

**STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD**

**In the matter of:
July 17, 2020 Water Quality Certification For Federal Permit Or License
for Yuba County Water Agency
Yuba River Development Project (FERC No. 2246)**

**YUBA COUNTY WATER AGENCY'S PETITION FOR
RECONSIDERATION OF JULY 17, 2020 WATER QUALITY
CERTIFICATION FOR FEDERAL PERMIT OR LICENSE**

Appendix A

Technical Memorandum – Condition 20 – Fish Passage

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APPENDIX A

TECHNICAL MEMORANDUM

CONDITION 20 – FISH PASSAGE

1.0 SUMMARY OF ANALYSIS AND CONCLUSIONS

Prior to 1905, and well prior to the construction of any Yuba River Development Project (YRDP) facilities, the Yuba River watershed had seen the construction of dozens of dams large and small, hundreds of miles of conduits and canals, and had withstood massive hydraulic mining that eventually resulted in more than 650,000,000 cubic yards of mining debris and sediment washed down into the river. In addition, the construction of Englebright Dam by the California Debris Commission in 1941 imposed a complete barrier to upstream passage of anadromous fish 24 miles upstream of the Yuba River and Feather River confluence. The January 2019 Final Environmental Impact Statement adopted by the Federal Energy Regulatory Commission (FERC) staff and United States Department of Defense, Army Corps of Engineers (USACE) staff describes fish passage for the Yuba River Basin thusly:

Additionally, Englebright Dam represents a complete barrier to upstream fish passage. Therefore, while the original construction of the Yuba River Development Project about 25 years after construction of Englebright Dam and 60 years after construction of Daguerre Point Dam did limit fish movement throughout the upper Yuba River Basin, any fish movement would have been, and currently is, facultative (i.e., not necessary to complete the species' life cycle) migrations because obligate (i.e., necessary to complete the species' life cycle) migrations within the upper Yuba River Basin were no longer possible following construction of Englebright Dam. (Final EIS at p. 3-229).

A full decommissioning and removal of all YRDP facilities, including dams and powerhouses, would have no effect on the ability of fish to pass upstream of Englebright Dam.

As described in the following sections and in the associated reference material, in addition to a lack of nexus between the anadromous fish passage barrier of Englebright Dam and the YRDP facilities, passage alternatives have been extensively studied in the Yuba watershed going back to 1999. After nearly 20 years of investigations at a cost of more than \$13,000,000 and thousands of hours of stakeholder time, there is no agreement on a cost effective or efficacious passage approach. Furthermore, based on a habitat capacity and population productivity study sponsored by the National Marine Fisheries Service (NMFS) in 2012, the total spawning habitat carrying capacity for the South , Middle and New Bullards Bar reaches combined is less than 250 redds (generally 1 redd = one spawning pair), whereas all of the passage alternatives investigated have life cycle costs of \$500,000,000 to more than \$1 billion dollars.

The WQC does not address any of the voluminous analysis concerning the potential – or lack thereof – benefits to salmonids of implementing passage above the USACE's Englebright Dam or the enormous costs of doing so. Instead, the WQC would require Yuba County Water Agency (YCWA) to further study a concept that has been studied extensively, even though Englebright

Dam predated the YRDP by over 20 years and was built by the federal government for its own purposes. Moreover, the WQC states that, following these further studies, “*The [State Water Resources Control Board’s] Executive Director may require implementation of the proposal in the report, or other alternative, following notice and an opportunity to be heard,*” which apparently would not involve even an evidentiary hearing before the Executive Director could compel YCWA to implement fish passage.

In conclusion, the WQC should not contain a condition to study and potentially implement fish passage because Englebright Dam is federal dam not authorized to include fish passage, there is no nexus between Project facilities and fish passage, and the WQC does not consider the extensive information resulting from the evaluation of passage alternatives that have found all potential alternatives technically fraught, expensive, and questionably effective.

2.0 SUMMARY OF CONDITION 20, FISH PASSAGE

Condition 20 in the) July 17, 2020 Water Quality Certification For Federal Permit Or License issued by the Executive Director of the State Water Resources Control Board (State Water Board 2020, or WQC) for YCWA’s YRDP requires the following, on page 53:

No later than six months following license issuance, the Licensee shall initiate consultation with NMFS, USFS, USFWS, CDFW, USACE, and State Water Board staff on studies regarding fish passage. At a minimum these studies shall include:

- *An assessment of a reasonable range of passage alternatives. This shall include evaluating alternatives for adult and juvenile volitional fish passage, as well as adult and juvenile trap and haul to locations above Englebright Dam and/or New Bullards Bar Reservoir. The evaluation of alternatives shall include an assessment of the adequacy of existing studies, and/or the need for additional studies. The assessment shall include all comments from agencies on the studies and on the selection of an alternatives;*
- *Reservoir transit studies for adult and juvenile passage;*
- *Identification of flows needed to support passage alternatives; and*
- *Identification of any proposed changes that will be implemented to Project facilities, flow regimes, fish stocking plans, availability of LWM [large woody material], gravel augmentation, and access to Project-affected tributaries.*

No later than three years following license issuance, the Licensee shall complete the studies and submit an informational report to the Deputy Director for review, including related information, and a proposal regarding anadromous fish passage past Project facilities. The Licensee shall develop the report in consultation with NMFS, USFS, USFWS, CDFW, USACE, and State Water Board staff. The Deputy Director may require modifications to the report. The Licensee shall file the Deputy Director reviewed informational report with FERC.

The Executive Director may require implementation of the proposal in the report, or other alternative, following notice and an opportunity to be heard.

3.0 STATE WATER BOARD'S RATIONALE FOR CONDITION

Pages 15 and 16 of the WQC lists the material the SWRCB staff reviewed and considered when preparing its WQC. The WQC's stated rationale for Condition 20 is as:

The Yuba Salmon Forum is a collaborative process that began in 2011, and is comprised of state and federal agencies, hydroelectric operators in the watershed (including YCWA), municipalities, and nongovernmental organizations. The purpose of the Yuba Salmon Forum is to evaluate and recommend implementation actions that could result in sustainable populations of salmonids in the Yuba River watershed and contribute to recovery goals. As part of the Central Valley salmonid recovery plan, the Yuba Salmon Forum considers other beneficial uses of water resources and habitat values in neighboring watersheds. Actions considered by the Yuba Salmon Forum included fish reintroduction above Englebright Dam, and the group completed initial evaluation of six fish passage alternatives, as well as an alternative for lower Yuba River habitat improvements.

Englebright Dam is the upper limit of anadromy on the Yuba River. Though Englebright Dam is owned by USACE, YCWA's Project operations rely on Englebright Dam to support peaking hydroelectric energy production at New Colgate and baseflow operations at Narrows 2 Powerhouse. The Project cannot operate as it has historically or proposed in its Amended FLA without use of Englebright Dam. Additionally, Project operations directly alter operations of Englebright Dam by reducing the duration and magnitude of spills from Englebright Dam and by controlling flows in the lower Yuba River. Additionally, prior to encountering Englebright Dam, anadromous fish are subject to Project impacts that affect flows in the lower Yuba River. As such, under current conditions, the Project directly impacts listed salmonids through its historic and proposed future operations. Condition 20 requires YCWA to develop a report that includes a proposal regarding fisheries reintroduction to reduce Project-related effects to listed salmonids (p. 24, WQC).

4.0 ENGLEBRIGHT DAM IS A FEDERAL FACILITY AUTHORIZED BY AN ACT OF CONGRESS

Englebright Dam is a 273 ft high concrete arch dam on the Yuba River, located in Yuba and Nevada Counties. It was put into service in 1941 by the California Debris Commission and is now owned and operated by the USACE. The primary purpose of the dam was to trap sediment derived from anticipated hydraulic mining operations in the Yuba River watershed. Hydraulic mining in the Sierra Nevada was halted in 1884, but resumed on a limited basis until the 1930s during the Great Depression. Although no hydraulic mining in the upper Yuba River watershed resumed after the construction of the dam, the historical mine sites continued to contribute sediment to the river (Hagwood, 1961).

Prior to the construction of Englebright, more than 600,000,000 cubic yards of sediment were released into the Yuba River watershed from hydraulic mining; of that volume, some 300,000,000 cubic yards remains in the Lower Yuba River (Hagwood 1961, Gilbert 1917, Alder 1980).

As of 2001, Englebright Reservoir held some 26,000,000 metric tons of sediment, approximately 25% of the total volume of the reservoir (Snyder et. al. 2004). The sediment was deposited at different rates through time, reflecting sediment availability and hydrologic events in the watershed (Snyder et. al. 2006). The sediment is highly infused with mercury, methylmercury and other heavy metals (Alpers et. al. 2002); many of the concentrations exceed EPA, NOAA (e.g. NOAA SQuiRTS) or other criteria for waterways.¹ In 2012, a summary of sediment conditions behind Englebright and Daguerre Point Dams conducted for the YSF noted:

Excluding the Milltown Reservoir Dam on the Clark Fork River near Missoula, Montana, an EPA Superfund site, the evaluation showed the sediments impounded by the Englebright Lake and Daguerre Point Dams contain some of the highest concentrations of trace metals of all dams surveyed on the West Coast. (Upson, 2012.)

Englebright Dam is a federally owned and administered facility, and modification of the facility in any way would require consultation with and approval by the USACE. Because Englebright Dam was authorized by, and built under, an act of Congress, it is possible that it would take another act of Congress to enable its removal or substantial modification. In addition,

“...the removal or substantial modification to the Englebright Lake or Daguerre Point Dams will result in the discharge of some portion of impounded sediments. The sediment discharge will likely generate physical and chemical impacts to downstream habitats and biological resources.” (Upson, 2012).

The dam sequestered some 400,000+ cubic yards per year on average between its commissioning in 1941 and 2001² and continues to sequester large sediment influxes. Modification or removal of the dam would require addressing the large volume of sediment and mercury, methylmercury and other metals in the sediment. In addition, the continued sediment influx to the Lower Yuba River, along with the potential for continued influx of heavy metals similar to what is currently stored behind Englebright Dam would need to be addressed to avoid negative impacts to existing habitat downstream of Englebright Dam.

Englebright Dam and the material impounded by it present numerous environmental challenges, not the least of which is its store of potentially toxic sediment. It would take concerted effort at the state and federal level to address Englebright Dam in any substantive way. It is noteworthy that the only dam impoundment in the West whose impounded sediments contain more trace metals than the USACE’s Englebright and Daguerre Point Dams on the Yuba River is a Superfund site. (Upson, 2012.)

The concept that YCWA and the YRDP can be held responsible for the effect of Englebright Dam – built by the federal government for federal purposes – also is inconsistent with the encouragement of the use of existing dams for multiple purposes. As recently as the 2018,

¹ NOAA Screening Quick Reference Table for Inorganics in Sediment.

² Accumulated volume ÷ 60 years, also Snyder et. al. 2004, 2006

Congress enacted the Water Infrastructure Act (P.L. 115-270 (S.3021)), which passed the House by voice vote and the Senate unanimously. The act calls for FERC to establish an expedited process for issuing hydropower licenses for facilities at existing, non-powered dams, and requires FERC and the Secretaries of the Interior, Army, and Agriculture to develop a list of existing non-powered federal dams that have the greatest potential for non-federal hydropower development. (P.L. 115-270, § 3003.)

5.0 THERE IS NO PROJECT NEXUS FOR FISH PASSAGE

As described extensively in Appendix C submitted with this Appendix and concerning the WQC's Condition 12, conditions for fisheries throughout the Yuba River watershed were highly impacted by hydraulic mining and other anthropogenic impacts prior to the construction of the YRDP facilities.

From 1870 through 1940, numerous dams, conduits and other waterworks were constructed in the Yuba River watershed, initially in support of hydraulic mining and later to support hydroelectric generation and water supply. Major dams constructed in this period include:

- The original Bowman Dam, 1872 (Middle Yuba River)
- The original Milton & Fordyce dams, by 1882 (Middle Yuba River)
- Debris Dam #1, 1900 (Lower Yuba River)
- Daguerre Point Dam, 1906 (Lower Yuba River)
- Spaulding Dam, 1913 (South Yuba River)
- The original Bullards Bar Dam, early 1920's (North Yuba River)
- Englebright Dam, 1941 (Yuba River Narrows)

Figure 1. Dams in the Yuba Watershed

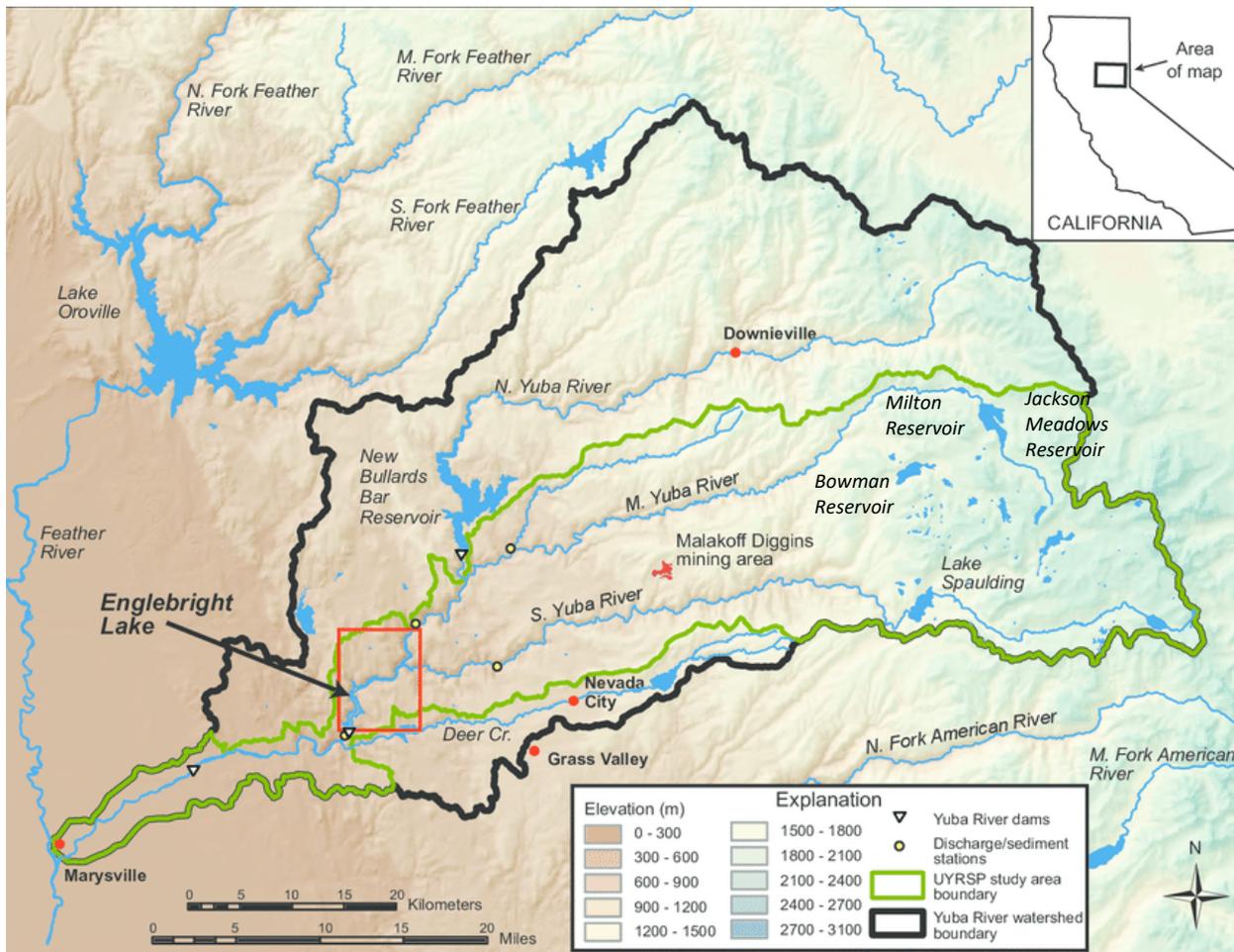


Figure from Snyder et. al. 2004

There are currently more than 30 dams within the jurisdiction of the State of California Department of Water Resources Division of Safety of Dams, and over 100 diversions and impoundments total in the Yuba River watershed.³ The original construction for most of these facilities was prior to 1950. The construction of Englebright Dam by the California Debris Commission in 1941 imposed a complete barrier to upstream passage of anadromous fish 24 miles upstream of the Yuba River and Feather River confluence

FERC staff and USACE staff adopted the January 2019 Final Environmental Impact Statement (FERC and USACE 2019, or Final EIS) for the YRDP. The Final EIS describes the USACE’s Englebright Dam, constructed in 1940, as a complete barrier to upstream migration of salmon, steelhead and other fish. The Final EIS describes fish passage for the Yuba River Basin thusly:

³ Dams Within Jurisdiction of the State of California, Alphabetically By County. California Natural Resources Agency, Department of Water Resources, Division of Safety of Dams. https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/All-Programs/Division-of-Safety-of-Dams/Files/Publications/2019-Dams-Within-Jurisdiction-of-the-State-of-California-Alphabetically-by-County_a_y20.pdf

Additionally, Englebright Dam represents a complete barrier to upstream fish passage. Therefore, while the original construction of the Yuba River Development Project about 25 years after construction of Englebright Dam and 60 years after construction of Daguerre Point Dam did limit fish movement throughout the upper Yuba River Basin, any fish movement would have been, and currently is, facultative (i.e., not necessary to complete the species' life cycle) migrations because obligate (i.e., necessary to complete the species' life cycle) migrations within the upper Yuba River Basin were no longer possible following construction of Englebright Dam. (Final EIS at p. 3-229).

During the development of the study plans for FERC's relicensing of the YRDP, NMFS requested a suite of studies of passage facility options similar to the requirements of Condition 20. In its Study Plan Determination, FERC notes:

NMFS, in its March 7, 2011 filing, did not contest that the Corps' Englebright dam is a physical barrier to fish passage... " (FERC Study Plan Determination for the Yuba River Hydroelectric Project, Sept. 30, 2011, p. 37),

FERC concluded:

We do not agree with NMFS' reasoning with respect to the role of YCWA's Narrows 2 powerhouse and upstream fish migration. The Corps' Englebright dam, constructed on the Yuba River, is a federal facility and blocked upstream fish passage for almost 25 years before the development of the Narrows 2 powerhouse. Furthermore, we are unaware of any hydroelectric generating facility that serves as a passage route for upstream migrating fish. The Narrows 2 powerhouse is located nearly 400 feet downstream from the Englebright dam. Therefore, any project effects on upstream fish passage are limited to the 400 feet between the Narrows 2 powerhouse outlet and Englebright dam, which is the next barrier for upstream fish passage. (FERC Study Plan Determination, p. 38), and

Consequently, NMFS has failed to demonstrate a nexus between studying anadromous fish passage upstream of Englebright dam and the Narrows 2 powerhouse (study criterion 5). For these reasons, we do not adopt NMFS's fish passage study request in its entirety particularly as it pertains to anadromous fish above Englebright dam. (FERC Study Plan Determination, p. 39)

NMFS disputed FERC's conclusion with regards to the nexus of fish passage studies to the YRDP. FERC convened a study dispute resolution panel consisting of one FERC staff member, one NMFS staff member, and one independent third party. In its consideration of NMFS's dispute and repeated request for passage studies, the Study Dispute Panel opined:

The Panel agreed with the Study Plan Determination that there is no nexus between project effects and anadromous fish upstream of Englebright dam because anadromous fish are not present above the dam and therefore there is no need to study fish passage at facilities above Englebright dam. (FERC Directors Formal Study Dispute Resolution Determination, Dec. 28, 2011, p. 9).

Finally, it should be noted that a full decommissioning and removal of all YRDP facilities, including dams and powerhouses, would have no effect on the ability of fish to pass upstream of Englebright Dam.

Studies conducted for the relicensing of the YRDP evaluated flows, stranding and entrainment potential for the YRDP's Narrows 2 Powerhouse, and various measures were developed and incorporated into the Final License Application (FLA) and Final EIS to address the impacts of the operation of Narrows 2. Studies or data gathering as suggested in Condition 20 that would apply to "*adult and juvenile trap and haul to locations above Englebright Dam and/or New Bullards Bar Reservoir*" and "*Reservoir transit studies for adult and juvenile passage*" are not germane since no YRDP facilities block upstream passage and no YRDP reservoirs are accessible to anadromous fish.

The WQC, including its rationale for Condition 20, contains no new information that would indicate that YCWA's operation of the YRDP has contributed to, or exacerbated, any problems with fish passage created by USACE's impassable Englebright Dam. The WQC also contains no information to indicate that the removal of Englebright Dam would be feasible, in light of the continuing issues resulting from historic hydraulic mining. As discussed below, other passage possibilities already have been studied extensively as well.

6.0 PASSAGE ALTERNATIVES HAVE BEEN EVALUATED, BUT THE WQC DOES NOT CONSIDER OR EVALUATE THE RESULTING INFORMATION

6.1 Extensive analysis of passage alternatives has occurred Over the past 20 years

Separate from a lack of nexus to YRDP operations, the suite of reasonable alternatives for anadromous fish passage to the upper reaches of the Yuba River watershed have been evaluated extensively and found to be expensive, technically fraught, and questionably effective. The WQC contains no additional information and does not analyze the voluminous information that has been produced to date since 1999. The WQC states that the "[p]roceedings of the Yuba Salmon Forum" were reviewed by SWRCB staff in preparing the WQC, but the WQC's rationale for Condition 20 contains no analysis of the information produced by those proceedings. (WQC, pp. 15-16, 22.)

Starting in the late 1990's, the Upper Yuba River Studies Program (UYRSP), was a \$9,000,000 agency-stakeholder collaborative funded by the CALFED Bay-Delta Program to determine the feasibility of restoring salmon and steelhead into the upper Yuba River system. After considerable early progress, the UYRSP ground to a temporary halt in 2001-02 due to a combination of state budgetary woes and related problems at CALFED. The program proceeded in fits and starts through 2004 when funding expired. Although specific passage alternatives were not fully developed, one useful outcome of the program was an extensive analysis of the sediments in storage at Englebright Reservoir by the United States Geographic Survey (USGS). Extensive sediment analysis, including volumes, locations, and analysis of toxic materials, informed subsequent passage investigations.

The Yuba Salmon Forum (YSF) process was convened in 2010 by NMFS. Between 2010 and late 2016, the group expended considerable resources in evaluation of habitat and developing alternatives for fisheries reintroduction, including conceptual cost estimates for Englebright Dam removal or fish ladders, and various other trap and haul alternatives. Stakeholders included state and federal agencies, local agencies including YCWA and water purveyors, NGO's and utilities. (YSF Convening Report, 2010).

The YSF habitat evaluation efforts focused on five habitat elements: water temperature, passage barriers, holding habitat, spawning habitat and rearing habitat. The work effort culminated in a Summary Habitat Analysis report, which compared the North, Middle and South Yuba Rivers based on habitat characteristics (Addley et. al 2013). The report summarized the habitat analysis, finding that the greatest amount of habitat for both spring-run Chinook Salmon and steelhead was in the Lower Yuba River (much greater), followed by the North Yuba River and the Middle Yuba River, followed by lesser amounts of habitat in other reaches. The relative amount of habitat for Chinook salmon and steelhead varied by river reach and by water year (drier versus wetter year) and hydrology scenario. For spring-run Chinook salmon, adult holding appeared to be one of the main limiting factors. The quantities of available habitat for other life stages were generally either related to the amount of holding habitat (e.g., spawning habitat calculated based on holding habitat) or of similar magnitude (juvenile rearing). The amount of steelhead rearing habitat was the primary limiting factor for steelhead. The amount of steelhead rearing habitat was greater than the amount of Chinook salmon habitat in the main stem rivers due to the higher steelhead temperature criteria.

The YSF stakeholders investigated seven passage or transport options for the Yuba watershed. Each option was comprised of 8 to 20+ elements or facilities. Preliminary conceptual designs, drawings and cost estimates were developed for all of the elements and actions, sufficient to generally compare costs between options, and to identify strengths and flaws for each option. The Options were summarized in a report for the YSF by MWH Americas, Inc. (MWH, 2013). All the options had substantial technical challenges to implement successfully. For example, a fish ladder past Englebright Dam would be taller than has ever been proven effective; trap and haul options are expensive and non-volitional; juvenile fish collection from a large reservoir such as New Bullards Bar or Englebright has many technical and biological challenges; flood damage in the narrow canyons of the Yuba watershed posed substantial flood damage risk to several potential facility locations; and the challenging water temperature regimes in all but the wettest years limited productivity of most options.

More than \$3,000,000 in total was expended by YCWA, Placer County Water Agency and other stakeholders over the course of the YSF study work (G. Rabone, B. Ransom pers. comm), in addition to thousands of person-hours of meeting time by the stakeholders.

In 2014, YCWA, NMFS, California Department of Fish and Wildlife (CDFW), American Rivers (AR), Trout Unlimited (TU) and California Sport Fishing Protection Alliance (CSPA) formed the Yuba Salmon Passage Initiative (later called YSP). The overall goal of the YSP program was to collaboratively develop, fund and implement a cost-effective program that would continue to expand the Yuba River watershed's contribution to recovery of anadromous salmonids in the Central Valley. The YSP parties used technical information developed as a part of the Yuba Salmon Forum and YRDP relicensing Studies to provide a foundation for identifying the most-

promising salmonid habitat enhancement and reintroduction actions in the Yuba watershed. The parties agreed that overall program goals could be accomplished through; (1) reintroduction into the North Yuba River upstream of New Bullards Bar Reservoir; and (2) habitat enhancement actions in the lower Yuba River (Yuba Salmon Partnership 2020).

The YSP team worked from 2014 through 2018 to develop a term sheet, draft settlement agreement, concept plan and action plan to outline governance agreements, regulatory obligations and approaches, fiscal responsibilities and general goals and objectives. Additionally, each party provided input on the scope of habitat improvement projects and facilities required to implement habitat improvement projects and a successful reintroduction program to the North Yuba River. A Technical Advisory Group (TAG) including biologists and engineers from the YSP parties, plus outside consultants, worked to develop basic design parameters, concept-level designs and cost estimates. Goals and objectives of the project included cost effectiveness, avoidance of impacts to the YRDP and third parties, improvement of habitat in the lower Yuba River, and access to North Yuba River habitat upstream of New Bullards Bar Reservoir sufficient to support an independent, viable population of spring-run Chinook salmon. To meet the goals and objectives, the following conceptual elements were included in the concept-level designs and costs:

- An adult salmon collection facility on the lower Yuba River including space and holding facilities to conduct on-site genetic sampling;
- Adult salmon release locations on the North Yuba River upstream of New Bullards Bar;
- An instream collector on the North Yuba River for juvenile collection, with juvenile release facilities on the lower Yuba River; and
- A fund for habitat improvement actions on the lower Yuba River.

The concept and action plans specified that facility design and habitat improvement project details would be refined after a suite of early-implementation scientific and site-specific studies were completed. The results of early studies would support final siting and design decisions, planning, and project-specific permitting.

6.2 Yuba Watershed stakeholders have been unable to reach consensus on preferred actions

Based on the habitat and options analysis, the key stakeholder groups in the YSF process (Water Caucus, Agency Caucus, Conservation Caucus) each provided a summary of the “most promising actions” resulting from the YSF. (YSF, 2014). YSF stakeholders were unable to coalesce around a single preferred reintroduction strategy, with each caucus group having its own priorities for further study. The YSF Most Promising Actions Compilation (April 2014) listed the preferred alternatives as:

The Water Caucus identified the most-promising potential YSF actions and listed the actions that the Water Caucus considers not to be promising. The Water Caucus considered: (1) the amount of “new” habitat created and the number of years (or frequency) with which it would be provided; (2) construction costs; (3) potential impacts (and potential magnitude of impacts) to other beneficial uses (e.g., water supply, hydroelectric generation, etc.); (4) construction feasibility; and (5) long-term operations

and maintenance costs and issues. A brief rationale and statements for each action is provided below.

- 1. Most-promising: Lower Yuba River Improvements (Action 7)*
- 2. Second Most-promising: Collect and Transport – North Yuba (Action 1)*
- 3. Less-promising: Collect and Transport – Middle Yuba (Action 2)*
- 4. Not promising: Full Height Ladder over Englebright Dam (Action 6)*
- 5. Not promising: Englebright Dam Notch and Ladder (Action 5)*
- 6. Not promising: Englebright Dam Removal (Action 4)*
- 7. Not promising: Collect and Transport – South Yuba (Action 3)*

The Agency caucus identifies the following potential salmon habitat actions as the three most-promising in no preferred order:

- 1. Action 1: Collection and transport to the North Yuba River*
- 2. Action 2.5: Collection and transport above Englebright*
- 3. Action 5: Englebright dam modification and ladder*

The Conservation Caucus identifies the following potential salmonid habitat actions as most-promising and those which should be pursued through additional planning and evaluation:

- A. Lower Yuba River Restoration and Enhancements.*
- B. Collect and Transport to the North Yuba and/or Middle Yuba River (Initially Spring-Run Chinook).*
- C. Volitional or Semi-Volitional Fish Passage Investigation.*

The YSP stakeholders then focused on a program for trap & haul to the North Yuba River. After considerable effort (described above), the YSP stakeholders held workshops or meetings for stakeholders outside of the YSP process in May 2014 and December 2015 to seek input and comments. Comments and presentations by California Sportfishing Protection Alliance, American Rivers, Patagonia, Stoecker Ecological, and others (May - December 2015 Presentations) revealed a diversity of opinions regarding the appropriateness of different reintroduction alternatives.

6.3 All reintroduction alternatives are technically fraught and tremendously expensive

Condition 20 would require YCWA to study “*for adult and juvenile volitional fish passage*” at both Englebright Dams and New Bullards Dam.

Other than dam removal, all passage alternatives are at best semi-volitional and would require tremendous levels of constant human attention and intervention to operate.

Dam removal (of Englebright Dam) comes with formidable sediment management challenges, as discussed in Section 4, above. The cost of Englebright Dam removal was estimated at \$2.5 to \$3.5 billion 2012 dollars by the YSF (MWH 2013).

A ladder, elevator, Whooshh system⁴ or other semi-volitional upstream passage facility for Englebright Dam would be subject to difficult conditions at the site: reservoir elevations can vary 30+ feet from normal operations through flood flows, and river stage downstream of the dam can vary more than 50 feet in elevation. Englebright Dam's overflow spillway makes any downstream facilities highly susceptible to flood risk, and no successful ladder over a dam of this height has been identified. Several challenges relating to temperature differential between river and reservoir have also been identified.

Downstream passage of juveniles past Englebright Dam would require a floating surface collector, fish screen and collector, gulper, or some other mass screening facility upstream of Englebright Reservoir, New Bullards Bar Reservoir or both. A fish screen or some other semi-volitional facility would require a downstream return pipe more than two and a half miles long downstream of Englebright Dam to meet NMFS passage criteria. Flood risk would be high to extremely high for any juvenile collection facility. Cost for a ladder and screen approach to Englebright Dam passage was estimated at nearly \$600,000,000 in 2012 dollars by the YSF (MWH 2013). The total cost of this alternative in nominal dollars (the amount actually spent to undertake the project), was over \$1 billion dollars over 30 years (MWH 2013).

Trap and haul is a non-volitional technique that could be used to provide targeted reintroduction. Capture, testing and sorting of adults at Daguerre Point Dam would be relatively straightforward. However, capture of juveniles, either on-river or via a floating surface collector, would be considerably more challenging. As described below, the YSP evaluated this alternative in considerable detail.

Several cost estimates were conducted by the YSP TAG, including for construction and operations, and with appropriate caveats for the early stage of concept design. The YSP determined the anticipated costs exceeded funding that would likely be made available for a North Yuba River reintroduction effort by a considerable margin. To validate the TAG's cost estimates, YWA on behalf of the YSP secured grant funding to hire a team of fish passage expert consultants lead by McMillen Jacobs Associates (MJA) to conduct an independent review of the program's primary fish passage elements (MJA 2019). The MJA report indicated that TAG construction and implementation costs were approximately correct:

McMillen Jacobs conducted an independent estimate review of the previously prepared TAG facility cost estimates prepared by MWH. The lead estimator of McMillen Jacobs' construction division conducted these reviews, with careful consideration and scrutiny given to the unit prices applied against the direct work components for each facility, the application of markups against those costs, and selection of appropriate contingency percentages and accuracy ranges. McMillen Jacobs provided markups to the original MWH-prepared estimate as an appendix to our Technical Memorandum 002 which was submitted at the conclusion our Task 4 work; these original markups are also included as Appendix G to this report document. In general, McMillen Jacobs found minimal estimated costs which we felt were out of line with the scope or nature of the work required for each facility, and we are in agreement with the application of and the values selected for the

⁴ Whooshh system is a proprietary fish passage technology utilizing soft silicon transport tubes and water or air pressure to move fish. <https://www.whooshh.com/>.

markups, contingencies, and accuracy ranges applied to the estimates, all of which are in line with the selected AACE Class 5 cost estimate level.

As discussed below, the MJA Review estimated that the cost of the program could range from \$400 million to over \$1 billion.

Further, the MJA Review concluded that only through adjustment of biological goals or design parameters away from what the YSP TAG had utilized for the project could the scope or scale be changed in order to reduce project costs. For example, shortening the period of operations (fewer months of operations per year), eliminating genetic testing to ensure fish origin and genetic integrity, or reducing the number of fish collected and transported will all lead to designs with lower costs, but would require decisions on whether program objectives could still be met.

Both the YSP TAG and MJA report had to make key assumptions about how anadromous salmonids would survive and reproduce in the upper watershed. Assumptions were based on data, observations and “lessons learned” from both successful and unsuccessful fish passage implementations in other locations in the Pacific Northwest. However, some watershed-specific uncertainties would need to be further resolved prior to full-scale implementation. Just a few of these key questions that might need to be answered with field studies or pilot scale testing are:

- Disease and genetic implications of reintroduction;
- Adult survival during holding in the North Yuba River, particularly in dry years;
- Egg survival and emergence timing;
- Outmigration timing and success;
- Potential outmigrant survival through New Bullards Bar Reservoir, and
- Options for efficient juvenile collection in the North Yuba River or New Bullards Bar.

Additionally, various aspects of implementation such as the impact of reintroduction on recreation or local communities, considerations, or concerns of key stakeholders (such as the US Forest Service), and funding for long term operations were not addressed by the YSP.

The MJA review generally found the YSP alternatives and cost estimate work reasonable. The MJA team identified various alternative facilities that would potentially lower costs but would generally require modification of the objectives or design criteria for facility design and performance.

As described in the MJA Review, both the YSP and MJA evaluated life cycle costs (inclusive of construction, operations & maintenance, and monitoring) for potential project facilities. The MJA Review focused on the most expensive and technically complex elements of the program.

As summarized in the MJA Review, the estimated YSP life cycle costs for just the key elements of the YSP program were \$624,000,000 to \$1,030,000,000, with additional minor facilities, monitoring, and enhancement measures adding additional costs.

Depending on which objectives or performance criteria were relaxed and thus which MJA alternatives could be utilized, key elements of the program could be \$408,000,000 to \$672,000,000, plus additional minor facilities, monitoring, and enhancement measures.

	30-Yr Nominal Life Cycle Cost (Rounded)	30-Yr Nominal Life Cycle Cost, High Bound of Accuracy Range
YSP TAG Major Facilities Concepts ¹	\$624,000,000	\$1,030,000,000
MJA Revised Facilities Designs ²	\$408,000,000	\$672,000,000

¹ Includes upstream collection, adult sanctuary, and downstream collection facilities only. Adult and juvenile release facilities, program monitoring and administration in addition.

² Includes revised designs using relaxed criteria for upstream collection, adult sanctuary, and downstream collection facilities only. Adult and juvenile release facilities, program monitoring and administration in addition.

It should be noted that none of the reintroduction analysis undertakings (Upper Yuba River Studies, Yuba Salmon Forum, or Yuba Salmon Partnership) carefully evaluated secondary or redirected impacts to landowners, local governments, water users, recreationists, or power generation; many of those impacts and related costs could be substantial.

This Technical Memorandum does not discuss potential removal of New Bar Bullards Dam as a means to achieve volitional fish passage of adults and juveniles (as required in Condition 20), because it would be inconceivable that such dam removal would be seriously considered by any responsible agency like the Water Board.

6.4 The efficacy of reintroduction is unknown

The potential for successful reintroduction of Chinook salmon in the upper Yuba watershed is unknown. The Yuba is fairly far south in the range of Chinook salmon, the watershed is heavily impacted by, among other non-YRDP factors, past hydraulic mining, non-YRDP dams and out-of-basin water diversions. Remaining habitat in the upper reaches of the watershed are fragmented and only available in some water year types. While there seems to be potential from a habitat perspective for a successful small experimental population, it is unclear that wholesale reintroduction efforts would merit the substantial investment in such a program (or if other habitat improvement measures would have more beneficial impact).

The YSF habitat study work identified spawning habitat as the most limiting factor for spring-run Chinook salmon in the Yuba watershed, and the success of population establishment would likely be tied to the availability of spawning habitat. In 2012, a report by Stillwater Sciences sponsored by NMFS entitled “*Modeling habitat capacity and population productivity for spring-run Chinook salmon and steelhead in the Upper Yuba River watershed*” estimated spawning capacity of the Yuba watershed under various current and potential future flow management scenarios. The modeled “alternative scenarios” included “*hypothetical increases in summer baseflow in the SY*

[South Yuba], MY [Middle Yuba], and NBB [New Bullards Bar] sub-basins, with the primary objective of increasing thermally suitable summer habitat for spring-run Chinook salmon and steelhead” (Stillwater 2012).⁵ Notably, the “hypothetical releases” are up to 10 to 20 times the current minimum instream flow requirements for the South, Middle and New Bullards Bar reaches (the North Yuba is unimpaired upstream of New Bullards Bar Dam). As can be seen from Table 6-5 from Stillwater 2012, the current predicted spawning capacity for the South Yuba is 0 redds, Middle Yuba 126 redds and New Bullards Bar reach is 123 redds.

Table 6-5. Predicted habitat carrying capacities of spring-run Chinook salmon holding, spawning (redds), and summer rearing life stages for each modeled sub-basin and scenario in the upper Yuba River watershed.

Carrying Capacity (K)	Scenario ¹	South Yuba ²	Middle Yuba	North Yuba ³	NBB
Redd ⁴	CC	0	126	2,696	123
	S1	707	929	n/a	889
	S2	1,621	2,098	n/a	1,777

¹CC = current conditions, S1 = Alternative Management Scenario 1, and S2 = Alternative Management Scenario 2.

²Under current conditions the entire SY below the natural fish passage barrier was predicted to be thermally unsuitable for spring-run Chinook salmon holding and rearing; therefore carrying capacity is zero.

³Alternative management scenarios were not modeled for the North Yuba sub-basin.

⁴Each redd was assumed to support one female spawner.

Based on Stillwater’s study work sponsored by NMFS in 2012, this level of potential spawning success appears to be quite small relative to estimated hundreds of millions of dollars of expense that would be involved in providing passage to these areas.

6.5 All reintroduction alternatives will have impacts throughout the watershed

Release of wild salmonids anywhere in the watershed upstream of Englebright Dam will have implications throughout the watershed. At a minimum, fish will evade capture and residualize in reservoir(s) in the watershed, and be present seasonally in various river reaches. The impacts, and associated costs, of salmonids on current practices for water supply, land use, fishing, recreation and other uses is unknown and has not been formally assessed to date. It is easy to imagine that despite possible benefits of reintroduction, that there will be stakeholder or user groups that are negatively impacted by a reintroduction.

In the Yuba watershed, YCWA is one of five hydroelectric projects licensed by FERC, one of four wholesale water purveyors, and one of about 20 local governmental entities. If the State of

⁵The New Bullards Bar reach is the reach of river located between New Bullards Bar Dam and the upstream end of Englebright Reservoir.

California or the Federal government were to be interested in taking steps to mitigate for or undo the impacts of hydraulic mining and/or the construction of Englebright Dam that the Federal government and the State permitted to occur for decades, YWA will be an engaged stakeholder in that process.

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