October 16, 2026

Dear Dr. Windham-Myers and Delta Science Program Peer Review Panelists:

Thank you for the opportunity to offer comments and documentation in support of this peer-review Panel. Here we provide a number of things for the Panel to consider in their review of the new lines of evidence. The charge for this Panel is extraordinarily broad. Meanwhile, the 10 documents provided for this review center on extremely narrow issues: (1) the measurable and modeled effects of hydrodynamic alteration caused directly by CVP and SWP ("Project") export operations on survival of endangered salmonids, and (2) the sensitivity of existing salmon life-cycle models to variation in estimated through-Delta survival. Although these are important questions, focusing exclusively on water export operation-related mortality of endangered salmonids doesn't capture the overall Project effects on fish and the aquatic environment[1].

The negative effects of Project operations extend far beyond entertainment-related mortality of salmonids in the Delta. There are 7 fish species listed under state and/or federal endangered species act that are impacted directly by entrainment – only 3 of these are salmonids. Project exports also lead to entrainment mortality of many non-endangered fishes (Grimaldo et al. 2009[2]), including those that once supported valuable and culturally important fisheries, and also impact the zooplankton that provide the nutrient base of the ecosystem (Hammock et al. 2019; Hartman et al. 2021).

The mechanisms driving Project effects – including modification of Delta hydrodynamics – also involve operations upstream. Indeed, control and reduction of river flows into, through, and out of the Delta is widely accepted to be the Project's most important operational impact on fish and aquatic habitats (SWRCB 2010, 2017; CDFW 2010). Project reservoir operations affect coldwater habitats for hundreds of miles upstream of the Delta (Arai et al. 2026; Burford et al. 2025; Sturrock and Johnson 2019) with an overwhelming amount of research demonstrating the dominant effect of flow on survival, abundance, life-history, and spatial distribution of various native species in the Bay-Delta watershed, including Chinook Salmon (Munsch et al. 2020; Michel 2018; Henderson et al. 2018), Longfin Smelt (Nobriga and Rosenfield 2016; Rosenfield and Baxter 2007); Delta Smelt (Polansky et al 2024; Dege and Brown 2004); White Sturgeon, Green Sturgeon, Starry Flounder, and Sacramento Splittail (SWRCB 2017; CDFW 2010), and various estuarine invertebrate prey populations (Kimmerer 2002).

The Panel should consider the Project-related alteration of Delta hydrodynamics in the context of the magnitude of Project effects on Delta inflow (as affected by reservoir operations upstream) and Delta outflow (as affected by both reservoir and export operations). Combined, Project infrastructure and operations are the single largest force modifying Central Valley hydrographs and Delta hydrodynamics, though non-Project storage and diversion upstream are also very important. In contrast, the combined

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[1] Kimmerer and Gross (2022) represents a cautionary tale about using entrainment as a proxy for overall Project impacts. Due to the limited available data, the authors invoked numerous assumptions to estimate the annual proportion of the larval LFS population that could be lost in the Project export infrastructure. These assumptions involved a high degree of uncertainty and, in some cases, contradicted what is known about the fish's biology. The authors' estimate that mean annual LFS larval losses averaged ~1.5% (and in some years up to 2.9%), and concluded that "attempts to reverse the decline of [Longfin Smelt] through manipulation of diversion flows are unlikely to bear fruit". However, mean annual mortality of 1.5% due to one anthropogenic mechanism is not necessarily a small impact to an endangered and declining population. More importantly, the entrainment impact is widely believed to be much smaller than the indirect impact of reduced Delta outflow caused by the combination of upstream diversions and Delta export operations of the Projects . We urge the Panel to consider the full range of Project impacts in drawing their conclusions.

[2] All Citations available to view and download via google drive **here**.

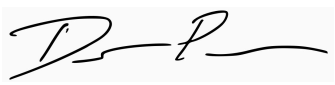
effect of ESA/CESA restrictions on the Projects is small relative to other constraints on their operations, including maintaining water quality for human use. Reis et al. (2019) estimated that the incremental effect of CESA/ESA constraints on Project exports led to an increase in actual Delta outflow of less than 5.3% (less than 2.9% relative to unimpaired Delta outflow) over the period 2010-2018. Since the endangered species safeguardsthat were in effect during that period have been significantly weakened in successive rewrites of the ESA Biological Opinions and CESA permits governing long-term operations, it is likely that CESA/ESA impacts on Project water exports have decreased relative to results of Reis et al. (2019).

Regarding the effect of Project-related hydrodynamic alteration in the Delta, the panel should:

1) Evaluate the full scope of the problem, including review of impacts to non-salmonid populations (Grimaldo et al. 2009; Castillo et al. 2012). For example, salvage/entrainment is believed to be one of the major factors driving the demise of Delta Smelt (Smith et al. 2021). Smith et al. cautioned that the Delta Smelt population could not sustain additional mortality associated with entrainment. Management of OMR flow rates under the 2008/09 federal Biological Opinions reduced the entrainment impacts on Delta Smelt population productivity; however, the Panel should be aware that protections Smith et al. studied have been significantly weakened in subsequent iterations of CESA/ESA regulatory documents (*see,* re: Longfin Smelt*,* 2020 ITP EIR at p. 4-184 to 187 and 5-141 to 143). Project exports also contribute to reduced Delta outflows that strongly impact Delta Smelt survival (Polansky et al. 2024).
2) Consider the mechanism by which “reverse flows” lead to entrainment-related mortality without assuming that juvenile fish movement tracks the direction and instantaneous velocity of flow (i.e., particle tracking; zone of influence). Such a mechanism would not make sense in the historical (pre-Project) environment; for example, juvenile fish are very unlikely to follow each incoming and outgoing tide. Instead, migrating salmonids are likely tracking both flow and the osmotic landscape over time as they migrate downstream. Thus the broad impacts of water exports on Delta hydrology have impacts well beyond instantaneous changes to flow direction and velocity..
3) Consider the decreasing correlation between the regulatory metric of OMR flows, upon which the OMR-entrainment relationships used in the 2008/2009 Biological Opinions were based, and the alternative OMR Index (OMRI) that is the current regulatory metric. This is relevant to the Panel’s review of the entrainment risk metric developed by Contra Costa Water District, and the related ‘zone of influence’ modeling, which focuses on velocity impacts without making a strong connection to potential biological impacts. It is important to remember that the realized biological impacts are likely to be much greater than accounted for by salvage and loss estimates.

We are available to address any questions or concerns you have regarding these comments. Thank you for your time and attention.

Sincerely,



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