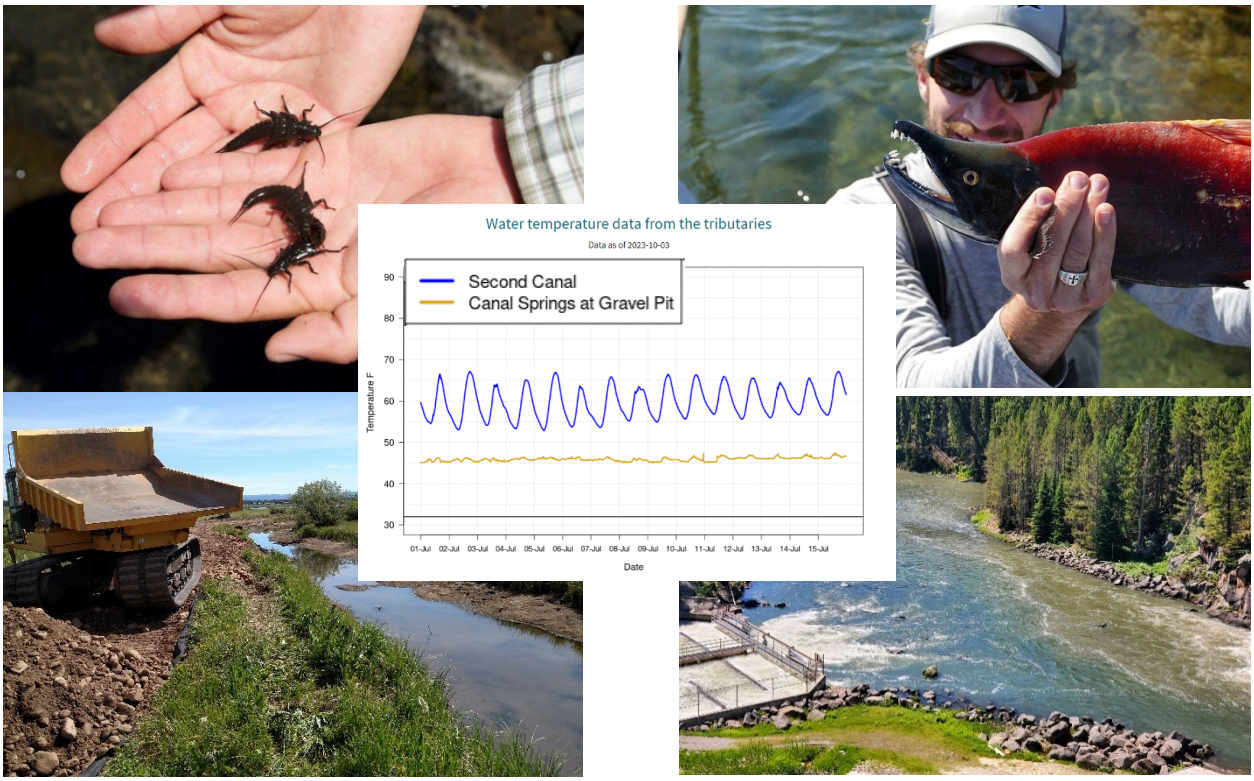
Developing Infrastructure to Reduce Temperature and Turbidity in the Henrys Fork Snake River Watershed

U.S. Bureau of Reclamation WaterSMART Aquatic Ecosystem Restoration Program Grant Proposal
January 24, 2024



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List of Abbreviations and Acronyms

HFF	Henrys Fork Foundation
IDFG	Idaho Department of Fish and Game
Reclamation	US Bureau of Reclamation
IDPR	Idaho Department of Parks and Recreation

IDEQ	Idaho Department of Environmental Quality
FRREC	Fall River Rural Electric Cooperative
USFS	US Forest Service
NOFO	Notice of Funding Opportunity
FMID	Fremont-Madison Irrigation District
USEPA	US Environmental Protection Agency
AMSL	Above Mean Sea Level
HSP	Harriman State Park
REACT	REmote Aquatic Chlorophyll-a Tracker
NGO	Non-Governmental Organization
HFWC	Henrys Fork Watershed Council
NTU	Nepholometric Turbidity Unit
HAB	Harmful Algal Bloom
HUC	Hydrologic Unit Code
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
DMP	Drought Management Plan
HOA	Homeowners Association
RFP	Request For Proposal
TBD	To Be Determined
CWA	Clean Water Act

Technical Proposal

Executive summary

APPLICATION: Jan. 24, 2024
PROPOSED PROJECT DURATION: Oct. 1, 2024–Sep. 30, 2027
APPLICANT: Henry's Fork Foundation
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The Henry's Fork Foundation (HFF), a nonprofit watershed conservation organization, proposes to partner with Idaho Department of Fish and Game (IDFG) on a three-year collaborative planning and assessment project to develop a "water quality basin plan" across multiple subbasins of the Henrys Fork watershed, Idaho and Wyoming. A water quality basin plan is a suite of nature- and evidence-based project designs to restore water quality, build resilience to drought, climate change, aging infrastructure, and human population growth, and thereby protect regional fish, wildlife, and aquatic habitat and associated economic resources. The Henrys Fork watershed is part of the Greater Yellowstone Ecosystem; its unique fisheries, wildlife, and aesthetic qualities support a world-renowned recreational tourism industry worth $30 million annually. At the center of the Henrys Fork watershed is Island Park Reservoir, a US Bureau of Reclamation (Reclamation) facility and the lynchpin of regional water quality, fish, wildlife, and aquatic resources. Drought, climate change, aging infrastructure, and human population growth have increased water temperatures, harmful algal blooms (HABs), and fine sediment transport, and reduced spring-fed thermal refugia and dissolved oxygen concentrations within Island Park Reservoir and the Henrys Fork River. Poor water quality has reduced the resilience of threatened fish and wildlife populations, aquatic macroinvertebrate community health, and the recreational fishing experience. The water quality basin plan will develop designs that 1) address aging facilities with new or retrofit infrastructure in Island Park Reservoir, 2) restore degraded tributaries with watershed-scale, nature-based stream, wetland, and aquifer restoration projects. Projects will be prioritized for implementation after collaborative evaluation, data collection, and stakeholder outreach in partnership with IDFG, Idaho Department of Parks and Recreation (IDPR), Idaho Department of Environmental Quality (IDEQ), Fall River Rural Electric Cooperative (FRREC), the US Forest Service (USFS), and Reclamation. This project is an outgrowth of previous work; our proposal supports water quality and fish and wildlife habitat objectives detailed in the 1992 Henrys Fork Basin Plan, 2005/2018 Henrys Fork Drought Management Plan, 2015 Henrys Fork Basin study, 2019-2024 IDFG Statewide Fisheries Management Plan, and the 2022 HFF Strategic Plan. This project directly addresses all three priorities contained in the NOFO: collaborative development, widespread regional benefits, and improvement of the health of regional fisheries, wildlife, and aquatic habitat through restoration. We propose to fund the project with $1,073,524 in federal funds, $425,711 paid directly by the applicant, and $219,600 in third-party contributions. Federal funds will be used primarily for design contractors, stakeholder engagement facilitators, and data collection, including a limnological monitoring buoy on Island Park Reservoir and tributary water-quality assessments. The applicant will contribute staff and intern resources as well as supplies, travel, and laboratory facilities to conduct river water-quality and fish habitat use assessments and stakeholder meetings. Third-party in-kind contributions include a dynamic water quality model, reservoir fishery studies, stakeholder engagement, and agency coordination.

Technical project description

Partners

The HFF is a 501(c)(3) nonprofit organization whose mission is to conserve, restore, and protect the unique fishery, wildlife, and aesthetic qualities of the Henrys Fork of the Snake River ("Henrys Fork") watershed. The HFF's expertise, skills, focus on science-based collaboration, and extensive existing hydrologic, ecologic, and geomorphic datasets make it uniquely positioned to effectively accomplish this project. The HFF is a Category B applicant as defined in this NOFO. Our Category A partner is IDFG. The IDFG's mission is to protect, preserve, perpetuate, and manage Idaho's wildlife resources and is the managing agency of fish and wildlife resources in the project area.

The HFF and IDFG, along with supporting partners IDPR, IDEQ, FRREC, and the USFS, have facilities, management, or mission nexus with the planned outcomes of this project. Some of the planning and design tasks as well as data collection will affect lands or facilities owned and operated by IDPR, FRREC, and USFS. These partners allow us to harness existing infrastructure and stakeholder connections to effectively plan and design water quality improvement projects. The outcomes of this project will help IDEQ meet its mission of ensuring Idaho's surface, ground, and drinking water resources meet statutory water quality standards. Finally, the primary focus of this planning and design project centers around Island Park Dam and Reservoir, a Reclamation facility.

Location

The Henrys Fork watershed is located in the Greater Yellowstone Ecosystem in Idaho and Wyoming. This project focuses on the headwaters area of the Henrys Fork within the Upper Henrys Fork Subbasin (Figure 1). The Henrys Fork is dammed to form Island Park Reservoir (Table 1). Reclamation manages Island Park Reservoir to meet downstream irrigation supply needs, in coordination with Fremont-Madison Irrigation District (FMID), the sole storage spaceholder in the reservoir. Water is stored in Island Park Reservoir during the winter and spring and is drafted during the summer and fall. Island Park Reservoir stores about 1/3 of its watershed's total annual yield in a water year (October 1–September 30), so the reservoir is drawn down and refilled to capacity on an annual basis. Annual drawdown in Island Park Reservoir is a function of the difference between irrigation-season outflow and inflow, the latter of which partially consists of outflow from Henrys Lake, a private storage reservoir located upstream. At the watershed scale, outflow from these two reservoirs and Grassy Lake, another Reclamation facility, is managed to meet total irrigation demand and streamflow targets at the bottom of the irrigation system. "Carryover" is the minimum amount of water in Island Park Reservoir at the end of irrigation season, and "drawdown" is the difference between full pool and carryover.

Island Park Reservoir consists of two semi-independent basins. The western basin of the reservoir contains the majority of Island Park Reservoir's surface area (24.7 km^2, 79%) and 40% of the reservoir's total volume. This western basin is shallow (max. depth = 14.6 m, mean depth = 2.61), and wide (fetch = 12 km, average width = 2.2 km). In contrast, the eastern basin of Island Park Reservoir consists of the Henrys Fork river canyon which is deep (max. depth = 22 m, mean depth = 14.7 m), and narrow (fetch = 4.4 km, average width = 1.5 km). Despite making up only 21% of the reservoir's surface area (6.6 km^2), the eastern basin contains 60% of

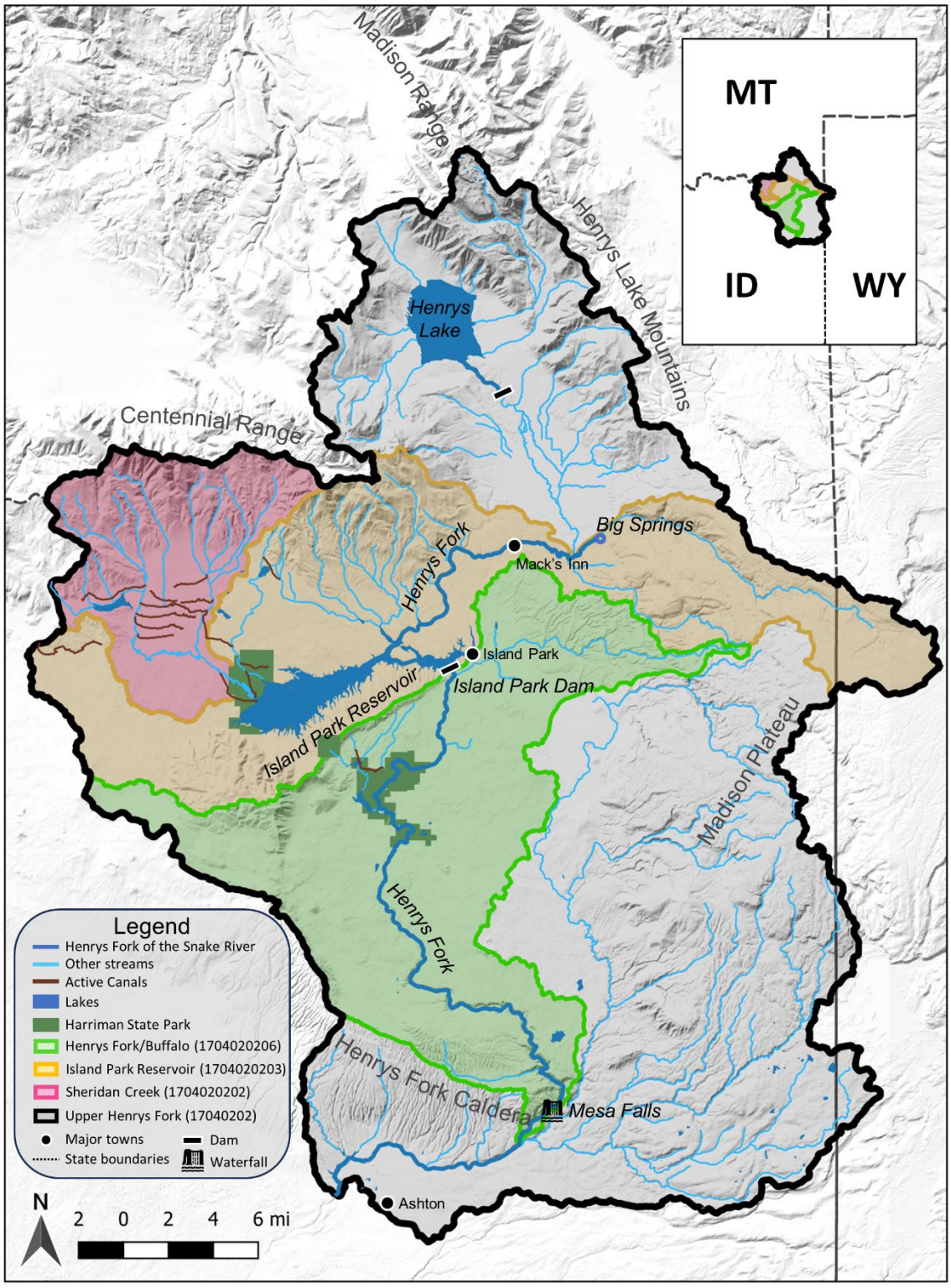

Figure 1: Map of the study area, referred to as the Henrys Fork Watershed upstream of Mesa Falls. The proposed planning and design study will focus on three HUC-10 watersheds within this area: Henrys Fork/Buffalo, Island Park Reservoir, and Sheridan Creek. Flow direction on the Henrys Fork within the watershed is from north to south.

Table 1: Basic information about Reclamation facility Island Park Reservoir

Year built	1938	
Drainage area	482 sq. mi. (1250 sq. km)	
Dam type	Zoned earth and rock fill	
Dam height	91 ft. (27.7 m)	
Dam crest elevation	6309 ft. (1923.0 m)	
Maximum surface elevation	6303 ft. (1921.1 m)	
Dam Location	44.418894° N, 111.396462° W	
Purpose	Irrigation storage and supply (primary), hydroelectric power generation (secondary), recreation (secondary), flood control (secondary)	
Ecoregion	USEPA 17j – Middle Rockies West Yellowstone Plateau	
	Full pool	**Average annual minimum**
Surface Area	7800 ac. (3156 ha.)	4500 ac. (1821 ha.)
Volume	135,205 acre-feet ($1.67*10^8$ m^3)	61,000 acre-feet ($7.52*10^7 m^3$)
Average depth	17.3 ft (5.27 m)	13.5 ft. (4 m)
Maximum depth	73 ft (22 m)	63 ft (19 m)

the reservoir's total volume and 80% of its inflow by annual volume. The eastern basin has the dam and dual outlet works. Outflow #1, constructed in 1939, is through the right abutment at 23 m in depth at full pool (1899 m AMSL), the deepest point in Island Park Reservoir. Outflow #2, constructed in 1992, is routed via siphon up and over the left abutment with the intake located at 16 m in depth at full pool (1905 m AMSL).

In the western basin, frequent mixing, a large surface area, nutrient inputs from the landscape, and erosive bottom and shoreline sediments create high water temperatures, high productivity, and high levels of suspended organic and inorganic material during the growing season (Figure 2). In contrast, the eastern basin thermally stratifies. Water temperatures, dissolved oxygen concentrations, and productivity are higher in the epilimnion than in the hypolimnion during the summer. Compared to the western basin, the eastern basin has lower water temperatures, lower primary productivity, and higher water clarity (Figure 2).

Key tributaries to Island Park Reservoir include Sheridan Creek, Icehouse Creek, Hotel Creek, Mill Creek, and the Henrys Fork River, their tributaries, and dozens of intermittent streams and groundwater inputs. Tributaries to the Henrys Fork between Island Park Reservoir and Mesa Falls include the Buffalo River, Box Canyon Creek, Blue Springs Creek, Antelope Creek, Thurmon Creek, Fish Pond Creek, and Osborne Springs. The Henrys Fork also receives significant groundwater inflow in the Harriman State Park (HSP) reach. Many tributaries were historically diverted to irrigate pastureland for cattle grazing in the ranch that was donated to the state to form HSP, and most of the canal system still exists. However, most diverted water is no longer used for irrigation and instead returns to the Henrys Fork as an artificial surface tributary. Sheridan creek is impounded in Sheridan Lake, a private reservoir. Thurmon Creek is impounded twice in Golden and Silver Lakes, and Fish Pond Creek is impounded in the Harriman Fish Pond, all within HSP.

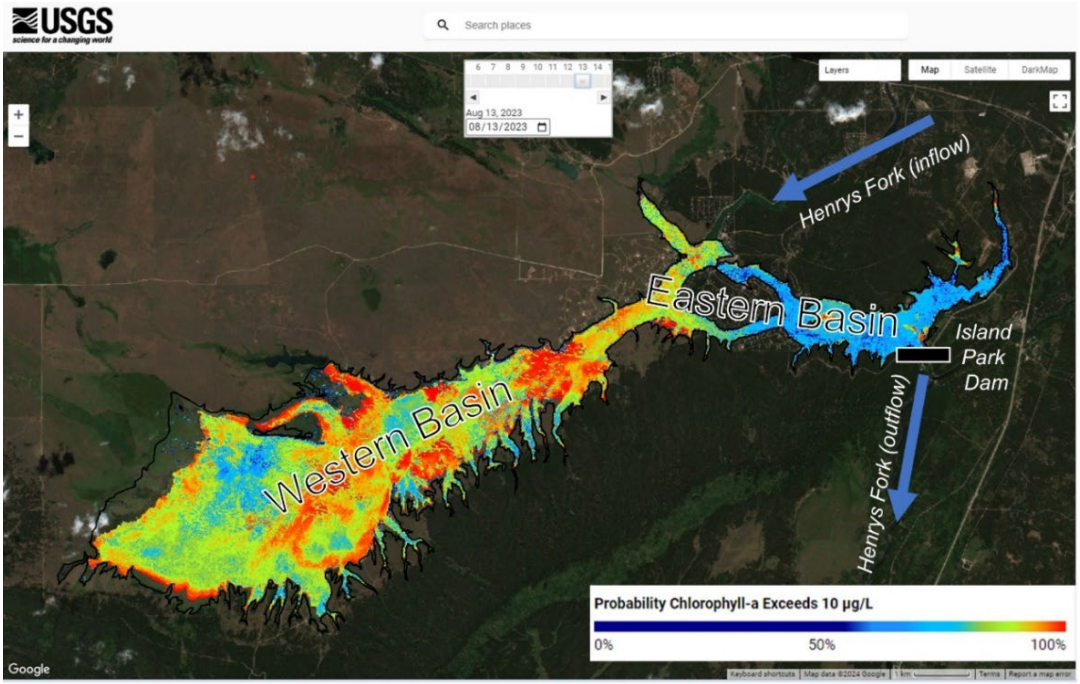

Figure 2: Map of Island Park Reservoir with false-color imagery showing the probability that chlorophyll-a concentrations exceed 10 µg/L, as determined by the USGS REmote Aquatic Chlorophyll-a Tracker (REACT) tool. Probabilities of high chlorophyll-a concentrations are much higher in the western basin of Island Park Reservoir than in the eastern basin, due in part to differences in morphology, limnology, and inputs to each basin.

Project Goal

Water quality degradation in the Henrys Fork watershed is responsible for declines in fish and wildlife resiliency, with consequences for regional recreational and economic quality. The project goal is to develop a water quality basin plan which will include data, models, and 60% design plans needed to implement evidence- and nature-based restoration, including updates to Island Park Reservoir infrastructure and tributary restoration in the project area. Collaborative, evidence- and nature-based solutions to be explored in a water quality basin plan have the potential to protect fish and wildlife resources in the upper Henrys Fork watershed, supporting the missions of IDFG and the HFF.

Developing a water quality basin plan requires collaboration with stakeholders within the Henrys Fork Watershed over three years to identify critical issues of concern, identify potential infrastructure or restoration actions, collect engineering and ecologic data to understand costs and benefits, and develop and evaluate design plans for implementation. A collaborative, evidence-based evaluation process will increase the likelihood of implementation and subsequent water quality, fisheries, ecological, and economic benefits. Design plans will:

1) **Address water quality problems caused by aging and inflexible physical and natural infrastructure at Island Park Reservoir** through projects such as variable-elevation withdrawal gates, hypolimnetic oxygenation, algaecides, water column nutrient management, sediment stabilization, sediment removal, and/or a watershed sediment and nutrient control plan.

2) **Restore degraded surface and groundwater inputs to Island Park Reservoir and the Henrys Fork with** nature-based stream, wetland, and shallow aquifer restoration projects implemented throughout the project watershed.

"Physical infrastructure" refers to the property, utilities, and equipment necessary for Island Park Reservoir to exist and function, including the dam, outflow works, and power generation facilities. "Natural infrastructure" refers to the existing natural area of Island Park Reservoir, including its bed, banks, and water, which are the source of ecological and recreational benefits. Research by the HFF has found inflexible and aging physical and natural infrastructure of Island Park Reservoir contributes to or causes elevated water temperatures, eutrophication leading to HABs and low dissolved oxygen, and organic and inorganic sediment deposition within the reservoir. These water quality problems then make their way into the outflowing Henrys Fork River when the reservoir is drawn down for irrigation.

Research by the HFF and our partners has found that degraded surface water inputs can increase temperature, fine sediment, and nutrient concentrations in receiving waterways, including Island Park Reservoir and the Henrys Fork River. The HFF has also found local groundwater inputs decrease water temperature. Drought, climate change, and reservoir management decisions may be suppressing groundwater inputs to Island Park Reservoir and the Henrys Fork. We seek to study potential methods to increase groundwater inputs and restore the quality of surface water inputs.

Filling data gaps

Developing a water quality basin plan requires closing important data gaps to 1) support stakeholder engagement, 2) address stakeholder concerns, and 3) obtain necessary data and information to produce accurate design plans. We propose to fill these data gaps through a combination of contracted activities with external consultants and in-house data collection and analysis.

Dynamic water quality model

First, we propose expanding current HFF water-quality monitoring of Island Park Reservoir and the Henrys Fork. In concert with consultants, we will use these data to develop a dynamic model of water, temperature, dissolved oxygen, sediment, and novel pollutants in Island Park Reservoir and the Henrys Fork in HSP. Developing this model for Island Park Reservoir will require high-resolution vertical profiles of water quality parameters and a clearer understanding of the inputs and sediment dynamics of Island Park Reservoir. To collect these data, we propose a comprehensive lake and river water quality testing procedure. This procedure will include studies by consultants on sediment oxygen demand and studies by the HFF on nutrient, sediment, and thermal load from surface and ground-water inputs. Similarly, development of river cross-sections and studies on water quality and constituent transport will be needed to understand the dynamics of outflow from Island Park Reservoir to the Henry's Fork downstream. To accomplish creation of a dynamic water quality model, especially for determining sediment and nutrient loads into and out of Island Park Reservoir, the HFF proposes expanding its in-house water quality testing capacity to include supplies for in-house measurement of suspended sediment concentrations. We also propose funding for additional water quality testing for emerging pollutants to address and potentially develop project alternatives for as-yet-undefined water quality problems.

A clear understanding of water quality throughout the reservoir is a critical piece of data infrastructure. A dynamic model will allow the HFF and its partners evaluate costs and water quality benefits of proposed actions to improve water quality in Island Park Reservoir. The proposed modeling and buoy infrastructure provide managers with real-time water quality data within Island Park Reservoir. These data are required for effective use of potential proposed future water quality improvement projects in Island Park Reservoir. For example, real-time water quality data will allow managers to understand when and where to inject hypolimnetic oxygen, what elevation to select in a variable-elevation outflow gate, and/or whether algae, nutrient, and turbidity-reduction projects around the western basin are effective.

Water quality monitoring buoy

We propose installing a permanent water quality sampling buoy on Island Park Reservoir at or near the dam to collect continuous vertical water quality profiles. The water quality buoy on Island Park Reservoir will serve multiple purposes. Water quality profiles will be used to calibrate a dynamic model of the reservoir. The buoy will be used in a joint HFF-USGS study to identify drivers of HABs and other sources of turbidity within the western basin, and the specifics of migration of water from the western basin to the eastern basin. The USGS Remote Aquatic Chlorophyll-a Tracker (REACT) tool estimates algal concentrations from sattelite imagery and can identify water quality across the entire reservoir surface. We propose ground-truthing REACT imagery with the buoy and other water quality data collected at Island Park Reservoir.

Fish and fish habitat

Final data gaps revolve around clarifying what effect, if any, proposed water-quality improvement actions would have on fish habitat. The HFF has strong existing data regarding the fish habitat envelope for rainbow trout (*Oncorhyncus mykiss*), kokanee (*O. nerka*), native Yellowstone cutthroat trout (*O. clarkii bouveri*), and brook trout (*Salvelinus fontinalis*) in Island Park Reservoir and the Henrys Fork. Development of real-time dynamic water quality monitoring with a buoy and a dynamic water quality model will allow for unprecedented modeling of these fishes' habitat through time. Models of water temperature and dissolved oxygen throughout the watershed will provide the basis for studying fish habitat availability, growth potential, hooking mortality, and even populations through time given different scenarios and water-quality improvement actions.

Another species of native coldwater sportfish is the mountain whitefish (*Prosopium williamsoni*). Mountain whitefish declines in the Henrys Fork are anecdotal but backed by similar declines across their range. The habitat requirements and preferences for whitefish in the Henrys Fork are unclear. To understand the potential impact of climate change, drought, water management, and any potential water quality improvement projects developed through a water quality basin study, the HFF proposes a paired-differences snorkeling study. This study would provide first-of-its-kind observations of quantitative habitat preferences of this understudied native species, perhaps marking a significant step forward in species conservation.

The final set of data gaps involve the role of groundwater in Island Park Reservoir and HSP water quality. We propose a shallow groundwater study to evaluate the potential efficacy of incidental aquifer recharge via restoration of flood irrigation or process-based restoration in HSP for expanding fish habitat.

Stakeholder outreach

To complete a water quality basin plan, stakeholder outreach will be paramount. Stakeholder outreach and collaboration will drive development of infrastructure and restoration alternatives, analysis of costs and benefits, and final project rankings and evaluation for implementation. At the highest level, stakeholders fall into two general categories: 1) agencies and engineering/natural resource professionals and 2) community members.

Identify community priorities.

Assessing community priorities, identifying projects to develop, and testing early community support for proposed alternatives is important for eventual implementation. In the first months of the grant, we will facilitate meetings with a variety of water managers and users, state and federal agencies, university researchers, and nongovernmental organizations (NGOs), with a goal of identifying technical and scientific issues and needs for inter-agency coordination. Separately, we propose to identify community and recreationist priorities through listening sessions in the first year of this project.

Develop design plans, present findings

In the second year of stakeholder outreach, we will emphasize data sharing and science communication. As potential water-quality improvement actions and models are developed, we will elicit feedback from both professionals and community members. We will present a dynamic model overview and workshop to the Henry's Fork Watershed Council (HFWC) to gather feedback from professionals on the model and the best way to share results.

Presenting findings from engineering and ecological studies to community members will allow for continued evaluation of their priorities. Once data gaps begin to close, an assessment of project costs— financial, material, and political—can begin. Project designs will be assessed based on a cost per unit water quality improvement (e.g., cost per °C, cost per mg/L PO_4, or cost per 1 Nepholometric Turbidity Unit [NTU] reduction). Input from and discussions with all stakeholders will result in a list of preferred projects, and those with the highest feasibility and social acceptability will be advanced to the 60% design phase.

Throughout the project, the HFF communications teams will share updates on river conditions and project development with community members and recreationists on the Henry's Fork through social media, email, and blog posts. The goal of these communications is to increase public understanding of scientific and technical information relevant to the ultimate goal of improving water quality. The communications team will also facilitate regular HFWC meetings to keep agencies informed of progress and identify needed agency coordination.

Produce final water quality basin plan

Final engagement with both professionals and community members will focus on presenting completed designs, allowing for completion of project evaluation and prioritization for implementation. A final report with each project, design plans, and stakeholder priorities will thereby produce a final list of projects ready for implementation. The water quality basin plan will then be used to obtain implementation funding.

Evaluation criteria

Evaluation Criterion A–Project Benefits

A.1 General Project Benefits:

What are the critical issues of concern in the watershed? Provide documentation and support for how the critical issues were identified.

HFF monitoring has found water quality impairment in Island Park Reservoir and the Henrys Fork downstream of the reservoir, including high water temperatures in the summer, increased suspended fine sediment and turbidity, low dissolved oxygen concentrations, and HABs. In the 2022 Integrated Report to the USEPA, IDEQ listed the Henrys Fork within HSP, Sheridan Creek upstream from its confluence with Willow Creek, and the Buffalo River downstream of Elk Creek as "impaired waterways" under the Clean Water Act (CWA) due to water temperatures exceeding state standards for salmonid spawning and cold-water aquatic life. Sheridan Creek is also impaired due to sedimentation. Increased turbidity and water temperatures can also hinder fishing success. Anglers have noticed water quality declines and changes in aquatic macroinvertebrate communities and declines in fish populations.

Drought, climate change, and land use combine with the following two critical issues to produce water quality impairments in the Henrys Fork watershed:

1. **Aging and inflexible natural and physical infrastructure in Island Park Reservoir**. This infrastructure issue contributes to increasing water temperatures, excessive nutrients leading to HABs, fine sediment erosion and transport, and decreases in dissolved oxygen within Island Park Reservoir and in its outflow, the Henrys Fork.
2. **Degraded tributaries to Island Park Reservoir and the Henrys Fork.** Anthropogenic land uses, including cattle grazing, irrigation, damming, and residential development all increase fine sediment erosion, water temperatures, and nutrient load in tributary streams. Simultaneously, drought and changing land uses may be endangering beneficial cool, clean groundwater inputs to the Henrys Fork and Island Park Reservoir

Explain how your project will benefit aquatic ecosystems, including benefits to plant and animal species, fish and wildlife habitat, riparian areas, and ecosystems. For example, will your project create new habitat, improve water quality, improve stream or riparian conditions, restore fish passage and connectivity, or otherwise benefit aquatic ecosystems.

We propose a planning process to produce a water quality basin plan, defined as a prioritized list of alternatives with quantified costs and benefits through engineering and ecological studies. We anticipate that the most feasible and socially accepted of the alternatives will be advanced to 60% design status by the end of the project. A water quality basin plan will be created in collaboration with diverse stakeholders and partners. The plan will identify, design, evaluate, and prioritize infrastructure upgrades and restoration actions that address the critical issues identified in evaluation criterion A.1. The water quality basin plan will prepare these alternatives for implementation funding. Once implemented, benefits will include:

1. Reduced turbidity in Island Park Reservoir, including reduced HAB frequency,
2. Reduced fine sediment export from Island Park Reservoir into the Henrys Fork,

3. Increased cold, oxygenated refugia in Island Park Reservoir and the Henrys Fork, as well as reduced summertime maximum temperatures throughout the watershed,
4. Reduced year-to-year variability in reservoir and outflow water quality by buffering water quality from fluctuations in climate and water supply.

Improved water quality in combination with riparian restoration is anticipated to increase fish and wildlife habitat and encourage healthy ecosystem function and resiliency (Figure 3).

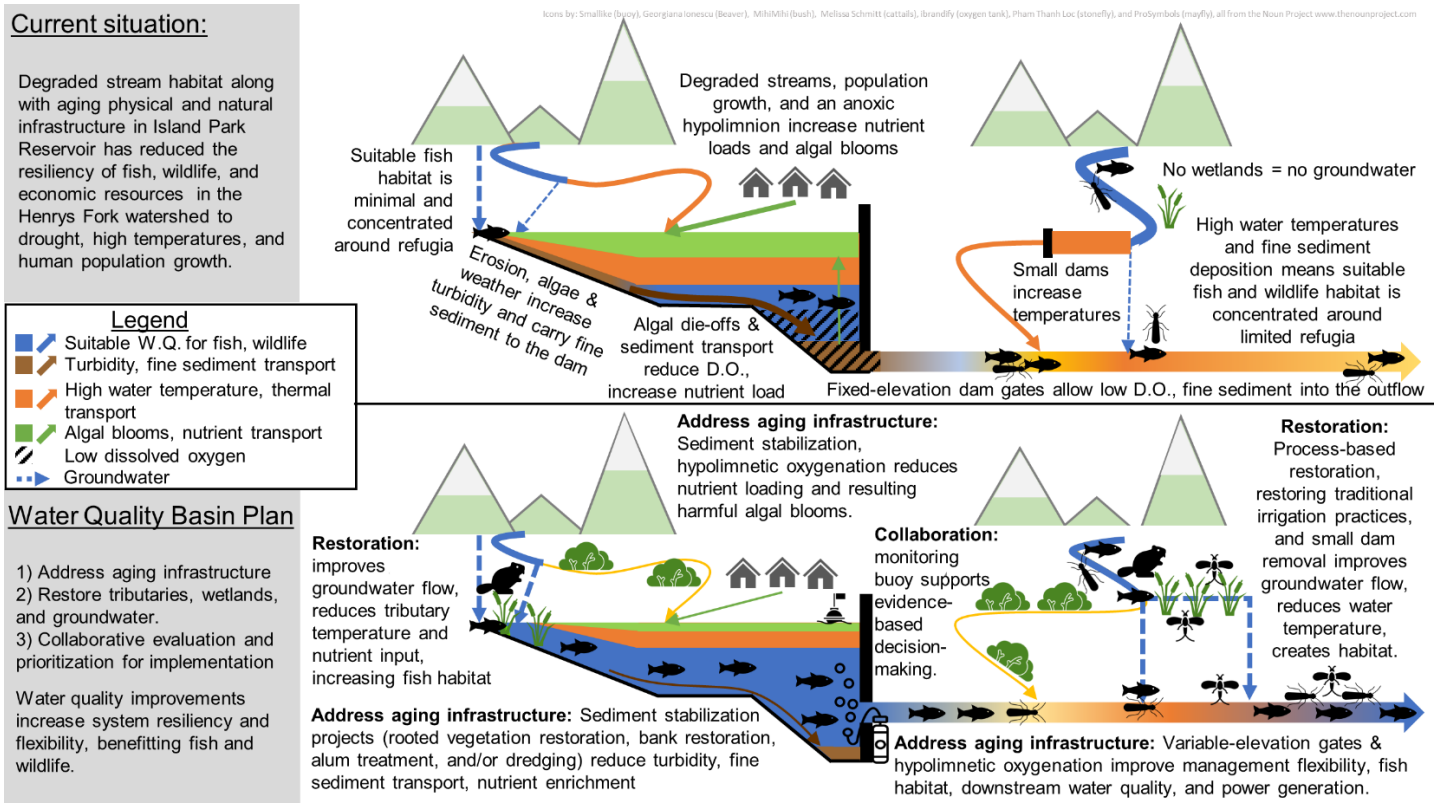

Figure 3: Conceptual diagram of the current impaired state of Island Park Reservoir, its tributaries, and the Henrys Fork River outflow (top panel), and goals of the water quality basin plan (bottom panel), including potential projects to be explored and their potential benefits.

Does the project affect water resources management in 2 or more river basins (defined as a minimum HUC-10 level)? Explain how and identify the area benefitted (provide a map).

All proposed work will occur in the drainage basin of the Henrys Fork upstream of Mesa Falls, excluding the watershed upstream of the confluence of Henrys Lake Outlet and the Henrys Fork (Figure 1). Our study area includes three HUC-10s: Sheridan Creek (1704020202), Island Park Reservoir (1704020203), and Henrys Fork/Buffalo (1704020206). Within these basins, this project focuses primarily on Island Park Reservoir and its tributaries, and the tailwater of Island Park Reservoir and its tributaries within HSP. Island Park Reservoir and HSP are the lynchpins of water quality, ecological resources, and economic uses across all three of these subbasins within the Henrys Fork watershed.

Does the project provide regional benefits, in addition to fish or habitat restoration, including: Supporting water needs for multiple water uses (i.e., agricultural, municipal, Tribal, environmental, recreational)?, Reducing water conflicts?, Providing other regional benefits, such as job creation or public safety benefits?

The proposed project supports water needs for multiple water users. Fish, recreational users, and agricultural users all rely on water quantity and water quality in Island Park Reservoir and the Henrys Fork. Island Park Reservoir was built to support downstream irrigation, and FMID and the irrigators it represents are the sole owners of the water rights in Island Park Reservoir. Increased drawdown of Island Park Reservoir due to drought-induced changes in water supply and demand is a factor in reducing water quality and fish habitat. In response, water users have increased precision in water management and saved water to preserve the economic and ecological benefits of the Henrys Fork River. Our proposed project builds on those actions to realize additional gains in water quality per unit of water conservation.

By improving fish habitat and populations, our project also supports job creation. The Henrys Fork watershed is part of the Greater Yellowstone Ecosystem; its unique fisheries, wildlife, and aesthetic qualities support a world-renowned recreational tourism industry worth $30 million annually. Most of this economic value comes from the world-famous recreational fly-fishery for rainbow trout within the Henrys Fork tailwater of Island Park Reservoir through HSP. Island Park Reservoir also contains important recreational fisheries for kokanee salmon, rainbow trout, brook trout, native Yellowstone cutthroat trout, and native mountain whitefish and supports power boating, swimming, and other recreational activities from both the public and hundreds of waterfront homeowners.

Is this project a component of a broader strategy or plan to replace aging facilities with alternate facilities providing similar benefits? Describe how this project fits within the strategy or plan and how it will continue to provide benefit.

This project will create a broader strategy to replace aging facilities at Island Park Reservoir to improve water quality. This project complements watershed-wide replacement of aging irrigation infrastructure and expansion of aquifer recharge capacity through both managed programs and restoration of traditional flood irrigation. For example, in 2023 the HFF partnered with irrigation districts and the Idaho Water Resource board to replace inefficient infrastructure diverting water from Conant Creek. The Conant Creek canal piping project will result in increased streamflow in the Henrys Fork watershed.

Describe the status of the species and/or habitat that will benefit from the project: Does the project contribute to the restoration of species listed under the Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531 et seq.)? Are the species subject to a recovery plan or conservation plan under the ESA? If the species are not listed under the ESA, please describe their status. For example, are they native species, game species, at-risk species, species of greatest conservation need, species of Tribal significance, or state listed?

Species impacted by this proposed project are kokanee, rainbow trout, brook trout, mountain whitefish, Yellowstone cutthroat trout, and grizzly bears (*Ursus arctos horribilis*). Kokanee, rainbow trout, brook trout, and mountain whitefish are important game species in Island Park Reservoir and the Henrys Fork. Yellowstone cutthroat trout are a state species of special concern.

Grizzly bears are listed on the ESA as threatened, and are a state species of special concern in Idaho. Kokanee are a food source for threatened grizzly bears.

Coldwater fish living in Island Park Reservoir are affected negatively by poor water quality. Reducing turbidity, especially oxygen-depleting HABs, and increasing the amount of cold, oxygenated refugia would improve coldwater sportfish habitat availability and populations. Fishes can be important sources of food for Grizzly bears, and so increased migratory fish populations resulting from this project may benefit Grizzly bears. The range of Yellowstone cutthroat trout has been impacted by stream and riparian degradation. Yellowstone cutthroat trout restoration in tributaries to Island Park Reservoir and the Henrys Fork is a priority of IDFG. Our proposed project will support process-based tributary restoration, which will provide an opportunity to restore or rejuvenate Yellowstone cutthroat trout habitat.

A.2 Quantification of Specific Project Benefits

Provide details and quantification of the critical issues within the watershed and explaining how your Task A Study and Design project will address those issues.

> *Species and Habitat Health. Provide information regarding the current status of species and habitat health in the planning area. Provide factual support for the status information, including citations to relevant studies, habitat or species health assessments, and statistical information to describe the critical species and habitat issues of concern in your planning area, including issues related to fish or wildlife health and habitat conditions.*

Water quality impairment in Island Park Reservoir and the Henrys Fork degrades fish and wildlife health and habitat conditions. Critical habitat issues of concern are:

1. High turbidity in Island Park Reservoir, including increased HAB frequency,
2. Increasing fine sediment export from Island Park Reservoir into the Henrys Fork,
3. A lack of cold, oxygenated refugia in Island Park Reservoir and the Henrys Fork to protect against increasing summer maximum temperatures, and
4. High year-to-year variability in reservoir and outflow water quality due to fluctuations in climate and water supply.

In 2023, wild rainbow trout population estimates on the Henrys Fork downstream of Island Park Reservoir, including HSP, set period-of-record (1994-2023) lows. Kokanee populations in Island Park Reservoir have declined since the early 2000s due to high water temperatures and low dissolved oxygen within Island Park Reservoir. Higher outflow of fine sediment and warmer water temperatures from Island Park Reservoir has also changed macroinvertebrate community quality, and may impact biodiversity and populations.

Aging and inflexible natural and physical infrastructure along with degraded tributaries contributes to turbidity and HABs in Island Park Reservoir. The western basin of Island Park Reservoir is a eutrophic system due to inflows from septic tanks and tributary streams flowing through erosive soils, pastureland, impoundments, and diversions, such as Sheridan Creek. Cattle grazing prevents growth of sediment-stabilizing vegetation. Eroded fine sediment contains phosphate given the erosive Cretaceous-Cambrian (70-540 Ma) phosphorite sedimentary rocks common in the Henrys Fork watershed. Excessive phosphorus causes harmful and benign algal

blooms. These blooms block sunlight from reaching littoral sediments, preventing growth of rooted aquatic vegetation. Without rooted aquatic vegetation, unstable bottom sediments are easily resuspended by wave energy from weather and recreational boating. Algal blooms and resuspended sediment perpetuate a state of high organic and inorganic turbidity. Density currents then deliver fine organic and inorganic sediment from the western basin along the bottom of the reservoir directly to the two hypolimnetic outflow structures at the dam. Inflexibility in outflow elevation means these density currents are passed into the outflow, increasing turbidity from a background level of 2.5 NTU to 10-15 NTU.

Aging natural infrastructure in Island Park Reservoir contributes to the loss of cool hypolimnion fish habitat refugia through oxygen depletion. Epilimnion temperatures in Island Park Reservoir reach a maximum of 23 °C, exceeding optimal water temperature limits for coldwater salmonids. The cold hypolimnion near the bottom of the reservoir provides refuge habitat for valuable coldwater fish. However, algal blooms decay and consume oxygen to 0 mg/L within the hypolimnion about four weeks after the onset of thermal stratification, eliminating fish habitat. Low oxygen in the hypolimnion also releases natural phosphate bound to the loess and alluvial sediments that underlie the western basin in a chemical process called internal nutrient loading. The released phosphate encourages more algal blooms, which then decay and continue the cycle.

Inflexible physical infrastructure contributes to the loss of thermal refugia within and downstream of Island Park Reservoir. When Island Park Reservoir first stratifies in the spring, the average epilimnion depth is ~6 m, meaning ~40% of the reservoir's volume is in the hypolimnion. Both reservoir outflow points (at 23 m and 16 m depth, respectively) are limited to drawing from the cold hypolimnion. Island Park Reservoir is drawn down by an average of 60% (40% of full volume remaining) by the end of the irrigation season. As a result, this valuable cold hypolimnetic water is evacuated downstream faster than can be replaced by cold-water inflows from groundwater inflow and tributaries. This reduces water temperatures in the Henrys Fork outflow temporarily during early summer. However, without the flexibility to change outflow elevation throughout the year, drought and higher drawdown eventually result in high maximum water temperatures in the Henrys Fork outflow and high overall temperatures within Island Park Reservoir.

Degraded tributaries also affect thermal refugia in the Henrys Fork watershed. When tributaries are degraded through anthropogenic land use, the stream bed and banks erode, widening and downcutting the stream channel. A wider, unshaded stream absorbs more thermal energy. Streams with impoundments also absorb more thermal energy. Within our project area, streams with unmitigated damage from cattle grazing or impoundments include Sheridan Creek, Antelope Creek, Thurmon Creek, Fish Pond Creek, and water returning to the Henrys Fork through the Harriman canal system. The HFF's and IDEQ's monitoring on Sheridan Creek, Blue Springs Creek, Antelope Creek, Thurmon Creek, Fish Pond Creek, the Buffalo River, and in HSP canal return flow all show average and daily maximum water temperatures exceeding that of the Henrys Fork and Island Park Reservoir, sometimes by up to 3 °C. These tributaries are disconnected from their floodplain—either due to riparian damage and downcutting or a reduction in use for traditional flood irrigation practices—reducing interaction with groundwater and potentially lowering the water table. A lowered water table could reduce cool groundwater input to the Henrys Fork River. HFF monitoring indicates water temperatures in HSP are moderated by up to 1°C by discrete groundwater inputs like Osborne Springs and diffuse seeps throughout the river. Island Park Reservoir also benefits from groundwater inputs. Groundwater

inputs form approximately 1000 acre-feet of the only suitable habitats for coldwater aquatic salmonids in Island Park Reservoir.

Inflexibility in outflow elevations and inadequate aeration infrastructure contribute to low dissolved oxygen concentrations and high fine sediment export in Island Park Reservoir and its outflow, affecting fish and macroinvertebrate habitat. Organic material, either drifting down from algal blooms in the epilimnion or transported via density currents from the western basin, decay and use oxygen. Oxygen depletion in concert with increasing temperatures due to drawdown threatens fish habitat in Island Park Reservoir, but also threatens dissolved oxygen standards and fish habitat in the Henrys Fork outflow. Initially, cold temperatures in the hypolimnion ensure easy reoxygenation by current aeration infrastructure in both outflows. For example, at 10°C, 100% oxygen saturation at 6300 feet in elevation is approximately 9 mg/L; aeration facilities need not be 100% efficient to meet the 6 mg/L standard in the Henrys Fork outflow. As the summer progresses, the hypolimnion is eventually entrained into the outflow and replaced by warm water rich in organic material. The inability to influence outflow water quality allows this warm water rich in decaying organic material to be entrained, making reaeration difficult. At 23 °C, 100% oxygen saturation at 6300 feet is 6.5 mg/L, necessitating very high efficiency oxygenation facilities.

> *Describe how your conceptual project will address these issues and how your study and design efforts will inform your approach. If you are able to quantify the expected species and habitat benefits of the project you are studying and designing, please do so.*

Strategies to benefit fish habitat will be identified via the stakeholder outreach process, and will focus on producing three of the benefits defined above:

1. Reduced turbidity in Island Park Reservoir, including reduced HAB frequency,
2. Reduced fine sediment export from Island Park Reservoir into the Henrys Fork,
3. Increased cold, oxygenated refugia in Island Park Reservoir and the Henrys Fork, as well as reduced summertime maximum temperatures throughout the watershed,

The HFF has already identified numerous projects intended to address water quality and fish habitat problems. Potential infrastructure updates include variable-elevation outflow gates, hypolimnetic oxygenation, and sediment stabilization. Potential degraded tributary restoration will focus on process-based restoration, incidental recharge, and small dam removal or retrofits in Shotgun Valley and HSP to increase shading and groundwater interface while also decreasing erosion and associated sediment and nutrient transport.

Breaking the eutrophication feedback loop is central to addressing the sources of turbidity, fine sediment, and low dissolved oxygen in Island Park Reservoir—particularly within the western basin—and by extension the Henrys Fork watershed. First, sources of nutrients from the watershed must be controlled. In the Henrys Fork, removing sources of water quality degradation will focus on working with landowners and agencies to address landscape-scale land-use issues such as cattle grazing practices, septic tanks, and stream restoration. The water quality basin plan will identify and design multiple strategies focused on best management practices to reduce stream channel degradation and resulting water quality impairment. Such goals could be accomplished by working with landowners to change cattle grazing practices and strategies like fencing or rotational grazing, or working with homeowners and Fremont County to reduce septic tank inputs to Island Park Reservoir. Removing cattle from the riparian area will reduce erosion

and allow riparian vegetation to regrow, starting the process of watershed restoration. Changing cattle grazing practices could reduce direct and indirect nutrient input by reducing erosion and manure runoff, and encouraging healthy, nutrient-absorbing vegetation growth. After land use is managed, the water quality basin plan can include additional strategies to create long-term, large-scale, process-based restoration. Beaver reintroduction, beaver-dam analogs, post-assisted log structures, and other process-based solutions could help restore the stream channel to a state that reduces sediment transport and nutrient enrichment. No matter what strategy is ultimately chosen, the water quality basin plan will focus on large-scale action that makes a watershed-scale difference in water quality.

Once nutrient inputs are better controlled, projects within Island Park Reservoir become the priority. Nutrient flocculation is one potential solution to break the eutrophication cycle. Applying alum, bentonite clay, zeolite, or other flocculants across the western basin of Island Park Reservoir would bind and flocculate free phosphorus in the water column, removing the fuel needed for algal growth and storing it in sediments where it is available for rooted vegetation. Alum, bentonite, and zeolite can cap sediments, sealing the sediment-water interface and preventing the release of stored phosphate into the water column if dissolved oxygen is depleted. With adequate application, capped sediments may also be less likely to resuspend during wind-wave events or heavy recreational boating activity, reducing inorganic sediment transport within Island Park Reservoir. The effect of these applications is temporary (1–5 year lifespan), but the temporarily clarified water can help reestablish rooted aquatic vegetation growth, further stabilizing sediments and breaking the eutrophication cycle in the long term.

Cyanobacteria can also be directly controlled through application of algaecides or cyanobacteria-specific algaecides. In particular, sodium percarbonate dissolves cyanobacteria, preventing heavy organic sediment deposition from intact dead cells. Sodium percarbonate also temporarily increases dissolved oxygen concentrations and reduces turbidity. These applications can be a cost-effective temporary solution for reducing toxins and harmful algal blooms, as well as having a potential application for improving water clarity to establish rooted aquatic plants. In addition, sodium percarbonate could temporarily prevent phosphate release from sediments by temporarily increasing dissolved oxygen in the water column.

Sediment stabilization projects would reduce inorganic sediment resuspension, reducing fine sediment transport into the outflow in density currents and would increase overall water clarity. Increased water clarity increases the area of the reservoir in which rooted aquatic vegetation can establish, further improving clarity and reversing eutrophication. Rooted aquatic plants are the most effective solution for stabilizing sediments in a large area across large areas such as Island Park Reservoir. Assisting rooted aquatic plant establishment with seeds or plugs may be one strategy once turbidity is reduced with other strategies. Outside of capping sediments with alum, bentonite, or zeolite applications, sediment stabilization and subsequent turbidity reduction can be accomplished through a number of common reservoir management projects. Dredging could stabilize sediments by removing layers of unstable fine loess and organic deposits. Hydroseeding exposed mudflats when Island Park Reservoir is drawn down could establish root networks to hold sediments in place. Bank stabilization projects—gabbions, rip-rap, willow planting, re-grading—could reduce fine sediment suspended due to wave action along shorelines. Finally, check dams, coffer dams, or dikes built in the reservoir could reduce density current movement from the western basin to the eastern basin, compartmentalizing water quality problems away from the eastern basin and the Henrys Fork outflow.

Next, actions could be designed to increase oxythermal refugia in Island Park Reservoir and the Henrys Fork. Variable-elevation outflow systems work by allowing managers to strategically select which layer of water within Island Park Reservoir is withdrawn into the Henrys Fork outflow. Variable-elevation outflow structures would grant managers unprecedented flexibility to adapt to current conditions and evaluate trade-offs to ensure a best-possible scenario for in-reservoir and downstream water quality. To manage water temperatures, managers could draw epilimnetic water from higher elevations within the reservoir during the cool springtime period. This would increase springtime temperatures in the outflow—when high water temperatures are not a concern—but preserve a larger-volume cold hypolimnion within the reservoir. This larger pool of cool water could then be used strategically to cool the Henrys Fork outflow during high water temperature periods later in the summer. Variable-outflow elevation systems could also mitigate dissolved oxygen problems by allowing managers to prioritize water primed for reaeration: cool, low in organic material, and high in dissolved oxygen. An additional benefit is the ability to manage fine sediment export; managers could raise outflow elevation to react to density currents.

Altering impoundments such as Golden or Silver Lakes on HSP is another option to reduce sources of temperature impairment. Golden and Silver Lakes inputs are cold, spring-fed creeks, but water impounded in these small lakes is warmed substantially by solar radiation. The outflows from each lake are from this warm surface water, so these tributaries are artificially warm. One potential solution is to retrofit the dams to release cooler hypolimnetic water. Another option to explore is routing the inflow around the lakes, thereby replacing an artificially warm outflow with a more natural water temperature pattern. Removing the lakes entirely and restoring the former lakebed to a more natural riparian area is another option to explore to reduce tributary water temperature.

Another set of potential strategies to centers on restoring local shallow aquifers to improve groundwater inflows to the Henrys Fork and Island Park Reservoir. Aquifer recharge is especially attractive given the state of existing infrastructure in the Henrys Fork basin, especially in HSP and Shotgun Valley, and can be accomplished with existing water rights and supply via restoration or expansion of traditional flood irrigation practices. An effective strategy could be to divert some tributaries into existing canal infrastructure for the purposes of recharging local groundwater, rather than allowing the degraded water quality to reach the Henrys Fork. In HSP, Thurmon Creek, Fish Pond Creek, and the Henrys Fork were traditionally diverted to flood-irrigate pastureland. Flood irrigation canals and ditch networks still exist but are unused. Currently, diversions on HSP are either inactive or diverted water is returned to the Henrys Fork as de facto surface streams. Restoring traditional flood irrigation practices to HSP could simultaneously prevent high sediment, temperature, and nutrient input to the Henrys Fork and instead increase cold groundwater-fed refugia. Process-based restoration of stream channels also significantly increases stream interaction with groundwater. Back-of-the-envelope calculations using parameters developed for the Henrys Fork suggest a 50% increase in groundwater flow (16 to 24 cfs) to the Henrys Fork is possible through the restoration of flood irrigation practices or similar process-based projects aimed at reconnecting streams with their floodplain.

An updated oxygenation system could increase hypolimnion and outflow dissolved oxygen concentrations, improving fish habitat and helping prevent internal nutrient loading. A point-of-discharge upgrade to FRREC facilities could increase aeration efficiency, potentially increasing water quality compliance and downstream water quality. In contrast, an in-reservoir system

would use hoses or a Speece cone to efficiently mix pure oxygen into the hypolimnion of Island Park Reservoir with minimal atmospheric loss. In 2021, our data suggests a hypolimnetic oxygenation system would have increased total habitat for kokanee salmon in Island Park Reservoir from <1,000 acre feet to ~3,500 acre-feet, an increase of 350%. Absolute habitat savings will be even larger in years where Island Park Reservoir drawdown is lower—preliminary data from Henry's Fork Foundation monitoring indicates up to 20,000 acre-feet in habitat improvement is possible in years with lower drawdown. This oxygen would also prevent internal nutrient loading from sediments, helping mitigate internal nutrient loading and associated algal blooms in Island Park Reservoir. When used in concert with a variable-elevation outflow system, hypolimnetic oxygenation could create a large pool of high-oxygen, low-nutrient water in the hypolimnion that could be used strategically throughout the growing season to balance in-reservoir fish habitat and downstream water quality, among other potential benefits.

> *Watershed Benefits. Provide information regarding the current status of water quality, ecological function, and ecological resiliency in the planning area. Provide factual support, citations to relevant studies, and statistical information to describe the critical issues in your planning area related to water quality, ecological function, ecosystem resiliency conditions.*

Frequent and variable drawdowns along with a warming climate, aging infrastructure, and degraded tributaries are producing degraded water quality, reduced ecological function, and most importantly, reduced ecological resiliency. Excessive annual drawdowns negatively affect water quality and fish habitat resiliency in Island Park Reservoir and the Henrys Fork. Drawdowns are becoming more frequent and variable as water supply declines and managers struggle to balance statutory water rights with ecological and economic resources. HFF monitoring has found Island Park Reservoir drawdown increases water temperatures, fine sediment transport, eutrophication in Island Park Reservoir, and decreases dissolved oxygen concentrations throughout Island Park Reservoir and the Henrys Fork. Macroinvertebrate communities in the Island Park Reservoir outflow are more variable than anywhere else in the watershed. These variable conditions threaten the "hatches" of aquatic insects critical for trout growth and for the fishing experience.

> *Describe how your conceptual project will address these issues and how your study and design efforts will inform your approach. If you are able to quantify the expected watershed benefits of the project you are studying and designing, please do so.*

A water quality basin plan is intended to buffer water quality changes from fluctuations in climate and water supply by focusing on how changes to infrastructure and landscapes could produce water quality, fish habitat, and macroinvertebrate community improvements despite a warming, drying world. This complements ongoing HFF work to improve water quality by reducing drawdown. HFF reductions in drawdown have saved about 26,000 acre-feet in Island Park Reservoir annually, good for an observed 150% increase in kokanee numbers in Island Park Reservoir over expected values. However, a 150% increase in kokanee numbers still was not enough to increase total populations back to levels seen 20+ years ago (~500 kokanee/mile observed spawning in 2020s vs. 1,000+ kokanee/mile observed spawning in 1990s).

A water quality basin study intends to take the next logical step to buffer water quality and subsequent fish and macroinvertebrate habitat from climate change and drought by identifying, designing, and evaluating for implementation a wide variety of water quality improvement projects aimed at aging and inflexible physical and natural infrastructure in Island Park Reservoir

and degraded tributaries throughout the watershed. This will produce projects like a hypolimnetic oxygenation system, which could increase fish habitat in Island Park Reservoir by 350% and permanently increase deep, cold-water refugia despite climate-driven uncertainty.

Water supply in the project area was 18% lower in water years 2001–2023 than in 1965–2000, and droughts have become more frequent and more severe. The proposed project will build resilience to drought by increasing the water-quality benefits that can be attained per unit of water conservation by a factor of around 1.5, thereby improving water quality roughly to early 1990s levels and providing a 30-year buffer to current climate trends. Statistical relationships indicate that for each 100 cfs reduction in summertime reservoir outflow, turbidity decreases by around 1 NTU and suspended sediment load decreases by around 325 tons. Water conservation efforts first implemented by the applicant and its partners in 2018 have increased carryover in Island Park Reservoir by an average of 26,000 acre-feet/year relative to water supply, equivalent to a 160 cfs decrease in mean summertime discharge. Thus, over the past six years, water conservation has lowered turbidity by 1.6 NTU and suspended load by 520 tons relative to what they would have been with the given water supply. In addition, outflow temperature decreases by around 0.3 °F per 10,000 acre-feet of increase in reservoir carryover, so water conservation efforts to date have reduced outflow temperature by around 0.75 °F, offsetting roughly 25 years of temperature increase.

Our hydrologic modeling suggests that additional improvements in water conservation will just keep pace with decreased water supply in the future, so that any additional improvements in water quality will come from the specific actions developed through this project. Based on analysis of Island Park Reservoir water quality and reservoir dynamics to date, we estimate that infrastructure improvements to the dam and reservoir could increase the turbidity benefit of water conservation to 1.5 NTU and 450 tons of sediment per 100 cfs reduction in summertime outflow. Thus, when coupled with existing water conservation relative to supply, our analysis shows that these infrastructure improvements will reduce turbidity by around 2.5 NTU relative to the current summertime average of 5 NTU, which is roughly the visual threshold above which anglers report degraded fishing conditions. This improvement will roughly set turbidity and sediment load conditions back to what they were in the early 1990s, thereby providing around a 30-year buffer before the worst water-quality experienced over the past 10 years will become the norm. While we do not expect much additional improvement in reservoir outflow temperatures as a result of reservoir infrastructure, we estimate that groundwater recharge and nature-based restoration downstream of the dam have the potential to increase the input of cool groundwater by around 50% (from around 16 cfs to 24 cfs) and decrease mid-summer temperatures of currently unshaded tributaries by 2-3 °F. Based on mass balance, this will cool the mean temperature of the main river by around 0.25 °F but more importantly increase the areal extent and quality of cold-water refugia. When combined with the current improvement in reservoir outflow of 0.75 °F, the temperature improvements also equate to ~30 years of climate buffer.

> *Water Supply Benefits. Provide information regarding the current status of water availability for aquatic ecosystems. Are there issues with sufficient water availability for ecosystems seasonally or year-round? Provide factual support, including hydrographs, citations to relevant studies, and stream flow information to describe the critical issues in your planning area related to water availability for aquatic ecosystems.*

As mentioned above, annual natural streamflow ("water supply") in the upper Henrys Fork subwatershed has averaged 18% (~215,000 acre-feet) lower since 2001 than between 1965 and 2000. From purely a water-supply standpoint, the two most direct effects of lower water supply on aquatic ecosystems in the project area are 1) annual draft of Island Park Reservoir and resulting loss of reservoir fish habitat and 2) decreased outflow from the reservoir into the river downstream during winter fill operations. Decreased water supply across the whole watershed drives the need for increased reservoir draft to meet irrigation demand, resulting in reductions to populations of reservoir fish and the numbers of these fish that migrate upstream into the Henrys Fork. Decreased winter outflow is well documented as the single biggest factor affecting recruitment of wild rainbow trout in the river reach downstream of the dam. Lower winter flows result in lower survival of juvenile trout, resulting in lower recruitment two years hence. Even if reservoir drawdown is reduced through water conservation actions, as has been done for the past six years, low winter inflow during periods of drought results in low winter outflow to attain required reservoir fill rates. For example, going into the winter of 2022-2023, water conservation efforts by HFF, FMID, Reclamation and others increased reservoir carryover by over 44,000 acre-feet (nearly a factor of 3) over what was expected based on water supply, thereby reducing need for winter (October to reservoir ice-off in April) fill from an expected 109,455 acre-feet to 65,208 acre-feet. However, winter inflow to the reservoir was the lowest in the modern 1978–2023 period of record, resulting in winter outflow of 212 cfs, compared with an average of 356 cfs, despite unprecedented water conservation successes.

Modeling and analysis by HFF shows that reservoir carryover of at least 60,000 acre-feet (44% full) and winter outflow of at least 400 cfs is necessary in at least two years out of three to consistently maintain fish populations at desirable levels. Since the start of the current long-term and widespread drought in the western U.S. in 2001, the reservoir carryover objective has been met in only 10 out of 23 (43%) years, five of which have occurred in the last six years since implementation of collaborative water conservation and management efforts. By comparison, the carryover objective was met in 22 of the preceding 36 years (61%). The winter flow objective has been met in only four years (17%) since 2001, three of which have occurred in the last six. By comparison, the winter flow objective was met in 18 of the previous 36 years (50%). Thus, despite substantial improvements in these two key water-supply metrics over the past few years because of water conservation, water supply remains lower than desired to meet fisheries objectives, which were met much more frequently—and incidental to customary management—between 1965–2000, when expectations for the quality of fisheries in the project area were set.

> *Describe how your conceptual project will address these issues and how your study and design efforts will inform your approach. If you are able to quantify the expected water supply benefits of the project you are studying and designing, please do so.*

The proposed project is not designed specifically to address water supply. However, the project will increase reservoir carryover and hence winter flow very modestly through three mechanisms. First, any upgrades to outlet infrastructure will be built with increased precision so that finer adjustments to reservoir outflow can be made than currently possible. These will likely be small—on the order of 10 cfs—relative to the average outflow adjustments of 50–200 cfs that are currently made. Half of the improvement in precision will be realized as irrigation-season benefits to irrigators and streamflow well downstream of the project area, which will occur when outflow is being increased as demand increases in early summer. The other half of the improvement will be in retaining water in the reservoir during the late summer when demand is

being reduced. This is about a six-week period, over which a 10-cfs savings would increase carryover by around 800 acre-feet. That would result in an increase in winter flow of around 3.5 cfs. These are improvements of around 1%.

Second, aquifer recharge via restoration of flood irrigation in HSP is expected to increase groundwater returns by around 8 cfs. Over the typical period of reservoir draft, this is an increase in streamflow gains of ~1,000 acre-feet. Most flood irrigation will occur before reservoir draft is needed, thereby using the shallow aquifer as a storage reservoir to replace 1,000 acre-feet of Island Park draft, another roughly 1% improvement in each of carryover and winter flow.

The third mechanism by which the project will address water supply is via implementation of supply-independent mechanisms for improving water quality. For example, one of the few strategies currently available to minimize the negative effects of fine sediment deposition in the Island Park to Riverside reach is delivery of a managed peak-flow freshet from Island Park Reservoir during April or May. This operation results in temporary draft of the reservoir, potentially jeopardizing fill prior to irrigation need, and can thus be done only in years of above average water supply. These conditions have existed in only about one-third of years since 2001. Reducing sediment deposition via measures explored in the proposed project could reduce the need for a managed freshet, potentially freeing up that water for other uses such as higher winter flow or managed aquifer recharge.

Other Quantifiable Benefits. Provide information regarding the other critical issues of concern in your project planning area. Are there issues related to human safety (significant flood risk/ damaged infrastructure), significant long term management costs, limited economic opportunity or a lack of jobs, lack of recreational access including access to safe recreational spaces or fishing access? Provide factual support, including citations to relevant data or studies, and information to describe the other critical issues in your planning area.

Hydroelectric power generation is threatened by low dissolved oxygen from eutrophication and increased water temperatures. The FRREC holds a 50-year Federal Energy Regulatory Commission (FERC) permit to generate hydropower through outflow #2. The power plant operates as a run-of-reservoir between 200 cfs and 960 cfs. Any flow more than 960 cfs is passed to the original dam outflow gates. As a condition of operation, FRREC is required to meet dissolved oxygen concentration standards in their outflow of Island Park Reservoir into the Henrys Fork. During salmonid spawning (March through June), instantaneous dissolved oxygen concentrations must be at least 8 mg/L. Outside of the salmonid spawning period, instantaneous dissolved oxygen concentrations must be no less than 6 mg/L. As such, power generation facilities include two forced air "blowers" to aerate outflow. Low dissolved oxygen concentrations in the hypolimnion outstrips FRREC's original aeration infrastructure, forcing FRREC to reduce or cease hydropower generation. Addressing this aeration infrastructure could benefit FRREC operations as well as fish and macroinvertebrate habitat.

Reduced fish habitat in Island Park Reservoir negatively impacts statewide economic benefits. Island Park Reservoir's fishery has declined since the 1980s, when it was once a "fishery of significant state interest". Low kokanee numbers result in reduced angler effort and loss of an egg collection source by IDFG for statewide hatchery operations. Variability in aquatic macroinvertebrate communities in the Henry's Fork downstream damages a world-famous dry-fly fishing experience that drives a local fishing-based economy worth $30 million annually.

Recreational safety on Island Park Reservoir is threatened by HABs. Our proposed study to ground-truth USGS REACT imagery with data from the buoy and a 3D reservoir model will give managers a clear picture of water quality across the reservoir in nearly real time. This information can be used to predict HABs, density currents, and other water quality issues to improve safety and reservoir management. This information can be passed along to recreators and managers.

Evaluation Criterion B–Prior Restoration Planning and Stakeholder Involvement and Support

Describe any prior planning efforts related to your proposed project, i.e., planning that took place before you submitted your proposal. Describe the specific planning, strategy, study, and any design document(s) (plan(s)) that support your project. Explain when the plan was prepared and for what purpose. What was the scope of the planning effort that supports your project? Describe the geographic extent and types of issues (e.g., water quantity, water quality, and/or issues related to ecosystem health or the health of species and habitat within the watershed). Was the plan developed collaboratively? If the referenced plan was not developed collaboratively, please explain why, for e.g., the planning effort is focused on a very small area or concerns internal to the applicant. Explain how any prior planning effort relates to your current proposal and how your current proposal adds value and builds on any prior planning efforts.

Table 2: Planning efforts that support the proposed project.

Plan	Organizational authority	Year	Process and collaboration
Henrys Fork Basin Plan	Idaho Water Resource Board	1992	Stakeholder input via local advisory group
Henry's Fork Drought Management Plan	Six signatories, including U.S. Bureau of Reclamation	2005, 2018	Stakeholder input via HF Watershed Council
Henrys Fork Basin Study	Idaho Water Resource Board U.S. Bureau of Reclamation	2015	Stakeholder input via HF Watershed Council
State Fisheries Management Plan	Idaho Department of Fish and Game	2019	Internal process with solicited stakeholder input
Strategic Plan	Henry's Fork Foundation	2022	Internal process with solicited stakeholder input

Henrys Fork Basin Plan

The Henrys Fork Basin Plan is one of 10 basin-specific components of the Idaho State Water Plan, which was initially developed on an interim basis by the Idaho Water Resource Board in 1972 and has been regularly updated and confirmed by the Idaho State Legislature since then. The Henrys Fork Basin planning process commenced in 1988 with interim protection for the Henrys Fork from Henrys Lake to Ashton Reservoir passed by the Idaho Legislature in Idaho Code §42-1734H and direction therein given to the Board to prepare a comprehensive plan for the basin. A public meeting held in the watershed on January 31, 1989 formally announced the start of the planning effort and called for nominations for a committee of local citizens to provide input to the process. The Board appointed a 13-member advisory committee including representatives of fisheries, irrigation, hydroelectric power, tourism, and timber interests, as well

as commissioners from the three counties in the watershed—Fremont, Madison, and Teton. The HFF was represented on the advisory board. The Plan was adopted in 1992.

Planning goals were established in the authorizing legislation and included preservation of existing water rights; economic development; provision of safe drinking water; minimum streamflow for aquatic life, aesthetics, and recreation; and sound watershed conservation practices. While applied to the entire 3,200-acre watershed, the planning process divided the watershed into stream reaches for the purposes of identifying and designating appropriate levels of protection and allowable future development. Two river reaches within the proposed project area were designated as "recreational"—the Henrys Fork from Island Park Dam to Riverside Campground, and the Thurmon Creek drainage from Golden Lake to the Henrys Fork confluence, including Golden and Silver lakes. The Basin Plan noted that the Island Park to Riverside reach supports a nationally and internationally recognized trophy trout fishery, and that Golden and Silver lakes support Trumpeter Swan nesting and have high aesthetic value. With respect to the latter, the Plan states that "close coordination with the Idaho Department of Parks and Recreation will be necessary to ensure that their management of the lakes and creeks complements this designation." The "recreational" designation in the Basin Plan limits alterations of the streambed in these reaches to only those necessary to maintain existing utilities, roadways, diversion works, and public access. New diversions, dams, hydroelectric projects, dredge or placer mining, and sand or gravel extraction are prohibited, and any new fishery enhancement or access facilities are limited to those implemented by public agencies.

Although over 30 years old, the Henrys Fork Basin Plan continues to protect the outstanding fishery, aesthetic, and recreational resources of the two stream reaches in the project area and provide guidance to state agencies in managing the water resources of the whole basin. The basin-wide perspective is critical because management of irrigation in the lower basin has a direct impact on the Island Park to Riverside reach via management of Island Park Reservoir. While the vision, protection, and guidance of the 1992 Plan are still relevant, the authors could not have anticipated the effects of drought, climate change and aging infrastructure on the outstanding resources of these two water bodies. The proposed project is necessary to maintain and enhance these resources into the future, thus ensuring the intent of the citizen's advisory group and the Water Resource Board at the time. Further, the proposed project will adhere to protections afforded by the 1992 Plan by using nature-based methods on water bodies in and adjacent to HSP and by facilitating coordination of all relevant agencies.

Henry's Fork Drought Management Plan

In part because of conflict that arose among different interest groups during development of the Basin Plan and in part because of lack of agency coordination made apparent by two separate river sedimentation events that occurred in 1992, the Henry's Fork Watershed Council was established during a year-long series of meetings held in 1993. The Council was chartered by the Idaho legislature in 1994 as a "grassroots community forum which uses a nonadversarial, consensus based approach" to address natural resource management issues in the Henrys Fork watershed. The Council is co-facilitated by FMID and HFF and has served as a model of collaborative watershed management for three decades. In the early 2000s, the HFWC assessed potential social, economic, and environmental effects of proposed transfer of title of Reclamation infrastructure in the watershed to FMID. After several years of deliberation, the HFWC reached consensus that title transfer of a diversion dam, canal, and groundwater wells in the lower

watershed would serve the interests of watershed stakeholders, while transfer of the two Reclamation storage reservoirs in the watershed—including Island Park Reservoir—would not. Upon the HFWC's recommendation, the Fremont-Madison Conveyance Act, passed by the U.S. Congress in 2003 to transfer the infrastructure, included a requirement that a drought management planning committee be established for the purposes of collaborative management of the watershed's water resources to benefit multiple stakeholders.

In 2005, the Henry's Fork Drought Management Plan (DMP) was completed and signed by six signatories: FMID, HFF, North Fork Reservoir Company, Trout Unlimited, The Nature Conservancy, and Reclamation. The DMP was last revised in 2018, with a goal to "maintain or enhance watershed health and ecology, even in years of below-average precipitation, in balance with agricultural needs through flexible and adaptive water management within the context of Idaho water law." Although only these six entities signed the DMP, its scheduled quarterly and other ad hoc meetings are open to the public. Regular non-signatory participants include IDFG and FRREC, key partners in the proposed project. The full HFWC is briefed at least twice each year on implementation of the DMP.

Because of the long-established dependence of trout recruitment downstream of Island Park Dam on streamflow during the winter, the DMP initially focused on winter flow management. The primary strategy used to maximize winter outflow while filling the reservoir to meet storage water rights was to lower outflow during October and November, when reservoir draft is not needed to meet irrigation demand but prior to onset of winter conditions in the aquatic ecosystem. This earlier storage allowed higher outflow during the December-February period critical for trout survival. However, after the four-year drought of 2013–2016, it became apparent that this strategy alone had only a relatively small (~10%) effect on winter flow, given that the single biggest factor affecting winter outflow was reservoir content at the end of the irrigation season. Further, research and monitoring done during and since that drought showed that high reservoir draft negatively affected fish populations in and upstream of the reservoir as well as water quality and fishing experience downstream. The 2018 revision of the DMP reflected this new understanding and included consideration of other water management actions such as managed aquifer recharge, demand reduction incentives, and lower-watershed streamflow targets that could limit the amount of reservoir drawdown during irrigation season, thereby reducing the amount of storage needed to fill the reservoir. Earlier sections of this application documented the improvements in physical reservoir carryover (50%) and winter flow (43%) since 2018 thanks to a suite of collaborative conservation measures including water management strategies, irrigation infrastructure, demand-reduction programs, expanded stream and canal gaging, and new predictive hydrologic models. Many of these conservation efforts have been funded by previous Reclamation WaterSMART grants. In addition to physical water savings these efforts have increased administrative carryover by around 24%, saving irrigators storage-use costs and providing them with more certainty going into the subsequent year.

While decreased reservoir draft has had measurable positive effects on turbidity, water temperature, and sediment loads downstream, these effects are relatively small and not sufficient to outweigh the effects of climate change. Our proposed project is the next logical step in addressing water quality issues to a larger degree than can be accomplished by water management actions via the DMP alone. By improving water quality through measures independent of water management, our proposed project will provide more resilience to aquatic ecosystems while also allowing more flexibility in water management to accommodate future

water supply challenges. As an example, updating infrastructure at Island Park Reservoir will help meet the DMP's objective of "manag[ing] water out of Island Park Reservoir to optimize…fish and wildlife populations [and] aquatic processes…". Currently, at least some outflow must be transferred to the bottom-withdrawal gates late in the summer when the power plant is unable to meet its dissolved oxygen criteria, resulting in higher turbidity and sediment export at a desired total outflow. In other cases, outflow is set either higher or lower than intended to meet water-management objectives because of outflow or reservoir-level constraints imposed by current infrastructure (e.g., ice encroachment on 30-year old spillway infrastructure). Thus, infrastructure upgrades can both improve water quality and water management precision.

Henrys Fork Basin Study

The Reclamation Basin Study program "supports collaborative planning to help Reclamation and its partners assess risks to water supplies from competing demands and to identify strategies to meet those demands." To date, 21 basin studies have been completed, including the Henrys Fork Basin Study in 2015, conducted jointly by the Idaho Water Resource Board and Reclamation. The HFWC served as the stakeholder workgroup for the Henrys Fork Basin Study and spent three years working on all aspects of the study, from hydrologic modeling, to alternatives assessment, to identification of potential sources of funding to implement study recommendations. As both of the previously described planning processes did, the Basin Study emphasized the high ecological value of fisheries and other aquatic resources in the Henrys Fork watershed and the need to maintain these resources while also meeting demand for irrigation and other uses. Further, the Basin Study modeled effects of climate change on water resources, finding that natural flow would become more concentrated in a shorter-duration, earlier runoff period in the spring, ultimately resulting in greater reliance on reservoir draft to meet irrigation demand late in the summer and on lower reservoir levels and natural streamflow at the end of the season. These projected climate changes and effects are those that have subsequently been shown to reduce water quality in and downstream of Island Park Reservoir.

The Basin Study identified five categories of conservation and management actions that could increase reliability of water supply in the basin: 1) increased surface water storage, 2) replacement of specific canals with pipelines, 3) on-farm irrigation demand reduction, 4) expanded managed aquifer recharge capacity, and 5) automation of canal infrastructure. The alternatives for increased surface storage had relatively high economic and environmental costs, and none have been seriously pursued in recent years. However, the other categories of water-conservation measures have been pursued aggressively through collaborations involving irrigation entities, Reclamation, the Idaho Water Resource Board, and non-governmental organizations. Funding has come from a variety of state, federal and private sources, including Reclamation WaterSMART. Watershed-wide coordination and implementation of improved water-management strategies has been implemented through the DMP participants, led by HFF, FMID, and Reclamation. These actions have improved physical reservoir carryover, administrative reservoir carryover, fish populations, and water quality.

However, as mentioned above, the water-quality improvements realized through water-quantity improvements fall short of those needed to align ecological resilience with water-supply resilience. The proposed project is designed to complement already successful water conservation actions, both taking advantage of the ecological benefits of improved water management while also potentially increasing water-management flexibility.

Idaho Department of Fish and Game State Fisheries Management Plan

The 2019–2024 IDFG State Fisheries Management Plan is the "guiding policy document for fisheries activities" within the agency. While largely an internal document, it "reflect[s] the desires of anglers and other interested stakeholders regarding conservation and management of Idaho's aquatic resources to benefit the public." Statewide guiding principles include emphasis on maintenance of self-sustaining wild fish populations, the belief that "productive habitats and healthy ecosystems are essential in sustaining diverse fish and wildlife and Idaho's communities and economies", and active support for state and federal agencies, Tribes, and private entities on projects that protect or enhance water quality, in-stream flows and fish habitat. Specific IDFG management objectives for waters in the project area are to 1) "manage the Henrys Fork above Island Park Reservoir for satisfactory and diverse angling opportunity", 2) "sustain a satisfactory fishing experience in the Henrys Fork on the catch-and-release section from Riverside Campground upstream to Island Park Dam", and 3) "produce and maintain a quality, consumptive salmonid fishery in Island Park Reservoir". The fisheries management plan also incorporates relevant goals and objectives from other plans such as the State Wildlife Action Plan and the Management Plan for Conservation of Yellowstone Cutthroat Trout in Idaho.

Our proposed water quality basin plan will help IDFG accomplish its objective of emphasizing wild, naturally reproducing trout populations in the Henrys Fork and is consistent with IDFG's statewide emphasis on maintaining productive habitats and ecosystems. Furthermore, the evidence- and collaboration-based process we propose to evaluate and prioritize alternatives matches with IDFG core values that "scientifically-developed knowledge and information are the foundation of fish and wildlife management" and that its "management responsibility is to foster solutions to fish and wildlife issues that are ecologically viable, economically feasible, and socially acceptable." More specifically, the key objective of the water quality basin plan is to restore water quality in the Henrys Fork downstream of Island Park Reservoir to improve fish and macroinvertebrate habitat and ecological function to support the fishing experience. By improving water quality in Island Park Reservoir, alternatives developed through the proposed water quality basin plan could increase the amount of trout habitat in the reservoir, which has been shown to improve quality and trophy fish numbers available for anglers both within Island Park Reservoir and in the family fishery in the Henrys Fork upstream. Strategies outlined in the IDFG Fisheries Management Plan will be developed into specific projects with design plans for implementation. These strategies include creating "biologically meaningful habitat, water quality and stream flow protection and enhancement" in the Henrys Fork downstream of Island Park Dam, "reservoir tributary habitat and stream flow protection and enhancement", "managing Island Park Reservoir for optimum trout production goals to ensure strong escapements of spawning Rainbow Trout and kokanee upstream through the upper Henrys Fork to Moose Creek, Big Springs, and Henrys Lake Outlet", and "addressing limiting factors on kokanee salmon to create quality kokanee fishery".

Restoring tributaries to Island Park Reservoir could also create new habitat for Yellowstone cutthroat trout, a state species of special concern. Improved habitat complexity in tributaries not only benefits downstream water supply and water quality, but can also improve cutthroat trout habitat, supporting IDFG goals to ensure the persistence of Yellowstone cutthroat trout in the Henrys Fork Watershed. Restoring tributaries to the Henrys Fork and Island Park Reservoir also produces practical opportunities to restore Yellowstone cutthroat trout to its native range within

the Henrys Fork watershed. Candidate streams for restoration to improve water quality in the Island Park Reservoir watershed are West Dry, Icehouse, Taylor, and Schneider creeks (tributaries of Sheridan Creek), which are also identified by IDFG as candidates for Yellowstone Cutthroat Trout restoration.

Henry's Fork Foundation Strategic Plan

The HFF is governed by a Board of Directors, which conducts strategic planning every 5–10 years to assess organizational effectiveness relative to challenges and threats and to prioritize programs and projects. The HFF strategic plan was last updated in 2022 and included substantial changes to organizational structure of HFF's Science and Technology Department and addition of quantitative water-quality objectives, reflecting extensive advancement in HFF's scientific understanding of water quality and aquatic ecosystem function since the previous plan revision in 2014. The proposed project has grown out of the process of routinely evaluating the effectiveness of 40 years of aquatic conservation work in the Henry's Fork watershed and of incorporating the latest scientific information as it is produced and published, including 13 relevant peer-reviewed publications by HFF staff and affiliated students since 2014.

Like IDFG's fisheries management planning process, HFF's strategic planning process is internally driven but incorporates input from stakeholders. During the most recent plan revision, HFF hired a consultant to conduct structured interviews with a variety of watershed stakeholders, ranging from agricultural producers to fishing guides and outfitters. In addition, HFF frequently receives unsolicited input from stakeholders, primarily anglers and fishing guides/outfitters. Over the past decade, anglers and fishing guides/outfitters have expressed increasing concern over water quality—primarily high water temperatures and high turbidity—and potential negative effects on aquatic invertebrates and the related dry-fly fishing experience for which the river is known. These concerns motivated HFF to establish the first systematic and comprehensive water quality monitoring program in its history in 2013, starting with collection of turbidity, suspended sediment and nutrient samples immediately downstream of Island Park Dam. The following summer, HFF installed the first five of what in 2016 would become a network of 11 continuously recording water-quality sondes and expanded the sediment and nutrient sampling program to match the sonde locations. Currently, 10 of the 11 sondes remotely transmit water-quality data to a website in near real-time. In 2015, HFF added annual, replicated sampling of aquatic macroinvertebrates at five key locations in the river, including two in the project reach, and began regularly measuring water quality in Island Park Reservoir, in collaboration with IDEQ.

Whereas the 2014 version of HFF's strategic plan emphasized monitoring and assessment, the 2022 version emphasizes outcomes, including quantitative objectives for water quality and water quantity. Through its participation in the collaborative water conservation and management projects described above, HFF has largely met its water quantity objectives over the past few years. However, its water-quality objectives for temperature and turbidity in the project area have not been met during years of below-average water supply, which have occurred more frequently in recent years, as documented above. With a 10th season of HFF's water-quality data now in hand, it is apparent that the two most important factors affecting water quality in Island Park Reservoir are natural flow (lower flow = worse water quality) and spring/summer air temperatures (increasing trend; warmer temperatures = worse water quality).

The proposed project is not only necessary to address these issues but is also the logical next step in HFF's 40-year conservation history. The organization's early efforts focused on immediate

threats to numerous river reaches from proposed hydroelectric development and on more localized but obvious impacts from livestock grazing along the river in the project reach. After those issues were largely addressed, the organization focused on improving fish passage, conserving native trout in headwater areas, and ensuring river access. Through the development and implementation of the DMP, HFF addressed water-quantity issues although not at the current scale until after the 2013–2016 drought, when it became apparent that the larger water conservation strategies included in the 2015 Basin Study would be necessary to achieve meaningful results. HFF's current strategic plan explicitly includes programs and staff to pursue large-scale water conservation that were not present in the previous plan, in response to quantitative assessments that showed that "traditional" conservation projects such as fish passage, riparian protection, and headwater restoration were not maintaining the main-river fishing experience stakeholders desired. The current plan also combined what were previously separate Research and Restoration and Stewardship programs into a single Science and Technology department, directed by a Ph.D. scientist and currently staffed by five other permanent staff members and contractors, including two other Ph.D. scientists. Undergraduate interns and graduate students also contribute to HFF's science and technology work. The reorganization of HFF's departments not only fully integrates on-the-ground conservation activities with water-quality monitoring but also facilitates rapid translation of science and data into conservation actions. Further, the current plan identifies a critical need for external communications and stakeholder engagement to build the understanding and support needed to address large-scale issues associated with climate change and aging infrastructure with equally large-scale restoration projects. To help meet this need, HFF recently received a large grant from a private foundation to establish a new Climate Adaptation Program, managed by a Ph.D. scientist as of January 1, 2024.

The proposed project will set the stage for implementation of the large-scale projects needed to meet HFF's water-quality and aquatic habitat objectives, and ultimately its stakeholder-driven mission. The current HFF strategic plan not only led to this project but also supports it via long-term organizational commitment to a stable staff of highly trained aquatic resource professionals, state-of-the-art monitoring technology, and science-based collaboration.

Stakeholder Involvement and Support for Task A: Study and Design Projects

Stakeholders belonging to seven sectors will be engaged throughout the project:

1. State and federal **agencies**, **municipalities**, and **NGO**s,
2. **Water users** and **hydropower operators**,
3. Homeowners Associations (**HOAs**) and private fishing **clubs** around Island Park Reservoir and along the Henrys Fork in the project area.
4. Fishing and water-related **recreation operators** on Island Park Reservoir and adjacent river reaches, including watercraft rental businesses, float shuttle operators, and fishing outfitters
5. Tourist-dependent **businesses** located in the project area
6. Non-angling **recreationists**, including Island Park Reservoir boaters, non-angling river floaters, and visitors to HSP and other state and federal recreation sites in the project area
7. **Anglers**, subdivided by water body: Henrys Fork upstream of Island Park Reservoir, Island Park Reservoir, Henrys Fork in the project area downstream of Island Park Dam

Identify stakeholders in the project area who have committed to be involved in the study and design process. Describe what sector(s) the participating stakeholders represent and how they will engage in this effort, e.g., will they contribute funding or in-kind services, or otherwise engage in the study and design process? Provide documentation of the commitment by stakeholders to participate in the study and design process. This could include letters from stakeholders committing to be involved in the study and design process; such letters should explain what their specific interest is and how they plan to participate. Are any stakeholders contributing to the cost-share?

Participating stakeholders

The IDFG will serve as the Category A partner, contributing $50,000 in non-federal, in-kind services (letter attached). Regional IDFG staff will participate in engagement activities with other stakeholders to provide IDFG perspective, coordinate with other agencies, and respond to questions and concerns raised by non-agency stakeholders, particularly anglers. In addition, IDFG will monitor fish populations in Island Park Reservoir to gather more information on relationships among climate, water quantity, water quality and fisheries and to expand the baseline to which post-project data can be compared. Given that some potential infrastructure improvements and restoration activities may have consequences (both positive and negative) for waterfowl, IDFG's wildlife staff will participate as needed alongside their fisheries counterparts.

The IDEQ will fully participate as a project partner, contributing $62,500 in non-federal, in-kind services (letter attached). Regional IDEQ staff will participate in agency coordination meetings, HFWC meetings, and community stakeholder listening sessions. The IDEQ will also conduct water quality assessments in the project area. In addition, IDEQ will fund development of a hydrodynamic model of Island Park Reservoir that will be used during year 3 to help assess effectiveness of potential infrastructure improvements and restoration.

The IDPR will contribute $7,100 in staff time and meeting facilities toward attending and hosting listening and feedback sessions aimed at HSP anglers and visitors (letter attached). Input from IDPR staff at the HSP and state levels will be required to assess feasibility of any potential on-the-ground restoration that would occur within the HSP.

Describe stakeholders in the project area who have expressed their support for the study and design process, whether or not they have committed to participate. Supporting documentation for this sub-criterion could include letters of support from stakeholders or a description of feedback from interested stakeholders.

Supporting stakeholders

The USFS manages land adjacent to or in the watershed of Island Park Reservoir and adjacent to HSP, in the watersheds of small tributaries that join the Henry's Fork in the project area. As such, some potential infrastructure improvements or restoration may be appropriate for implementation on USFS land, and the agency will participate in assessing these potential actions to ensure that they are compatible with agency land management plans and resource objectives (letter attached). Because some of potential infrastructure upgrades and restoration actions could affect hydropower operations at Island Park Dam (positively or negatively), FRREC will participate as needed to ensure compatibility with their operations and FERC license (letter attached).

Fremont-Madison Irrigation District is also a supporting stakeholder and will participate by co-facilitating meetings of the Henry's Fork Watershed Council. We will consult with FMID as needed on potential reservoir infrastructure upgrades that may affect operation of Island Park Dam. Regional and area Reclamation staff are regular participants in the Henry's Fork Watershed Council and will receive regular updates on the project via that venue. As has been the case with previous WaterSMART projects, they can refer specific needs for Reclamation input to the appropriate staff in other offices.

What will the applicant do during the study and design process to ensure participation by a diverse array of stakeholders?

Engagement of other stakeholders

Agencies/municipalities/NGOs will be the easiest sector to engage because most attend meetings of the HFWC regularly, and all receive announcement of HFWC meetings. We will provide project information and updates at two HFWC meetings per year through the life of the project and use HFWC meetings to discuss and gather relevant information and coordinate with agencies as needed (Table 3). In year 3, we will visit locations of potential infrastructure improvements and restoration activities in person on the HFWC annual summer field tour. Although the HFWC will be the primary venue for engaging the agency/municipality/NGO sector, representatives of some of these entities are likely to be engaged via other modes; conversely, individuals in other stakeholder sectors are welcome to participate in HFWC meetings and may choose to do so.

Table 3: Stakeholder engagement objectives and activities by project year.

	Objectives	Activities
Year 1	1. Gather stakeholder concerns related to water quality, fisheries, and habitat 2. Coordinate with and report to agencies/municipalities/NGOs	1. Open-ended listening sessions and surveys prefaced with little background information and no specific infrastructure/restoration actions 2. Two meetings per year of the Henry's Fork Watershed Council
Year 2	1. Summarize and respond to concerns, present new data, introduce potential infrastructure/restoration actions 2. Coordinate with and report to agencies/municipalities/NGOs	1. Formal presentations followed by question/answer, break outs, and large group discussion 2. Two meetings per year of the Henry's Fork Watershed Council
Year 3	1. Vet specific infrastructure upgrades and restoration actions for feasibility and stakeholder acceptance 2. Coordinate with and report to agencies/municipalities/NGOs 3. Visit sites of potential restoration actions	1. Formal presentation of specific actions, followed by Q/A and discussion over multiple sessions 2. Two meetings per year of the Henry's Fork Watershed Council 3. Henry's Fork Watershed Council annual field trip

Because stakeholder input and support will be critical to eventual implementation of any potential infrastructure upgrades and restoration activities and because we anticipate opposition

to both the planning process itself and to some of the potential water-quality improvement actions, we will employ the services of professional, external facilitators to conduct much of the formal engagement of stakeholders beyond those we will reach via the HFWC. In addition to the formally planned activities and methods described below, we will seek opportunities for less formal community participation to build trust and familiarity, especially among groups with which HFF have not previously engaged.

Recreation operators, businesses, HOAs and **clubs** will be contacted directly via phone, email or mail during Year 1 to make them aware of the project and ask how best to engage with them and their clientele. Because these businesses and housing developments are widely dispersed geographically throughout the project area, we will travel to locations convenient for these stakeholders and most likely hold numerous small engagement activities at specific geographic locations. We have interacted with many of these stakeholders in the past regarding other projects and conservation activities and will build upon past experience to make interactions as positive and useful as possible. For example, we have successfully engaged two of the private fishing clubs on the Henrys Fork upstream of Island Park Reservoir in our science and conservation work by giving presentations at regular club meetings and social events. During this project, we intend to expand our network of engaged businesses and operators beyond those specific to fly fishing.

Anglers and other **recreationists** who are not affiliated with any of the above entities will be engaged through both direct and passive interception (e.g., posters with QR codes) at recreation access sites, including boat launches, parking lots, campgrounds, visitor centers, and HSP. The majority of these access sites are managed by project partners, with whom we will coordinate activities. Both IDFG and HFF have extensive experience with on-site recreationist interactions for the purposes of gathering and disseminating information. We will also use local newspapers and Facebook groups to invite anglers and other recreationists to meetings, solicit email registration for project events and communication, and share general project updates.

> *Is there opposition to the proposed project effort? If so, describe the opposition and explain how it will be addressed.*

We anticipate three types of opposition to the project: 1) ideologically based opposition to any type of federally-funded planning, 2) ongoing opposition to HFF's watershed-scale, science-based approach relative to mission accomplishment, and 3) to-be-determined opposition to specific infrastructure/restoration actions that could change recreational user experience.

The project area is located in a region with high distrust of the federal government and opposition to planning of any kind because of a perception that planning is a step toward excessive government regulation. Over the past decade, two planning processes associated with natural resource issues were strongly and vocally opposed, and one was terminated because of local opposition. However, neither of these planning efforts were associated specifically with water or aquatic resources, and the Reclamation Basin Study planning process proceeded via the Henry's Fork Watershed Council without opposition. During that process, diverging stakeholder opinions and viewpoints were respectfully presented and discussed. We anticipate no impediments to constructive discussions held among agencies, NGOs and citizens at the Watershed Council, but we are mindful that engagement with stakeholders outside of that venue may trigger opposition. We plan to address this type of opposition by listening to concerns

during Year 1 without direct response and by focusing on shared values (e.g., "we all want the reservoir to be clean enough for swimming and boating") when responding to concerns in year 2. By engaging in informal community activities (e.g., co-sponsoring the annual reservoir ice fishing tournament) throughout the project, we hope to instill trust in our locally based organization to find locally acceptable solutions. In y=Year 3, stakeholders will be able to participate directly in the process of vetting potential infrastructure upgrades and restoration activities, and we will emphasize that eventual implementation of socially acceptable activities will be facilitated locally by the applicant and not unilaterally by a federal agency.

The second type of opposition we anticipate is years-long, ongoing opposition to HFF's science-based, collaborative approach to mission accomplishment among a very small but very vocal group of anglers and fly-fishing influencers who nearly exclusively fish the river in and adjacent to HSP. This group criticizes HFF's watershed-wide work based on 1) misunderstanding of the connection between water use and management in the agricultural areas of the watershed and water quality in the target river reach via management of the reservoir, 2) lack of trust in and support for large-scale and innovative projects that are beyond the traditional restoration activities on the main river that HFF has shown are not effective at addressing the very concerns of this stakeholder group, and 3) some level of science denial. HFF has addressed this opposition continuously for a decade and has made some progress via the strategies listed above—namely listening, engaging in their community, and focusing on shared values. As an example, we anticipate this group will be supportive of the concept of traditional instream restoration actions, even if the most effective implementation of those will be on tributary streams and not on the main river reach where these anglers fish. The common support for these types of actions could be an entry point to acceptance of other potential actions among this group. We have also explored and developed new ways of communicating science that are more acceptable to non-scientists, with evidence that we are improving understanding and acceptance. One of the primary jobs of HFF's new Climate Adaptation Program Manager is science communication, and she will be a key member of the stakeholder engagement team.

Lastly, we anticipate opposition to specific infrastructure upgrades and restoration actions but will not know the nature of the opposition until we develop and present those actions in Year 3. We anticipate that most of the opposition to specific proposals will center around potential changes to the current recreational experience. For example, if restoration of flood irrigation in HSP proves to be feasible, it will water a portion of the Park that is currently dry during the most popular fishing time in late June and early July. Anglers currently walk unimpeded through that dry area and will be inconvenienced if it is covered with water. If they choose to walk across saturated ground to maintain their traditional access routes, erosion and other damage may occur. We will address concerns like this as they arise with site-specific, stakeholder-driven solutions that will be incorporated into final design. In this case, elevated walkways over saturated ground could be incorporated into project design. We will use the effective science communication methods mentioned above to help stakeholders understand that addressing *their* issues—increased water temperatures, increased sediment, and decreased fishing quality—will require innovative and technologically-sound actions that may result in some localized changes to access, aesthetics, or scenery. That is the nature of climate adaptation, which will be a central theme in our communications with non-agency stakeholders.

Evaluation Criterion C–Project Implementation and Readiness to Proceed

Describe the implementation plan for the proposed study and design project. Please include an estimated project schedule that shows the stages and duration of the proposed study and design work, including major tasks, milestones, and dates.

The schedule and completion dates for all major tasks required to meet the three project aims is given in Table 4.

> *Describe the plan to conduct project specific outreach during your award period. What regional stakeholders will you target and how will you connect and engage with them and incorporate their feedback?*

See Evaluation Criterion B above and Table 4 for detailed descriptions of project stakeholders and plans for engaging them and obtaining their review of data and alternatives.

> *Describe the plan to carry out any relevant studies (e.g., Project-Specific Study and Analysis, Restoration Project Opportunities and Alternatives Analysis, Benefits Analysis, or Legal and Institutional Requirements Research).*

In addition to ongoing water-quality, invertebrate, habitat, and fisheries monitoring and assessments conducted by HFF, IDFG, and IDEQ, the HFF will conduct several project-specific assessments to fill known data gaps. These include one-hour-frequency reservoir water-quality profiles near the dam from a buoy-mounted water-quality sonde, field measurements of streamflow and sediment concentrations in Island Park Reservoir tributaries, whitefish habitat assessment, Island Park Reservoir boater use estimate, and groundwater flow assessment in the area that could potentially be used for managed aquifer recharge. These studies will be planned and provisioned during the first six months of the project so they can be implemented during the 2025 field season. The boater use and whitefish assessment will be conducted solely during that field season. The other activities will continue at least through the second field season of the project.

Development of technical and engineering aspects of in-reservoir treatments, infrastructure improvements, and nature-based restoration will be done by consulting firms with expertise in these areas. In addition, assessments such as sediment composition and provenance that are beyond the technical capabilities of HFF will be done by consulting firms. Project staff at HFF and their agency partners will develop Requests for Proposals (RFPs) for this work as soon as grant agreement is finalized so that bids and contracts can be awarded in time to begin work by the end of the first field season of the project (Table 4). Contractor(s) will be required to provide initial development and assessment of alternatives by August of the second summer, so that these initial alternatives can be presented by the end of that summer to stakeholders who visit or reside in the study area only seasonally. After stakeholder review and input, consultants will provide more refined analysis for the alternatives that have the highest potential to meet water-quality and habitat objectives and receive stakeholder support for implementation. These alternatives will be advanced to stakeholder-informed cost-benefit analysis during the spring and summer of Year 3.

Table 4: Project timeline and milestones

Tasks	FY 2025		FY 2026		FY 2027		Completion (end of month)
	Oct - Mar	Apr-Sep	Oct-Mar	Apr-Sep	Oct-Mar	Apr-Sep	
Address water quality problems caused by aging infrastructure at Island Park Reservoir. Restore degraded surface and groundwater inputs to Island Park Reservoir and Henrys Fork.							
RFPs for contractors advertised	■						Dec 2024
Bids prepared and submitted	■	■					Apr 2025
Evaluate bids, award contract(s)		■					Aug 2025
Develop solutions/upgrades/projects		■	■	■			Aug 2026
Stakeholder review and input				■	■		Nov 2026
Refine solutions/upgrades/projects					■		Mar 2027
Stakeholder-informed cost/benefit						■	Jun 2027
60% design for feasible alternatives						■	Sep 2027
Stakeholder engagement							
RFPs for contractors advertised	■						Nov 2024
Bids prepared and submitted	■	■					Feb 2025
Evaluate bids, award contract(s)		■					May 2025
Stakeholder listening sessions		■					Sep 2025
Analysis of listening session input			■				Mar 2026
Stakeholder review: alternatives/data				■	■		Nov 2026
Cost/benefit and feasibility review						■	Jun 2027
Watershed Council meetings	■	■	■	■	■	■	2 per year
Community interactions	■	■	■	■	■	■	Ongoing
Fill data gaps							
HF water quality/invert. monitoring	■	■	■	■	■	■	Ongoing
Plan, purchase supplies/equipment	■						Mar 2025
Whitefish habitat use assessment		■	■				Oct 2025
IP Reservoir boater use estimate		■	■				Nov 2025
Groundwater flow assessment		■	■	■	■		Oct 2026
IP Reservoir and tributary monitoring		■	■	■	■	■	Ongoing

Describe the current design status of the project and describe the design activities will need to be completed to advance the project to 60% design?

All of the potential types of reservoir treatments, infrastructure upgrades, nature-based restoration, and aquifer recharge activities mentioned in this application and considered by the HFF to date have been successfully applied in other locations. Although we have not pursued design of any of these activities in the project area, designs for similar activities exist, and familiarity with such activities will be a key criterion for selection of consultants to conduct design components of this project. Thus, we anticipate that alternatives advanced to cost-benefit analysis during the second half of Year 3 will be partway through the design process at that point. Relatively simple alternatives with strong stakeholder buy-in could be advanced to 60% design by the end of the project. We realize that some of the more complex and expensive alternatives may require additional planning beyond this grant to attain 60% design status, but the water quality basin plan produced by this project will provide a mid-way point for the remaining analysis, assessment, and stakeholder engagement necessary to advance those alternatives to 60% design and stakeholder acceptance.

If the applicant intends to do any on-site investigation or monitoring work, please provide documentation of permission and detail any permits or easements that may be required for access.

The applicant will need permission from Reclamation for installation of the buoy-mounted water-quality monitoring sonde in Island Park Reservoir and will work with Reclamation personnel to facilitate permission and installation if awarded the grant. The only other on-site investigation that will require permission is installation and maintenance of piezometers to assess groundwater flow characteristics in HSP. The piezometers will be shallow enough that they will not require a well permit from Idaho Department of Water Resources, and we will work with IDPR to design and install the piezometer network to minimize disruption to wildlife, recreational, and aesthetic resources in the Park. The whitefish habitat assessment will be conducted via snorkeling and designed collaboratively with IDFG. The HFF's resident staff member who handles permitting and compliance will review all proposed on-site investigations and ensure that proper permissions and certificates are obtained, including those conducted by contractors.

Evaluation Criterion D–Presidential and Department of the Interior Priorities

1. Climate Change: E.O. 14008 emphasizes the need to prioritize and take robust actions to reduce climate pollution; increase resilience to the impacts of climate change; protect public health; and conserve our lands, waters, oceans, and biodiversity.

If applicable, describe how the project addresses climate change and increases resiliency.

The goal of the project is to develop infrastructure and restoration actions that will increase resilience of the unique fisheries and aquatic ecosystems in the project area to climate change. Analysis of climate and water-quality monitoring data shows that increasingly warm spring/summer air temperatures and increased frequency and severity of drought are the two

largest factors responsible for decreased water quality in Island Park Reservoir and the Henry's Fork downstream of the reservoir. The water quality basin plan that will be produced by this project will provide a menu of logistically and socially feasible actions that can be implemented to reduce the negative effects of warmer temperatures and decreased water supply on aquatic ecosystems in the project area. In turn, these ecosystems will continue to support the economically important water- and fishing-based recreation intended by previous local, state and federal planning efforts to be maintained for future generations.

How will the project build long-term resilience to drought? How many years will the project continue to provide benefits? Please estimate the extent to which the project will build resilience to drought and provide support for your estimate.

As detailed in section A2, the proposed project will build resilience to drought by increasing the water-quality benefits that can be attained per unit of water conservation by a factor of around 1.5, thereby improving water quality roughly to early 1990s levels and providing a 30-year buffer to current climate trends.

Will the proposed project reduce greenhouse gas emissions by sequestering carbon in soils, grasses, trees, and other vegetation? Does the proposed project seek to reduce or mitigate climate pollutions such as air or water pollution? Does the proposed project contribute to climate change resiliency in other ways not described above?

Greenhouse gas emissions from reservoirs are primarily methane from exposed or anoxic sediments. Several of the reservoir infrastructure improvements that will be developed through this project will stabilize sediments and increase reservoir-bottom oxygen concentrations, thus reducing these emissions. Stream restoration is likely to include revegetation of riparian areas or development of wetlands thereby significantly increasing carbon sequestration in the Henrys Fork watershed.

Project Budget

We propose a three-year project budget of $1,718,835, of which $1,073,524 (62.5%) is federal funding requested in this application (Tables 5 and 6). Roughly 84% of the federal funds will be used to pay external consultants to conduct stakeholder engagement, engineering assessments, and design work. The remaining federal contribution will consist of indirect costs and around 70% of equipment, supply, and mileage costs for conducting water-quality, hydrological and ecological assessments.

Non-federal match will total $645,311 (37.5% of project budget), of which $425,711 will be costs paid by the applicant using nonfederal funds. The applicant's share of match includes staff salaries, student internships, and the remaining cost of the water-quality, hydrological, and ecological assessments. All of this funding will come from 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.

The remaining non-federal match of $219,600 will come from in-kind contributions from project partners and TBD consultants. The Idaho departments of Parks and Recreation, Environmental Quality and Fish and Game together will contribute $119,600 in in-kind services toward non-agency stakeholder engagement, agency coordination, and water-quality and fishery assessments. The commitment and valuation of these contributions are documented in the attached letters of commitment. The remaining $100,000 of third-party in-kind contribution will be provided by external consultants, who will be required to show a 10% reduction in total fees relative to customary rates for their services to this project. The applicant currently has similar arrangements with consultants who provide a portion of their services at no or reduced cost because the applicant is a nonprofit organization.

Table 5: Total project costs. Asterisks denote in-kind contributions.

SOURCE	AMOUNT	PERCENT OF TOTAL
Non-Federal Entities		
Henry's Fork Foundation (Applicant)	$ 425,711	
Idaho Department of Parks and Recreation*	$ 7,100	
Idaho Department of Fish and Game*	$ 50,000	
Idaho Department of Environmental Quality*	$ 62,500	
TBD Consultants*	$ 100,000	
Non-Federal Subtotal	$ 645,311	37.5%
REQUESTED RECLAMATION FUNDING	$ 1,073,524	62.5%
TOTAL PROJECT COST	$ 1,718,835	100%

Table 6: Detailed budget

BUDGET ITEM DESCRIPTION	$/Unit	Qty.	Qty. type	TOTAL	Federal	Non-federal
Personnel						
Sci/Tech Director	$50.96	600	hour	$30,576		$30,576
Aquatic Ecology Manager	$28.85	2400	hour	$69,240		$69,240
Climate Adaptation Manager	$31.73	1200	hour	$38,076		$38,076
Technician	$20.00	1200	hour	$24,000		$24,000
Communications Director	$37.12	1200	hour	$44,544		$44,544
Communications Coordinator	$20.19	1200	hour	$24,228		$24,228
Aquatic Resources Coord.	$24.00	300	hour	$7,200		$7,200
TOTAL Personnel				**$237,864**	**$0**	**$237,864**
Fringe Benefits						
Sci/Tech Director	15.1%	$30,576	salary	$4,617		$4,617
Aquatic Ecology Manager	37.2%	$69,240	salary	$25,757		$25,757
Climate Adaptation Manager	19.4%	$38,076	salary	$7,387		$7,387
Technician	8.1%	$24,000	salary	$1,944		$1,944
Communications Director	26.4%	$44,544	salary	$11,760		$11,760
Communications Coordinator	29.0%	$24,228	salary	$7,026		$7,026
Aquatic Resources Coord.	29.0%	$7,200	salary	$2,088		$2,088
TOTAL Fringe Benefits				**$60,579**	**$0**	**$60,579**
Travel						
Stakeholder engagement	$0.655	4320	mile	$2,830	$2,830	
IP Reservoir boat use survey	$0.655	7280	mile	$4,768	$4,768	
Whitefish habitat assessment	$0.655	2000	mile	$1,310	$1,310	
IP Res./trib. water quality	$0.655	6240	mile	$4,087	$4,087	
Macroinvertebrate sampling	$0.655	150	mile	$98		$98
Henrys Fork water quality	$0.655	6000	mile	$3,930		$3,930
Groundwater assessment	$0.655	900	mile	$590	$590	
TOTAL Travel				**$17,613**	**$13,585**	**$4,028**
Equipment						
Reservoir monitoring buoy				$97,000	$97,000	
TOTAL Equipment				**$97,000**	**$97,000**	**$0**
Supplies						
Room rental, refreshments	$300	24	mtgs.	$7,200	$7,200	
Drysuits and field gear	$1,000	4	crew	$4,000	$4,000	
Lab supplies, sediment	$4,500	1	EA	$4,500	$4,500	
Preservative and bottles	$60	2	year	$120		$120
Lab, field and data	$2,735	12	site-yr	$32,820		$32,820
Pipe, transducers, installation	$1,540	5	site	$7,700	$5,000	$2,700
TOTAL Supplies				**$56,340**	**$20,700**	**$35,640**

Contractual						
Data Manager	$60	80	hour	$4,800		$4,800
Macroinvertebrate lab	$300	36	sample	$10,800		$10,800
Stakeholder engagement				$180,000	$180,000	
Assessment and design				$720,000	$720,000	
TOTAL Contractual				**$915,600**	**$900,000**	**$15,600**
Third-party In-kind						
ID Parks and Recreation				$7,100		$7,100
ID Fish and Game				$50,000		$50,000
ID Environmental Quality				$62,500		$62,500
Stakeholder contractors				$20,000		$20,000
Assess./Design contractors				$80,000		$80,000
TOTAL Third-party In-kind				**$219,600**	**$0**	**$219,600**
Other Direct Costs						
Undergraduate internship	$8,000	9	EA	$72,000		$72,000
TOTAL Other				**$72,000**	**$0**	**$72,000**
TOTAL Direct Costs				**$1,676,596**	**$1,031,285**	**$645,311**
Indirect Costs						
De minimus, modified direct	10%	$422,396		$42,240	$42,240	$0
TOTAL Project Cost				**$1,718,835**	**$1,073,524**	**$645,311**
			Share	100.0%	62.5%	37.5%

Budget Narrative

Personnel

All personnel included in the budget are permanent HFF employees, who will be paid at their normal rates. Project total personnel costs are based on the fraction of a 2000-hour work year each employee will devote to this project in each of the project's three years.

Science/Technology Department Director, Dr. Rob Van Kirk

Rob will devote 10% of his total work time to the project in each of the three years, for a total of 600 hours. He will supervise all scientific and technical work of the project, including water-quality and habitat assessments, groundwater monitoring, and the work of external engineering/design consultants. With 30 years of experience in conducting externally funded projects and managing large grants, Rob will mentor the Project Manager, who is in his second year of post-graduate employment with HFF, in all aspects of project management. He will participate in meetings of the Henry's Fork Watershed Council and other stakeholder activities.

Aquatic Ecology Manager and Project Manager, Dr. Jack McLaren

Jack will devote 40% of his work time to the project in each of the three years, for a total of 2,400 hours over the life of the project. As Project Manager, he will manage all aspects of project logistics, implementation and reporting. As HFF's resident aquatic ecologist and the foremost scientific expert in any organization on Island Park Reservoir, he will devote considerable time

to the scientific and technical aspects of water-quality and habitat assessments and to ensuring that external consultants provide the information necessary for success of the project.

Climate Adaptation Manager, Dr. Christina Morrisett

Christina will devote 20% of her total work time to the project in each of the three years, for a total of 1,200 hours. She will work primarily on stakeholder engagement, specifically developing ways to communicate project-relevant science and climate adaptation concepts to non-scientists. As HFF's resident expert in managed aquifer recharge, she will supervise all aspects of assessing potential for managed aquifer recharge to achieve water-quality improvement objectives.

Conservation Technician, Amber Roseberry

Amber will spend 400 hours on this project over each of the three years, for a total of 1,200 hours. As HFF's primary field and laboratory technician, Amber will perform or supervise most field and lab work associated with water-quality, recreational use, and habitat assessments.

Communications Director, Jamie Powell

Jamie will devote 20% of her work time to the project in each of the three years, for a total of 1,200 hours. She will co-facilitate meetings of the Henry's Fork Watershed Council and supervise all communications, outreach, and stakeholder engagement activities. She will be responsible for developing the RFP to recruit an external stakeholder engagement facilitation consultant and will supervise the work of that consultant to ensure that project goals are met.

Communications Coordinator, Jasper Davis

Jasper will devote 20% of her work time to the project in each of the three years, for a total of 1,200 hours. She will assist the Communications Director and Climate Adaptation Manager in developing and implementing communications strategies to engage stakeholders and build support for the project.

Aquatic Resources Coordinator, Matt Hively

Matt will devote 5% of his time to the project in each of the three years. As coordinator of HFF's water-quality monitoring program, Matt will coordinate all ongoing and project-specific water-quality monitoring, macroinvertebrate sampling, and fish habitat assessment activities. Matt also handles all of HFF's permitting and environmental compliance activities and will ensure that all project activities are properly permitted and comply with applicable laws and regulations.

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 Federal Insurance Contributions Act taxes, health insurance, Individual Retirement Account contributions, and vehicle allowance. Rates differ across employees because of different health insurance coverage, IRA selections, and vehicle allowances.

Travel

All travel included in the project budget is local travel within the project area at the current federal rate of $0.655 per mile. Travel for **stakeholder engagement** is based on two trips per month between the HFF office and stakeholder engagement locations in or near the project area,

at an average round trip of 60 miles. Travel for the **Island Park Reservoir boat use** survey is based on a four-day-per-week randomized survey design, which is the standard HFF has used successfully for recreational use surveys in the past. Over the 26-week season of open-water use on the reservoir, this design will require 104 round trips to reservoir boat access locations, with an average round-trip distance of 70 miles. The **whitefish habitat assessment** will require eight trips to each of five river reaches, at an average round-trip distance of 50 miles. **Water quality sampling in Island Park Reservoir** and its tributaries will require roughly one field day per week during each of the 26 weeks of open-water season during each year of the project. Average round trip to reach all tributaries is 80 miles. **Macroinvertebrate sampling** in the project area requires one 75-mile round trip on the annual sampling day each year. Because we have already obtained another federal grant to fund this activity in year 1, this activity is included in the budget only in years 2 and 3. HFF's routine **water quality monitoring in the Henry's Fork** within the project area requires 40 field days per year at a round trip distance of 75 miles. We have a federal grant to fund this activity in year 1, so this activity is included in the budget only in years 2 and 3. **Groundwater monitoring** will require installation, maintenance, and data download of piezometers in the area most likely to be suitable for managed aquifer recharge. Over the project, this will require 20 visits to the site at a round-trip distance of 45 miles.

Equipment

The only piece of equipment needed for the project is a buoy-mounted water-quality sonde to record water quality parameters through the full vertical profile of the reservoir multiple times each day. We obtained technical advice on the best equipment for this application and a cost quote from Yellow Springs Instruments, whose equipment we have been using in our water-quality monitoring program for 10 years.

Supplies

Based on current costs for similar meetings, we estimate $300 per meeting for room rental and refreshments for each of 8 formal **stakeholder meetings** scheduled for each year, including those of the Henry's Fork Watershed Council. The IDPR will host an additional 2 meetings per year and fund expenses for those meetings as an in-kind contribution. The **whitefish habitat assessment** will be conducted with snorkeling methodology by a four-person field crew. Based on past projects and current costs advertised by vendors, we budgeted $1000 per crew member for a drysuit, mask, snorkel, and other field and safety gear. We obtained a cost estimate from a vendor website for a start-up kit to equip our existing laboratory to measure **suspended sediment concentrations** in house. **Preservative and collection bottles** are required for annual invertebrate sampling. We have another federal source to fund this in year 1 and so included this item only for years 2 and 3. **Laboratory, field, equipment maintenance, and data transmission/storage** costs for our existing water-quality network averages around $2,735 per site per year. We have six sites in the study area and have included these costs in the budget for years 2 and 3 of the project. We have secured another federal source to fund these sites in year 1. **Groundwater monitoring supplies** include piezometer pipes, pressure transducers, and installation hardware and tool rental. These costs were estimated from a previous, similar groundwater study we conducted in 2020-2023.

Contractual

Ecosa Consulting (Melissa Muradian, Data Management Consultant). Melissa will spend 40 hours per year on this project to maintain the existing data network and expand it to incorporate real-time data from the buoy-mounted sonde we will install as part of this project. Her time in year 1 will be funded by an existing federal source, so only time spent on this activity in years 2 and 3 is included in this budget. Her consulting rate is $60 per hour.

River Continuum Concepts (Brett Marshall, Invertebrate Consultant). Since HFF started its invertebrate sampling program in 2015, Brett and his team have supervised all of our field collection of macroinvertebrates and performed all laboratory identification and quantification of the samples. His average rate per sample is $300, under our current contract with him. We collect six samples per year at each of three sites in the study area. We are including only years 2 and 3 in the budget, because we have secured another federal source to fund this work in year 1.

TBD Stakeholder Engagement Facilitator. Based on previous projects and interactions, we are unlikely to find a suitable facilitator located close to the project area, so we have budgeted for this activity at rates and travel costs typical of facilitators located in regional cities such as Boise, Salt Lake City, and Bozeman. We have budgeted for time at $200/hour plus travel to facilitate 20 of the 30 total formal stakeholder meetings we intend to hold. The total budget for facilitation is $200,000, but we will require the successful bidder to show a 10% in-kind contribution to the project via reduced fees because we are a nonprofit organization.

TBD Engineering/Design Consultant(s). Based on previous projects, we have budgeted 4000 hours at a total rate (including travel, overhead, materials testing, etc.) of $200/hour to assess feasibility, effectiveness, and cost of the potential infrastructure and nature-based restoration activities that could be implemented in the project area. Infrastructure improvements or restoration activities that show particularly high cost-benefit ratio, feasibility, and stakeholder acceptance will be advanced to the design phase in year 3. As with the stakeholder facilitator, we will require the successful bidder to show a 10% in-kind contribution to the project via reduced fees because we are a nonprofit organization.

Third-party contributions

Idaho Department of Parks and Recreation will contribute $7,100 in staff time to attending stakeholder meetings and hosting one or more meetings at HSP.

Idaho Department of Fish and Game will contribute $50,000 in staff time and field equipment and supplies to attending stakeholder meetings, coordinating with other agencies, and conducting fisheries assessments in Island Park Reservoir and in river reaches in the project area.

Idaho Department of Environmental Quality will contribute $15,000 in staff time and field equipment and supplies to attending stakeholder meetings and assessing water quality in the project area. In addition, IDEQ is funding development of a hydrodynamic model of Island Park Reservoir, at a cost of $50,000.

All external consultants who successfully bid for work on this project will be required to show a 10% in-kind contribution to the project. This will amount to $100,000 across all consultants.

Other expenses

Three **undergraduate internships** (400 hours per internship) will be devoted to the project in each of its three years. Each 10-week 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. Total internship value includes administrative cost of $1,750 per internship. Interns will conduct field and laboratory work and assist HFF staff with stakeholder engagement and other project activities as needed.

Indirect costs

Indirect costs at the *de minimus* rate of 10% of modified total direct costs are requested.

Environmental and Cultural Resources Compliance

Most of the anticipated on-site assessments that will be conducted as part of this project will occur in Island Park Reservoir (or on the reservoir bottom, within the full-pool reservoir footprint) or in tributary streams and the Henry's Fork river, accessed on public land or via permission from current landowners. Assessments associated with potential stream, riparian or wetland restoration will be temporary, visual and non-ground disturbing. These will take place on USFS land or HSP, and we will coordinate such assessments with these agencies. The only anticipated ground-disturbing activity is installation of groundwater monitoring piezometers in HSP.

Will the proposed project impact the surrounding environment (e.g., soil [dust], air, water [quality and quantity], animal habitat)? Please briefly describe all earth-disturbing work and any work that will affect the air, water, or animal habitat in the project area. Please also explain the impacts of such work on the surrounding environment and any steps that could be taken to minimize the impacts.

Piezometer installation will require using a jackhammer to drive 2-inch diameter steel pipes roughly 16 feet into the ground. We plan to install five such pipes over the course of a 5-day work period. Very localized ground vibration and dust will be produced during hammering. The biggest environmental effect of installation will be noise. We will minimize the effect of these activities by conducting them after waterfowl nesting that occurs in the area, prior to migration of big game into the area in the fall, and at times during the season and day when angler and other recreational use is low.

• *Are you aware of any species listed or proposed to be listed as a Federal threatened or endangered species, or designated critical habitat in the project area? If so, would they be affected by any activities associated with the proposed project?*

Grizzly bears are present in the project area. They will not be affected by any of the project activities proposed in this study and design project. We will assess effects of potential reservoir treatment/infrastructure and nature-based restoration activities on grizzly bears during the planning conducted as part of this project.

• *Are there wetlands or other surface waters inside the project boundaries that potentially fall under CWA jurisdiction as "Waters of the United States"? If so, please describe and estimate any impacts the proposed project may have.*

Yes. Island Park Reservoir, the Henry's Fork and all perennial streams and connected wetlands within the project area are navigable waters and hence Waters of the United States under the CWA. They will not be impacted by the assessment activities of this project. The only invasive activity is the piezometer installation described above. We will locate the piezometers in upland areas not currently inundated for any time during the year.

• *When was the water delivery system constructed?*

Island Park Reservoir was authorized in 1935 and constructed between then and 1939. Some of the canal infrastructure in HSP that will be assessed for its potential to deliver water for managed aquifer recharge was originally built in the late 1890s.

• *Will the proposed project result in any modification of or effects to, individual features of an irrigation system (e.g., headgates, canals, or flumes)? If so, state when those features were constructed and describe the nature and timing of any extensive alterations or modifications to those features completed previously.*

No. The proposed project is a study and design project and will not result in any modification of existing irrigation systems. However, some of the alternatives developed during this project may modify existing irrigation infrastructure, and those effects will be assessed and described in the planning documents produced by this project.

• *Are any buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places? A cultural resources specialist at your local Reclamation office or the State Historic Preservation Office can assist in answering this question.*

Yes. Some of the project area within HSP is a National Historic District, and most of the structures within HSP are on the National Register of Historic Places. As described above, the only ground-disturbing activity associated with this planning and design study is installation of groundwater monitoring piezometers. Based on the publicly available GIS layer defining the National Historic District, we may be able to conduct the groundwater monitoring outside of the boundaries of the District and still obtain the needed information. We will consult with the IDPR and appropriate cultural resources specialists before installing the piezometers. If such installation is not allowable even in the vicinity of the District, we will not conduct this activity and will instead use other, non-invasive techniques to assess the groundwater characteristics of the areas within HSP we currently think will be used for managed aquifer recharge.

• *Are there any known archeological sites in the proposed project area?*

Not that we know of.

• *Will the proposed project have a disproportionately high and adverse effect on low income or minority populations?*

No

• *Will the proposed project limit access to, and ceremonial use of, Indian sacred sites or result in other impacts on tribal lands?*

No

• *Will the proposed project contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area?*

No. Potential for spread of noxious weeds and invasive species will be minimized through standard practices of cleaning field equipment between site installations.

Required Permits or Approvals

The HFF's resident staff member who handles permitting and compliance for all of our work will review all proposed on-site investigations, including those conducted by contractors, and ensure that proper permissions and compliance certificates are obtained,

Overlap or Duplication of Effort Statement

Some of the water-quality monitoring tasks and outreach activities that will be conducted as part of the proposed project are ongoing projects of the applicant. Thus, the costs of these associated activities are included as non-federal match in this application, and then only those costs that are being funded by non-federal sources. None of the proposed engineering/design, facilitated stakeholder engagement, and project-specific assessments duplicate work already planned by the applicant and funded by other sources, federal or not.

Letters of support

Attached:

Fall River Rural Electric Cooperative

U.S. Forest Service

Letter of Category A partnership and funding commitment

Attached: Idaho Department of Fish and Game

Official resolution

Attached: Henry's Fork Foundation Board of Directors

Letters of support and funding commitment

Attached:

Idaho Department of Parks and Recreation

Idaho Department of Environmental Quality

Fall River Electric
Cooperative, Inc.
1150 N 3400 E
Ashton, ID 83420
208-652-7431
www.fallriverelectric.com

January 2, 2024

Bureau of Reclamation
Water Resources and Planning Office
Attn: Ms. Avra Morgan
Mail Code: 86-63000
P.O. Box 25007
Denver, CO 80225-0007

Dear Ms. Morgan,

This letter of support confirms that Fall River Rural Electric Cooperative supports the application of the Henry's Fork Foundation (HFF) to Reclamation's WaterSMART Aquatic Ecosystem Restoration Project NOFO R23AS00106. The proposed project is a Task A Study and Design project entitled "Developing Infrastructure to Reduce Temperature in Turbidity" in the Henry's Fork Snake River downstream of Island Park Reservoir, a Reclamation irrigation storage facility located in eastern Idaho.

Fall River Rural Electric Cooperative has a stake in this project because we own and operate a hydroelectric generation facility at the Island Park Dam. The power plant operates as a run-of-river facility using available outflow as determined by irrigation storage and delivery needs. We operate the plant in compliance with water-quality criteria specified in our Federal Energy Regulatory Commission (FERC) license. Some of the potential restoration actions could occur near our intake in the reservoir or via changes to dam infrastructure, which may affect our operations.

As a nonprofit utility serving over 20,000 meters, Fall River Rural Electric Cooperative's priority is maintaining current hydro project generation and limiting the financial impact of proposed changes which will help keep rates low to our members.. To ensure that potential restoration actions developed through this project will be compatible with our operations, we commit to participating in consultation activities with the applicant.

Regards,

Dave Peterson
Engineering Manager
Fall River Electric Cooperative

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FALL RIVER
RURAL ELECTRIC COOPERATIVE
Where Service Matters

USDA United States Department of Agriculture | Forest Service | Ashton/Island Park Ranger District

46 South Highway 20
P.O. Box 858
Ashton, ID 83420
208-652-7442
Fax: 208-652-7863

File Code: 1560
Date: January 17, 2024

Letter of Support, USBR Water Smart RFP
To Whom it May Concern

I am writing this letter in support of the Henrys Fork Foundation's application for grant funding through the U.S. Bureau of Reclamation Water Smart Grant Program. HFF is seeking funding through the Aquatic Ecosystems Restoration Program. This funding would support work that HFF is proposing around Island Park Reservoir and the dam. Some of this work would occur on National Forest System Lands and provide benefits to NFS lands located on the Caribou-Targhee National Forest. HFF has been and continues to be a great partner with the Forest Service. I fully support their efforts to secure this funding.

Sincerely,

William G Davis

WILLIAM G DAVIS
District Ranger

IDAHO DEPARTMENT OF FISH AND GAME
UPPER SNAKE REGION
4279 Commerce Circle
Idaho Falls, Idaho 83401

Brad Little / Governor
Jim Fredericks / Director

January 19, 2024

Bureau of Reclamation
Water Resources and Planning Office
Attn: Ms. Avra Morgan
Mail Code: 86-63000
P.O. Box 25007
Denver, CO 80225-0007

Ms. Morgan:

This letter confirms that Idaho Department of Fish and Game (IDFG) is partnering with the Henry's Fork Foundation (HFF) and supports their application to Reclamation's WaterSMART Aquatic Ecosystem Restoration Project Notice of Funding Opportunity R23AS00106. The IDFG will serve as the Category A partner. The proposed project is a Task A Study and Design project entitled "Developing Infrastructure to Reduce Temperature and Turbidity" in the Henry's Fork Snake River downstream of Island Park Reservoir which is a Reclamation irrigation storage facility located in eastern Idaho. The Henry's Fork Snake River is a world-renowned wild trout fishery but has experienced increased turbidity and water temperatures in recent decades due to warming air temperatures, decreased water supply, aging and inflexible infrastructure, and human population growth. Research and monitoring by IDFG, HFF and other partners has shown that water quality in and management of Island Park Reservoir have the large quantifiable effects on fisheries and water quality downstream of the reservoir and on fisheries in and upstream of the reservoir.

Fish and wildlife in the state of Idaho are property of all Idaho citizens, and the IDFG is expressly charged with statutory responsibility to "…preserve, protect, perpetuate, and manage all fish and wildlife in Idaho (Idaho Code § 36-103(a)). Within this capacity, IDFG maintains a Fisheries Management Plan which describes the Henry's Fork drainage as "…providing one of the most important Rainbow Trout fisheries in the state." The plan's primary objective for the Henrys Fork drainage is to maintain quality trout fishing. Under this objective, three strategies are identified which direct IDFG to "…work with partners and stakeholders" to improve infrastructure related to fish passage and survival and to protect stream flows for fish.

Over the past three decades, IDFG and the Henrys Fork Foundation have worked collaboratively for the benefit of Idaho fisheries. The proposed project aligns with the objectives and strategies in our Fisheries Management Plan. The project is intended to evaluate infrastructure on Island Park Dam/Reservoir which could improve abiotic factors which influence fisheries in the reservoir and downstream. The proposal also evaluates value of restoring stream, wetland, and shallow aquifer habitats in Shotgun Valley and Harriman State Park which may benefit fish

habitat conditions in parts of the Henrys Fork drainage where dissolved oxygen and temperature are limiting factors for fish populations.

During the three-year project, IDFG will assist with data collection including fish population surveys in Island Park Reservoir and the Herny's Fork Snake River. As a partner of the project, IDFG staff will attend meetings with stakeholders to share information and collect public input. In all, IDFG will commit staff time valued at a combined $50,000 per year to the three-year project.

The Department supports the Henrys Fork Foundation in their proposal to evaluate opportunities to benefit fisheries in the Henrys Fork watershed which will help IDFG accomplish objectives outlined in our Fisheries Management Plan. Thank you for considering funding this important collaborative work.

Sincerely,

Lance Hebdon
Bureau Chief of Fisheries

Cc: Brett High, IDFG
John Heckel, IDFG

RESOLUTION OF THE BOARD OF DIRECTORS OF THE

HENRY'S FORK FOUNDATION

WHEREAS, the mission of the Henry's Fork Foundation is to conserve, protect, and restore the unique fisheries, wildlife and aesthetic qualities of the Henry's Fork and its watershed; and

WHEREAS, the Henry's Fork Foundation uses a science-based, collaborative approach to promote favorable streamflow, good water quality, healthy fish populations, and a positive fishing experience on the Henry's Fork and South Fork Snake River watersheds; and

WHEREAS, the Henry's Fork Foundation has consistently demonstrated its effectiveness at administering federal grants and using federal funds to meet its mission; and

WHEREAS, the U.S. Bureau of Reclamation's WaterSMART program provides opportunities to fund collaborative projects that meet the mission of the Henry's Fork Foundation, and the Board of Directors has reviewed these opportunities and their suitability for the organization; and

Now therefore be it

RESOLVED, that the Henry's Fork Foundation Board of Directors authorizes Brandon Hoffner, Executive Director, to submit applications to WaterSMART funding programs during fiscal year 2024 for projects to restore aquatic habitats and improve water management that will be undertaken in fiscal years 2025-2027; and

RESOLVED, that the Henry's Fork Foundation Board of Directors authorizes Brandon Hoffner, Executive Director, to enter into financial agreements with the U.S. Bureau of Reclamation pursuant to application for, receipt of, and administration of WaterSMART funding; and

RESOLVED, that the Henry's Fork Foundation will adhere to any and all deadlines, timelines, and requirements of said agreements; and

RESOLVED, that the Henry's Fork Foundation will commit the non-federal in-kind and cash contributions as specified in the grant applications, during fiscal years 2025-2027.

I, the undersigned, do hereby certify:

1. *That I am the duly elected and acting Secretary of the Henry's Fork Foundation, and*
2. *That the foregoing constitutes a Resolution of the Board of said organization, as duly adopted at a meeting of the Board of Directors held on the 6th day of October 2023.*

IN WITNESS WHEREOF, I have hereunto subscribed by name, this 6th day of October 2023.

Ron Miller, Secretary
Henry's Fork Foundation

December 20, 2023

Bureau of Reclamation
Water Resources and Planning Office
Attn: Ms. Avra Morgan
Mail Code: 86-63000
P.O. Box 25007
Denver, CO 80225-0007

Dear Ms. Morgan,

This letter of support confirms that Idaho Department of Parks and Recreation (IDPR) supports the application of the Henry's Fork Foundation (HFF) to Reclamation's WaterSMART Aquatic Ecosystem Restoration Project NOFO R23AS00106. The proposed project is a Task A Study and Design project entitled "Developing Infrastructure to Reduce Temperature in Turbidity" in the Henry's Fork Snake River downstream of Island Park Reservoir, a Reclamation irrigation storage facility located in eastern Idaho. This river reach is world renowned for its wild trout fishery but has experienced increased turbidity and water temperatures in recent decades due to warming air temperatures, decreased water supply, aging and inflexible infrastructure, and human population growth. Extensive research and monitoring by HFF and its partners has shown that water quality in and management of Island Park Reservoir have the largest quantifiable effects on fisheries and water quality downstream of the reservoir and on fisheries in and upstream of the reservoir.

The Idaho Department of Parks and Recreation has a large stake in this project, because the centerpiece of the fishery that will benefit from this project is located within Harriman State Park, the park whose creation resulted in the establishment of IDPR. The mission of IDPR is to "Improve the quality of life in Idaho through outdoor recreation and resource stewardship". The Henrys Fork of the Snake River winds its way through the park, offering 8 miles of pristine water-based recreational opportunity to visitors. The sustainable management and protection of this waterway are crucial for fisheries purposes; habitat for insects, birds and wildlife; and benefit to Idahoans in the shape of farming irrigation further downstream. As a dedicated wildlife refuge and bird sanctuary, the State of Idaho manages this land and waterway to the standards set forth in the original gift deed. Any impacts on that management focus are of concern and thus foster a solutions-based approach. Harriman State Park has collaborated on projects with HFF over the years, and our goals are similar in numerous respects. The park fully supports HFF in this study and would be pleased to assist where we may.

Specifically, the project will assess three types of potential actions to reduce the negative effects of high water temperatures and sedimentation in the target river reach: 1) address aging facilities with new or retrofit infrastructure in Island Park Reservoir to improve overall water quality 2) plan watershed-scale, nature-based stream, wetland, and shallow aquifer restoration projects to increase refugia habitat, and 3) collect physical, chemical, hydrologic, and fisheries data to support planning and stakeholder outreach. Many of the activities under the second two of these

action types will potentially occur in Harriman State Park, to the benefit of the fishery and other resources within the Park.

During the three-year project, IDPR will attend stakeholder meetings to ensure that any habitat enhancement activities implemented in Harriman State Park will be responsive to visitor input and consistent with IDPR's mission and strategic plan. Further, IDPR agrees to host some of these stakeholder meetings at Harriman State Park, to allow Park visitors easy access to participation in the process. Finally, IDPR will work closely with the applicant to ensure that necessary data can be collected in Harriman State Park with little if any disruption to the visitor experience and existing fish, wildlife, and historical resources in the park.

Over the course of the three-year project, IDPR will devote 216 hours of staff time to this project worth $5,600 and waive the normal room rental fees for stakeholder meetings hosted at the Park. Together, this represents a third-party, in-kind, non-federal contribution of $7,100 to the project.

Please contact me with any questions you may have. Thank you.

Sincerely,

Jess Brumfield, Harriman State Park Manager

208 360 1387

STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

900 N Skyline Drive, Suite B, Idaho Falls, ID 83402
(208) 528-2650

Brad Little, Governor
Jess Byrne, Director

January 18, 2024

Ms. Avra Morgan
Bureau of Reclamation
Water Resources and Planning Office
Mail Code: 86-63000
P.O. Box 25007
Denver, CO 80225-0007

Subject: Henry's Fork Foundation application for WaterSMART Aquatic Ecosystem Restoration Project NOFO R23AS00106

Ms. Morgan,

The Idaho Department of Environmental Quality (DEQ) has read and reviewed the technical proposal and evaluation criteria as part of Henry's Fork Foundation (HFF) application to the Bureau of Reclamation's WaterSMART Aquatic Ecosystem Restoration Project NOFO R23AS00106. We believe that the objectives listed in this proposal will identify existing water quality impairments, improve known water quality issues, and inform future management actions in the Henry's Fork subbasin.

For the 2022 Integrated Report, DEQ evaluated data submitted by HFF for waterbody assessments in the Henry's Fork subbasin, which resulted in eight new 303(d) listings for temperature impairments (DEQ 2022). The 303(d) list consists of impaired surface water segments that will require the development of total maximum daily loads (TMDLs). It is very likely that there are several more existing temperature impairments within the Henry's Fork subbasin that have not yet been assessed. In fact, elevated surface water temperature is the most common impairment of Idaho waters on the 2022 303(d) list (DEQ 2022). Given this prevalence of temperature impairments in the region, high temperature in surface waters is an important pollutant of concern for this subbasin. DEQ is supportive of the proposed project goals and objectives that focus directly and indirectly to address regional temperature impacts.

DEQ is additionally concerned about the existing impairments for which TMDLs have previously been developed in the Henry's Fork subbasin (temperature, sedimentation, and *E.coli*; see DEQ 2010, and DEQ 2021). This proposed project may also provide information regarding other existing causes of impairment (e.g. excessive nutrient loading or depleted dissolved oxygen), which could be impacting the support of cold water aquatic life and recreational beneficial uses in the Henry's Fork subbasin.

DEQ and HFF have a long history of successful project collaboration in the region. To continue this collaboration, DEQ will support this project by (1) attending stakeholder meetings, (2) providing approximately 416 staff hours (approximately $12,500) for water quality monitoring support, and (3) provide funding directly to a contractor (approximately $50,000) to develop a

temperature model of the Island Park Reservoir and the downstream section of the Henry's Fork River. The total DEQ contribution will be approximately $62,500. Overall, we believe this proposed project will help DEQ carry out the Idaho DEQ mission: to protect human health and the quality of Idaho's air, land, and water.

Sincerely,

Alex Bell
Water Quality Manager
Idaho Falls Regional DEQ Office

References

DEQ 2010. Upper and Lower Henrys Fork Total Maximum Daily Loads: Addendum to the Upper Henrys Fork Subbasin Assessment and TMDLs. Idaho Falls Regional DEQ Office. *https://www2.deq.idaho.gov/admin/LEIA/api/document/download/11859*

DEQ 2021. Upper and Lower Henrys Fork: 2021 Sediment and Bacteria TMDLs. Idaho Falls Regional DEQ Office. *https://www2.deq.idaho.gov/admin/LEIA/api/document/download/14974*

DEQ 2022. Idaho's 2022 Integrated Report. Boise, ID: DEQ. *https://www2.deq.idaho.gov/admin/LEIA/api/document/download/16619*