Nevada Irrigation District

December 14, 2021

Ellen Roots McBride, M.S.
Sacramento River Basin Branch Chief, California
Central Valley Office
NOAA Fisheries
650 Capital Mall, Suite 5-100
Sacramento, CA 95814

Via email: Ellen.McBride@noaa.gov
Via certified mail: USPS 7020 0640 0000 4543 7934

RE: Nevada Irrigation District Hemphill Diversion Fish Passage Project (Project) Draft Design Concept Report -- Response to written comments received CDFW (November 23, 2021) and NOAA/NMFS (November 24, 2021)

Dear Ms. McBride:

Thank you for the review and comments on the Draft Design Concept Report. Please find the attached responses to the comments. As you may be aware, responses to verbal comments received during the Concept Review meeting on November 15, 2021, were posted online under the Project. You should have received an email indicating the updates to the Project website.

The Project team would like to review the comments, responses, fish screen, and current project status with your team and CDFW's team. We will be sending out a Zoom meeting invitation for Tuesday, December 21, 2021, at 9:30 am. The goal is to address the agencies' comments and concerns in a timely fashion before advancing on the design while maintaining a timeline for construction by Summer 2022.

We appreciate NMFS feedback and commitment to implementing a successful project. We acknowledge that the timeline is aggressive, but its pace will keep us on track to implement a successful and agreed-upon Project in time for Fall 2022. If you have any questions or concerns, please feel free to reach out to me by phone at 530-271-6815 or email me at herrera@nidwater.com.

Thank you for your consideration of this request.

Sincerely,

Tonia M. Tabucchi Herrera

Tonia M. Tabucchi Herrera, PE
Senior Engineer

Enclosure (1): McMillen Jacobs response to comments dated December 13, 2021

Cc: File and NID website
Greg Jones, Nevada Irrigation District, jonesg@nidwater.com
Doug Roderick, Nevada Irrigation District, roderick@nidwater.com
Chris Stabenfelt, ECORP Consulting, cstabenfeldt@ecorpconsulting.com
Dave Thomas, ECORP Consulting, dthomas@ecorpconsulting.com
Hannah Stone, ECORP Consulting, hstone@ecorpconsulting.com
Mark Morse, ECORP Consulting, mmorse@ecorpconsulting.com
Gregg McKenzie, Placer County Conservation Program Administrator, gamckenz@placer.ca.gov
Brett Grosko, Department of Justice, brett.grosko@usdoj.gov
Patrick Carroll, NOAA Office of General Counsel, patrick.f.carroll@noaa.gov
Paul Ortiz, NOAA Office of Law Enforcement, paul.ortiz@noaa.gov
Beth Lawson, California Department of Fish and Wildlife, beth.lawson@wildlife.ca.gov
Jean Castillo, NOAA NMFS, jean.castillo@noaa.gov
Neal McIntosh - NOAA NMFS, neal.mcintosh@noaa.gov

Comment Response Memorandum

To:	Tonia M. Tabucchi Herrera, PE	Project:	Hemphill Diversion Project
From:	Jon Burgi, PE	cc:	File
Prepared by:	Jon Burgi, PE Kevin Jensen, PE	Job No.:	21-125
Date:	December 13, 2021		
Subject:	Response to comments received from CDFW and NMFS on the Hemphill Diversion Structure - Draft Concept Design Report		

1.0 Introduction

The purpose of this memorandum is to provide responses to comments on the Draft Concept Design Report and Drawing that were received from California Department of Fish and Wildlife (CDFW) on November 23, 2021, and the National Marine Fisheries Service (NMFS) on November 24, 2021. Comments are shown below, with responses provided in italics.

2.0 CDFW

Comments from CDFW were separated into three sections – Overall Comments, Farmer's Fish Screen Concept, and Roughened Ramp Fishway.

2.1 Overall Comments

- At 50% design, among the other design plans that will be included, we would also expect to see specific details regarding:
    - Hydraulic analysis that shows how often the CDFW fish screen criteria is met;
    - Bypass flow hydraulic analyses that detail entrance, exit and in-pipe conditions for fish;
    - An operations plan that will outline how the fish screen and control gate will operate including details regarding sediment and debris passage.

Response: 50% design submittal will include hydraulic analysis of the head gate, entrance channel, fish screen, exit, and bypass. Additionally, an O&M manual will be prepared at a 50% level addressing operations of the head gate and fish screen. It is anticipated that the O&M manual will include description of flow conditions in Auburn Ravine that will need to be met prior to diverting water into Hemphill Canal for the protection of fish in the Roughened Channel, as well as over the horizontal screen and bypass. The O&M Manual will also discuss maintenance of the screen, including clearing of debris and sediment.

- The CDFW engineering checklist sections for fish screens and roughened channels should be completed and questions that arise can be discussed during future design meetings, or in writing along with 50% design drawings. The most recent version of the engineering checklist is attached.

Response: We have received the checklist and will use the applicable sections in guiding future design meetings, calculations, and preparation of the 50% design package.

2.2 Farmer's Fish Screen Comments

- In the presentation on 11/15/2021, NID's engineering contractor's presentation indicated that using NMFS criteria, and approach velocity of 0.25 ft/sec or less was appropriate for horizontal screens. However, CDFW's criteria specify that screens that are not self-cleaning should have one fourth the velocity outlined in Section B, which would indicate approach velocities of no greater than 0.1 ft/sec, which also affects screen sizing calculations.

Response: As design moves forward, approach velocity will be adjusted to 0.1 fps.

- NID should provide hydraulic modeling as well as operating instructions to justify how the proposed screen area will be consistently maintained and kept clear of debris and sediment.

Response: Screen maintenance (including clearing of debris and sediment) will be defined in the O&M manual. Discussions with stakeholder agencies will also take place in regard to debris and sediment loading on the proposed screen relative to existing canal conditions.

- Using NOAA's criteria for horizontal screens (11.6.1.7.7) NID should provide calculations and operations information that describe how the head gate at the diversion structure will be used throughout the range of flows during diversion season to either maintain one foot of depth or shut off diversions.

Response: NMFS criteria for depth of bypass flow of one foot will be maintained. It is important to note that the Farmer's screen is designed with a weir wall that controls the depth of flow. While in operation, flow cannot pass through the fish screen if there is less than one foot of water over the screen. If flows entering the fish screen decrease, the effect is seen in the amount of flow entering the canal, not the amount of flow or depth of flow passing the screen and entering the bypass. Operations information will be provided for the head gate to guide NID in the operation of the system.

2.3 Roughened Ramp Fishway Comments

- In the design proposed by NID, both of the NOAA criteria for slope and length are met, but additionally the criteria specify that: "It should be demonstrated in the design analysis that any scouring of fines from the constructed channel will be refilled by subsequent bedload transport and aggradations." How will NID use modeling or other quantitative calculations to determine that scour/fill in the constructed channel will remain in equilibrium without need for continual refurbishment?

Response: Sediment transport calculations in Auburn Ravine will be prepared as part of the 50% design package. Finer material (gravels with some sand) would be placed in the constructed channel as filter material. As such, the material will be placed beneath the larger rock material exactly to counter-act winnowing/scouring of material from the natural bed. Any similar material located on top of the rock

ramp will have been tranported from upstream and deposited at low flow. This material could be scoured out during high flows. However, such a natural sequence of deposition and scour would be expected to repeat from one year to the next. Furthermore, the rock ramp is currently understood to be a transport channel and is not expressly intended to provide spawning or rearing habitat.

- The guidance in the Habitat Restoration Manual calls for slope of rock ramps to be lower than 4%. Although NOAA guidelines allow slope using stream simulation for designs up to 6%, is there a possibility to extend the ramp in this location to be longer than 150' and provide a lower slope?
    - For nearby reference, the slope of the Lincoln gaging station is a 4% slope with 187 feet length.
    - Another consideration is a possible gradual transition to the 4.5% rock ramp to avoid a big water surface drop during the transition from elevation head to velocity head (for example, a pool and chute ladder where the second weir is often at the same elevation or higher than the first one).

Response: Current design meets NMFS criteria. To meet the guidance from CDFW, the length would exceed criteria for NMFS. It appears that this is a possible solution given the precedence at the Auburn Ravine Gaging station. NID will work with NMFS and CDFW to adjust the slope and length.

- The drawing designates the material in the rock ramp as "rip rap." The proposed size of rock mix for use in the ladder should be described in the 50% design and should reference equations and guidance in the "Sizing the Engineered Streambed Material" section of the Habitat Restoration Manual.

Response: Specifications for the material that will make up the roughened channel will be prepared for the 50% design package and will reflect the sizing of engineered streambed material as presented in the Habitat Restoration Manual. All references to riprap will be replaced with river rock or natural stone to better reflect the smoother, more rounded nature of material used on the roughened channel.

- Although the 95% exceedance for flow at the NID - BR200 (1995 – 2021) was 13.3 cfs, flows lower than 13.3 cfs should considered during the design process. Examination of this gage data indicates that during fall-run Chinook and steelhead migration season, flows in Auburn Ravine at this location can be as low as 5 cfs.

Response: Yes, there are flows below the 95% exceedance of 13 cfs. As the design of the roughened channel and low flow channel move forward, they will be modeled and a stage-discharge relationship will be developed to identify the water surface elevation at the head gate that is needed to keep 1 foot of depth in the low flow channel.

- Flow bypass through the fish screen will be routed back to the river *below* the roughened rock ramp. Please describe how flow will be split between the ladder and the fish screen/bypass during irrigation season.

Response: As summarized in the previous response, based on flow modeling, maintaining 1 foot of depth in the low flow channel, maintaining 1 foot of depth over the horizontal screen and maintaining required flow for the bypass – direction will be provided in the O&M manual guide NID in the operations of the Hemphill Diversion, and to determine the amount of water that must be placed in Auburn Ravine in order to meet Hemphill Canal demands.

3.0 NMFS

Comments from NMFS were provided in introductory text, Horizontal Screens, and general questions sections.

3.1 Introductory questions

- NMFS has concerns with moving from a conceptual design for the horizontal screen directly to a 50% design within the next four weeks without the recommended collaborative process agreed upon in early 2021 meetings with NID.

Response: We agree that a collaborative process moving forward will not only aid in meeting the tight schedule but will provide a more successful project. As such, we suggest a meeting in mid-December to update NMFS and CDFW on the advancement of the design.

- In addition to establishing a meeting schedule with NMFS, we request that NID provide a detailed schedule outlining the 50-, 90-, and 100% design submittal packages, permitting timeline, and in-water construction dates.

Response: Updated design schedule is being prepared. The next deliverable (50%) will be delivered to NID on January 12th. The updated design schedule will be emailed to all that attended the Design Concept Review meeting and made available on NID's website. Permitting timeline is dependent on NID's inclusion as a special participating project for the Placer County Conversation Program (PCCP). In water construction dates are also dependent upon permit conditions but based on the conditions in the PCCP we expect in water work to occur between June 1st and October 31st.

- The horizontal screen design process submittals must include modeling to demonstrate that sufficient hydrologic and hydraulic conditions are favorable at this location, in order to ensure that the facility will provide safe, timely, and effective passage for fish.

Response: Hydraulic calculations are being prepared for the roughened channel as well as the horizontal fish screen and bypass. These calculations will define the required water surface elevations and associated flow rates that will be needed in the roughened channel, fish screen and bypass in order to meet the desired flow in Hemphill Canal. Operationally, this will guide NID in regards to the flow rate that is must be placed in Auburn Ravine upstream of Hemphill so that safe, timely and effective fish passage is provided. The operational flow rates will be reflected in the O&M Manual.

- The criteria tables in the CDR list some metrics for juveniles and adults, but do not provide details of capabilities for juveniles (i.e., swimming speeds). Given that peak spawning for steelhead is between January to March, there could be rearing/migrating juveniles smaller than 100mm present during the irrigation season. All juveniles, and especially smaller ones, will have reduced capabilities compared to adults.

Response: The proposed fish screen will be located behind a head gate that will be closed from January to March. To meet CDFW criteria, approach velocity for Horizontal Screen will be reduced to 0.1 fps.

- Fish Screen #2 for future expansion is shown on the plan set. Please clarify if it is being built now and just not used or if it will be phased in at a future date. If it is being phased in, when is the second screen proposed to be built?

Response: Only one fish screen will be installed as a part of this project. There is currently no schedule for when the second screen would be built. 50% design package will only show one screen.

3.2 Horizontal Screens

3.2.1 Section 11.6.1.7.2 Hydrologic and Hydraulic Analysis

- Flow Splits: Please provide what the flow split will be between the canal (horizontal screen diversion flow plus bypass flow with adequate depth on the screen) and the roughened ramp for the daily low flow during the irrigation season. Identify splits for the single 10 cfs screen and the full proposed future build out for 20 cfs.

Response: Hydraulic analysis being prepared for the 50% design package will identify the flow that is required in the roughened channel to meet flow depth criteria of 1 foot and the flow that is required to meet bypass depth and flow criteria at normal canal flow rates.

- Is there sufficient stream flow (down the ramp) and screen bypass flow available at all times during irrigation season when the horizontal screen is in use for both the single 10 cfs screen and the full proposed future buildout for 20 cfs?

Response: NID understands that irrigation diversions are limited by the flow in Auburn Ravine. Additional users (City of Auburn, PCWA, PGE) exist in Auburn Ravine such that there will be flows past the diversion point along the roughened channel. The hydraulic conditions and water surface elevations will be defined in the O&M manual to guide operation of the system.

3.2.2 Section 11.6.1.7.5 Flow Regulation

- Please provide design details for the proposed headgate and its operational schedule for regulating flows on the horizontal screen and bypass.

Response: Design of the headgate will be included in the 50% design package. O&M manual will have guidelines for operation of the headgate and screen.

3.2.3 Section 11.6.1.7.6 Channel Alignment

- Please provide a hydraulic analysis for the approach flow conditions in the conveyance channel.

Response: Hydraulic analysis will be provided for the approach flow conditions in the conveyance channel.

- What is the length of the inlet flume? Is it adequate to provide a smooth hydraulic transition to the screen face?

Response: Length of inlet flume will be determined in 50% design process. It will be adequate to provide a smooth hydraulic transition to the screen face.

3.2.4 Section 11.6.1.7.7 Bypass flow Depth

- Please provide hydraulic analysis that demonstrates the minimum depth of 1 foot will be achieved at all times during irrigation season over the downstream end of the screen.

Response: Hydraulic analysis will be provided. The design of the Farmers screen includes a weir wall that the water must overtop prior to flowing into the canal. This weir wall will be designed to provide at least 1 foot of depth over the entire horizontal screen during operations.

- How will the bypass for fish screen #1 and #2 be coordinated? How will the depth change when screen #2 is put online?

Response: Only one fish screen will be installed as a part of this project. 50% design package will only show one screen.

3.2.5 Section 11.6.1.7.8 Bypass Flow Amount

- Please provide hydraulic analysis that shows how the required bypass flow amount will be achieved.

Response: Hydraulic analysis will be completed demonstrating the rate of flow and the depth of flow criteria for bypass will be met.

- How will the bypass for fish screen #1 and #2 be coordinated? How will the additional flow amount change the hydraulics in the pipe and at the outfall?

Response: 50% design package will show that the future fish screen #2 will have a separate and independent bypass. This project will construct only fish screen #1 and its bypass.

3.2.6 Section 11.6.1.7.9 Diversion Shut Off

- Table 2-4 states manual control is sufficient. Please clarify how this meets the automated Diversion Shut Off requirement

Response: Headgate design will be prepared in the 50% design package. The referenced Table 2.4 in the Concept Design Report is referencing NID canal and diversion criteria – not NMFS criteria.

3.2.7 Section 11.6.1.7.10 Sediment Removal

- As outlined in NMFS' comments in the EIR dated May 17, 2021, Northwest Hydraulic Consultants, Inc.'s (NHC) 2021 report titled "Hemphill Diversion Structure and Fish Passage Assessment – Final Report (NHC-Final Report) states on page 26, regardless of the final fish screen design, we [NHC] recommend conducting a hydraulic analysis of the preferred alternative to understand the hydraulics and sediment transport in and around the screen. NMFS agreed with NHC's recommendation to

conduct a hydraulic analysis of the preferred alternative to understand the hydraulics and sediment transport in and around the screen. Given the geologic conditions along Auburn Ravine, and the observed sediment accumulation, plugging of the horizontal screen is a consideration that should be addressed.

Response: The referenced NHC report briefly considered two fish screening options. Flat plate (i.e., a vertical flat plate) and cone screens, both of which would be located in the Auburn Ravine channel and exposed to the sediment loading of the ravine. The proposed location of the horizontal screen in the Hemphill Canal limits the sediment load to the sediments that would enter the canal. Since the crest of the roughened channel will be approximately the same as the crest of the existing concrete structure, and the proposed headgate location is not significantly changing, the sediment load in the canal will not significantly change.

- Please provide the results of the hydraulic and sediment analysis for the Horizontal Screen.

Response: Analysis will be provided for the hydraulics and sediment

- Please describe the sediment removal and cleaning system and the likelihood of small sediment being lodged in the openings in the screening material.

Response: Sediment removal system will be further developed in the 50% design package. O&M manual will address cleaning of the screen during irrigation flow and in the off season.

- Include in the maintenance and operation plan how the water to the canal will be shut down if the screen needs to be cleaned during fish migration periods to not trap/strand fish.

Response: O&M manual will describe cleaning of screen during irrigation season as well as in preparation for irrigation season.

3.2.8 Section 11.6.1.7.11 Screen Approach Velocity

- Following CDFW criteria for screens that are not self-cleaning, allowable approach velocity should be less than 0.1 ft/sec, lining up with NMFS' findings from prototype type development.

Response: Approach velocity of 0.1 fps will be used to size the horizontal screen.

3.2.9 Section 11.6.1.7.12 Screen Sweeping Velocity

- Please provide hydraulic and bedload analysis through the canal to demonstrate the required sweeping velocity is adequate or if additional flow may be required.

Response: Hydraulic analysis will be provided addressing sweeping velocity.

3.2.10 Section 11.6.1.7.13 Screen Cleaning

- Please provide hydraulic analysis and modeling that demonstrates sweeping flow for a passive screen will provide similar cleaning and hydraulic characteristics to a successful prototype.

Response: Hydraulic analysis will be provided demonstrating adequate sweeping velocity similar to a successful prototype.

3.2.11 Section 11.6.1.7.14 Inspection, Maintenance and Monitoring

- Please provide a fully developed Inspection, Maintenance and Operating and Monitoring plan with the 50% design.

Response: Maintenance, Operations, and Monitoring will be included in the O&M manual.

3.3 General Questions

- Questions related to the pipe between the head gate and canal
    - Will the new 24-inch pipe be under pressure flow at any time?
    - How will the inlet flume and the future fish screen be coordinated?
    - What are the velocities coming out of the 24-inch pipe?
    - Will the canal bank need to be enforced for any scour potential at the outlet of the 24-inch pipe?

Response: The 24" pipe design was prepared for the concept design. The size and layout will likely change in the development of the 50% design package. Hydraulic analysis will be provided for this connection between the headgate and fish screen. All hydraulic criteria for the bypass pipe and outfall will be met, as demonstrated by these forthcoming analyses.

- Table 2-6 shows the bypass flow as 5% of the total diverted flow citing section 11.9.3.4. For the Horizontal Screen Section 11.6.1.7.8 Bypass Flow Amount states, for diversion rates less than 100 cfs about 15% of the total diverted flow should be used as bypass flow for horizontal screens. Small horizontal screens may require up to 50% of the total diverted flow as bypass flow. Please use the bypass flow criteria found in the section for horizontal screen design.

Response: Bypass flow will be provided to meet the hydraulic conditions specified. The flow rate for the bypass flow will be analyzed along with the rest of the hydraulic analysis for the horizontal screen.

- Please show the juvenile bypass outfall location in the profile for the rock ramp on the drawing.

Response: Juvenile bypass outfall will be shown in profile in the 50% design package

- What is the velocity in the scour pool by juvenile bypass outfall at the end of the rock ramp?

Response: Juvenile bypass outfall will be located where flow is >4 fps during smolt outmigration.

- Please provide a cross-section that shows the low flow channel in the rock ramp.

Response: Roughened Channel cross section will be shown in 50% design package

- What is the flow capacity of the canal?

Response: Current flow in the canal is approximately 6 cfs (240.5 Miners Inches). Hemphill Canal master plan flow is currently at 18 cfs. However, based on historical usage, NID does not anticipate reaching master plan flows.

- How wide and how long is the horizontal screen?

Response: The screen size will be shown in the 50% design package.

- When Screen #2 is put online, will there be flow control to shut one of the screens down if flows are low or maintenance needs to be performed?

Response: Yes, the screens would be operated independently allowing for one screen to shut down for maintenance if needed.

- If the boulders need to be anchored what is the method that will be used?

Response: Uncertain at this point. Hydraulic calcs being prepared for the 50% design package will guide the sizing of the boulders and indicate if anchoring is needed.