Provo River Delta Restoration Project Proposed Modifications

Environmental Analysis and Categorical Exclusion

Background

The Provo River Delta Restoration Project (PRDRP) is an essential action needed to recover the threatened June sucker, a species native to Utah Lake. Construction on the project began in 2020 (Figure 1) and is scheduled for completion in 2024. When finished, the project will restore habitat in the lower Provo River and its interface with Utah Lake that is needed for young June sucker to survive. The decision to construct the PRDRP was made in 2015 when the Utah Reclamation Mitigation and Conservation Commission (Mitigation Commission), the U.S. Department of the Interior Central Utah Project Completion Act Office (DOI), and the Central Utah Water Conservancy District (District) (collectively the Joint Lead Agencies or JLA's) issued a Final Environmental Impact Statement (FEIS) and Records of Decision (RODs).

The need to modify several aspects of the project from how they were described in FEIS and RODs have become apparent. The reasons for the modifications are twofold:

1. Environmental Impact Statements describe projects in sufficient detail to analyze and compare the anticipated environmental impacts of different alternatives. The primary purpose of which is to provide decision makers with the information they need to make informed decisions based on the consequences of different courses of action. After a decision is made through a ROD, final designs and specifications are often made for the selected alternative. It is not uncommon for design changes to be recommended during final design of the selected alternative.
2. New information and circumstances may change from the time of the ROD and the time of actual construction that warrant changes.

Federal agencies are required to prepare a supplement to their final EIS if they determine that the proposed changes approved in the ROD are substantial. Alternatively, if the agency determines that the proposed changes are minor and do not result in significant impacts on the environment, then the federal agency can prepare a more streamlined environmental analysis that is "Categorically Excluded" from a more detailed environmental review. The JLA's have evaluated the modifications to the PRDRP relative to how they were described in the FEIS and ROD and believe the changes fall into actions that are "Categorically Excluded" from a more detailed environmental review.

Public Participation and Opportunity to Comment

The purpose for this document is to:

1. Describe the proposed modifications to the PRDRP relative to how they were described in the FEIS and ROD; and
2. Make available for public review and comment the Categorical Exclusion and Environmental Analysis that evaluates the significance of the proposed modifications relative to what was described in the FEIS and RODs. Questions and comments can be submitted by email to urmcc@usbr.gov between now and June 30, 2022.


Figure 1
Outlet Channels Constructed December 2021 - January 2022
Provo River Delta Features Constructed March 2020 - November 2021 (imagery Nov 2021)
Berm Construction Along South Boundary of Project Area
Channel Construction 2022
Small Downstream Dam
Figure 2 Detail Area
N 3110 W
W 1390 N
N Lakeshore Dr
Lakeview Parkway
620 N
Boat Harbor Dr
Oxbow Park
Lakeshore Dr
W Center St
Gamesfield Park
Esri Community Maps Contributors, County of Utah, Utah AGRC, Esri, HERE, Garmin, FAO, NOAA, USGS, Bureau of Land Management, EPA, NPS, US Census Bureau, USDA

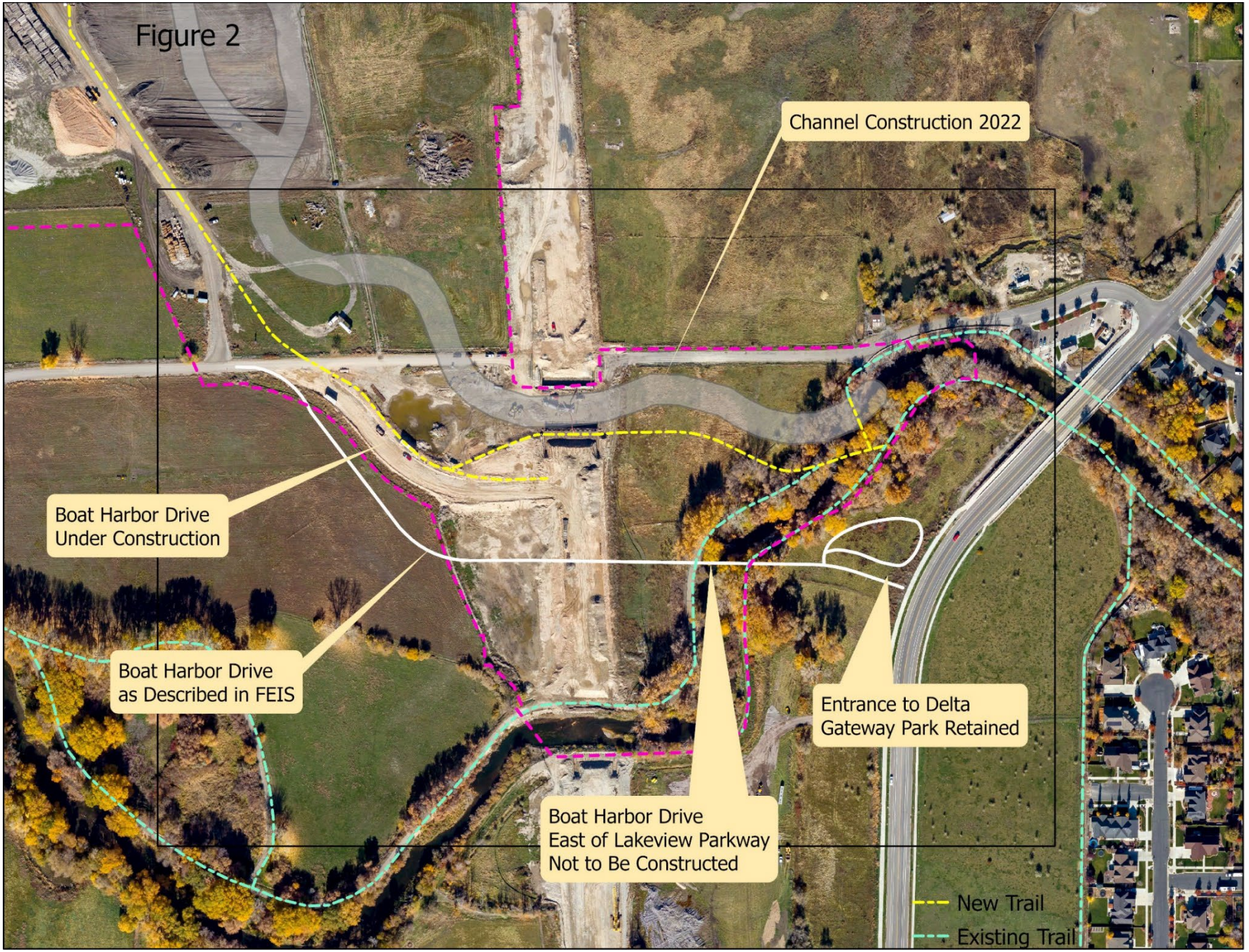
Figure 2
Channel Construction 2022
Boat Harbor Drive
Under Construction
Boat Harbor Drive
as Described in FEIS
Entrance to Delta
Gateway Park Retained
Boat Harbor Drive
East of Lakeview Parkway
Not to Be Constructed
New Trail
Existing Trail

Environmental Analysis of Proposed Modifications to FEIS and ROD

The proposed modifications, reasons for them and the anticipated environmental impacts are described below.

1. Boat Harbor Drive Realignment

The FEIS and RODs described a need to realign Boat Harbor Drive to the south of its current location and to connect it to Lakeshore Drive as shown in Figure 1 and Figure 2. The underlying objective of realigning Boat Harbor Drive was the need to maintain two forms of access to and from Utah Lake State Park (via Center Street and Boat Harbor Drive). At the time of the FEIS and RODs, the future of the Lakeview Parkway was uncertain. In December 2016 Provo City amended its Major and Local Street Plan to extend 620 North Street from Lakeshore Drive in a westerly direction to connect to the planned Lakeview Parkway. The 620 North Street extension was completed in 2018 as shown in Figure 1 and connects to Lakeshore Drive only 0.36 mile north of the connection point described in the FEIS. Because of the proximity of the constructed 620 North Extension to Lakeview Parkway to the planned connection described in the FEIS, it became apparent that this alignment would provide the north side access to Utah Lake State Park and maintain two forms of access to Utah Lake State Park. Extending Boat Harbor Drive all the way to Lakeshore Drive as described in the FEIS would be redundant.

Proposed Modifications

For the reasons described above, the JLAs propose to terminate Boat Harbor Drive at Lakeview Parkway as shown in Figure 2. An access driveway from Lakeshore Drive to the planned Provo River Delta Gateway Park (referred to as the PRDRP Lakeshore Drive Trailhead/ recreation access parking area in the FEIS and RODs) will still be constructed as described in the FEIS and RODs; however, it will not connect to the Lakeview Parkway and will instead terminate at the planned Provo River Delta Gateway Park.

Environmental Effects of the Proposed Modification – Boat Harbor Drive Realignment

Connecting Harbor Drive to the Lakeview Parkway in lieu of connecting Harbor Drive to Lakeshore Drive eliminates the need to construct a third vehicular bridge crossing over the existing Provo River channel within a distance of 0.3 river miles. This eliminates the need to construct approximately 550 feet of roadway east of Lakeview Parkway. The proposed modified alignment would reduce impacts to the river channel, reduce roadway construction and long-term operation and maintenance costs, and leave the area which would have been developed for this section of the roadway as open space.

2. Reduced Elevation of the South Boundary Berm

The FEIS and RODs indicated that a berm would be constructed along the boundary of property acquired for the delta restoration portion of the project, as needed to protect adjacent non-acquired lands from flooding as shown in Figure 1. The berm was to be constructed at an elevation of 4,495’ (NGVD29) to provide protection during a 100-year flood event. At the time of the FEIS and RODs in 2015, the FEMA-designated Utah Lake flood level was 4494.5’. In September 2021, the Utah Division of Emergency Management completed a draft report and maps that re-analyze Utah Lake flood hazards to account for modern conditions and water control features e.g. dams, pumps, etc. (AECOM 2021). The 2021 maps for the Provo River Delta project area revise the Utah Lake 100-year flood elevation downward to 4492.7’ (NGVD29); this revised value is 1.8’ lower than the flood level used in the 2015 FEIS and RODs to determine the design elevation for the berm.

Proposed Modifications

For the reasons described above, the JLAs propose to construct the south boundary berm to elevation 4,494 feet (NVGD 29 Vertical Datum), one foot lower than described in the FEIS and RODs and consistent with the revised flood hazard mapping. The proposed change would only affect the portion of the berm between Boat Harbor Drive and the Skipper Bay Dike where lake flooding, rather than river flooding, creates the higher 100-year risk.

Environmental Effects of the Proposed Modification – South Berm Elevation

Reducing the height of the South boundary berm to an elevation of 4,494' would still protect adjacent property owners from a 100-year Utah Lake flood based on the revised 2021 flood hazard mapping. The lower elevation would result in a reduced berm footprint and construction of the berm would require less labor, materials and time saving more than $150,000 in construction costs. Visual impacts of the berm would be reduced by reducing the berm height and width.

3. Flow Allocation to Existing River Channel

Under the Selected Action described in the FEIS and RODs, the existing Provo River channel will remain in place. Most of the flow of the Provo River will be diverted into the new river delta but a portion of the total flow would continue down the existing channel. Additionally, a small dam will be constructed at the downstream end of the channel near Utah Lake State Park (Figure 1). The small dam, flow and water level management will regulate the elevation of the Provo River in the existing channel at a relatively constant water level which will provide more reliable and safer recreation access, will be more aesthetically pleasing during all seasons of the year and will facilitate management of this reach of the river as a sport fishery. Separating the existing channel area from Utah Lake with a small dam also prevents June sucker from potentially attempting to reach spawning areas through the old channel, which will no longer provide access to spawning areas.

The FEIS and RODs described how flow and water level in the existing Provo River channel would be managed post PRDRP construction as follows:

1. "The existing river channel will…be provided with a guaranteed flow of 10 to 50 cfs **depending on the volume of flow in the river as illustrated in Table 2-1**."
2. "the first 10 cfs and up to 50 cfs is delivered to the existing lower Provo River channel to help maintain aesthetics, water quality, and recreational values."
3. "[The small downstream dam] would allow for a stable water elevation of approximately 4,489 to 4,490 feet in the existing channel, creating a linear 'pond'…"

Table 2-1 from the FEIS is summarized below (Table 1); it describes that flow allocated to the existing channel would be 10% of the total available river flow with a minimum flow commitment of 10 cfs and a maximum of 50 cfs.

Table 1. Allocation of Provo River flow to new river delta and existing channel (as per FEIS Table 2-1).

TOTAL RIVER FLOW	FLOW ALLOCATION TO EXISTING CHANNEL	FLOW ALLOCATION TO NEW DELTA
Less than or equal to 100 cfs	10 cfs	Remainder of total flow (0 to 90 cfs)
Between 100 and 500 cfs	10% of total river flow (~11 cfs to 50 cfs)	90% of total river flow (~90 cfs to 450 cfs)
Greater than 500 cfs	50 cfs	Remainder of total flow (>450 cfs)

Need to Modify Flow Allocation

Since completion of the FEIS and signing of the RODs, the JLAs assembled a design team that has been preparing and evaluating design concepts for various PRDRP elements. During the course of this process, the JLAs performed a Value Engineering (VE) Study. A VE Study is performed to take a critical and objective look at proposed designs and plans by an independent assemblage of subject matter experts (the VE Team). The VE Team identified significant concerns that the detailed flow allocation requirement (Table 1) creates with respect to meeting project objectives and developing effective engineering designs for project features. The difficulty with the Table 1 allocation schedule is not necessarily the requirement to provide a minimum of 10 cfs to the existing channel; rather, the difficulty lies with the rigid requirement to deliver more than 10 cfs based solely on total river flow. Operating in this manner would require extensive and expensive metering of the total river flow, and bypasses to the existing channel. It would require automated gates on the diversion structure that would of necessity adjust many times during a 24-hour period as total river flow would vary hourly or more frequently.

This distribution pattern of 10% of total river flow, up to 50 cfs, would also be made without regard to other important conditions such as the amount of sediment and debris in the river water, the level of Utah Lake, flooding or maintenance concerns, or the June sucker larval drift period. The VE Team also could not identify any positive effect on water quality from delivering greater than 10 cfs into the existing channel and identified a concern that adding sediment-laden water to the existing channel could exacerbate water quality and sedimentation problems. Discussion of these various concerns is provided below.

Larval June Sucker Entrainment

The underlying need for the PRDRP is to facilitate the recovery of June sucker. The flow allocation described in Table 1 restricts the flexibility to limit the entrainment of drifting larval June sucker into the existing river channel where they have very limited survival rates. Allowing unacceptable levels of larval June sucker to drift down the existing channel is diametrically opposed to the purposes for which the PRDRP is being constructed.

Larval drift occurs only during a limited time frame of about 3 weeks in duration, typically during June, and over 90% of daily drift occurs at night between 10 pm and 2 am. Operational flexibility with regards to flow allocation during this critical but limited time frame (less than 1% of the time) would provide the JLAs with an important additional tool to minimize larval entrainment into the existing river channel.

High Lake Level/Flooding

Delivery of 10-50 cfs required by the flow allocation table has the potential to exacerbate flooding problems along the existing Provo River channel when Utah Lake levels are higher than 4491.5’ in

elevation. Delivering the entire river flow of the Provo River into the new delta would be preferable from a flood management standpoint rather than delivering up to 50 cfs to the existing channel when adjacent properties are being flooded.

Water Quality

Water quality improvement and maintenance is expected to be achieved by using the aeration system that will be installed in the existing channel. The aeration feasibility report completed in support of the FEIS indicates that aeration efficiency and effectiveness are maximized when inflow of water is minimal and the time it takes to move through the river channel is long. At high inflow rates, new water is continuously needing to be treated, while at the same time additional nutrient and sediment loads are being discharged into the existing channel.

The flow allocation table requires that flows of 10 cfs and higher will need to be delivered to the existing channel even if flow inputs of this magnitude prove to be detrimental to aeration effectiveness. Additionally, requirements limit the flexibility to deliver high pollutant load water to the new delta area where it could spread out into the floodplain wetlands and be filtered rather than into the existing channel and Utah Lake where they would be detrimental to water quality. Inflow loads of suspended sediments, organic matter, nutrients, and other pollutants associated with 50 cfs is more than 5 times higher than at 10 cfs.

Proposed Modifications

The JLAs propose to replace the flow allocation table described in the FEIS with the following adaptive plan for delivering river flows to the existing Provo River channel.

Table 2. Summary of proposed modifications to flow allocation

CONDITIONS	FLOW ALLOCATION TO EXISTING CHANNEL	FLOW ALLOCATION TO NEW DELTA	FREQUENCY
All typical conditions	10 cfs	Remainder of total river flow	Vast majority of time
Only when/if stakeholders decide higher flows are desired to facilitate maintenance of existing channel or small downstream dam; see full discussion for details	Up to 50 cfs	Remainder of total river flow	Rarely (once/year or less) and briefly (2-3 day duration)
When/if project leads determine too many larval June sucker are being entrained into existing channel; see full discussion for details	Less than 10 cfs	Remainder of total river flow	Rarely (Only during active larval drift period which is less than 1% of time, or during rare flooding or maintenance events)

Typical Conditions – 10 cfs to existing channel

Under all typical conditions, 10 cfs will be delivered to the existing river channel on a constant, year-round basis. The remainder of the total river flow will be delivered to the new delta.

Rare Conditions- more than 10 cfs to existing channel

Periodically and on a short-term basis, flows greater than 10 cfs up to a maximum of 50 cfs may be delivered to the existing channel in order to achieve specific objectives. These objectives may include (a) mobilizing fine organic and inorganic particulate matter that may accumulate in the upper riverine/riparian wet meadow portion of the existing channel, (b) limiting vegetation encroachment in the upper riverine channel, and/or (c) facilitating maintenance flushing at the small downstream dam. The delta diversion structure design would NOT include measures to effectively screen larval fish from flows greater than 10 cfs. A decision to deliver more than 10 cfs would be made in coordination with the June Sucker Flow Workgroup, Utah Lake State Park, Provo City and Utah County. Monitoring data would be collected to document pre- and post-high flow delivery conditions to assess whether objectives are met. Flows greater than 10 cfs would only be delivered when:

- It is outside the June sucker larval drift period
- Sediment, nutrient, organic matter, and pollutant loads in the Provo River water are not elevated
- Property owners adjacent to the existing river channel are not experiencing Utah Lake or groundwater-related flooding problems

Rare Conditions – less than 10 cfs to existing channel

In the event that monitoring data demonstrate that entrainment-related take of larval June sucker exceeds the 1% level authorized by the Biological Opinion, the JLAs may opt to reduce or temporarily cease flow deliveries to the existing channel during the peak nighttime larval drift period. Such reductions in flow would be limited to a 4-hour period each night during the approximately 3 week-long larval drift period, which typically occurs between late May and early July.

Flows less than 10 cfs may also be delivered when Utah Lake levels are high and flooding could be exacerbated by flow deliveries into the existing Provo River. In addition, the diversion structure may occasionally need maintenance work that would require that flow deliveries temporarily cease. Such reductions in flow are expected to be brief and rare, and any decisions to temporarily reduce flow deliveries would be made in coordination with the June Sucker Flow Work Group, Provo City, Utah County, and Utah Lake State Park.

Adaptive management

The aeration system planned for the existing river channel will be designed to function effectively based on a constant input of 10 cfs. Once the system is installed, water quality conditions will be monitored to assess its effectiveness and to inform decisions regarding its operation. Should monitoring results indicate that the water quality and associated recreational/aesthetic objectives for the existing river channel could be best met by delivering a smaller amount of water (thereby increasing residence time), the JLAs may consider reducing the default flow delivery value below 10 cfs. Such adjustments could be implemented either on a permanent year-round basis or on a seasonal basis during the critical hot summer months when temperature and oxygen problems are most likely to occur. Any decision to reduce the typical 10 cfs flow delivery amount would be subject to a stakeholder and public involvement process.

Environmental Effects of Proposed Modification-Flow Allocation

The resource effects of the proposed flow allocation modification described above are summarized by resource in Table 3.

Table 3. Summary of resource effects of proposed flow allocation modification within lower existing Provo River channel.

EXISTING CHANNEL RESOURCE	CONDITION AS PER FEIS	CONDITION UNDER PROPOSED MODIFICATION	SUMMARY OF ANTICIPATED EFFECT
Hydrology/ Streamflows in Existing Channel	Typical late summer through spring flow = 10 cfs; Typical spring through early summer flow = 10-50 cfs	Typical late summer through spring flow = 10 cfs; Typical spring through early summer flow = 10 cfs	Flows above 10 cfs would be much less frequent and of shorter duration
Springtime Hydraulics – Upstream Flowing Section	Approximate velocity 2.0 ft/s at 50 cfs	Approximate velocity 0.5 ft/s at 10 cfs	Higher velocity flows would be much less frequent and of shorter duration.
Springtime Hydraulics – Flatwater Area	Approximate velocity 0 ft/s at 50 cfs	Approximate velocity 0 ft/s at 10 cfs	No change. Water velocities drop to near zero within several hundred feet of reaching flatwater, regardless of inflow amount.
Water Quality – Springtime Temperature	Cold	Slightly higher but still cold	Temperature would likely increase slightly but would remain below state water quality standards
Water Quality – Late Summer Temperature	Too warm	Too warm	No change.
Water Quality – Dissolved Oxygen	Expected to meet state water quality standards	Expected to meet and potentially outperform minimum state water quality standards	Improved aeration effectiveness/efficiency and improved dissolved oxygen conditions in the water column and in the bed sediments.
Water Quality – Sediment/Pollutant Loads	Inflow loads of suspended sediments, organic matter, nutrients, and other pollutants associated with 50 cfs is >5 times higher than at 10 cfs	Reductions in potentially damaging sediment/ organic matter/ nutrient/ and pollutant loads.	Inflow loads are reduced and water quality conditions potentially improved.

Larval June Sucker	Higher potential for entrainment/loss of larval June sucker	Lower potential for entrainment/loss of larval June sucker	Up to 5 times lower risk of entrainment.

4. Small Downstream Dam Design

The 2015 RODs selected Alternative B and Existing Channel Option 2. Under Existing Channel Option 2, a small dam will be constructed at the downstream end of the channel near Utah Lake State Park. Specific language in the RODs relevant to the small downstream dam includes:

- "This dam [the small downstream dam] will maintain the water level in the existing channel at a relatively constant elevation year round."
- "Option 2 [which includes the small downstream dam] is environmentally preferable because it provides a better opportunity to manage the channel as a sport fishery. Maintaining a relatively constant water elevation in the channel will provide more reliable and safer recreation access and will be more aesthetically pleasing during all seasons of the year. Also, separating the channel area from Utah Lake will provide the opportunity to exclude carp, to actively manage the channel as a sport fishery, and to prevent June sucker from potentially attempting to reach spawning areas through the old channel, which will no longer provide access to spawning areas."

The FEIS (Chapter 2) provides these additional specifics in its description of the selected action:

- "This dam [the small downstream dam] would allow for a stable water elevation of approximately 4,489 to 4,490 feet in the existing channel, creating a linear 'pond'…"
- "The dam/weir [the small downstream dam] would include an outlet to release this flow to Utah Lake. ***It would also include facilities to allow pumping of the water into Utah Lake if/when Utah Lake elevation exceeds 4,490 feet, negating the option of gravity flow***."
- "Potential variations could be incorporated with this option with respect to identifying the most preferable water elevation for the pond (probably somewhere between 4,489 and 4,490 feet)…"

Since completion of the FEIS and signing of the RODs, the JLAs assembled a design team that has been preparing and evaluating design concepts for various PRDRP elements. During the course of the design and value engineering process for the small downstream dam, it became apparent that the inclusion of pumping facilities described in the FEIS (see bold/italic text in list above) would not add value or help achieve project objectives.

This is because Utah Lake only exceeds an elevation of 4490' approximately 5% of the time. Also, during the even more rare situation when Utah Lake levels increase to 4491.5' or higher such that they begin to overtop Skipper Bay dike, the potential exists for lake water to flow in from the north and overtop the north levee of the existing river channel. The area immediately upstream of the Center Street bridge is particularly vulnerable, as the north levee in this area is only about 4491.5' high. Pumping over the small dam would prove ineffective in controlling water elevations during this situation.

Proposed Modifications

For the reasons described above, the JLAs propose to eliminate pumping facilities from the small dam design.

Environmental Effects of the Proposed Modification – Small Dam Design

The proposed modification will save the cost of installing, maintaining, and operating pumping facilities. The dam will still maintain a stable water elevation of approximately 4,489 feet in the existing channel during most lake level conditions. When lake levels exceed 4,489', the water level in the existing channel will rise along with the lake. The water elevation range (4,489-4,490') described in the 2015 FEIS would be met 95% of the time.

REFERENCES

AECOM 2021. Frequency Analysis of Lake Levels and Flood Hazard Analysis for Utah Lake within Utah County, Utah. Draft Technical Report prepared by AECOM for State of Utah Department of Public Safety, Division of Emergency Management, for submittal to the Federal Emergency Management Agency. Taylorsville (UT): 64 p.