

North Unit Irrigation District Fish Screen Replacement at Bend Headworks



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North Unit Irrigation District

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List of Attachments:

Attachment 1 – Basis of Design Report, HDR 2015

Attachment 2 – Project Observation Report, ODFW 2022

Attachment 3 - ODFW Review of Predesign Memorandum, 2013

Attachment 4 – Letters of Support

Attachment 5 – NUID North Unit Main Canal Fish Screen Improvements Opinion of Probable Construction Costs

Executive Summary

North Unit Irrigation District (NUID) submits this application to fund the construction of the Fish Screen Replacement and Bend Headworks (fish screen or project) on June 1, 2023. NUID is a Category A applicant, an irrigation district, located in Madras, Oregon in Jefferson County. The funding for this project falls under Task Area B: Construction.

This project replaces the fish screens at the NUID main canal intake located on the mainstem of the Deschutes River to comply with state and federal fishery screening requirements. This project will remove the existing screens and other related components at the canal intake and replace them with new screens and components that are in compliance with state and federal standards. This will allow for safe passage and coexistence with fish and wildlife in the Deschutes River. The existing fish screen at the Bend Headworks was installed in the 1940s and does not comply with state or federal screening criteria for fish protection including standards for approach velocity, screen mesh size, and lacks a fish bypass system. Given the age of the current screens, frequent repairs are needed during the irrigation season that typically require removal of the screens from the intake that allows fish to enter the NUID Main canal. As a result, NUID performs annual fish rescue within the canal to retrieve any fish that passed through the intake. During the 2020 post-irrigation season fish rescue effort over 4,194 fish were rescued over a two-day period. NUID in concert with U.S. Bureau of Reclamation (Reclamation) have been working toward replacing the fish screens for over three decades. NUID has completed a preliminary design and concept (See Attachment 1) for the replacement. Construction will take place Fall of 2024 – Spring 2025. This project is part of the North Unit Main Canal headworks owned by U.S. Bureau of Reclamation and operated by NUID.

Project Location

The North Unit Irrigation District Main Canal fish screens are located on the eastern side of NE Division Street, north of NE Addison Street and Riverview Park, in Bend, Oregon. The headgate and associated fish screens are located in Township 18 South, Range 11 East, in the SW ¼ of the NE ¼ of Section 13, within the channel of the Deschutes River, north of downtown Bend, Deschutes County, OR. The site is located at latitude 44° 4'31.88" North and longitude -121° 18'21.67" West.

Below is a map of the project site.



Project Map

Project Description

Purpose and Need

The purpose of the project is to ensure the new screens will meet not only the needs of the water user, but also meet or exceed current state and federal fish screening criteria that provides safe passage and coexistence with fish and wildlife in the Deschutes River.

This project addresses an outdated screen installed in the 1940s that does not meet state or federal standards. In January 1999, Reclamation reviewed the condition of the fish screens and reported a list of deficiencies for the NUID Canal diversion fish screen facility including:

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- rotary drum screen did not meet ODFW standards for approach and sweep velocities for protection of fry-size juvenile fish;
- the lack of a fish bypass system;
- screen mesh openings that were too large to meet criteria for protection of fry-size fish;
- seals that were not fish tight; and
- and screening mesh that was damaged and had large holes, leaving fish at risk of injury or mortality.

In addition to other deficiencies, an *Oregon Department of Fish and Wildlife (ODFW) 2013 Project Observation Report* (Attachment 2) for the NUID fish screening facility makes specific reference to the rotary drum screening mesh, stating, “the mesh appears to be nearing the end of its useful life and there were a significant number of holes in the mesh larger than a single ¼” square opening.”

The Deschutes River is home to brown and rainbow trout, the rare brook trout, whitefish, and transient fingerling coho and kokanee from Wickiup Reservoir. Between the headwaters of the Deschutes River and its confluence with the Columbia River, there are many dams slowing, complicating, and halting the upward migration of many anadromous fish which use the headwaters of the Deschutes Basin for spawning.

The North Canal Dam provides head pressure for irrigation diversions to NUID, Swalley Irrigation District and Central Oregon Irrigation District (COID). During upgrades to the Central Oregon Irrigation District and Swalley Irrigation District diversion and fish screen, a fish ladder was installed at the dam for fish to transverse up and downstream past the dam. A construction ready flat panel fish screen design currently exists that mimics the design of the neighboring COID fish screen. The design includes a fish bypass system that releases fish near the base of the North Canal Dam and existing fish ladder to support the movement of fish above and below the dam.

Through design features that will slow the approach velocity, shrink the mesh size for the screen, and provide a safe path to the fish ladder, the proposed fish screen will provide protection, survival, and restoration to native fish, while allowing clean and efficient diversion of water for farms. Juvenile fish will survive an encounter with the designed screen, and both juvenile and adult fish will be allowed to continue their migration up and downstream through the ladder.

Not only will the renovations to the fish screen remove the hazard to fish that encounter the current screening system, but it will help support the health and growth of fish populations by removing a source of potential population loss.

Project Components

This project will install flat plate screens and a traveling screen cleaning system. The hydraulic capacity of the system will be designed to meet NUID’s certificated water right. Fry sized salmonids are not expected to be present at the proposed fish screens from July 15 – October 31, thus Oregon Department of Fish and Wildlife is not opposed to the screen operating with an approach velocity of up to 0.8 fps from July 15 – October 31 (See Attachment 3: ODFW Letter.) The following is a description of the fish screen starting upstream and moving downstream. Refer to Attachment 1 indicating the preliminary design of the screen with the following elements:

- Upstream trash racks: The existing trash racks will continue to be used to prevent debris from entering the irrigation canal. An automated, or self-cleaning, trash rack system has been contemplated but is not part of the current design.
- Bulkheads for dewatering the system: After removing the existing drum screens, the eastern portion of the intake works will be abandoned. A concrete segmented Bulkhead will be placed on the eastern portion and backfilled with soil and rock materials. Removal bulkheads will be required for the western portion of the intake works. The slots used for the existing western drum screen will be used for a bulkhead system that will be lowered into the canal intake headworks to dewater the fish screens during inspections and repairs/maintenance.
- Gantry crane to raise and lower bulkheads: A gantry crane like the existing will be required for the removable bulkheads. The gantry crane will be located over the western portion of the intake works. Annually this crane will be used for maintenance and operations on a limited basis (less than 6 times per year) depending on maintenance requirements.
- Canal U/S from Primary Fish Screens: The existing canal will need to be enlarged to accommodate the design discharge of 1,101 cubic feet per second (CFS) and the primary fish screens. The existing invert elevation of the canal will be maintained at 3549 feet (ft.) The east wall of the existing canal will be increased in height, so the top of wall elevation is 3566.8 ft NAVD88, but the location will remain the same. The west wall of the canal will be removed, and a new wall constructed to the west with a top wall elevation of 3566.8 feet, NAVD88. The channel will be about 24 ft wide.
- Primary Screens: nineteen primary vertical flat plate screens will be used to dewater the majority of the discharge into the irrigation canal. These screens will be angled across the canal, directing flows into a fish bypass channel.
- Fish bypass channel: As bypass flows enter the bypass channel, flows will drop over an overshot gate (overflow style adjustable weir). This overshot gate shall be adjusted to maintain a bypass flow to safely pass the fish from the high pool elevations down to the existing fish bypass pipe. A set of stop logs will also be used to provide flexibility in varying the drop height and allowing for either one pool or two pools prior fish entering the bypass pipe.
- Secondary Fish Screens: Three secondary screens will dewater flows entering the fish bypass channel. Flows passing through the screens will discharge into the NUID irrigation canal. Fish Bypass Pipe: The new fish screen system will connect to an existing fish bypass pipe. This 24-inch diameter pipe is aligned to pass under the existing COID canal just to the west of the NUID canal. The existing fish bypass pipe has length of about 175 feet and a slope of approximately 0.001 ft/ft and a tie-in invert elevation of 3,547.82 ft, NAVD88. A new section of pipe will be added to the downstream section of the existing pipe. The pipe will parallel the existing COID fish bypass pipe and be at about the same depth and slope. Fish will be discharged into the Deschutes River at the same location as the COID fish discharge.
- Downstream Flow Control Gates: The current flow control gate concept includes implementation of two automatic modulating overshot gates (overflow style adjustable weir) to regulate canal diversion flow. These gates are located downstream from the proposed fish screen system. All gates route flow from the diversion intake to the NUID irrigation canal. A small overshot gate will also be used downstream of the secondary screens to control bypass flow.

The major project features include the primary screen structure, the primary fish screen, the secondary screen, the bypass flow passage, and diversion gates. Their details are as follows:

- **The Primary Screen Structure:** The primary screen structure shall be a long diagonal vertical flat panel screen spanning over 165 feet in length. The width of the screened channel is 24 feet at the upstream end and 1.5 feet at the downstream end. This primary fish screen shall consist of 19 vertically mounted 8.58 feet wide x 15.5 feet tall vertical perforated plate screen panels with a total screen area of approximately 2,525 sf and a length of 165 feet. At a minimum forebay water surface elevation of 3561.80 ft, the screens will have an effective depth of 12.8 feet and an effective screen area of 1945.6 sf excluding vertical pier supports. All screen and structural metal members shall be stainless steel 304L. The perforated plates shall be a maximum of 3/32-inches thick with 3/32-inch round holes. Each of the nineteen perforated screen panels shall be framed in 3.5 3.5 x ¼ inch stainless steel structural angles that shall be screwed to a W12 x 26 structural support. These W beams shall transmit screen structure loads into the bedrock. Primary screens shall be cleaned using a brush cleaning system that consists of a vertical brush that will sweep horizontally across the face of the screens. A jib crane or trolley type of crane will be required to remove screens for maintenance and repair. As the design proceeds, NUID will select the type of crane that they would like to use. A jib crane, if selected, would be located near the downstream end of the primary fish screen.
- **The Secondary Screen:** The secondary screen shall be in the bypass channel. Three secondary fish screens shall be installed downstream of the primary screen in the bypass channel. The secondary screen structure shall be approximately 26 feet long. Based on comments from ODFW, vertical traveling screens are being proposed as part of the concept plan. This will eliminate the need to have a brush cleaning system in the bypass channel.
- **The Bypass Flow:** As the bypass flow passes the last 15.5 ft tall primary screen, the flow shall enter a 1.5 ft wide sloped channel. The slope of the channel floor shall be 3H:1V and be approximately 30 feet long. In this sloped section, the secondary screens with a total screen area of approximately 120 sf. In this 30 ft long section of the bypass channel, sweeping velocities shall increase from approximately 3.7 fps to 5 fps at the maximum diversion. At the low design diversion rate of 200 cfs to the irrigation canal sweeping velocities shall increase from approximately 1.4 fps to 5 fps in the 30-foot-long bypass channel, which is below NMFS's maximum allowable acceleration of 0.2 fps per foot length. As the bypass flow enters the ramped section of the bypass channel, flows will accelerate to a maximum channel velocity of 5 fps where the bypass flow drops over an overshot gate. This overshot gate can be adjusted to account for varying upstream pool elevations.
The existing 2 ft diameter fish bypass pipe which is under the COID's canal has a slope of approximately 0.001 ft/ft and a tie-in invert elevation of approximately 3,547.82 ft. To safely drop the fish from the high pool elevation down to enter the existing bypass pipe, there will be two hydraulic drops, one over the overshot gate and one over stop logs. Each pool shall be 2.5 ft wide and 15 ft long. The last bypass pool will transfer the bypass flow to the existing 2 ft diameter pipe.
A new section of pipe will be added to the downstream section of the existing pipe. The new pipe will parallel the existing COID fish bypass pipe and be at about the same elevation and slope. Fish will be discharged into the Deschutes River at approximately the same location as the COID fish discharge. The current flow control gate concept includes implementation of two

automatic modulating overshot gates to regulate flow through the primary and secondary diversion to the irrigation canal. These gates are located downstream from the proposed fish screen system. These gates route flow from the diversion intake to the NUID irrigation canal.

- The Diversion Gates: Flow will be conveyed in a weir condition over the diversion gates, where the maximum potential conveyance is proportional to the total head difference between the forebay water surface and the inlet condition of the canal, less hydraulic head losses that occur through the screen and gates.

Effectively, the automated control gates will raise and lower to decrease or increase driving head within the system and will thus increase or decrease the amount of flow that is conveyed to the canal. Here, diversion flows are subjected to atmospheric conditions where water surface elevations will equalize at a position that is relative to the forebay water surface, minus head losses through the screen and conveyance system.

Evaluation Criteria

Evaluation Criterion A - Project Benefits

Sub Criterion A.1. General Project Benefits

The Deschutes Basin and mainstem Deschutes River are heavily influenced by human activity including irrigation diversions along the mainstem Deschutes. Aquatic species encounter many hardships in the basin including altered hydrology, water quality challenges, as well as encountering several diversions and headworks.

The existing fish screen near the North Canal Dam is located on the north side of Bend, Oregon at Deschutes river mile 164.8. The existing screen has numerous issues noted by federal and state agencies over the past three decades. ODFW, in a site visit in 2022, noted several issues that could put fish, including listed species, at risk. Most notably: (1) wire mesh screen with many holes and open spaces that exacerbate the fact that the current screen mesh size exceeds criteria; and (2) several open spaces and broken seals. NUID repairs as much as it can every year, however both ODFW and NUID staff agreed that the screens need replacement.



Screen Material with Extensive Damage resulting in Open Spaces >1/4."

During the 2020 post-irrigation season fish salvage effort, NUID recovered 339 Redband Trout, 17 Brown Trout, 10 Mountain Whitefish, 18 sculpin, and 3,810 Kokanee Salmon were rescued from the irrigation canal behind the screen during a 2-day salvage effort. Since this was a short-term effort – it is not indicative of the entrainment that took place during the full 6-month irrigation season. However, it does demonstrate the large issues caused by the existing screen.

The removal of the existing fish screen and replacement with a design that meets-or-exceeds state and federal standards for the benefit of fish and wildlife in the mainstem Deschutes River. The design features of the new fish screen will slow the approach velocity, shrink the mesh size for the screen, and provide a safe path to the fish ladder. Additionally, the fish screen will provide protection, survival, and restoration to ESA-listed fish and native fish while allowing for clean and efficient diversion of water for farms. Not only will the renovations remove the hazard to fish and encounter the current screening system, but it will help support the health and growth of fish populations by removing a source of potential population loss.

Irrigation districts in Central Oregon, including NUID, are focused on modernizing and improving their aging infrastructure. This regional effort has resulted in hundreds of miles of open canals being enclosed in leak-free piping, replacements of headgates, and improvements of fish screens. These efforts ensure restoration of flows, habitat, and water quality for multiple water users including agricultural, municipal, Tribal, environmental, recreational and others. Millions of dollars and resources have been spent to conserve water by enclosing porous open canals into leak-free piping to reduce the current conflict of water for consumptive use and flows for aquatic species. This fish screen is an element of the regional effort to restore better conditions for fish and wildlife.

Sub Criterion A.2. Quantification of Specific Project Benefits

Species and Habitat Benefits

As noted above, more than 4,000 fish could remain in the river based on the 2020 post irrigation season main canal fish rescue and relocation efforts. Further, in 2017 ID’s commissioned the North Canal Dam Fish Ladder that is located adjacent to the NUID Main Canal Diversion and Fish Screens. Irrigation districts working with local interests designed, constructed, and commissioned the ladder to provide fish passage over the dam for the first time in over 100 years. The ladder is the longest made of stainless steel in Oregon. To ascertain its effectiveness, the Oregon Department of Fish & Wildlife conducted a small study from 2018 through 2020 to track passage. 440 redband and brown trout were captured below the dam down to Tumalo State Park and fitted with radio tags. Antennas were placed at the bottom and top of the fish ladder to detect these fish. The study used a small sample and only 12% of the tagged fish entered the fish ladder, but 83% of the redbands and 50% of the brown trout that started passage were later detected at the top. Thus, at least 52 trout moved upstream over the study period. Additional non-tagged fish most likely used the ladder as well. Providing a compliant fish screen would provide more opportunity to improve fisheries habitat both above and below the dam.

The below table is a representation of fish rescue efforts since 2017 performed by Mount Hood Environmental. In the fall when NUID stops diverting water to the main canal, fish rescue was performed to remove and relocate fish that migrated past the fish screen into the irrigation canals. Fish were then released into locations dictated by ODFW.

Number of fish rescued from NUID main irrigation canal 2017 - 2022.

| Date | Redband Trout | Brown Trout | Whitefish | Sculpin | Kokanee | Total |
|----------------------------|----------------------|--------------------|------------------|----------------|----------------|--------------|
| October 18, 2017 | 38 | 7 | 1 | | | 46 |
| October 18-19, 2018 | 127 | 46 | 51 | 3 | 201 | 428 |
| October 14-15, 2019 | 57 | 18 | 80 | 0 | 4 | 160 |
| October 28-29, 2020 | 339 | 17 | 10 | 18 | 3810 | 4194 |
| October 21-22, 2021 | 97 | 11 | 2 | 24 | 18 | 142 |
| October 18-19, 2022 | 221 | 26 | 7 | 270 | 13 | 547 |

The fish rescue numbers give a representation of the hazards currently experienced by aquatic species on the Deschutes River. In a year like 2020, where there are record runs of certain species – there is an increased likelihood of mass entrainment. Replacing the fish screen would eliminate this hazard and create a better environment for fish movement on the mainstem Deschutes.

The Endangered Species Act listed (ESA) Oregon spotted frog has habitat above the current NUID diversion, approximately 2.5 miles upstream from the fish screen. Significant efforts are underway to recover and restore populations of the frog throughout the basin. If populations recover and move downstream, the screens could provide some protection for the Oregon spotted frog. While there are no specific screening criteria to date for frogs, this fish screen could remove a hazard to this listed species.

Watershed Benefits

This project will have significant environmental and economic benefits in the Deschutes Basin Watershed by keeping more native fish in the rivers systems where they belong (modern screens can reduce fish entering water diversions by over 90%); protecting native fish during upstream and downstream migration, allowing more fish to survive to maturity and boosting native fish populations; protecting other aquatic creatures impacted by existing screens; delivering cleaner water, and reducing maintenance costs to landowners, by preventing debris and fish entering diversions; preventing debris and fish from entering diversions can provide opportunities to evaluate water conservation measures (irrigation practices) by supplying cleaner water to farmers; supporting local businesses and creating regional job opportunities during construction and installation; and improving recreational fishing opportunities across the region, supporting regional economies through increased tourism.

The replacement of the fish screen would also contribute to watershed connectivity and support fish movement along the Deschutes River. In 2017, the North Canal Dam Fish Ladder was installed and provided an opportunity for upstream fish passage for the first time in over 100 years. Now that fish passage is possible both up and downstream, it is essential to remove hazards to reinforce basin-wide efforts for watershed connectivity.

Water Supply Benefits

In addition to protecting aquatic life, the screens are intended to supply debris-free water to irrigators without harming aquatic life. As noted, the current NUID Main Canal Fish Screens on the Deschutes River are over 75 years old. Operating 75-year-old screens creates an ongoing series of maintenance issues, including increased maintenance costs, during the irrigation season that can result in adverse water operations. Also, the Deschutes River near Bend, Oregon contains a considerable number of suspended materials in its water ways including woody debris and large amounts of vegetation during certain periods of the irrigation season. A trash rack in front of the current screens prevent some material from entering the screened section but not all material. Material can build up and reduce diversions creating operational inconsistency. Further, NUID plays a significant role in river operations at the Bend Diversion. The NUID diversion is responsible for maintaining minimum river flow consistent with legal instream requirements at North Canal Dam as well as ensuring the North Canal Dam Fish Ladder maintains sufficient supplies for fish migration. In short, new fish screens could provide water supply benefits to NUID operations, farms, the river, and fish.

Other Quantifiable Benefits

The *Upper Deschutes Basin Study*, initiated in 2014 and funded by U.S. Bureau of Reclamation (Reclamation), investigated a variety of water supply tools and habitat measures. This study was a collaborative effort between forty stakeholders, including irrigation districts, that worked together to restore flows in the Deschutes as well as finding strategic approaches to combining water supply tools to benefit the basin. The Study was completed in 2019. Much of the study was focused on flow restoration and implementation of conservation methods, such as piping district canals and on-farm upgrades. The irrigation districts in the basin, and their partners, have invested millions of dollars to pipe open porous canals to return flows to the basin. As a result, flows in the mainstem Deschutes and its tributaries are returning to more normative patterns, keeping more water in stream that leads to water quality and quantity improvements during critical rearing and migration periods. The improvements to water flow must be coupled with removal of hazards and barriers to aquatic species to realize the full range of benefits of the efforts resulting from the Basin Study.

In addition to the Basin Study, the *Deschutes River Basin Habitat Conservation Plan (HCP)*, another large-scale collaborative plan that helps the City of Prineville and Deschutes Basin irrigation districts meet their current and future water needs while enhancing fish and wildlife habitat. Conservation measures listed in the HCP are designed to minimize and mitigate impacts caused by the incidental take of covered listed species that may result from the activities of the irrigation districts and City of Prineville. Keeping fish screens in good working order is an important practice listed several times in the HCP. Since the NUID fish screen is beyond maintenance or repair, replacing this screen is an important aspect of realizing the benefits anticipated in the HCP.

The measures listed in the Basin Study and HCP are tracked and reported on an annual basis. More details can be found at the Deschutes Basin Board of Control website: <https://dbbcirrigation.com/>

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

Sub-Criterion B.1. Task B: Construction Stakeholder Involvement and Support and Prior Restoration Planning

Prior Planning, Study, and Design

Since the deficiencies in the original fish screen were identified by Reclamation in 1999, NUID has been working with local, state, and federal partners to plan for its replacement. Over the past decade, it was determined that the current screens cannot be retrofit to meet guidelines without restructuring the size and shape of the diversion intake.

Reclamation prepared a fish screen design in 2003 that has been reviewed and endorsed by ODFW. A vertical flat plate design was proposed by BOR and is like the fish screens that have been operational at the COID Canal Intake. These screens are located roughly fifty feet west of the NUID intake.

NUID consulted with HDR, Inc, for the *Basis of Design Report*, included as Attachment 1. The report determined flat plate screens can be used with a traveling screen cleaning system as designed. The hydraulic capacity of the system will be designed to meet NUID's certificated water right of 1101 cfs. The existing canal will need to be enlarged to accommodate the design discharge of 1,101 cfs and primary fish screens. The existing invert elevation of the canal will be maintained at 3549.0 feet. The east wall of the existing canal will be increased in height, so the top of wall elevation is 3566.8 feet, NAVD88, but the location will remain the same. The west wall of the canal will be removed, and a new wall constructed to the west with a top of wall elevation of 3566.8 feet, NAVD88. The channel will be about twenty-four feet wide.

Nineteen primary vertical flat plate screens will be used to dewater the majority of the discharge into the irrigation canal. These screens will be angled across the canal, directing flows into a fish bypass channel. The secondary screen shall be located in the bypass channel. Three secondary fish screens shall be installed downstream of the primary screen in the bypass channel designed to divert up to 48 cfs with an approach velocity of 0.4 fps and up to 95 cfs with an approach velocity that will not exceed 0.8 fps. Leaving the remaining 16 cfs bypass flow to enter the existing 2-foot diameter fish bypass pipe. The secondary screen structure shall be approximately 26 feet long. Based on comments from ODFW, vertical traveling screens are being proposed as part of the concept plan. This will eliminate the need to have a brush cleaning system in the bypass channel. Refer to Attachment 1 for further detail about the design and criteria used for developing this design.

In a letter from ODFW’s Lead Project Manager for the Fish Screening Program, Michael Lambert said, “The PDM is thorough and well presented. It covers the needed subjects and issues in a prudent and proficient manner. It sufficiently addresses and quantifies the factors and parameters that are requisite to proceeding with a final design. In short, the criteria used by the predesign team and presented in the PDM (Ref. Pg. 5, ff, with the included hydraulic analyses and figures) are suitable for direct use by a final design team, as the projects advances.”

This design will be furthered to final design in the pursuit of all compliance activities ahead of construction.

Stakeholder Support for the Proposed Task B: Construction Project

Replacement of the fish screen is an important part of NUID’s efforts to modernize its system and reduce harm to aquatic species. This feeling is shared by local stakeholder groups, including Deschutes River Conservancy and Upper Deschutes Watershed Council and has broad based support from the community in general. Additionally, NUID has the support of state and federal agencies to bring the screen into compliance with their standards. ODFW has submitted several letters of support of their review of the predesign reports and has encouraged NUID to seek funding to replace the fish screen (see Attachment 4 as well as Letters of Support.)

Tribes, irrigation districts, local governments, environmental groups, and private citizens have all dedicated time and resources to restore the Deschutes Basin and reduce the human impacts to aquatic habitat. Millions of dollars and decades have been spent enclosing porous canals into leak-free piping to restore live flow to the rivers; fish passage barriers have been removed; and sovereigns and stakeholders have come together for comprehensive basin planning to integrate efforts toward a healthy Deschutes Basin. Groups like the Deschutes Basin Board of Control, Deschutes River Conservancy, Deschutes Basin Water Collaborative, and others have all come together in multiple forums to support projects that improve conditions for fish and wildlife. These groups have resulted in important regional products like the *Upper Deschutes Basin Study* and the *Deschutes River Basin Habitat Conservation Plan*. They have also resulted in millions of dollars of investment in water conservation projects and habitat restoration in the basin. Those efforts rely on removal of fish passage barriers and hazards. Replacing this fish screen is an important piece of ensuring safe passage of native fish on the Deschutes River near Bend.

Evaluation Criterion C – Project Implementation and Readiness to Proceed

Sub-Criterion C2: Task B: Construction Readiness to Proceed

Construction ready design was completed in December 2015. Cultural Resource work with the State Historic Preservation Office was completed in August 2020. In May 2020, NUID entered into a Memorandum of Agreement with U.S. Dept. of the Interior Bureau of Reclamation and the Oregon State Historic Preservation Office for Upgrades to the North Unit Canal Headgate and Fish Screens in Deschutes County, Oregon. To date, project necessary permits, although identified, have not been obtained due to expiration and uncertainty in project funding. Construction could begin in Fall of 2024 – dependent upon funding award and funding agreement timelines. NUID anticipates starting construction in Fall 2024 during the in-water work period. Below is a high-level schedule for replacement of the fish screen:

- Permitting and compliance activities: March 2023 – March 2024

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- Prepare bid documents: January 2024 – March 2024
- Bid/award Screen Construction: May/April 2024
- Mobilization/material procurement: April 2024 – September 2024
- In-water work: October 2024 through December 2024
- Screen construction: October 2024 – April 2025

The highest schedule risk is the timeline for permitting and compliance activities. If required permits are not received by March 2024, then construction will be delayed until Fall 2025. However, NUID will make every effort to receive the required permits on schedule.

Evaluation Criterion D—Presidential and Department of the Interior Priorities

Climate Change

This project is a component of a climate resilient strategy to reduce hazards to native species in the Deschutes River. This, in concert with efforts that restore instream flows in the Deschutes Basin, will allow for the region to be more resilient against low flow drought conditions that cause impacts to water temperature, water quality, and habitat suitability.

A 2019 vulnerability assessment of southern and Central Oregon shows the effects of climate change on hydrology will be highly significant with decreased snowpack and earlier snowmelt shifting the timing and magnitude of streamflow with significantly lower summer flows (Halofsky et. Al 2019). Additionally, climate models from the Inter-governmental Panel on Climate Change (IPCC) show a change in fall and winter flows to the reservoir. This could result in higher flows in the fall and winter in addition to lower flows in the late summer. Additionally, the most recent IPCC report, they found that escalating climate change impacts causing hotter droughts and progressive loss of seasonal water storage in snow and ice will tend to reduce summer season flows in much of western North America.

The climate driven changes in flow can have major impacts on the native fish in the stream near the NUID fish screen. Temperature and water quality impacts can add another hazard to habitat. Replacing the fish screen will remove one major hazard from this equation to continue a connected watershed and allow for more movement through the river.

Disadvantaged or Underserved Communities

Areas with over 50 percent or “meaningfully greater” representation of minority or low-income communities are considered environmental justice communities (CEQ 1997), and their propensity to experience disproportionately adverse effects from a given action must be analyzed within NEPA documents per Executive Order 12898. A higher proportion of several minority groups and low-income populations reside in Jefferson County, the county that NUID patrons reside in and NUID serves, relative to the proportions in the state and planning area cities. The Reservation of the CTWS overlaps with Jefferson County, leading to the high proportion of American Indian and Alaska Native in the county. Additionally, while farm owners in the region are disproportionately white, farm workers are disproportionately low-income and minority (USFWS 2020).

Although environmental justice communities are not present within the county (Deschutes) where the proposed project would be constructed and implemented, the proposed project would not affect emissions or degrade environmental quality. The proposed project would benefit agricultural

production, which would support farm operators and farm workers. As proposed project benefits accrue and agricultural production stabilizes or increases, the farm worker employment sector could benefit from increased production. Stabilization of the farm worker sector would benefit the environmental justice community component of the farm worker sector through seasonal certainty.

Tribal Benefits

NUID maintains and values a special government-to-government relationship with the Confederated Tribes of Warm Springs (CWTS) with direct communication and coordination on basin activities.

Species of cultural significance to the CTWS located in the Middle and Upper Deschutes River include wild populations of redband trout, Pacific lamprey, and a variety of other native non-salmonid species. Protection and maintenance of these populations is important to Tribal culture and future harvest opportunities. Protection of these watersheds and associated species is essential to the recovery and sustainability of these populations. New fish screens would assist in ensuring culturally significant tribal species are protected and remain sustainable.

Evaluation Criterion E—Performance Measures

Since 2017, North Unit Irrigation District has performed fish rescue and salvage efforts to remove and relocate fish captured in the NUID Main Canal once the irrigation season is over and diversions from the Deschutes River have ended. As part of this effort, NUID has recorded and maintained data on the species collected, size of species collected, and total number of species collected during the rescue and relocation effort. Using the data, NUID will be able to compare the number of fish captured in the NUID main canal following an irrigation season compared to pre-construction fish capture numbers. Preferably, a Fyke Trap or similar fish trap could be placed in the canal downstream of the new screens to directly measure screen performance and effectiveness.

Project Budget

| Summary | | | |
|---|--------------------|--------------------------|------------------------------|
| Figures in this summary table are calculated from entries made in subsequent categories, only blank white cells require data entry. | | | |
| 6. Budget Object Category | Total Cost | Federal Estimated Amount | Non-Federal Estimated Amount |
| a. Personnel | \$59,250 | | |
| b. Fringe Benefits | \$17,775 | | |
| c. Travel | \$1,516 | | |
| d. Equipment | \$0 | | |
| e. Supplies | \$0 | | |
| f. Contractual | \$0 | | |
| g. Construction | \$9,101,143 | | |
| h. Other Direct Costs | \$0 | | |

NUID Fish Screen Replacement at Bend Headworks

| | | | |
|------------------------------|------------------------------|--------------------|--------------------|
| i. Total Direct Costs | \$9,179,684 | | |
| i. Indirect Charges | \$0 | | |
| Total Costs | \$9,179,684 | \$5,965,809 | \$3,213,875 |
| | Cost Share Percentage | 65% | 35% |

All budget numbers were calculated using Attachment 5: Opinion of Probable Construction Costs concurrent with 100% Design Drawings, developed by HDR, Inc. in 2015. These numbers were escalated 6% to account for price increases and 5% for contingency. This budget narrative includes cost categories. Attachment 5 includes more granularity of each individual material item.

The following is a list of funding sources for the program:

| Funding Sources | |
|---|--------------------|
| Non-Federal Entities | |
| 1. North Unit Irrigation District Funds | \$2,463,875 |
| 2. ODFW Fish Screen Funding | \$750,000 |
| Non-Federal Subtotal | \$3,213,875 |
| Requested Reclamation Funding | \$5,965,809 |

Environmental and Cultural Resources Compliance

Required Permits or Approvals

Construction ready design was completed in December 2015. Cultural Resource work with the State Historic Preservation Office was completed in August 2020. In May 2020, NUID entered into a Memorandum of Agreement with U.S. Dept. of the Interior Bureau of Reclamation and the Oregon State Historic Preservation Office for Upgrades to the North Unit Canal Headgate and Fish Screens in Deschutes County, Oregon. To date, project necessary permits, although identified, have not been obtained due to expiration and uncertainty in project funding. Construction could begin in Fall of 2024 – dependent upon funding award and funding agreement timelines.

The following table is a list of identified permits required for the project, as well as anticipated timing of approvals:

| Potential Permits | Regulated Activity | Application and Approval Timelines |
|-------------------|--------------------|------------------------------------|
| FEDERAL | | |

NUID Fish Screen Replacement at Bend Headworks

| Potential Permits | Regulated Activity | Application and Approval Timelines |
|--|--|--|
| U.S. Army Corps of Engineer (USACE), Portland District Section 404, Clean Water Act Individual Permit (Joint application with Oregon Department of State Lands) | Replacement of previously authorized, currently serviceable structure within waterway. Section 404 permitting is part of the joint permit application process. | Application preparation began March 2023 for submittal in Winter 2024. Approval approximately 120 days after application deemed complete and after completion of ESA consultation and receipt of state water quality certification. |
| Bureau of Reclamation NEPA Compliance | Section 404 triggers requirement for NEPA documentation | Concurrent with 404 review process. Documentation will be completed by Winter 2024. |
| STATE | | |
| Oregon State Historic Preservation Office (SHPO) Section 106, National Historic Preservation Act (NHPA) | If archeological resources are found along the project corridor or at any of the construction sites | Approval received May 2020. |
| Oregon Department of Fish and Wildlife Oregon State ESA | Any taking of state listed species on state-leased or state-owned lands is regulated under Oregon state ESA | Concurrent with Section 404 review process. |
| Oregon Department of State Lands (DSL) Removal/fill Permit (Joint application with USACE) | In-water work period compliance | Application completeness review within 30 days of receipt and issue decision within 90 days of completeness determination. |
| Oregon Department of Environmental Quality Clean Water Act Section 402 | Any activity requiring discharge into waters of the state must receive water quality certification. | Concurrent with Section 404 review process. |
| LOCAL | | |
| City of Bend Construction-related Permits | Removal/replacement of fish screen | Will be secured by contractor following procurement process in Winter – Spring 2024. |

Overlap or Duplication of Effort Statement

There are not any active or anticipated proposals that will conflict, overlap, or cause duplication of efforts with this project. NUID will be pursuing state funding to match the federal funding in this application, however, these funds will be additive to any funding received from the Aquatic Ecosystem Restoration program, and not duplicative.

Conflict of Interest Disclosure Statement

NUID is not aware of any actual or potential conflict of interest that exists for this project at the time of submission.

Uniform Audit Reporting Statement

NUID submitted a Single Audit Report for the most recently closed fiscal year. NUID's EIN is 93-6001560 and it is available through the Audit Clearinghouse website.

NUID Fish Screen Replacement at Bend Headworks

Letters of Support

Letters of support are included in Attachment 4.

Official Resolution

Due to the timing of NUID's board of directors, an official resolution could not be passed at the time of submission. An official resolution will be brought to the board on June 13, 2023. Upon its passage, it will be submitted to bor-sha-fafoa@usbr.gov.



Oregon

Tina Kotek, Governor

Department of Fish and Wildlife

Fish Division

4034 Fairview Industrial Drive SE

Salem, OR, 97302

(503) 947-6201

www.dfw.state.or.us/

May 25, 2023

To Bureau of Reclamation grant review team:

I am writing to you today to express the Oregon Department of Fish and Wildlife's (ODFW) support for funding the North Unit Canal Fish Screen Project, which will upgrade an existing fish screen and protect aquatic species that live in the Deschutes River.

At ODFW, we aim to protect and enhance Oregon's Wildlife and their habitats for use and enjoyment by present and future generations. It is the policy of the State of Oregon to provide for the upstream and downstream passage of native migratory fish, which necessitates the proper screening of water diversions to prevent any harm or mortality to fish populations.

The existing fish screen on the North Unit Canal, constructed in the 1940s, can no longer adequately protect Deschutes River fish populations. In addition to being at the end of its life span, the facility does not meet the current ODFW criteria for fish screening.

Funding for this project will support removing the existing screens and other related components at the canal intake and replacing them with new screens and components that comply with state and federal standards. ODFW has already demonstrated our support for this project by allocating \$750,000 the Department received through the American Rescue Plan Act.

Implementing a modernized fish screen will significantly reduce impacts on fish and wildlife near the diversion by ensuring species in the Deschutes are not entrained in the canal. This will benefit all collaborators and preserve the multiple values the Deschutes River provides.

The fish screen project represents just one of many restoration projects in the Deschutes Basin. This project holds immense potential to make a positive and lasting impact on the ecosystem. It is an essential component of ongoing regional collaborative efforts to restore the habitat for aquatic species in the basin.

I appreciate your consideration of this request. Your support for the North Unit Canal Fish Screen Project will contribute to the long-term preservation and sustainable management of Oregon's natural resources.

Sincerely,

Greg Apke
Fish Passage and Screening Program Manager
Oregon Department of Fish and Wildlife

Cc: Curt Melcher, ODFW Director
Shaun Clements, ODFW Fish Division Assistant Administrator
John Zauner and Ted Wise, ODFW Hydro Program
Katherine Nordholm, ODFW Fish Screening and Passage Coordinator



DESCHUTES RIVER
CONSERVANCY

May 24, 2023

Dear Bureau of Reclamation grant review team:

The Deschutes River Conservancy is writing in support of North Unit Irrigation District's (NUID) application for the 2023 Bureau of Reclamation WaterSMART: Aquatic Ecosystem Restoration Program.

The mission of the Deschutes River Conservancy is to restore streamflow and water quality in the Deschutes River Basin. DRC has been involved in collaborative restoration projects to improve fish and wildlife habitat for over two decades. Functional fish screens at irrigation diversions are critical to support native fish and wildlife in the basin, complementing our mission.

This project proposes to replace the fish screens at the NUID main canal intake located on the mainstem of the Deschutes River in Bend, Oregon. This project will remove the existing screens and other related components, constructed in the 1940's, at the canal intake and replace with new screens and components that are in compliance with state and federal standards.

With the addition of the North Canal Dam Fish Ladder in 2017, adjacent to the NUID fish screens, these new fish screens will contribute to the restoration of watershed connectivity and support fish movement along the Deschutes River, promoting both the sustainability of native fish species as well as enhancing fishing and recreational opportunities in Central Oregon. This project has regional benefits, enabling ongoing irrigation in the north part of the basin while providing connectivity for fish throughout the middle Deschutes River.

We ask that you please support funding for the North Unit Irrigation District Fish Screen Replacement Project to reinforce the ongoing efforts in the Deschutes to restore ecosystem function at a basin-wide scale. This effort, in concert with flow and habitat restoration initiatives, is essential to the success of our aquatic ecosystem in Central Oregon.

Sincerely,

Kate Fitzpatrick

Kate Fitzpatrick
Executive Director



UPPER DESCHUTES
WATERSHED COUNCIL

May 25, 2023

To Bureau of Reclamation grant review team:

The Upper Deschutes Watershed Council is writing in support of North Unit Irrigation District's (NUID) application for the 2023 Bureau of Reclamation WaterSMART: Aquatic Ecosystem Restoration Program.

The mission of the Upper Deschutes Watershed Council (UDWWC) is to restore and protect the Upper Deschutes watershed through collaborative projects in habitat restoration, watershed education and long-term monitoring and recently celebrated our twenty-fifth year as a nonprofit conservation organization in Central Oregon. UDWC was involved with and raised funds for a fish ladder that was constructed at North Canal Dam adjacent to the proposed fish screen facility as part of this proposal. Funding this proposal would provide much needed funding to upgrade infrastructure that would replace fish screens constructed in the 1940s with new fish screens and components meeting state and federal standards.

This project proposes to replace the fish screens at the NUID main canal intake located on the mainstem of the Deschutes River in Bend, Oregon. With the addition of the North Canal Dam fish ladder in 2017, these new fish screens will further and support fish movement along the Deschutes River and reduce fish becoming stranded in irrigation canals, promoting both the sustainability of native fish species as well as enhancing fishing and recreational opportunities in Central Oregon.

We ask that you please support funding for the North Unit Irrigation District Fish Screen Replacement Project to reinforce the ongoing efforts in the Deschutes to restore ecosystem function at a basin-wide scale. This effort in concert with flow restoration initiatives and habitat restoration efforts are essential to improving the health of our aquatic ecosystem in Central Oregon.

Thank you for your consideration.

Sincerely,

A handwritten signature in blue ink that reads "Kris W. Knight".

Kris Knight
Executive Director
Upper Deschutes Watershed Council



May 31, 2023

To Bureau of Reclamation grant review team:

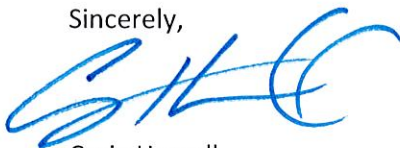
As President of the Deschutes Basin Board of Control (DBBC), I am writing today in support of North Unit Irrigation Districts (NUID) application for the 2023 Bureau of Reclamation WaterSMART: Aquatic Ecosystem Restoration Program.

The DBBC is comprised of the eight irrigation districts in rural Central Oregon that are critical to conveying water supplies throughout the Deschutes Basin to over 7,600 farm and ranch families, schools, and local parks and recreation districts. In addition, the DBBC has a long history of working collaboratively with local and regional interests to restore and improve fish and wildlife habitat.

In partnership with NUID, DBBC districts completed construction of the North Canal Dam Fish Ladder in 2017. The North Canal Dam Fish Ladder is adjacent to the NUID main canal diversion and new fish screens would greatly contribute to the restoration of watershed connectivity while supporting fish movement along the Deschutes River. New fish screens at the NUID main canal diversion will complement the fish ladder by promoting the sustainability of native fish species up and down the Deschutes River.

The NUID fish screen project is one of many restoration projects in the Deschutes Basin and is an important component of ongoing regional collaborative efforts to restore habitat for aquatic species in the region. We ask that you please support funding for the North Unit Irrigation District Fish Screen Replacement Project to reinforce the ongoing efforts in the Deschutes Basin to restore ecosystem function at a basin-wide scale.

Sincerely,



Craig Horrell

PO Box 919 - Madras, OR 97741

Deschutes Basin Board of Control Member Districts

*Arnold Irrigation District • Central Oregon Irrigation District • Lone Pine Irrigation District • North Unit Irrigation District
Ochoco Irrigation District • Swalley Irrigation District • Three Sisters Irrigation District • Tumalo Irrigation District
DBBC President - Craig Horrell, 541-548-6047; chorrell@cod.org*



Jefferson County Soil and Water Conservation District

625 SE Salmon Ave, Ste 6 Redmond, OR 97756
(541) 699-3170 www.jeffswcd.org

May 25, 2023

To Bureau of Reclamation grant review team:

Jefferson County Soil and Water Conservation District (JCSWCD) is writing in support of North Unit Irrigation Districts (NUID) application for the 2023 Bureau of Reclamation WaterSMART: Aquatic Ecosystem Restoration Program.

The JCSWCD promotes resource management that benefits watershed health and economic viability. As allies, NUID and the JCSWCD have collaborated on many projects such as this one, each providing multifaceted benefits to water quality, water efficiency, operational control, and ecosystem health.

This project proposes to replace the fish screens at the NUID main canal intake located on the mainstem of the Deschutes River in Bend, Oregon. This project will remove the existing screens and other related components, constructed in the 1940's, at the canal intake and replace with new screens and components that are in compliance with state and federal standards. This fish screen project will also provide cleaner irrigation water for growers which improves on farm operation through reduced maintenance and ease of delivery.

With the addition of the North Canal Dam Fish Ladder in 2017, adjacent to the NUID fish screens, these new fish screens will contribute to the restoration of watershed connectivity and support fish movement along the Deschutes River, promoting both the sustainability of native fish species as well as enhancing fishing and recreational opportunities in Central Oregon.

We ask that you please support funding for the North Unit Irrigation District Fish Screen Replacement Project to reinforce the ongoing efforts in the Deschutes to restore ecosystem function at a basin-wide scale. The fish screen project is one of many restoration projects in the Deschutes Basin and is an important component of ongoing regional collaborative efforts to restore habitat for aquatic species in the region.

Sincerely,

Staci A. Merkt

Staci Merkt

District Manager