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July 23, 2021

The Low Impact Hydropower Institute
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Electronic submission to: comments@lowimpacthydro.org

**COMMENT LETTER ON THE FOLSOM AND NIMBUS HYDROELECTRIC PROJECTS LOW-IMPACT HYDROPOWER INSTITUTE CERTIFICATION APPLICATION**

Dear Low-Impact Hydropower Institute Certification Review Committee:

This letter comments on the application of the United States Bureau of Reclamation (UBSR) for the Low Impact Hydropower Institute certification for USBR's Folsom and Nimbus Hydroelectric Projects. Comments on this application are due on July 23, 2021, and the California Department of Fish and Wildlife submits these comments in accordance with the deadline.

The California Department of Fish and Wildlife (CDFW) is California's Trustee Agency for fish and wildlife resources and holds those resources in trust by statute for all the people of the state (Fish & G. Code, §§ 711.7, subd. (a) & 1802; Pub. Resources Code, § 21070; CEQA Guidelines § 15386, subd. (a).). CDFW, in its trustee capacity, has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species (Id., § 1802.). As such, CDFW is commenting on the recent application for Low-Impact Hydropower Institute Certification made on behalf of the Folsom and Nimbus Hydroelectric projects. By commenting on this application, CDFW does not cede any statutory authorities to this process.

CDFW recommends **no certification** for this application. This recommendation is made because several standards outlined in the application do not meet the standards as outlined in the Low Impact Hydropower Certification Handbook. CDFW is focusing its comments on the standards outlined in the application that are insufficient or incorrect. Each criterion that CDFW contests, with supporting information, is outlined below.

## Criterion A- Ecological Flow Regimes; Standard A-2

USBR selected standard A-2 in its application: the flow regime at the facility was developed with a science-based resource agency recommendation. The material presented outlines a history of events in which state, federal, local government, and

non-governmental organizations together developed flow management standards for the benefit and protection of fish and wildlife species.

USBR operates Folsom Reservoir to meet flood control operations, water rights, contracts, and agreements which are not the product of science-based resource agency recommendations. In addition, USBR operates Folsom Reservoir to meet regulatory requirements that apply to the entire Central Valley Project, including the Sacramento San Joaquin Delta (Delta), that are not specific to the lower American River nor the Flow Management Standard. These operations typically result in flows above the minimum planning flows and cause significant impacts to cold water pool volume and subsequent impacts to aquatic resources. Summer operations typically deplete cold-water pool volume in Folsom Reservoir by October because of in-river summer temperature management, contract deliveries, and releases to meet Delta water quality needs. Once cold-water pool volumes are depleted, the primary way to provide additional instream cooling is to release water from the lower outlet. This operation, known as power bypass, circumvents the power penstocks and has significant impacts on power generation.

Folsom operations are largely described in its 2019 Biological Assessment (BA) (USBR 2019). The BA states that in order to optimize power generation, USBR will limit power bypass operations solely to respond to emergency or unexpected events or during extreme drought years when a drought emergency has been declared by the Governor of California. The prioritization of power generation in operations often comes at the expense of water temperature control in the lower American River during fall. This period overlaps with adult fall-run Chinook Salmon immigration and spawning and results in significant impacts to this species. These impacts include increased prevalence of disease, pre-spawn mortality, reduced gamete viability, increased incubating egg mortality, and a truncation of the viable spawn timing. Delayed spawning results in juvenile emigration occurring in spring when juveniles are exposed to poor environmental conditions such as suboptimal temperatures, increased predation related mortality, and potential for disease. Folsom Reservoir operations cannot be decoupled from cold water pool depletion and subsequent hydropower generation related impacts which lead to the loss of long-term viability of the lower American River to maintain or recover a natural origin self-sustaining fall-run Chinook Salmon populations.

The characterization of how operational standards were developed as described in the application are inaccurate. The 2015 Modified Flow Management Standard (MFMS) outlined in the applicant's submission was not developed by resource agencies, and no input from CDFW was provided during its development. CDFW is a leading agency for fisheries monitoring in the Central Valley and recognizes the need for and importance of incorporating multiple fields of science into a flow standard. The 2015 MFMS was again changed in 2017 without CDFW input. The 2017 MFMS included new indices on which the minimum release requirement (MRR) is now based, included new MRR relationship curves, and a change in recommendations regarding the End-of-December storage target. Due to this mischaracterization, Table 2 and Figures 6 and 7 in the application

are no longer relevant to this project. CDFW has not evaluated if the MFMS is appropriate for the lower American River below Folsom and USBR has yet to operate the system in accordance with what is outlined in the MFMS. The 2020 water year is a good example of how inflow and outflow patterns can be inconsistent from MFMS MRR flows (Figure 1). Because of this, presenting this flow standard as a science-based management system is disingenuous as Folsom has not operated according to those standards since implementation, and the modified version did not solicit input from leading fisheries science agencies in the development.

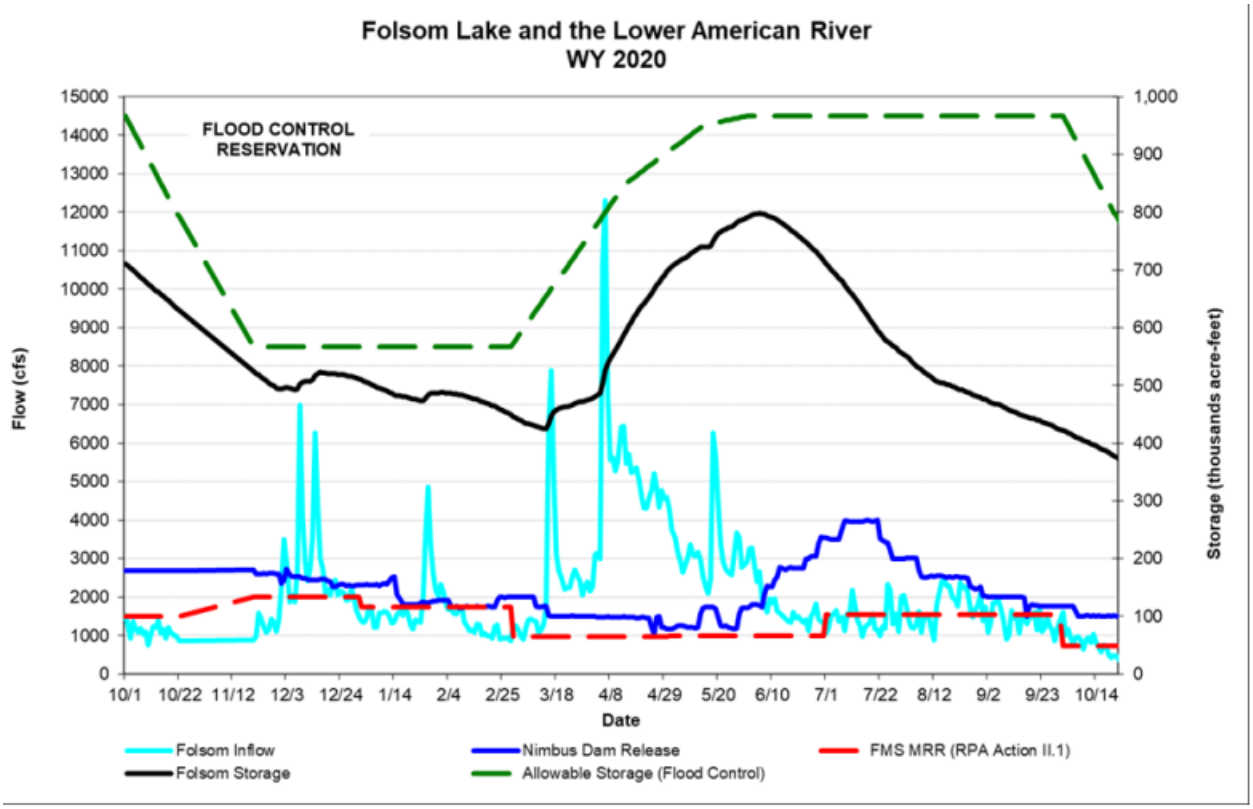


Figure 1. Inflows and outflows of Folsom Lake. Extracted from USBR 2021.

## Criterion B - Water Quality Standards; Standard B-2

USBR selected standard B-2 in its application: the facility is in compliance with all water quality conditions contained in a recent Water Quality Certification or science-based resource agency recommendation providing reasonable assurance that water quality standards will be met for all waterbodies that are directly affected by the facility.

As of June 4, 2021, the lower American River is on the draft 303(d) list for a temperature impaired water body (https://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/2020_2022_integrated_report.html). This draft listing was based on temperature criteria

needed for cold water beneficial uses for steelhead summer rearing, juvenile rearing, adult migration, and spawning. This draft listing underscores that temperatures in the lower American River are problematic for multiple life stages of anadromous fish across the calendar year. Temperature, unlike other water quality criteria in the lower American River, is directly influenced by Folsom Dam and project operations for water delivery and hydropower production.

The temperature of water released from Folsom Reservoir into the lower American River is a function of cool water pool storage, total storage, temperature shutter placement and operation, project operations by USBR including power generation, total water volume released, travel time through Lake Natoma and water year type. Water temperatures during October and November are of particular interest as successful fall-run Chinook Salmon spawning and egg incubation rely upon suitable water temperatures during this time. In the lower American River, observed temperatures are rarely below the 56º F threshold needed for successful spawning and egg survival (Table 1). Instead, temperatures in late October and early November are typically over 60º F resulting in egg mortality (Snider and Vyverberg 1995). In the lower American River, Chinook Salmon eggs incubated in water temperatures above 62º F resulted in 100% mortality; eggs incubated at in water at 60-62º F had 50% mortality to the eyed stage, and eggs incubated in 55-59º F experienced 20% mortality (Hinze 1959). Furthermore, even when eggs were taken at water temperatures of 60-62º F and incubated at cooler temperatures of 55-56º F, there was still 30% loss to the eyed stage. Mortalities of 80% or more were experienced by fry when incubated in water temperatures of 60-61º F (Healey 1979). Egg and fry mortalities were insignificant when water temperatures were between 57.5º F and 43.5º F (Healey 1979).

**Table 1. Temperatures on November 4 from 2002 through 2020 for the upper and lower boundaries of spawning habitat on the lower American River. Site AHZ is the upstream location of spawning habitat, and site AWP is located near the downstream end of spawning habitat**.

| Year | Nov. 4 Temp at AHZ Low (CDEC) | Nov. 4 Temp at AHZ High (CDEC) | Daily Average | Nov. 4 Temp at AWP Low (CDEC) | Nov. 4 Temp at AWP High (CDEC) | Daily Average |
|---|---|---|---|---|---|---|
| 2002 | 56.0 | 57.3 | 56.7 | 55.4 | 59.5 | 57.4 |
| 2003 | 61.1 | 61.6 | 61.3 | 60.2 | 63.0 | 61.6 |
| 2004 | 60.2 | 60.8 | 60.5 | 59.1 | 61.0 | 60.1 |
| 2005 | 58.8 | 59.5 | 59.2 | 58.4 | 60.8 | 59.6 |
| 2006 | 60.4 | 61.3 | 60.9 | 59.8 | 62.4 | 61.1 |
| 2007 | 60.9 | 61.7 | 61.3 | 59.1 | 63.5 | 61.3 |
| 2008 | 61.1 | 61.6 | 61.4 | 58.9 | 61.4 | 60.2 |
| 2009 | 61.3 | 61.7 | 61.5 | 59.9 | 63.8 | 61.9 |
| 2010 | 60.0 | 60.3 | 60.2 | 59.3 | 62.7 | 61.0 |
| 2011 | 58.5 | 59.2 | 58.9 | 57.1 | 59.5 | 58.3 |
| 2012 | 60.2 | 61.0 | 60.6 | 59.1 | 62.4 | 60.8 |
| 2013 | 59.0 | 59.9 | 59.5 | 57.0 | 59.7 | 58.4 |
| 2014 | 58.1 | 58.8 | 58.5 | 56.2 | 60.1 | 58.2 |
| 2015 | 60.7 | 61.7 | 61.2 | 58.5 | 62.4 | 60.5 |
| 2016 | 57.4 | 58.3 | 57.9 | 56.2 | 60.6 | 58.4 |
| 2017 | 59.0 | 59.4 | 59.2 | 58.6 | 59.6 | 59.1 |
| 2018 | 59.9 | 60.4 | 60.2 | 58.8 | 61.9 | 60.4 |
| 2019 | 58.5 | 59.0 | 58.8 | 56.5 | 60.1 | 58.3 |
| 2020 | 57.7 | 59.5 | 58.6 | 57.2 | 59.7 | 58.5 |

As highlighted by the temperature data in Table 1, fall water temperatures in the lower American River likely result in reduced fall-run Chinook Salmon juvenile production. Juvenile salmonid egg to fry survival estimates from 2012 through 2016 range between 1.27 to 7.27% (PSMFC 2014a, 2014b; Silva and Bouton 2015). Based on scientific literature review, 10% freshwater survival is needed to recover Chinook Salmon to viable population levels in North American west coast rivers (Anchor 2016; Quinn 2005).

Without significant infrastructure modifications, CDFW is concerned poor temperature management in the lower American River will continue to negatively impact salmonid production. It has been well-documented by USBR that leaking and inefficient infrastructure at Folsom Dam and Nimbus, and a shallower-than-needed intake structure on the Folsom Dam powerhouse intake, is problematic for temperature management. In April of 2007, USBR, U.S. Fish and Wildlife Service and the Sacramento Water Forum published a study: *Temperature Modeling of Folsom Lake, Lake Natoma, and the Lower American River*

(https://www.usbr.gov/tsc/techreferences/hydraulics_lab/pubs/PAP/PAP-1084.pdf). Several of the notable structural modifications from the study include:

1. *Structural and operational changes to Folsom Dam and Lake could be more effective at reducing river temperatures downstream of Nimbus Dam than changes to Nimbus Dam and Lake Natoma and might be further investigated.*
2. *If safety and recreational concerns are not limiting factors, a Nimbus Dam forebay curtain acting as a skimmer wall located just upstream of the Nimbus Powerplant intakes provides more temperature reduction than other modeled Nimbus Dam or Lake Natoma cooling alternatives.*
3. *Localized dredging in Nimbus Dam forebay and the Lake Natoma boat course provide minimal additional temperature reduction; however, dredging may be necessary to optimize dam curtain installation or provide other benefits, such as minimizing shallow depths which affect boats in the racecourse.*

Additionally, the authors noted that *"temperature reduction management alternatives at Nimbus Dam are less effective than those at Folsom Dam."* Addressing these infrastructure needs would improve the USBR's ability to meet water quality standards, so it is concerning that little progress has been made in the fourteen years since the study was completed.

Importantly, USBR is able to bypass water through the low-level outlets when water temperatures accessible through the powerhouse are insufficient to meet downstream fisheries requirements. Known as a power bypass, this operation can decrease temperature related losses in spawning salmon by accessing cooler water lower in the reservoir but comes at the cost decreased hydropower production. As described for the proposed action within the Biological Assessment for the Central Valley Project, USBR proposes to limit power bypass operations at Folsom Reservoir solely to respond to emergency or unexpected events or during extreme drought years when a drought emergency has been declared by the Governor of California (USBR 2019). This approach to operations limits the frequency that this important tool can be used to improve survival of fall-run Chinook Salmon. Additionally, a new policy, known as the "Power Initiative" (United States Department of the Interior, 2019), described that in order for a power bypass to be granted, fisheries agencies must justify the biological benefit of the recommended power bypass compared to the cost of foregone power generation. This policy puts the burden on the public and resource agencies for justification and creates a lengthy process for petitioning for a power bypass.

## Criterion C - Upstream Passage Criterion; Standard C-4

USBR selected Standard C-4 in its application: in the absence of science-based fish passage recommendations from a resource agency and in lieu of upstream passage provisions at the facility, the facility employs approved, alternative fish passage mitigation measures that support the migratory fish species affected by the facility.

The Certification Handbook requires that upstream passage provisions are sufficient to support healthy populations of migratory species through compliance with one of four standards. The standard chosen requires in-kind or out-of-kind mitigation, and the applicant must show measures that equal or exceed the benefits of providing upstream fish passage measured by reproductive success or area of suitable fish habitat with approval from resource agencies. However, this application incorrectly states that Nimbus Hatchery was constructed to mitigate for Folsom and Nimbus Dam. Nimbus Hatchery was primarily constructed to mitigate for the loss of Central Valley steelhead and Chinook Salmon spawning habitat *between* Nimbus and Folsom dams; it does not mitigate for impacts due to lost habitat above Folsom Dam (California Hatchery Scientific Review Group 2012).

CDFW currently operates the Nimbus Fish Hatchery and is funded by USBR to produce 4 million Chinook salmon smolts and 430,000 steelhead yearlings. CDFW regularly communicates with USBR about hatchery operations, limitations, and projections. The success of the salmon program relies on incorporation of naturally produced individuals incorporated into broodstock, which requires successful in-river production. As described above, in-river production has been impacted by poor temperatures during spawning resulting in an increasingly hatchery dominated run, reduction of genetic diversity, and a compromised wild population. Successful hatchery production of steelhead requires rearing juveniles over summer. At present, water temperatures at the hatchery are entirely dependent Folsom Dam operations as the hatchery draws its water directly from Lake Natoma. With the current infrastructure, Nimbus Fish Hatchery is unable to rear steelhead for mitigation purposes when river temperatures get above 69°F. Temperatures at or above 69°F result in unmanageable disease outbreak in the hatchery and mortality. In 2014, 2015, and again in 2021, CDFW evacuated the entire mitigation production of steelhead trout from Nimbus Fish Hatchery because water temperatures at the hatchery were unsuitable for rearing of fish to yearling size. In 2015 and in 2021 fish were moved and reared at alternative facilities. This is problematic as it can contribute to increased straying of returning adult steelhead in subsequent years. With climate change, more frequent drought projections, and current water operations, it is unlikely that mitigation requirements will be sustainable at Nimbus Fish Hatchery without infrastructure modernization at the hatchery and at Folsom Dam to aid in providing water for both the river and hatchery.

## Criterion F - Threatened and Endangered Species Protection; Standard F-3

The threatened and endangered species protection standard F-3 states: the facility is in compliance with relevant conditions in a species recovery plan, with relevant conditions in an incidental take permit or statement, biological opinion, habitat conservation plan, or similar government document and the incidental take document and/or biological opinion issued relevant to the facility was designed to be a long-term solution for protection of the listed species.

Many of the operational standards outlined in the BA (USBR 2019) and evaluated in the Biological Opinion (NMFS 2019) are in place for the protection of natural resources, including threatened Central Valley Steelhead. The Temperature Management Plan, as outlined in the BA (USBR 2019), is the guiding document for over-summer temperature management and provides a forecast of fall storage. This plan outlines temperature targets required for minimizing take of threatened Central Valley steelhead and forecasting cold-water pool storage; implementation of this plan should commence annually on May 15th (USBR 2019). As outlined in the BA (USBR 2019), over summer months temperatures should not exceed 65º F for more than three days; in extreme drought this proposed temperature threshold increases to 68º F. However, in 2021, a drought year, lack of water storage and cold-water pool resulted in a temperature management plan aiming to achieve a temperature target of 71º F at a point farther upstream in the system than the typical compliance point. This inability to adhere to outlined targets highlights that the standards set forth in the BA may be unachievable in the face of drought, climate change, and water quality standards downstream in the Delta driving water operations at Folsom. Because of this, the Folsom and Nimbus projects cannot maintain compliance with species recovery goals, take, and the Biological Opinion and BA governing this project.

The application fails to meet the outlined standards for Criteria A, B, C and F. Criterion A is not met because it does not operate to the outlined flow regime and the flow regime outline was not developed in a collaborative science-based process with resource agency recommendations. Criterion B is not met because the facility is not able to achieve water quality standards and assurances that water quality standards will be met for all waterbodies that are directly affected by the facility cannot be made. Criterion C is not met because Nimbus Hatchery was not developed as a mitigation measure that supports the migratory fish species affected by the facility. Nimbus Hatchery was primarily constructed to mitigate for the loss of Central Valley steelhead and Chinook Salmon spawning habitat between Nimbus and Folsom dams not for upstream passage and mitigation for fish upstream of Folsom dam. Criterion F is not met because conditions of the Biological Opinion are not met, and the facility was not designed to be a long-term solution for protection of the listed species. Based on the application presented, CDFW recommends that **no certification** be provided to this application.

Sincerely,

DocuSigned by:
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Kevin Thomas
Regional Manager
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