loss rates of 2.0-3.5 ft/day (ft^3/day of loss per ft^2 of wetted canal area) for canals in the Rexburg area (Figure 1). The interquartile range of loss rates collected and reported by Peterson (2011) and Apple (2013) for canals in the Fall River and Henry’s Fork area was 1.2-6.3 ft/day, with a mean of 2.7 ft/day (standard error = 0.5). Of that net loss, less than 1% was attributable to evaporation from the canal surface and transpiration from canal-side vegetation. Thus, we consider total loss to be essentially equal to seepage loss. The treatment reach of Conant Creek Canal is 5.7 miles long, as measured from IDWR hydrography data. The mean canal width is 12 feet, as estimated from our field measurements and analysis of aerial imagery (method detailed in Peterson 2011). Applying the 2.7 ft/day seepage rate to the total area of the reach yields a loss of around 11 cfs when the canal is fully wetted, well within the range of ADCP measurement error. Given this independent validation, we used the field observation of a 14-cfs seepage loss in the treatment reach of the canal in subsequent calculations.

We used analysis of existing data over irrigation years 2001-2020 to extrapolate instantaneous canal loss to whole irrigation seasons. This range of years was chosen because irrigation practices and surface-water diversion in the watershed changed substantially in 2001 but have been very consistent since then (Van Kirk 2020). We assume that hydrologic conditions over the life of the project will be similar to those over 2001-2020. We assumed that the treatment reach of the canal was fully wetted and losing 14 cfs when observed mean daily flow at the IDWR accounting point was greater than 0 cfs. For all such days during the irrigation season, we calculated the total net diversion from Conant Creek as the reported IDWR diversion rate plus the 14 cfs loss. This is the net amount diverted from the creek downstream of the spill point; the actual amount diverted from the stream at the point of diversion is this amount plus spill back to the creek, but that amount is currently not measured and is expected to remain close to its current value after proposed lining of the treatment reach.

Conant Creek itself is not gaged, but it is the only tributary to Fall River between USGS gages 13047600 and 13049500. Irrigation return and groundwater interactions are minimal in this reach, so a good estimate of current regulated discharge in Conant Creek is the difference in discharge between the two Fall River gages plus total diversion from that reach. Natural flow was estimated as regulated flow plus total diversion from the creek, including that currently lost to canal seepage in the treatment reach of Conant Creek Canal. All diversions except Conant Creek Canal are pumps, with essentially l00% conveyance efficiency. During dry years, the two downstream-most water users on Conant Creek Canal can run short of physical water to fully meet their irrigation demand, on the order of 1-3 cfs. In the modeling, we allocated 3 cfs to those users when current regulated flow in Conant Creek at the Fall River confluence dropped to 3 cfs or less. Net project savings is the 14-cfs seepage loss, less the additional 3 cfs of irrigation delivery. Expected streamflow in Conant Creek at the Fall River confluence as a result of the project is current regulated flow plus savings due to the project. Although there are a few diversions from Conant between the Conant Creek Canal Company spill and Fall River, we expect very little of the additional streamflow resulting from this project to be diverted. There are two reasons for this expectation. First, all of the diversions are pumps, which have limited capacity to take additional physical water beyond what they already take. This is in contrast to canals, which can divert more water when stream stage is higher. Second, savings due to the project will not increase administrative water availability in Conant Creek or elsewhere in the upper Snake River basin water-rights accounting system.

Under current conditions, canal seepage in the treatment reach averages 2,850 ac-ft/year (range = 2,051 – 3,742), resulting in a conveyance efficiency of around 44% for the upper reach of the canal. The project will eliminate that seepage, increasing conveyance efficiency in that reach to around 99%, allowing a small amount for evaporation. Of the total seepage that will be eliminated as a result of the project, an average of 147 ac-ft/year will be delivered to the downstream-most users on the canal, and the remaining 2,703 ac-ft/year will be left in Conant Creek. The project will increase streamflow from mid-May until early October (Figure 3). On average, Conant Creek streamflow will increase by 13 cfs during the month of July, a 39% increase (Figure 4). Currently, regulated streamflow in Conant Creek is 0 from late June through mid-August in about 25% of all irrigation years. The project is expected to keep at least 11 cfs of flow in Conant Creek all season every year.

c. What are the expected post-project seepage/leakage losses and how were these estimates determined (e.g., can data specific to the type of material being used in the project be provided)?

The project will eliminate that seepage, increasing conveyance efficiency in that reach to around 99%, allowing a small amount for evaporation. Wytzes (1980) reported loss rates of 2.0-3.5 ft/day (ft^3/day of loss per ft^2 of wetted canal area) for canals in the Rexburg area (Figure 1). The interquartile range of loss rates collected and reported by Peterson (2011) and Apple (2013) for canals in the Fall River and Henry's Fork area was 1.2-6.3 ft/day, with a mean of 2.7 ft/day (standard error = 0.5). Of that net loss, less than 1% was attributable to evaporation from the canal surface and transpiration from canal-side vegetation. Thus, we consider total loss to be essentially equal to seepage loss. The reach of canal will be lined with 40 MIL HDPE 35-foot-wide canal liner.

d. What are the anticipated annual transit loss reductions in terms of acre-feet per mile for the overall project and for each section of canal included in the project?

Under current conditions, canal seepage in the treatment reach averages 2,850 ac-ft/year (range = 2,051 – 3,742), for the 5.7 mile reach, 500 ac-ft/mile, resulting in a conveyance efficiency of around 44% for the upper reach of the canal. The project will eliminate that seepage of 500 ac-ft per mile, increasing conveyance efficiency in that reach to around 99%, allowing a small amount for evaporation. Of the total seepage that will be eliminated as a result of the project, an average of 147 ac-ft/year (25.79 ac-ft/mile) will be delivered to the downstream-most users on the canal, and the remaining 2,703 ac-ft/year (474.21 ac-ft/mile) will be left in Conant Creek. The project will increase streamflow from mid-May until early October (Figure 3). On average, Conant Creek streamflow will increase by 13 cfs during the month of July, a 39% increase (Figure 4). Currently, regulated streamflow in Conant Creek is 0 from late June through mid-August in about 25% of all irrigation years. The project is expected to keep at least 11 cfs of flow in Conant Creek all season every year.

e. How will actual canal loss seepage reductions be verified?

Conant Creek Canal Company and HFF will monitor irrigation results. Direct measurements of discharge in the canal will be used to identify seepage and then estimated loss reductions validated by comparison with previous loss rates measured directly. Discharge measured with an Acoustic Doppler Current Profiler (ADCP), using the standard method of two passes across the canal in each direction, taking up to seven stream flow measurements each year and utilize the information to build a stream flow rating curve for the site. Building on the monitoring and information base, a temperature and pressure logger will also be installed very near the mouth of Conant Creek on Fall River. A rating curve utilizing the same ADCP process will be established at this site.

Canal flow measurements utilizing the ADCP unit will also be obtained each time the HFF stream measurement crew measure Conant Creek flows. This schedule will start in 2022 and continue through the life of the program for a minimum of five additional years although the stage recorders within the canal diversion and spillback will eventually take the place of ADCP measurements for the canal.

f. Include a detailed description of the materials being used.

The reach of canal will be lined with 40 MIL HDPE 35-foot-wide canal liner.

(2) Municipal Metering: Municipal metering projects can provide water savings when individual user meters are installed where none exist to allow for unit or tiered pricing, when existing individual user meters are replaced with advanced metering infrastructure (AMI) meters, and when new meters are installed within a distribution system to assist with leakage reduction. To receive credit for water savings for a municipal metering project, an applicant must provide a detailed description of the method used to estimate savings, including references to documented savings from similar previously implemented projects. Applicants proposing municipal metering projects should address the following:

a. How has the estimated average annual water savings that will result from the project been determined? Please provide all relevant calculations, assumptions, and supporting data.
N/A

b. How have current distribution system losses and/or the potential for reductions in water use by individual users been determined?
N/A

c. For installing end-user water service meters, e.g., for a residential or commercial building unit., refer to studies in the region or in the applicant's service area that are relevant to water use patterns and the potential for reducing such use. In the absence of such studies, please explain in detail how expected water use reductions have been estimated and the basis for the estimations.
N/A

d. Installation of distribution system meters will not receive points under this criterion. Accordingly, these projects must be paired with a complementary project component that will result in water savings in order for the proposal to receive credit for water savings, e.g., pipe installation using upgraded materials, or individual water service meters.

N/A

e. What types (manufacturer and model) of devices will be installed and what quantity of each?
N/A

f. How will actual water savings be verified upon completion of the project?
N/A

(3) Irrigation Flow Measurement: Irrigation flow measurement improvements can provide water savings when improved measurement accuracy results in reduced spills and over-deliveries to irrigators. Applicants proposing municipal metering projects should address the following:

a. How have average annual water savings estimates been determined? Please provide all relevant calculations, assumptions, and supporting data.
N/A

b. Have current operational losses been determined? If water savings are based on a reduction of spills, please provide support for the amount of water currently being lost to spills.
N/A

c. Are flows currently measured at proposed sites and if so, what is the accuracy of existing devices? How has the existing measurement accuracy been established?
N/A

d. Provide detailed descriptions of all proposed flow measurement devices, including accuracy and the basis for the accuracy.
N/A

e. Will annual farm delivery volumes be reduced by more efficient and timely deliveries? If so, how has this reduction been estimated?
N/A

f. How will actual water savings be verified upon completion of the project?
N/A

(4) Turf Removal: Applicants proposing turf removal projects should address the following:

a. How have average annual water savings estimates been determined? Please provide all relevant calculations, assumptions, and supporting data.
N/A

b. What is the total surface area of turf to be removed and what is the estimated average annual turf consumptive use rate per unit area?

N/A

c. Was historical water consumption data evaluated to estimate average annual turf consumptive use per unit area? If so, did the evaluation include a weather adjustment component?
N/A

d. Will site audits be performed before applicants are accepted into the program?
N/A

e. How will actual water savings be verified upon completion of the project?
N/A

(5) Smart Irrigation Controllers, Controllers with Rain Sensor Shutoff, Drip Irrigation, and High-Efficiency Nozzles: Applicants proposing smart irrigation controllers, controllers with rain sensor shutoff, drip irrigation, or high-efficiency nozzle projects should address the following:

a. How have average annual water savings estimates been determined? Please provide all relevant calculations, assumptions, and supporting data.
N/A

b. Was historical water consumption data evaluated to estimate the percent reduction in water demand per unit area of irrigated landscape? If so, did the evaluation include a weather adjustment component?
N/A

c. What types (manufacturer and model) of devices will be installed and what quantity of each?
N/A

d. Will the devices be installed through a rebate or direct-install program?
N/A

e. Will site audits be performed before and after installation?
N/A

f. How will actual water savings be verified upon completion of the project?
N/A

(6) High-Efficiency Indoor Appliances and Fixtures: Installing high- efficiency indoor appliances and fixtures can provide water savings for municipal water entities where there is significant potential for replacing existing non-efficient indoor appliances and fixtures. Applicants proposing high-efficiency indoor appliance and fixtures projects should address the following:

a. How have average annual water savings estimates been determined? Please provide all relevant calculations, assumptions, and supporting data.
N/A

b. What types (clothes washers, shower heads, etc.) of appliances and fixtures will be installed and what quantity of each?
N/A

c. Have studies been conducted to verify the existence of non-efficient appliances and fixtures? Provide published water savings rates for each of these devices and reference the source for each of the device savings rates.
N/A

d. Will the devices be installed through rebate or direct-install programs?
N/A

e. How will actual water savings be verified upon completion of the project?
N/A

(7) Commercial Cooling Systems: Cooling towers are components of many refrigeration systems with many applications. They dissipate heat to the atmosphere through the evaporative process and are common in manufacturing processes where cooling is required. They are also used for cooling large commercial buildings. Cooling tower structures vary in size, design, and efficiency. Regardless, all cooling towers consume large volumes of water and energy. Open-circuit or direct contact are the most common types of cooling towers. Water is supplied to the tower after gathering heat and then released in the upper tower levels. A fan near the base of the tower creates upward airflow. Closed-circuit towers are more efficient and closed-circuit towers with adiabatic cooling are more efficient yet. Water and energy savings can be achieved by replacing or retrofitting older low efficiency cooling towers. Applicants proposing cooling system projects should address the following:

a. How have average annual water savings estimates been determined? Please provide all relevant calculations, assumptions, and supporting data.
N/A

b. Was historical water consumption data evaluated to estimate the percent reduction in water demand?
N/A

c. Specify type (manufacturer and model) of cooling tower system to be installed and/or provide a detailed description of the system retrofit plan.
N/A

E.1.2. Evaluation Criterion B—Renewable Energy (20 points)

E.1.2.1. *Subcriterion No. B.1: Implementing Renewable Energy Projects Related to Water Management and Delivery*

Describe the amount of energy capacity. For projects that implement renewable energy systems, state the estimated amount of capacity (in kilowatts) of the system. Please provide sufficient detail supporting the stated estimate, including all calculations in support of the estimate.

Describe the amount of energy generated. For projects that implement renewable energy systems, state the estimated amount of energy that the system will generate (in kilowatt hours per year). Please provide sufficient detail supporting the stated estimate, including all calculations in support of the estimate. Please explain how the power generated as a result of this project will be used, including any existing or planned agreements and infrastructure.

Describe the status of a mothballed hydro plant. For projects that are brining mothballed hydropower capacity back online, please describe the following:

• Clearly describe the work that will be accomplished through the WaterSMART Grant. Note: normal OM&R activities are not eligible for funding. The work being proposed must be an investment.

• Provide information about the capacity (in kilowatts) of the existing hydro system and the expected capacity once it is brought back on-line. Section E: Application Review Information

• Provide information about the duration that the hydro system has been offline and the reasons why it has been mothballed. Please include any regulatory reporting or filings (e.g., FERC filings) or other documentation regarding the system.

Describe any other benefits of the renewable energy project. Please describe and provide sufficient detail on any additional benefits expected to result from the renewable energy project, including:

• How the system will combat/offset the impacts of climate change, including an expected reduction in greenhouse gas emissions

• Expected environmental benefits of the renewable energy system

• Any expected reduction in the use of energy currently supplied through a Reclamation project.

• Anticipated benefits to other sectors/entities.

• Expected water needs, if any, of the system.

AND/OR

E.1.2.2. Subcriterion No. B.2: Increasing Energy Efficiency in Water Management
*Up to **10 points** may be awarded for projects that address energy demands and reduce greenhouse gas emissions by retrofitting equipment to increase energy efficiency and/or through water conservation improvements that result in reduced pumping or diversions*.
Describe any energy efficiencies that are expected to result from implementation of the water conservation or water efficiency project (e.g., reduced pumping).

• If quantifiable energy savings is expected to result from the project, please provide sufficient details and supporting calculations. If quantifying energy savings, please state the estimated amount in kilowatt hours per year.
N/A

• How will the energy efficiency improvement combat/offset the impacts of climate change, including an expected reduction in greenhouse gas emissions.

This project's water savings and water efficiency improvement will help to mitigate for the expected increase in late season demands on storage throughout the Henrys Fork River basin due to climate change. Like much of the western United States, climate change is impacting (and will continue to impact) the Upper Snake River Region with anticipated warmer seasonal temperatures and more variable precipitation. It is anticipated that droughts will become more common and severe in Idaho, leading to reliance on storage water to meet irrigation demand. Projects like the one in this application that increase irrigation delivery and water supply will be critical to meet the needs of agricultural production in the region while simultaneously reduce greenhouse gas emissions. A reduction in our carbon foot print will result from the declined use in vehicle travel needed to adjust the canal systems withdrawal, heavy equipment usage for canal cleanings annually, and finally implementing a small-scale solar system that will not increase energy demands for this project. Automating the canal diversion will reduce vehicle travel by an estimated total of 4,000 miles annually. Lining of the canal will reduce diesel fuel consumption from an excavator by a total of 700 gallons annually. The reduced emissions from both vehicle and heavy equipment usage will be complimented by a small-scale solar system that will provide electricity for the telemetered remote-control apparatus will allow the Conant Creek Canal Company watermaster to change diversion and spillback rates to meet demand on a much finer scale than past operations. Together all of these components will have benefits that are expected to reduce greenhouse gas emissions and combat climate change.

• If the project will result in reduced pumping, please describe the current pumping requirements and the types of pumps (e.g., size) currently being used. How would the proposed project impact the current pumping requirements and energy usage?

The proposed project will provide a critical first step in determining how future management and agricultural practices can reduce consumptive use of water or allow for greater production utilizing historic amounts of water (no increase in irrigation). Reduced pumping in this system could result when expensive storage water is no long economically feasible for the water users. No other reduction in pumping is expected to occur from this project, nor is any increase in pumping expected in this canal system.

• Please indicate whether your energy savings estimate originates from the point of diversion, or whether the estimate is based upon an alternate site of origin.

Energy savings estimates originate for the point of diversion.

• Does the calculation include any energy required to treat the water, if applicable?
N/A

• Will the project result in reduced vehicle miles driven, in turn reducing greenhouse gas emissions? Please provide supporting details and calculations.

Yes. Annually through the management of Conant Creek Canal the water managers are driving passenger vehicles for a total of 4,000 miles. The vehicles being used get an average of 15 miles per gallon while driving and navigating off-road terrain. The Environmental Protection Agency (EPA) Greenhouse Gas Emissions from a Typical Passenger Vehicle website features tailpipe carbon dioxide (CO_2) emission estimates from burning one gallon of gasoline. CO_2 Emissions from a gallon of gasoline is equivalent to 8,887 grams CO_2/ gallon.

4,000 miles driven / 15 MPG =266.67 gallons of consumptive use

8,887 grams * 266.67 gallons of gasoline = 2,369,896.29 grams

2,369,896.29 grams * 1.185 for conversion to metric tons = 2.369 Metric tons

Annually through flow management of the canal itself water users are contracting 70 hours of heavy equipment use in the form of a 50,000 lb. tracked excavator. The excavator consumes 10 gallon of diesel fuel per hour of operation. Resulting in 700 gallons of diesel fuel being consumed that will no longer be needed with canal lining. The Environmental Protection Agency (EPA) Greenhouse Gas Emissions from a Typical Passenger Vehicle website features tailpipe carbon dioxide (CO_2) emission estimates from burning one gallon of Diesel. CO_2 Emissions from a gallon of gasoline is equivalent to 10,180 grams CO_2/ gallon.

10,180 grams * 700 gallons of diesel fuel = 7,126,000 grams

7,126,000 * 1.185 for conversion to metric tons = 7.126 Metric tons

Total project will reduce CO_2 emission by the total of 9.945 metric tons annually.

• Describe any renewable energy components that will result in minimal energy savings/production (e.g., installing small-scale solar as part of a SCADA system).

A telemetered remote-control device will allow the Conant Creek Canal Company watermaster to change diversion and spillback rates to meet demand on a much finer scale than past operations. This system provides the water manager with real-time data on the flow rates and volumes of water at key points within the irrigation water delivery system. Access to such data allows the water manager to make accurate and timely deliveries of water. This real time delivery data promotes improved on-farm efficiencies. This component will be serviced by a small-scale solar panel system and battery reserve. This will result in minimal energy production that will allow the unit to stand alone separate from the energy grid.

E.1.3. Evaluation Criterion C—Sustainability Benefits (20 points)

Enhancing drought resiliency. In addition to the separate WaterSMART Environmental Water Resources Projects NOFO, this NOFO places a priority on projects that enhance drought resiliency, through this section and other sections above, consistent with the SECURE Water Act. Please provide information regarding how the project will enhance drought resilience by benefitting the water supply and ecosystem, including the following:

• Does the project seek to improve ecological resiliency to climate change?

This project will help increase the ecological resiliency of Conant Creek and Fall River by keeping more water in these systems during the most thermally stressful summer months for cold-water aquatic species. Increased flows during the summer will help reduce solar loading in Conant Creek and Fall River, effectively decreasing water temperatures in these reaches. Increased flows also increase connectivity between river reaches that may otherwise become disconnected during periods of high irrigation demand. This habitat connectivity is crucial for cold-water aquatic species to be able to move between habitats, particularly if habitats become thermally stressful or uninhabitable.

This project will also increase water storage in Island Park Reservoir which will provide a host of benefits upstream and downstream of the reservoir that will increase the ecological resilience of the system to climate change. In particular, maintaining increased reservoir levels in the late summer and early fall allow for thermal stratification within the reservoir to occur where water drawn into the power plant intake will occur at the cooler hypolimnion layer, rather than warmer water in the metalimnion or epilimnion layers which occurs when the reservoir gets drafted to low levels. This provides a consistent supply of cool, oxygenated water to the reach of the Henry's Fork River below Island Park Dam. Additionally, keeping more water in Island Park Reservoir provides additional habitat for cold-water species that rely on Island Park

Reservoir for all, or a portion, of their life cycle. By keeping more water in Island Park Reservoir, the natural stratification of the reservoir helps provide refuge for cold-water aquatic species in the face of climate change.

• Will water remain in the system for longer periods of time? If so, provide details on current/future durations and any expected resulting benefits (e.g., maintaining water temperatures or water levels).

This project will help keep more water in Conant Creek and Fall River during the most thermally stressful summer months for cold-water aquatic species. The project will increase streamflow from mid-May until early October and, on average, Conant Creek streamflow will increase by 13 cfs during the month of July, a 39% increase. Currently, regulated streamflow in Conant Creek is 0 from late June through mid-August in about 25% of all irrigation years. The project is expected to keep at least 11 cfs of flow in Conant Creek all season every year. Increased flows during the summer will help reduce solar loading in Conant Creek and Fall River, effectively decreasing water temperatures in these reaches. In addition to increasing streamflow in Conant Creek, the project will save an average of 1,987 ac-ft/year of storage water in Island Park Reservoir (1.5% of reservoir capacity). Increased storage water in Island Park Reservoir in the late summer and early fall will help support thermal stratification within the reservoir providing a supply of cool, oxygenated water to the reach of the Henry's Fork below Island Park Dam, as well as thermal refuge for cold-water aquatic species within the reservoir.

• Will the project benefit species (e.g., federally threatened or endangered, a federally recognized candidate species, a state listed species, or a species of particular recreational, or economic importance)? Please describe the relationship of the species to the water supply, and whether the species is adversely affected by a Reclamation project or is subject to a recovery plan or conservation plan under the Endangered Species Act (ESA).

Conant Creek provides critical habitat for an array of cold-water fish species including native Yellowstone Cutthroat Trout, Mountain Whitefish, Mottled Sculpin, Paiute Sculpin, Speckled Dace, Redside Shiner, and Mountain Suckers, as well as non-native Rainbow Trout, Brook Trout, and Brown Trout. Of particular importance, Conant Creek supports a robust population of Yellowstone Cutthroat Trout. Since the 1970's, native populations of Yellowstone Cutthroat Trout have declined due to harvest, habitat degradation, and competition and introgression from non-native species. Yellowstone Cutthroat Trout were petitioned to be listed as "threatened" under the Endangered Species Act of 1973 (ESA) but the petition was ultimately denied in 2001. To protect Yellowstone Cutthroat Trout and prevent future petitions to list Yellowstone Cutthroat Trout under the ESA, state and federal agencies have designated and prioritized Yellowstone Cutthroat Trout a species of conservation priority and a significant amount of effort and resources have gone in to protecting and conserving Yellowstone Cutthroat Trout populations within Idaho (IDFG 2007; USFWS 2017).

The project proposed in this application will coincide with multiple state and federal conservation goals and objectives outlined in a variety of management and strategic plans. By increasing the precision of diversions and reducing on-farm irrigation demand through more efficient water delivery systems, more water will remain in Conant Creek during thermally stressful summer months. This will help reduce the impacts of solar loading on water temperatures (keep water temperatures cooler), increase habitat connectivity, and provide additional habitat for cold-water species. Additionally, this project will help meet objectives outlined in state-wide conservation plans pertaining to habitat improvement and Yellowstone Cutthroat Trout conservation (IDFG 2007, 2019), the project falls within the Middle Rockies Focus Area designated in the Partners for Fish and Wildlife Program Strategic Plan (USFWS 2016), and the project aligns with the Idaho Fish and Wildlife Office goals and objectives for protecting and conserving Yellowstone Cutthroat Trout and increasing habitat connectivity within the Middle Rockies Priority Conservation Area (USFWS 2017).

• Please describe any other ecosystem benefits as a direct result of the project.

This project will provide benefits to all facets of Conant Creek and Fall River ecosystems that are dependent on sufficient water supply to function. Whether that is willows or cottonwoods needing sufficient flows to transport seedlings down river, or a water table that is high enough to support riparian vegetation. Increasing instream flow in Conant Creek (and subsequently Fall River) provides holistic ecosystem benefits to both systems.

• Will the project directly result in more efficient management of the water supply? For example, will the project provide greater flexibility to water managers, resulting in a more efficient use of water supplies?

The project will increase the efficiency and precision of water delivery through the Conant Creek Canal resulting in increased streamflow in Conant Creek and increased storage water in Island Park Dam. This provides water managers more flexibility in water operations and water supply.

Projects that are intended to improve streamflows or aquatic habit, and that are requesting $500,000 or more in Federal funding, must include information about plans to monitor the benefits of the project. Please describe the plan to monitor improved streamflows or aquatic habit benefits over a five-year period once the project has been completed. Provide detail on the steps to be taken to carry out the plan.

A YSI EXO3 Multiparameter Sonde will be installed between the diversion and spillback point on Conant Creek to monitor the impacts this project will have on streamflow and aquatic habitat conditions in the reach. Sondes collect data on temperature, dissolved oxygen, pressure (depth), conductivity, turbidity, chlorophyll, and blue-green algae at 15-minute intervals. The sonde will be installed one year prior to the implementation of the project and will be maintained for the preceding five years in order to compare before and after effects the project has on aquatic habitat conditions. Pairing the pressure data collected at the sonde with the rating curve developed from discharge measurements will provide high resolution data on flows in Conant Creek throughout the irrigation season allowing us to quantify the changes in streamflow pre- and post- project implementation. Additionally, the data collected at the sonde will allow us to quantify the improvements the project has on abiotic habitat conditions in the system that have implications on ecosystem productivity and cold-water species viability.

Additionally, a pressure transducer and temperature probe will also be installed on Conant Creek directly upstream of the confluence of Conant Creek and Fall River. This will be another monitoring location used to assess the impacts the project has on streamflows and aquatic conditions for Conant Creek.

Addressing a specific water and/or energy sustainability concern(s). Will the project address a specific sustainability concern? Please address the following:

- Explain and provide detail of the specific issue(s) in the area that is impacting water sustainability, such as shortages due to drought and/or climate change, increased demand, or reduced deliveries.

Like much of the western United States, climate change is impacting (and will continue to impact) the Upper Snake River Region with anticipated warmer seasonal temperatures and more variable precipitation. It is projected that droughts will become more common and severe in Idaho, leading to reliance on storage water to meet irrigation demand. Projects like the one in this application that increase irrigation delivery and water supply will be critical to meet the needs of agricultural production in the region.

- Explain and provide detail of the specific issue(s) in the area that is impacting energy sustainability, such as reliance on fossil fuels, pollution, or interruptions in service.

N/A

- Please describe how the project will directly address the concern(s) stated above. For example, if experiencing shortages due to drought or climate change, how will the project directly address and confront the shortages?

Reservoir carryover at the end of irrigation season over the past two decades has ranged from around 18,000 ac-ft (13% of reservoir capacity) in the driest years to 118,000 ac-ft (87% full) during wet years. The Conant Creek Canal project savings are expected to result in an increase in reservoir carryover of around 2,300 ac-ft (12.7% increase) in dry years to 1,500 ac-ft (1.3% increase) in wet years. Thus, the project has a much larger positive effect on reservoir storage savings in dry years, when reservoir carryover is critical for fisheries, water quality, and water supply.

- Please address where any conserved water as a result of the project will go and how it will be used, including whether the conserved water will be used to offset groundwater pumping, used to reduce diversions, used to address shortages that impact diversions or reduce deliveries, made available for transfer, left in the river system, or used to meet another intended use.

Water saved by the project is expected to reduce the amount of storage delivered from Island Park Reservoir. Releases from the reservoir deliver physical water to maintain canal diversion from the Henry's Fork and Teton River. Island Park storage water is delivered to the Teton River through the Crosscut Canal, which diverts from the Henry's Fork downstream of the Fall River confluence. Physical draft of Island Park Reservoir coincides with the need for delivery to the Teton River through the Crosscut Canal. Applying the additional Conant Creek streamflow to total flow available at the Crosscut Canal during the period of Island Park Reservoir draft will reduce total draft by an average of 1,987 ac-ft/year (range = 1,285-3,229 ac-ft/year). Reservoir carryover at the end of irrigation season over the past two decades has ranged from around 18,000 ac-ft (13% of reservoir capacity) in the driest years to 118,000 ac-ft (87% full) during wet years. Project savings are expected to result in an increase in reservoir carryover of around 2,300 ac-ft (12.7% increase) in dry years to 1,500 ac-ft (1.3% increase) in wet years. Thus, the project has a much larger positive effect on reservoir storage savings in dry years, when reservoir carryover is critical for fisheries, water quality, and water supply.

- Provide a description of the mechanism that will be used, if necessary, to put the conserved water to the intended use.

The Idaho Water Rights system under prior appropriation will ensure the conserved water is put to the intended use.

- Indicate the quantity of conserved water that will be used for the intended purpose(s).

The project will eliminate 2,850 ac-ft/year in canal seepage loss, increasing conveyance efficiency in the top 5.7 miles of the canal from 44% to 99%. We estimate that an average of 147ac-ft/year of this savings will be used for irrigation demand that is currently not met in dry years due to insufficient physical water supply. The remaining 2,703 ac-ft/year will be left in Conant Creek. The water savings will increase streamflow during the month of July by an average of 13 cfs, a 39% increase in over current conditions. In addition to increasing streamflow in Conant Creek, the project will save an average of 1,987 ac-ft/year of storage water in Island Park Reservoir (1.5% of reservoir capacity).

Other project benefits. Please provide a detailed explanation of the project benefits and their significance. These benefits may include, but are not limited to, the following:

(1) **Combating the Climate Crisis:** E.O. 14008: Tackling the Climate Crisis at Home and Abroad, focuses on increasing resilience to climate change and supporting climate-resilient development. For additional information on the impacts of climate change throughout the western United States, see: https://www.usbr.gov/climate/secure/docs/2021secure/2021SECUREReport.pdf. Please describe how the project will address climate change, including the following:

o Please provide specific details and examples on how the project will address the impacts of climate change and help combat the climate crisis.

The project will help address anticipated increased seasonal temperatures and increased variability in precipitation for the Upper Snake River region by implementing a more efficient irrigation delivery system that will reduce water loss during delivery and increase storage water in Island Park Reservoir.

o Does this proposed project strengthen water supply sustainability to increase resilience to climate change?

Water saved by the project is expected to reduce the amount of storage delivered from Island Park Reservoir. Releases from the reservoir deliver physical water to maintain canal diversion from the Henry's Fork and Teton River. Island Park storage water is delivered to the Teton River through the Crosscut Canal, which diverts from the Henry's Fork downstream of the Fall River confluence. Physical draft of Island Park Reservoir coincides with need for delivery to the Teton River through the Crosscut Canal. Applying the additional Conant Creek streamflow to total flow available at the Crosscut Canal during the period of Island Park Reservoir draft will reduce total draft by an average of 1,987 ac-ft/year (range = 1,285-3,229 ac-ft/year). Reservoir carryover at the end of irrigation season over the past two decades has ranged from around 18,000 ac-ft (13% of reservoir capacity) in the driest years to 118,000 ac-ft (87% full) during wet years. Project savings are expected to result in an increase in reservoir carryover of around 2,300 ac-ft (12.7% increase) in dry years to 1,500 ac-ft (1.3% increase) in wet years. Thus, the project has a much larger positive effect on reservoir storage savings in dry years, when reservoir carryover is critical for fisheries, water quality, and water supply.

o Will the proposed project establish and utilize a renewable energy source?

N/A

o Will the project result in lower greenhouse gas emissions?

Total proposed project will reduce CO2 emission by the total of 9.945 metric tons annually.

(2) Disadvantaged or Underserved Communities: E.O. 14008 and E.O. 13985 support environmental and economic justice by investing in underserved and disadvantaged communities and addressing the climate-related impacts to these communities, including impacts to public health, safety, and economic opportunities. Please describe how the project supports these Executive Orders, including:

a. Does the proposed project directly serve and/or benefit a disadvantaged or historically underserved community? Benefits can include, but are not limited to, public health and safety through water quality improvements, new water supplies, new renewable energy sources, or economic growth opportunities.
    - N/A

b. If the proposed project is providing benefits to a disadvantaged community, provide sufficient information to demonstrate that the community meets the disadvantaged community definition in Section 1015 of the Cooperative Watershed Act, which is defined as a community with an annual median household income that is less than 100 percent of the statewide annual median household income for the State, or the applicable state criteria for determining disadvantaged status.
    - N/A

c. If the proposed project is providing benefits to an underserved community, provide sufficient information to demonstrate that the community meets the underserved definition in E.O. 13985, which includes populations sharing a particular characteristic, as well as geographic communities, that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life.
    - N/A

(3) **Tribal Benefits:** The Department of the Interior is committed to strengthening tribal sovereignty and the fulfillment of Federal Tribal trust responsibilities. The President's memorandum "Tribal Consultation and Strengthening Nation-to-Nation Relationships" asserts the importance of honoring the Federal government's commitments to Tribal Nations. Please address the following, if applicable:

a. Does the proposed project directly serve and/or benefit a Tribe? Will the project increase water supply sustainability for an Indian Tribe? Will the project provide renewable energy for an Indian Tribe?

As a part of the Nez Perce Water Rights Settlement Agreement of 2005, the Upper Snake River water users provide flow augmentation water down river for fish habitat. The amount of flow augmentation water available from the Upper Snake River system is significantly dependent upon reservoir levels. This project will help keep more water in the reservoir and therefore more water may be available in any given year for flow augmentation down river.

b. Does the proposed project directly support tribal resilience to climate change and drought impacts or provide other tribal benefits such as improved public health and safety through water quality improvements, new water supplies, or economic growth opportunities?

As a part of the Nez Perce Water Rights Settlement Agreement of 2005, the Upper Snake River water users provide flow augmentation water down river for fish habitat. The amount of flow augmentation water available from the Upper Snake River system is significantly dependent upon reservoir levels. This project will help keep more water in the reservoir and therefore more water may be available in any given year for flow augmentation down river.

(4) **Other Benefits:** Will the project address water and/or energy sustainability in other ways not described above? For example:

a. Will the project assist States and water users in complying with interstate compacts?

N/A

b. Will the project benefit multiple sectors and/or users (e.g., agriculture, municipal and industrial, environmental, recreation, or others)?

Yes, the project will benefit agricultural producers as well as conservation and recreational groups in the region.

c. Will the project benefit a larger initiative to address sustainability?

The project is one piece of an on-going effort to improve and repair and upgrade aging agricultural infrastructure in the Upper Snake River Region in order to increase the precision and efficiency of water delivery and management in the system. The cumulative effects of the projects will increase the sustainability and viability of user groups that are dependent on water in the region, particularly in the face of climate change.

d. Will the project help to prevent a water-related crisis or conflict? Is there frequently tension or litigation over water in the basin?

Water saved by the project is expected to reduce the amount of storage delivered from Island Park Reservoir. Releases from the reservoir deliver physical water to maintain canal diversion from the Henry's Fork and Teton River. Island Park storage water is delivered to the Teton River through the Crosscut Canal, which diverts from the Henry's Fork downstream of the Fall River confluence. Physical draft of Island Park Reservoir coincides with need for delivery to the Teton River through the Crosscut Canal. Applying the additional Conant Creek streamflow to total flow available at the Crosscut Canal during the period of Island Park Reservoir draft will reduce total draft by an average of 1,987 ac-ft/year (range = 1,285-3,229 ac-ft/year). Reservoir carryover at the end of irrigation season over the past two decades has ranged from around 18,000 ac-ft (13% of reservoir capacity) in the driest years to 118,000 ac-ft (87% full) during wet years. Project savings are expected to result in an increase in reservoir carryover of around 2,300 ac-ft (12.7% increase) in dry years to 1,500 ac-ft (1.3% increase) in wet years. Thus, the project has a much larger positive effect on reservoir storage savings in dry years, when reservoir carryover is critical for fisheries, water quality, and water supply.

E.1.4. Evaluation Criterion D—Complementing On-Farm Irrigation Improvements (10 points)

If the proposed project will complement an on-farm improvement eligible for NRCS assistance, please address the following:

- Describe any planned or ongoing projects by farmers/ranchers that receive water from the applicant to improve on-farm efficiencies.

Farmers in the Conant Creek Canal Company service area rely on healthy soils and dependable water sources to grow high quality and high value crops. How that water is utilized is a critical natural resource issue as well. The United States Department of Agriculture's Natural Resources Conservation Service (NRCS) can help farmers with effective irrigation water management plans tailored to their farm-specific needs. The farmers that receive water from Conant Creek Canal Company will install flow meters as a device to record instantaneous flow rates and total volume usages on their pumping station. This form of irrigation management can improve on-farm efficiencies through the practice of monitoring and managing the rate, volume, and timing of water applications according to the seasonal crop needs. After flow meters are installed, on-farm efficiencies will trend towards implementing soil health practices with the intent to increase the soil's ability to hold water for longer periods of time.

o Provide a detailed description of the on-farm efficiency improvements.

One important aspect of irrigation water management is properly evaluating and monitoring the available soil moisture for the particular crop. By observing moisture levels in the soil, the irrigator can determine the appropriate amount of water to apply to the crops. Irrigation water management through the use of a flow meter is a process of determining and controlling the volume, frequency, and application rate of irrigation water in a planned, efficient manner. A flow meter is a valuable tool for improving irrigation efficiency, evaluating current management practices, determining pump efficiency and detecting pump and irrigation system problems. The device provides two basic pieces of information. First pumping rate, typically in gallons per minute (gpm), or cubic feet per second (cfs), and secondly as a totalizer, typically in acre feet (with a multiplier), or gallons (with a multiplier). Flow meters are a useful tool to help understand water use and pump performance in irrigation systems.

o Have the farmers requested technical or financial assistance from NRCS for the on-farm efficiency projects, or do they plan to in the future?

Yes, farmers in the Conant Creek Canal Company have met with NRCS regarding proposed on farm work and one farmer has signed a letter of intent. The NRCS can help farmers conserve water with plans that increase their soil water holding capacity using conservation tillage and mulching to keep the ground covered and reduce water loss through evaporation. Biodiversity should be introduced in the soil through the use of cover crops and alternative cropping rotations that can add up to higher soil organic matter. Farmers in the Conant Creek Canal Company consider the soils ability to intake and hold water and in this area soil moisture should be managed to obtain optimum yields, without deep percolation losses or runoff. Irrigation water management tools such as flow meters will work in conjunction with soil health practices to help irrigators determine the effectiveness of irrigation practices, make good water management decisions, and justify making irrigation delivery adjustments in the existing systems. All of these programs are available with NRCS assistance and have been Identified by local district conservationists and farmers alike as complimentary on-farm conservation practices to work alongside WaterSMART.

o If available, provide documentation that the on-farm projects are eligible for NRCS assistance, that such assistance has or will be requested, and the number or percentage of farms that plan to participate in available NRCS programs.

The Conant Creek Canal Company service area has been designated as a priority area by the NRCS Local Working Groups. Local Working Groups are composed of a variety of stakeholders representing agricultural and natural resource interests and issues in the local community. The role of Local Working Groups is to provide recommendations to the District Conservationist and the State Conservationist on local natural resource priorities and criteria for conservation activities and programs. This fall, it was agreed upon by the Local Working Groups to make the Conant Creek Canal Company service area a designated priority area meaning that more award points were available to producers in this area for applications submitted through the Environmental Quality Incentives Program (EQIP). We expect 50% of the service area's acres to be enrolled in the EQIP program throughout the length of this grant.

o Applicants should provide letters of intent from farmers/ranchers in the affected project areas.

Conant Creek Farms (see attached)

 Describe how the proposed WaterSMART project would complement any ongoing or planned on-farm improvement.

A well designed and managed irrigation system reduces water loss to evaporation, deep percolation, and runoff and minimizes erosion from applied water. Application of this plan will reduce the waste of irrigation water, improve water use efficiency, and reduce the total pollutant discharge from an irrigation system.

o Will the proposed WaterSMART project directly facilitate the on-farm improvement? If so, how? For example, installation of a pressurized pipe through WaterSMART can help support efficient on-farm irrigation practices, such as drip-irrigation.
OR
o Will the proposed WaterSMART project complement the on-farm project by maximizing efficiency in the area? If so, how?

The proposed WaterSMART project will perfectly complement the installation of irrigation flow management devices that will provide the water manager with real-time data on the flow rates and volumes of water at key points within the irrigation water delivery system. Access to such data allows the water manager to make accurate and timely deliveries of water, reducing over-deliveries and spillage at the end of the canal. This real time delivery data promotes improved on-farm efficiencies.

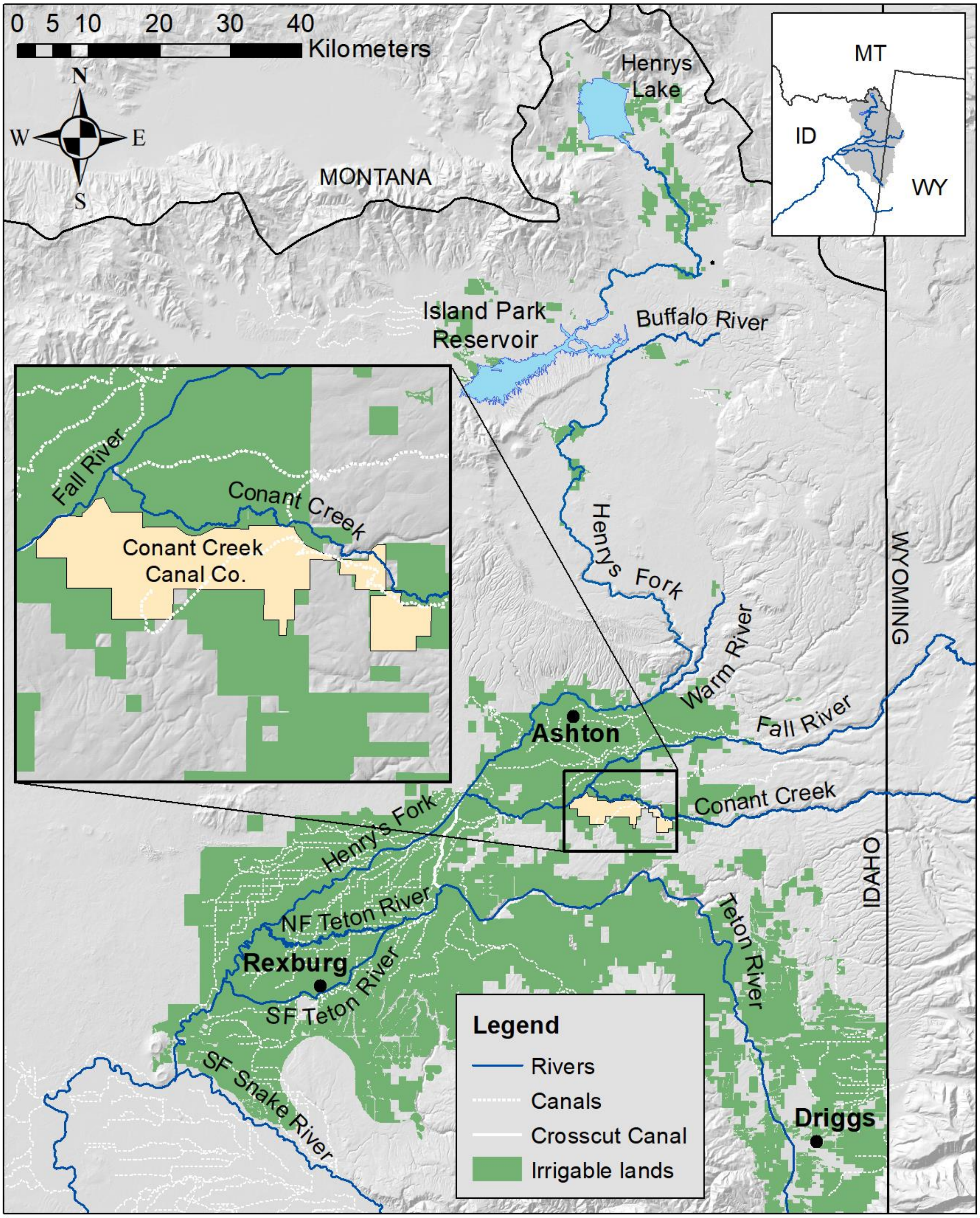
 Describe the on-farm water conservation or water use efficiency benefits that are expected to result from any on-farm work.

The intent of this plan is to assist the irrigation users in Conant Creek Canal Company to meet the following goals: manage soil moisture to promote the desired crop response, optimize use of available water supplies, reduce the need for expensive storage water purchases, and decrease non-point source pollution of surface and groundwater resources. Irrigation water management for crop production will consist of monitoring soil moisture to determine the timing of irrigations through the growing season, and developing an understanding of irrigation system performance to determine the duration of irrigations. Having historical knowledge about water use allows growers to understand how weather patterns impact irrigation needs and how different management choices impact water use on their fields.

o Estimate the potential on-farm water savings that could result in acre-feet per year. Include support or backup documentation for any calculations or assumptions.

The proposed project will provide a critical first step in determining how future management and agricultural practices can reduce consumptive use of water or allow for greater production utilizing historic amounts of water (no increase in irrigation). On-farm water savings could incur when expensive storage water is no long economically feasible for the water users, resulting in reduced pumping. No other reduction in pumping is expected to occur from this project, nor is any increase in pumping expected in this canal system. This project is also complimentary to the work carried out in Henry's Fork Foundation's Farms & Fish program that work with farmers, voluntarily, to not divert their share of water and seek alternative cropping rotations such as a cover crop for years the land is not in cash crop production. While its hard to quantify a number for this project, we are opening the door to a program that worked with farmers to save over 1,200 acre-feet in crop year 2021.

 Please provide a map of your water service area boundaries. If your project is selected for funding under this NOFO, this information will help NRCS identify the irrigated lands that may be approved for NRCS funding and technical assistance to complement funded WaterSMART projects.



Map of Henry's Fork watershed, showing Conant Creek, and Conant Creek Canal Company service area.

E.1.5. Evaluation Criterion E—Planning and Implementation (8 points)

E.1.5.1. Subcriterion E.1— Project Planning

Points may be awarded for proposals with planning efforts that provide support for the proposed project.

Does the applicant have a Water Conservation Plan and/or System Optimization Review (SOR) in place? Does the project address an adaptation strategy identified in a completed WaterSMART Basin Study? Please self-certify or provide copies of these plans where appropriate to verify that such a plan is in place. Including a specific excerpt or a link to the planning document may also be considered where appropriate.

Provide the following information regarding project planning:

(1) Identify any district-wide, or system-wide, planning that provides support for the proposed project. This could include a Water Conservation Plan, SOR, Drought Contingency Plan or other planning efforts done to determine the priority of this project in relation to other potential projects.

Reclamation has been an important partner in collaborative water management with irrigation districts and other stakeholders in the Henry's Fork Watershed. All of that collaborative management has originated through the Henry's Fork Watershed Council, a grassroots, consensus-based watershed organization founded in 1993 and co-facilitated by FMID and the Henry's Fork Foundation (HFF). Reclamation has been an active and regular participant in the Watershed Council since its inception, frequently presenting water-supply updates and other information at Council meetings. In 2003, after years of deliberation by the Council, a Congressional Act transferred ownership of the Crosscut Canal, along with some groundwater wells and permits, from Reclamation to FMID. That Act also required development of a Drought Management Plan (DMP) to provide a framework for collaborative management of Island Park Dam among water users, agencies and fisheries conservation groups. The DMP was completed in 2005 and signed by FMID, NFRC, Reclamation, HFF, Trout Unlimited, and The Nature Conservancy. These six entities form the core of the DMP Committee, which meets four times each year to set general operational strategies for managing the reservoir to benefit fisheries as much as possible under the legal system that governs storage and delivery of irrigation water. Because the entire upper Snake River Basin is administered under a single, common system of water rights, the DMP Committee seeks to optimize integrated operation of Henry's Lake, Island Park Reservoir, and Grassy Lake to benefit local water users and resources, within the larger upper Snake River Basin system. Reclamation's participation in the DMP Committee is critical to bringing the system-wide perspective to DMP process. This grant proposal takes another step toward implementing some of the alternatives developed through the Henry's Fork Basin Study.

(2) Describe how the project conforms to and meets the goals of any applicable planning efforts and identify any aspect of the project that implements a feature of an existing water plan(s).

In the North Fremont region, piping irrigation canals would increase total annual flows, peak flows, and nonpeak flows. This would have positive benefits to the Henrys Fork River basin's water budget. Pipeline systems already constructed in the North Fremont irrigated region have helped to reduce the need for deliveries from upstream storage. For the North Fremont region, canal automation shows potential to increase nonpeak flows. The increase of nonpeak flows would be a positive effect during periods of normally low flows. Canal automation in combination with the ongoing conservation efforts in the North Fremont region to pipe and line canals could cumulatively make a positive impact on local streamflows.

As stated in the 2015 Basin Study: The irrigation canal piping alternative consists of the installation of pipelines in irrigation canals to limit water loss due to canal seepage. This is a routine conservation practice in many parts of the country, but because of the interconnectedness of the groundwater and surface water in the Henrys Fork River basin and the influence canal seepage has on return flows to the river, this conservation practice is generally not applied in the Henrys Fork River basin. After initial analysis, pipelines and canal linings were shown to be of positive benefit only in the North Fremont irrigated region.

(3) If applicable, provide a detailed description of how a project is addressing an adaptation strategy specifically identified in a completed WaterSMART Basin Study or Water Management Options Pilot (e.g., a strategy to mitigate the impacts of water shortages resulting from climate change, drought, increased demands, or other causes)

This grant proposal takes another step toward implementing some of the alternatives developed through the Henry's Fork Basin Study. With funding from its WaterSMART program, along with match from the State of Idaho, the U.S. Bureau of Reclamation completed the Henry's Fork Basin Study, a planning document intended to be a template for future actions to ensure reliability and sustainability of water resources in the basin. The Henry's Fork Watershed Council, which HFF co-facilitates with Fremont-Madison Irrigation District, served as the stakeholder workgroup for this planning effort. The Basin Study contains a number of potential options that were thoroughly vetted by a diverse group of stakeholders. These options include small off-stream storage reservoirs, modest enlargement of existing reservoirs, managed aquifer recharge, market-based administrative exchanges in time and place of water use, canal linings and piping, and automated irrigation delivery infrastructure. Although developed with the entire watershed—and even the entire Snake River basin—in mind, the most viable options in the Basin Study are relatively small in scale and designed to be implemented and managed in conjunction with other efforts at the local level.

For more information on Basin Studies, including a list of completed basin studies and reports, please visit: www.usbr.gov/WaterSMART/bsp.

E.1.5.2. Subcriterion E.2— Readiness to Proceed

Applications that include a detailed project implementation plan (e.g., estimated project schedule that shows the stages and duration of the proposed work, including major tasks, milestones, and dates) will receive the most points under this criterion.

• Identify and provide a summary description of the major tasks necessary to complete the project. Note: please do not repeat the more detailed technical project description provided in Section D.2.2.4.; this section should focus on a summary of the major tasks to be accomplished as part of the project.

Project Implementation Plan

Task Description	**Dates of Proposed Work**	**Milestone**
Implementation Plan: Pre-Planning		
Stakeholder Meetings and Outreach • Host irrigator meeting • Host public informational meeting • Conduct one-on-one outreach to irrigators	Ongoing through the life of the Grant	Secure additional commitment to participate canal lining and remote automation
Site Selection and Design Plans • Select and identify sites for monitoring • Design plans for new headgate diversion with remote control automation	Early 2022	Detailed specifications on locations chosen and design plans to be implemented
Pre-Project Monitoring • Acquire necessary equipment • Install gage and establish rated stream section • Take flow measurements • Establish rating curve	Starting immediately through 5-year monitoring project	Stream gage successfully installed & rating reliable rating curve established

Project Administration • Semiannual reports	Ongoing through the life of the grant	All responsibilities are know for grant reporting.
Implementation Plan: Phase 1		
Canal Lining Preparation • Coordinate participating irrigators • Gather additional bids • Collect & compile diversion data	Spring of 2022	Contracts established with bid winners
Canal Lining Implementation • Canal liner installation begins	Fall of 2022 & into spring of 2023	Canal lining is finished
NRCS EQIP Applications • Farm participants enroll in EQIP	Fall of 2022	50-75% farmer participation
Implementation Plan: Phase 2		
Remote Control and Automation • New concrete diversion, headgate, and spillback structures • Real time flow and staff gauges • Telemetered remote control devices	Fall 2023 & into spring 2024	Installation of these core components for canal automation
Implementation Plan: Phase 3		
Flow Meter Installations • Coordinate participating irrigators • Collect & compile data	2023 and 2024	Irrigation water management devices are installed or planning to be installed.
Implementation Plan: Post Monitoring		
Continue 5 Year Monitoring Plan • Data collection • Final report	Fall 2024 and ongoing	Quantifying the instream improvements for Conant Creek

• Describe any permits that will be required, along with the process for obtaining such permits.

N/A

• Identify and describe any engineering or design work performed specifically in support of the proposed project.

None to date

• Describe any new policies or administrative actions required to implement the project.

N/A

• Please also include an estimated project schedule that shows the stages and duration of the proposed work, including major tasks, milestones, and dates. Milestones may include, but are not limited to, the following: complete environmental and cultural compliance; mobilization; begin construction/installation; construction/installation (50% complete); and construction/installation (100% complete)

Table 1. Timeline of project tasks. Shading indicates task performance during a given quarter.

TASKS	FY 2022				FY 2023				FY 2024			
	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep
Conant Creek Canal lining												
Design			■	■	■							
Installation					■		■					
Stream and canal gages												
Site selection		■	■									
Installation			■	■								
Rating			■	■	■		■	■	■		■	■
Diversion and remote control												
Design			■	■	■	■	■					
Construction								■	■		■	
Flow meters – irrigation pumps												
Installation					■	■	■	■	■	■	■	■
Information dissemination												

Stakeholder mtgs.	■	■	■	■	■	■	■	■	■	■	■	■
User outreach	■	■	■	■	■	■	■	■	■	■	■	■
Project administration												
Semi-annual reports		■		■		■		■		■		
Final report												■

E.1.6. Evaluation Criterion F—Collaboration (6 points)

• Please describe how the project promotes and encourages collaboration.

After official release of the final Basin Study document in 2015, HFF's Board of Directors directed staff to take a leadership role in pursuing implementation of alternatives in the Basin Study, as well as other, related actions that ensure sustainability of water resources for all uses, including fish and wildlife. Many of the important management issues identified in the Basin Study are related to late-season shortages of water resulting in higher demands on Island Park Reservoir. Addressing these shortages is critical to improving late-season and winter flows on the mainstem Henry's Fork and other tributaries and has been a collaborative effort to promote and encourage this work.

Consider the following:
• Is there widespread support for the project? Please provide specific details regarding any support and/or partners involved in the project. What is the extent of their involvement in the process?

The 3,200 square-mile watershed of the Henry's Fork Snake River is a major source of water for irrigated agriculture both locally and regionally. The water resources and uses of the watershed are thoroughly described in the Henry's Fork Basin Study and supporting technical documents. The background data presented here is a brief summary of the information already published in the Basin Study. The Henry's Fork watershed contains three major sub-watersheds, those of the Upper Henry's Fork, Fall River and Teton River, in addition to a large area of the Snake River Plain that has few surface water features. Mean annual basin yield is 2.54 million ac-ft: 1.23 million ac-ft from the upper Henry's Fork, 700,000 ac-ft from Fall River, and 610,000 ac-ft from the Teton River. About 1.1 million ac-ft per year is diverted from the surface water system for irrigated agriculture, although total diversion has been declining steadily at about 7,500 ac-ft per year since the late 1970s due to increased irrigation efficiency. Of the 1.1 million ac-ft withdrawn annually for irrigation, about 256,000 ac-ft is consumptively used by crops, 12,000 ac-ft is lost to evaporation, and the remainder returns to the surface system or regional aquifer within the upper Snake River Basin. About 1.66 million ac-ft leaves the Henry's Fork watershed as surface flow, and 600,000 ac-ft recharges the Eastern Snake Plain Aquifer, which discharges to the Snake River downstream of the Henry's Fork watershed. About 180,000 ac-ft of groundwater is withdrawn for irrigation in the watershed, and only about 18,000 ac-ft, almost all groundwater, is withdrawn for all non-irrigation uses. In addition to providing water for agriculture across the entire upper Snake River Basin, the rivers, reservoirs, lakes and streams of the Henry's Fork watershed support world- recreational trout fisheries that are economically important to local communities.

Diminished water supplies impact Eastern Idaho's agricultural economy, recreation economy, and natural resources. Throughout the watershed there is widespread support for improving irrigation infrastructure that leads to more efficient delivery of water. Inefficiencies currently exist for both large and small-scale structures. The partners in this proposal, Canyon Creek Canal Company and Fremont-Madison Irrigation District, recognize the ability to achieve water savings throughout the watershed by working with irrigation companies to upgrade and replace existing structures. Also, by partnering with agricultural producers to devise and enact local strategies that are consistent with and beneficial to state water management goals, we can enhance economic returns for farms, and reduce demand for water in the region.

All work on this project will be closely coordinated with the Conant Creek Canal Company, including jointly signing all bids and contracts for the project. Fremont-Madison Irrigation District will host the real-time monitoring data of flow information on their SCADA system pending an agreement with the Conant Creek Canal Company. The project partners would also begin to solicit bids for design of the new diversion, headgate, and spillback in 2023 with the hopes of installing the new structures in the fall of 2023. Finally, flow meters will be installed on irrigation pumps in conjunction with Conant Creek Canal Company shareholders.

• What is the significance of the collaboration/support?

Pipeline and canal lining systems already constructed in the North Fremont irrigated region have helped to reduce the need for deliveries from upstream storage. Evidence indicates piping systems have saved approximately 10,000 acre-feet of storage annually that were historically lost to canal seepage. Additionally, pipeline systems in the North Fremont region have had and could continue to have a positive impact on streamflows in the river system by reducing instream withdrawals. Water savings realized through water conservation projects such as piping and canal lining could make more water available later in the irrigation season. This could help mitigate for current water supply shortages in the region and help to mitigate the expected increase in late season demands predicted due to climate change.

Significant collaboration and support from local sponsors have already made great strides in implementing this alternative through cooperation with IWRB and USDA financial assistance programs, which has funded various phases of the North Fremont Gravity Pipeline Project. The project is being implemented in five phases and is awaiting its final phase.

Collaboration and support from partners makes this project possible. HFF will provide technical assistance and coordination, but Conant Creek Canal Company and Fremont-Madison Irrigation District provide the permission and opportunity to implement the project and water savings. The project benefits both agriculture and irrigation needs as well as overall watershed and fisheries health.

• Will this project increase the possibility/likelihood of future water conservation improvements by other water users?

Yes, as stated in the 2015 Basin Study: The IWRB Financial Program coupled with Reclamations WaterSMART grant program or any USDA financial assistance programs should continue to be utilized to move this alternative forward. As water users see the success of this project, it will open doors to new water conservation improvement projects in the future.

• Please attach any relevant supporting documents (e.g., letters of support or memorandum of understanding).

E.1.7. Evaluation Criterion G— Additional Non-Federal Funding (4 points)

50% Match.

E.1.8. Evaluation Criterion H— Nexus to Reclamation (4 Points)

Describe the nexus between the proposed project and a Reclamation project or Reclamation activity. Please consider the following:

The Bureau of Reclamation, in partnership with the Idaho Water Resource Board, completed the $800,000 Henry's Fork Basin Study in 2015. Designed to identify potential water supply solutions to address water supply needs in the Henrys Fork Basin and beyond, the final product provided the alternatives and background data used as a launch pad for the next five years of work in the Basin. The Basin Study endeavored to "identify opportunities for development of water supplies (i.e., above- ground storage, aquifer storage) and improvement of water management (i.e., conservation measures, optimization of resources) while sustaining environmental quality." To that effect, the Basin Study examined potential new dam sites, expansion of existing storage facilities, groundwater recharge, municipal conservation, piping and lining of canals, demand reduction, and water marketing strategies. The Conant Creek Canal Lining Project fits in perfectly with the USBR Henry's Fork Basin Study and complements other WaterSMART projects funded since the Basin Study was completed.

• Does the applicant have a water service, repayment, or O&M contract with Reclamation?

N/A

• If the applicant is not a Reclamation contractor, does the applicant receive Reclamation water through a Reclamation contractor or by any other contractual means?

N/A

• Will the proposed work benefit a Reclamation project area or activity?

Yes, it will meet the objectives of the Henry's Fork Basin Study.

• Is the applicant a Tribe?

N/A

D.2.2.4.5. Performance Measures

Inflow/outflow testing will be the performance measurement used to quantify actual water savings for the canal lining. This will be taken six times at two separate locations in a year prior to the canal lining and for subsequent years after the canal lining is in place. Locations for the measurements will be directly after the diversion point into the canal and directly before the spillback site to measure canal seepage in the total treatment reach of the canal. Henry's Fork Foundation staff will utilize a Teledyne StreamPro ADCP (acoustic doppler current profiler) to take the six stream flow measurements each year. This schedule will start in 2022 and continue through the life of the program for a minimum of five additional years. Although after the construction of new infrastructure, rated irrigation weirs within the canal diversion and spillback will eventually take the place of ADCP measurements for the canal.

D.2.2.5. Project Budget

We propose a three-year project budget of $2,050,803.60, of which $1,050,901.80 (50.0%) is federal funding requested in this application (Table 3). The federal funds will be used to pay the majority of the cost of the canal lining portion of the project consisting of contractors and necessary supplies ($1,440,000). Funding from the Henry's Fork Foundation will cover the remaining balance of the canal lining and the remainder of the project scope.

D.2.2.5.1. Funding Plan and Letters of Commitment

Non-federal match will total $1,050,901.80 (50.0 % of project budget), of which $944,501.80 will be costs paid by the applicant using nonfederal funds. The applicant's share of match includes salaries, travel, equipment and supplies, contractors and consultants, environmental compliance reporting, and student internships. All of this funding is backed by private donations to HFF obtained through HFF's normal fundraising mechanisms and schedules. As indicated in the official resolution, HFF's Board of Directors commits to ensuring that non-federal contributions to HFF will be sufficient over the life of the project to meet the proposed match commitment. HFF's match commitment does not depend on any pending grant or loan requests but HFF will continue to seek specific grants to free up private, unrestricted funds for associated water conservation projects housed within HFF's Farms and Fish Program.

The remaining non-federal match will come from in-kind contributions from board members of the Conant Creek Canal Company shareholders ($104,000) and Fremont Madison Irrigation District ($2,400). The commitment to the project and the willingness to provide support are documented in the attached letters of commitment. Conant Creek Canal Company will donate 2080 hours of time over the three-year period of the grant to provide project oversight, review planning documents, meet with the project proponent and contractors, troubleshoot operations or technical issues, install flow meters, and establish proper monitoring and reporting for the project. FMID will facilitate stakeholder meetings through the Henry's Fork Watershed Council and add the flow data to their SCADA system if requested by Conant Creek Canal Company.

Table 3. Total project costs.

SOURCE	AMOUNT	PERCENT OF TOTAL
Costs to be reimbursed with the requested Federal funding	$1,050,901.80	50.0%
Costs to be paid by the applicant	$944,501.80	44.9%
Value of third-party contributions	$106,400	5.1%
TOTAL PROJECT COST	$2,101,803.60	100%

D.2.2.5.2. Budget Proposal

The budget proposal appears in Table 4.

Table 4. Budget proposal.

BUDGET ITEM DESCRIPTION	COMPUTATION		Quantity Type	TOTAL COST
	$/Unit	Quantity		
Salaries and Wages				
Manager: Daniel Wilcox Farms & Fish Program Manager	$26.50	2,808	hour	$74,412.00
Brandon Hoffner, Executive Director	$58.00	800	hour	$46,400.00

Bryce Oldemeyer, Conservation Program Manager	$30.00	800	hour	$24,000.00
Rob Van Kirk – Senior Scientist	$50.00	240	hour	$12,000.00
Matt Hively - Aquatic Resources Coordinator	$22.00	240	hour	$5,280.00
Darcy Janssen - Finance Administrator	$24.00	600	hour	$14,400.00
Jamie Laatsch – Communication and Outreach Director	$34.00	90	hour	$3,060.00
Amber Roseberry – Conservation Technician	$18.00	240	hour	$4,320.00
Shawn Holwegner – Technology Coordinator	$35.00	240	hour	$8,400.00
Fringe Benefits				
Manager: Daniel Wilcox Farms & Fish Program Manager	30.0%	$74,412.00	salary	$22,323.60
Brandon Hoffner, Executive Director	17.5%	$46,400.00	salary	$8,120.00
Bryce Oldemeyer, Conservation Program Manager	16.0%	$24,000.00	salary	$3,840.00
Rob Van Kirk – Senior Scientist	15.0%	$12,000.00	salary	$1,800.00
Matt Hively - Aquatic Resources Coordinator	28.0%	$5,280.00	salary	$1,478.40
Darcy Janssen - Finance Administrator	18.0%	$14,400.00	salary	$2,592.00
Jamie Laatsch – Communication and Outreach Director	16.0%	$3,060.00	salary	$489.60
Amber Roseberry – Conservation Technician	15.0%	$4,320.00	salary	$648.00
Shawn Holwegner – Technology Coordinator	15.0%	$8,400.00	salary	$1,260.00
Travel				
Local	$0.56	3000	mile	$1,680.00

Non-local (Boise)	$900.00	3	trip	$2,700.00
Equipment				
YSI Exo 3 Sonde w/ probes	$16,000.00	1	EA	$16,000.00
Flow gaging equipment	$3,200.00	2	EA	$6,400.00
Remote control diversion equipment	$4,000.00	2	EA	$8,000.00
Irrigation pump flow meters	$5,000.00	15	EA	$85,000.00
Supplies and Materials				
Flow gage installation supplies	$150.00	2	EA	$300.00
New diversion structure and head gate	$80,000.00	1	EA	$80,000.00
New canal spillback structure	$80,000.00	1	EA	$80,000.00
YSI Exo 3 Sonde installation materials	$1,000.00	1	EA	$1,000.00
Contractors/Consultants				
Engineer – Design of diversion/headgate/spillback structures	$150.00	160	hour	$24,000.00
Golden West Irrigation installation of 35' wide canal liner (40mil HDPE)	$240,000.00	6	mile	$1,440,000.00
Third-party In-kind				
Aaron Dalling – Fremont-Madison Irrigation District - SCADA	$60.00	40	hour	$2,400.00
Conant Creek Canal Company Directors	$50.00	2080	hour	$104,000.00
Environmental and regulatory compliance				
Compliance verification and report	$3,000.00	1	EA	$3,000.00
Other expenses				
Undergraduate student internships	$6,250.00	2	EA	$12,500.00
TOTAL DIRECT COSTS				$ 2,101,803.60
Indirect Costs				$0.00

TOTAL ESTIMATED PROJECT COSTS	$2,101,803.60

D.2.2.5.3. Budget Narrative

D.2.2.5.3.1. Salaries and Wages

All salaries and wages included in the budget will be paid to regular HFF employees at their current hourly rate.

Daniel Wilcox, HFF Farms and Fish Program Manager

Daniel will devote 45% of his total work time (936 hours) to the project in each of the three years, for a total of 2,808 hours over the life of the project. Of this time, 1,966 hours (70%) will be spent on the canal lining and diversion structure upgrade project management, coordination, and administration, 702 hours (25%) on the flow metering and associated on-the-farm projects, and 140 hours (5%) on information dissemination.

Brandon Hoffner, HFF Executive Director

Brandon will contribute 267 hours per year to the project. Of this time, 107 hours (40%) will be spent on assistance to the Farms and Fish Program Manager for project management, 107 hours (40%) managing all staff regarding the Conant Creek Canal Project, and 53 hours (20%) on information dissemination to HFF membership, the HFF Board of Directors and other partners.

Bryce Oldemeyer, HFF Conservation Program Manager

Bryce will contribute 267 hours per year on the Conant Creek Canal Project. All of Bryce's time will be dedicated to technical aspects of the projects such as rating curve development, water quality monitoring data, flow monitoring, ecological indicator monitoring, and GIS.

Rob Van Kirk, HFF Senior Scientist

Rob will contribute 80 hours per year to design flow monitoring, flow modeling, review of engineered plans and water rights accounting information.

Matt Hively, HFF Aquatic Resources Coordinator

240 total hours conducting stream measurements to support rating-curve development at the stream gage stations

Darcy Janssen, HFF Finance Coordinator

200 hours per year managing all aspects of payroll, finances, and financial reporting for the project.

Amber Roseberry, HFF Conservation Technician

240 total hours: 168 hours conducting streamflow measurements to support rating-curve development at the stream gage stations and 72 hours installing and maintaining equipment at the stream gage sites.

Shawn Holwegner – HFF Technology and Facilities Coordinator

240 hours total dedicated to ensuring that remote communications from diversion structures are operable and all networking and computing requirements for the project are taken care of.

D.2.2.5.3.2. Fringe Benefits

Benefits will be paid to these employees at their current, respective rates, calculated as a percentage of the total salary each employee will contribute to the project. Fringe benefits include health insurance and IRA contributions. Rates differ across employees because of different health insurance coverage and IRA selections.

D.2.2.5.3.3. Travel

Local travel of 3,000 miles (100, 30 mile roundtrips over three years) will be required to plan, design, implement, and monitor the canal lining/remote-transmission equipment at the Conant Creek Canal diversion and spillback. 30 of the trips will be necessary for installing the YSI Sonde and developing a rating curve for pre and post project monitoring. Another 15 trips will be necessary for flow meter installation. Mileage rate is the standard federal rate of $0.56 per mile.

The Project Manager or other HFF staff will make three trips to Boise, ID to present project results, respectively, to the Idaho Water Users Association annual meeting, a regular meeting of the IWRB, and a biennial nongovernmental organization water conference. Mileage to Boise is 660 mi RT per trip and calculated at $0.56/mile. Two nights lodging are required and 2.5 days' worth of meals. Lodging is estimated at $175/night and meals at $180.

D.2.2.5.3.4. Equipment

A single YSI Exo 3 water quality monitoring sonde with pressure transducer will be purchased for monitoring the project. This YSI sonde, utilizing atmospheric pressure and a rating curve, will be able to measure stream flow. Other measurements will include temperature, dissolved oxygen, turbidity, etc. A recent estimate from YSI projects this item to cost $16,000 and is in line what HFF has paid for water monitoring equipment previously.

Flow gaging equipment will cost $3,200 based upon another recent installation of the Teton River.

Based upon recent projects in the watershed, remote control upgrades on diversion structures have cost about $4,000 on average. A remote control system will be placed on both the diversion structure and the canal spillback.

Fifteen irrigation pumps will be fitted with flow meters to better manage water delivery for each canal shareholder. NRCS indicated that flowmeters cost about $5,000 per unit installed.

D.2.2.5.3.5. Materials and Supplies

The Conant Creek gages will require a staff plate at $33.75 (from Forestry Suppliers), and $100 in installation hardware and supplies. Installed at both the diversion and spillback sites.

Concrete and head gate to completely rebuild the diversion structure allowing for the installation of new remote control head gate motors. Engineering is not initiated for this project but local canal company and irrigation district employees feel that $80,000 is a good starting place for the project based on 35 c.f.s. of flow and the location of the worksite.

The same need and method for estimation was used for the spillback structure. Estimated at $80,000.

Twelve feet of aluminum channel, pvc pipe, and bolts needed for sturdy install of the YSI sonde over a 3-5 year period. Previous installs ran approximately $1,000.

D.2.2.5.3.6. Contractual

Engineering Firm: Develop plans for the new diversion, head gate, and spillback apparatus. $150/hour and 160 hours based upon past projects. HFF will be able to provide baseline data.

Golden West Irrigation: 6 miles of 35' wide 40 mil HDPE canal liner. Installed cost $1,440,000. This estimate from Golden West Irrigation falls within 5% of the NRCS established rate for 35' liner.

D.2.2.5.3.7. Third-Party In-Kind Contributions

Conant Creek Canal Company: 693 hours per year to review HFF and contractor plans, approve plans, coordinate work around irrigation needs, implement plans, monitor irrigation results, manage remote head gates and install flow meters. Travel cost and travel time included in rate.

Fremont-Madison Irrigation District: 40 hours at $60 per hour to facilitate Henry's Fork Watershed Council meetings, chair Drought Management Planning Committee meetings and to add the Conant Creek Canal Company information to the FMID SCADA system.

D.2.2.5.3.8. Environmental and Regulatory Compliance Costs

HFF will pay an external consultant up to $3,000 in estimated costs to conduct an environmental compliance and permitting check.

D.2.2.5.3.9. Other Expenses

The equivalent of three undergraduate internships (400 hours per internship) will be devoted to the project. Each 10-week (400 hours) summer intern is paid a stipend of $5,000 and is housed in HFF's campus dormitory facility. Housing is valued at $125 per week.

D.2.2.5.3.10. Indirect Costs

No indirect costs are included.

D.2.2.6. Required Permits or Approvals

No permits or approvals required.

D.2.2.7. Letters of Support and Letters of Partnership

Attached:

Canyon Creek Canal Company
Fremont-Madison Irrigation District
Trout Unlimited
The Nature Conservancy
Friends of the Teton River

D.2.2.8. Official Resolution

RESOLUTIONS OF THE BOARD OF DIRECTORS
OF THE HENRY'S FORK FOUNDATION
(adopted via email on October 28th, 2021)

BE IT RESOLVED, that the Executive Committee of the Henry's Fork Foundation (HFF) on behalf of its board of directors, pursuant to the authority granted to the Executive Committee in the Foundation's governance documents authorizes Daniel Wilcox (Farms and Fish Program Manager) and Brandon Hoffner (HFF Executive Director) to apply for, administer, and execute a US Bureau of Reclamation (USBR) WaterSMART grant on behalf of the Henry's Fork Foundation.

RESOLVED, in this authority is the ability to appropriate the necessary funding and in-kind contributions specified in the grant application funding plan.

RESOLVED, if selected for funding, HFF staff will meet all established deadlines for entering into a grant or cooperative agreement with USBR.

RESOLVED, titled "Lining of Conant Creek Canal coupled with irrigation management practices to allow for additional instream flow for Conant Creek", this grant application seeks to generate approximately 14 c.f.s of flow in Conant Creek which represents 30-50% of total July base flow depending on the water year. The lining of Conant Creek Canal will be coupled with canal management changes and on the farm irrigation modifications to optimize water use. This project will allow for an additional 1,000 acre-feet of storage water in Island Park Reservoir on a perennial basis due to decreased need of Cross Cut Canal water and represents a holistic water program benefiting many Idaho water users and wild trout.

DATED this 28th day of October, 2021

Cliff Nowell, Secretary

References

Apple, B. 2013. Predicting Groundwater Effects Due to Changing Land Practices in the Intermountain West. M.S. thesis, Humboldt State University, Arcata, CA.

Idaho Department of Environmental Quality (IDEQ). 2010. Upper and Lower Henry's Fork TMDL Five-Year Review. Department of Environmental Quality, Idaho Falls, ID.

Idaho Department of Environmental Quality (IDEQ). 2011. Follow-up Sampling for Bacteria, Nitrates, Major Ions, Stable Isotopes, and Tritium 2009–2010: Ashton-Drummond Nitrate Priority Area. Ground Water Quality Technical Report No. 43. Idaho Falls, ID.

Idaho Department of Fish and Game (IDFG). 2007. Management Plan for Conservation of Yellowstone Cutthroat Trout in Idaho. Idaho Department of Fish and Game, Boise, ID.

Idaho Department of Fish and Game (IDFG). 2019. Fisheries Management Plan 2019-2024. Idaho Department of Fish and Game, Boise, ID.

Jankovsky-Jones, M. 1996. Conservation Strategy for Henrys Fork Basin Wetlands. Idaho Conservation Data Center, Idaho Department of Fish and Game. Boise, ID.

Peterson, K.D. 2011. An Analytical Model of Surface Water/Groundwater Interactions in a Western Watershed Experiencing Changes to Water and Land Use. M.S. thesis, Humboldt State University, Arcata, CA.

U.S. Bureau of Reclamation (USBR). 2012. Henrys Fork Basin Study Water Needs Assessment. Technical Series No. PN-HFS-001. Pacific Northwest Regional Office, Boise, ID.

U.S. Fish and Wildlife Service (USFWS). 2016. Region 1-Pacific Region Partners for Fish and Wildlife Strategic Plan: 2017-2021. U.S. Fish and Wildlife Service, Portland, OR.

U.S. Fish and Wildlife Service (USFWS). 2017. Strategic Habitat Conservation in Idaho, a Priority Conservation Strategy, 2017. U.S. Fish and Wildlife Service, Boise, ID.

Van Kirk, R. 2020. Analysis of water balance in the Henry's Fork watershed. Henry's Fork Foundation, Ashton, ID.

Wytzes, J. 1980. Development of a Groundwater Model for the Henry's Fork and Rigby Fan Areas, Upper Snake River Basin, Idaho. Ph.D. Dissertation, University of Idaho, Moscow, ID.

Conant Creek Farms LLC

Po Box 514

Ashton, ID 83420

November 2, 2021

Water and Energy Efficiency Grants for Fiscal Year 2022

Letter of intent for on-farm complementary irrigation improvement

Dear Grant Selection Committee

We are writing this letter in support of the Henry's Fork Foundation's WaterSMART grant application for the canal lining and remote automation of the Conant Creek Canal located just outside of Ashton Idaho. We intend on pursuing on-farm complimentary irrigation improvements to increase irrigation efficiencies on parcels utilizing water distributed from the Conant Creek Canal Company

Through the NRCS Environmental Quality Incentives Program we want to install irrigation water management devices in the form of flow meters on our highly productive irrigated farm ground. This device will allow us to record instantaneous flow rates and total volume usages on our pumping stations. Irrigation water management tools such as flow meters will work in conjunction with soil health practices to help us as irrigators to determine the effectiveness of irrigation practices, make good water management decisions, and justify making irrigation delivery adjustments in the existing systems.

The programs that are available with NRCS assistance and have been Identified by local district conservationists and farmers alike as complimentary on-farm conservation practices to work alongside WaterSMART. Being a family operation, we believe that this collaborative effort will stretch and secure our water supplies for future generations.

Thank you for your consideration,

Sincerely,

Brett Reynolds _______________ Date: 11-2-21

Brett Reynolds,

Partner, Conant Creek Farms LLC

Conant Creek Canal Company

Po Box 514

Ashton, ID 83420

October 28, 2021

Water and Energy Efficiency Grants for Fiscal Year 2022

Letter of support for the application of the Henry's Fork Foundation

Dear Grant Selection Committee

We are writing this letter in support of the Henry's Fork Foundation's WaterSMART grant application for the canal lining and remote automation of the Conant Creek Canal located just outside of Ashton Idaho.

The Conant Creek Canal Company provides water from Conant Creek to more than 4,000 acres of highly productive irrigated farm ground. For many years we have been seeking the funds needed to line approximately 5.8 miles of the Conant Creek Canal. This particular section of canal demonstrates massive seepage loses meaning that nearly half of the water diverted into the canal is not delivered to the farms. As a result, by lining this stretch of the canal, the diversion from Conant Creek is expected to decrease and we will more efficiently be able to deliver water to our shareholders. Furthermore, the improvement of our agricultural water reliability in turn dramatically improve flows in Conant Creek for the benefit of aquatic habitat. In addition, we will be pairing the irrigation infrastructure upgrades with on-the-farm water efficiency and soil health projects through the NRCS Environmental Quality Incentives Program.

There are a number of emerging water issues which face communities like ours in Eastern Idaho. Together, all elements of this project will result in quantifiable and sustained water savings that have broader sustainability benefits. We believe that collaborative efforts between farmers and conservation groups within the watershed can fully execute the proposed grant that will stretch and secure our water supplies for future generations.

Thank you for your consideration,

Sincerely,

[signature] Date: 10-28-21

Steve Reynolds,

President Conant Creek Canal Company

Fremont-Madison Irrigation District

350 North 6th West
PO Box 15
St. Anthony, Idaho 83445
Phone: (208) 624-3381 Fax: (208)624-3990
Email: fmid@myidahomail.com

November 1, 2021

Dear Grant Review Committee,

Fremont-Madison Irrigation District (FMID) holds the contract with the Bureau of Reclamation (Reclamation) for the storage water in Island Park and Grassy Lake Reservoirs. FMID is charged with delivering this supplemental storage water to over 160 river diversions including Conant Creek Canal.

This project fits within two significant watershed planning efforts completed in our area in recent years. In 2009 with the assistance of Reclamation, FMID completed a Conservation Plan which identified canal automation as a potential way of reducing overall water demand. This project also fits within the planning efforts of the 2015 Henry's Fork Basin Study, which was coordinated and completed with the help of several partners including the Henry's Fork Foundation and Reclamation. In the study, canal automation was identified as one of the most economical means of conserving water in the Henry's Fork Watershed.

Conant Creek Canal diverts water from Conant Creek. This project will be of particular benefit because of the extremely limited supply of water in Conant Creek. Conant Creek does not have a reservoir, so they are extremely vulnerable to limited snowpacks and overall dry conditions. In most years, Conant Creek does not have enough physical water available to supply water to all of its irrigation diversions. This limited water supply not only results in crop losses, but also has created significant conflicts over the years between irrigators.

FMID fully supports this project and believes it will not only benefit Conant Creek Canal but all the irrigators within the Henry's Fork Watershed. We also believe it will reduce overall conflicts among irrigators on Conant Creek.

Respectfully,

Aaron Dalling

Aaron Dalling

November 1, 2021

To whom it may concern:

Trout Unlimited (TU) has more than 300,000 members and supporters nationwide. Our mission is "to bring together diverse interests to care for and recover rivers and streams so our children can experience the joy of wild and native trout and salmon."

In pursuit of this mission across the West, TU works with farmers, ranchers, Tribes, states, governmental agencies, local contractors, local businesses, and many other partners to restore streams while also sustaining working lands and vibrant communities. We believe that the best conservation results come from partnerships and this is a key reason why we support the Conant Creek Canal Lining Project.

This project, proposed by the Henry's Fork Foundation and Conant Creek Canal Company, will improve, and modify, existing irrigation infrastructure that diverts water from Conant Creek to increase the efficiency and precision of water delivery to ten water users, saving an estimated 2,850-acre feet of water annually. Specifically, this project includes lining five miles of canal and changing the point of diversion for water delivery.

Conant Creek has significant ecological, agricultural, and power production implications within the region. This project will both increase water use efficiency for Conant Creek water users and improve habitat conditions for aquatic species within Conant Creek. This work will also indirectly improve aquatic habitat conditions downstream in Fall River and the lower Henry's Fork River during critical summer months. Additionally, the project will save storage water in Island Park Reservoir, subsequently improving aquatic conditions within the reservoir and in the reach of the Henry's Fork River below the reservoir

Trout Unlimited: America's Leading Coldwater Fisheries Conservation Organization
910 W Main Street, Suite 342, Boise, ID 83702
(208) 345-9800 • Fax: (208) 345-6766 • www.tu.org

which supports an iconic, world-renowned fishery.

Finally, this project will help meet objectives identified in Idaho Department of Fish & Game plans related to Yellowstone Cutthroat Trout conservation representing a high priority for our organization.

Please feel free to contact me anytime if you have questions or need additional information – kira.finkler@tu.org or (208) 530-1027.

Sincerely,

Kira Finkler
Director
Idaho Water and Habitat Program

Idaho Chapter Office
950 W. Bannock St.
Suite 210
Boise, ID 83702

Tel (208) 343-8826
Fax (208) 343-8892

nature.org

October 29, 2021

RE: WaterSMART Grant Proposal Letter of Support

Dear WaterSMART Program Administrators,

It is my pleasure to write this letter in support of the WaterSMART project proposal being submitted to the Bureau of Reclamation by The Henry's Fork Foundation.

At The Nature Conservancy (TNC) our mission is to conserve land and water upon which all life depends. The Idaho Chapter of TNC is working to create a more sustainable future for the state's water resources through our Resilient Water Supply program. As part of this effort TNC along with the Henry's Fork Foundation, Friends of the Teton River, and Trout Unlimited have come together to form the Upper Snake Collaborative to collectively address river flow and water quality goals across the greater Henry's Fork region. Through this collaborative effort projects such as the one submitted for consideration by The Henry's Fork Foundation for WaterSMART grant funding will achieve scaled outcomes for the region's natural, agricultural, and community landscapes.

The proposed canal lining project by the Henry's Fork Foundation will be paired with on-farm water efficiency and soil health projects through the NRCS Environmental Quality Incentive Program, and will result in reduced water consumption, improved agricultural water reliability, and increased energy efficiency. These outcomes will help regional farmers to create more efficient and resilient production systems in the face of increasing pressures from climate change. Additionally, the proposed project will save storage water in Island Park Reservoir, increasing the power production potential during winter months.

Conant Creek is a second order stream and tributary to the Fall and lower Henry's Fork Rivers, providing important habitat for Yellowstone Cutthroat Trout (YCT) an aquatic species classified as sensitive. The project falls within the Middle Rockies Focus Area designated in the Partners for Fish and Wildlife Program Strategic Plan (USFWS 2016) and will help to meet objectives outlined in state-wide conservation plans pertaining to habitat improvement and YCT conservation (IDFG 2007, 2019). At a broader regional scale, the storage water saved in Island Park Reservoir would improve aquatic conditions both within the reservoir and below – the reach of the Henry's Fork River, an iconic, world-renowned fishery.

In closing, the project proposed by the Henry's Fork Foundation presents the opportunity to create a more resilient water supply for agricultural producers, communities, and aquatic ecosystems, which are necessary adaptations in the face of a changing climate. The Nature Conservancy is fully supportive of the proposed project and believes that the investment will have a multiplier effect for the greater Henry's Fork River region.

I thank you for the opportunity to be involved in this process and to support such an impactful project.

Best Regards,

Neil Crescenti
Agriculture Program Manager
The Idaho Chapter of The Nature Conservancy

FRIENDS OF THE teton river

208 354 3871
www.tetonwater.org

18 North Main Street, Suite 310
PO Box 768
Driggs, Idaho 83422

Bureau of Reclamation
Attn: Mr. Josh German
PO Box 25007
Denver, CO 80225

November 2, 2021

Dear Grant Selection Committee,

On behalf of the Friends of the Teton River (FTR), I would like to express my support for the WaterSMART Grant proposal being submitted by the Henry's Fork Foundation (HFF), in partnership with the Conant Creek Canal Company. The proposed Conant Creek project is an outgrowth of the work of the Upper Snake Farms and Fish Collaborative, in which FTR is an active participant.

The mission of Friends of the Teton River is to restore and conserve the Teton River Watershed, ensuring a lasting legacy of clean water, healthy streams, and a thriving wild fishery. We implement programs and projects founded on sound science, community education, and cooperation with landowners, citizens, and agency partners. As such, the proposed project is directly in line with our mission. Friends of the Teton River staff will continue to actively participate in the Upper Snake Collaborative during the project period, and will provide in kind technical support as needed.

This project, if funded, will continue to build on the Bureau of Reclamation's highly successful investment in the broader Henry's Fork Watershed, and the work that the BOR has supported in the Teton River sub-watershed. FTR and our partners (including HFF) founded the Teton Water Users Association under a WaterSMART Cooperative Planning Phase I Grant, and utilized the WaterSMART Cooperative Planning Phase II funding program to support implementation of its phase I planning efforts. We have also partnered with HFF and the Upper Snake Collaborative on BOR-supported work in the Canyon Creek drainage, successfully utilizing WaterSMART funding to act on the goals and priorities identified in the Henry's Fork Basin Study, which was also funded under the WaterSMART Program. This project will also build upon substantial NRCS investment in the watershed, complementing a regional soil health initiative and significant region-wide work to improve on-farm water efficiency.

As a partner in the Upper Snake Collaborative, we believe that HFF and the Conant Creek Canal Company are in a unique position to improve agricultural water reliability while also reducing water consumption, improving agricultural water reliability, increasing energy efficiency, and improving flows in Conant Creek for aquatic habitat and native Yellowstone Cutthroat trout.

Thank you for your consideration,

Amy Verbeten

Amy Verbeten, **Executive Director**
208.354.3871 ext. 13
amy@tetonwater.org