April 16, 2021

Via Email to InstreamFlow@wildlife.ca.gov

Edmund Pert, Regional Manager
California Department of Fish and Wildlife, South Coast Region
3883 Ruffin Road
San Diego, CA 92123

Subject: Comments on CDFW Draft Instream Flow Recommendations for the Lower Ventura River and Coyote Creek

Dear Mr. Pert:

Casitas Municipal Water District (Casitas) appreciates the opportunity to comment on CDFW *Draft Instream Flow Recommendations for the Lower Ventura River and Coyote Creek* (Draft Instream Flow Recommendations) released by on February 26, 2021. Casitas is an affected stakeholder in the Ventura River watershed, and provides drinking water to approximately 70,000 people and 6,000 acres of agriculture within the District's boundaries. This critical service is provided to residents, farms, businesses, and other retail water providers through the storage of water in the United States Bureau of Reclamation's Ventura River Project (Lake Casitas) as well as local groundwater wells. For over 15 years, Casitas has implemented a Fisheries Program completing several projects that improve habitat conditions for endangered steelhead trout, including construction of a state-of-the-art fish passage facility at the Robles Diversion Facility.

The CDFW Draft Instream Flow Recommendations present complex technical issues of hydrology and biology in the Ventura River and Coyote Creek. Prior to implementation of a new proposed flow regime in the Ventura River Watershed, Casitas expects that a full environmental analysis in compliance with the California Environmental Quality Act and National Environmental Policy Act will be conducted. The overall benefits of stored water in Lake Casitas should be considered with respect to fishery and wildlife resources. As this subject is revisited by the State of California, it remains critically important to balance the needs of the environment, public health, and all beneficial uses.

At this time, Casitas respectfully requests that our concerns described herein are addressed given the importance of the flow recommendations in relation to the groundwater-surface water modeling study being developed by the State Water Resources Control Board.

1. **Hydrology Omits Long-term Drought Cycles Known to Occur.**

The CDFW Draft Instream Flow Recommendation hydrology discussion of the Ventura River watershed should acknowledge the long-term drought cycles known to occur in the watershed

based on precipitation records dating back to the late 1800s, as well as tree ring analyses and lake bed sediments studies dating back several centuries. The periods analyzed by CDFW in the hydrology discussion (Section 2.2) included 1928-1955 for pre-dam conditions in the Coyote Creek and 1965-2007 for the Lower Ventura River. Neither of these periods capture the longer-term extended drought cycles, particularly those that occurred from 1918-1934 and 1944-1965.

2. **Proposed Coyote Creek Flows Exceed Historic Flows, Would Cause Significant Water Supply Impacts, and Ignore Steelhead Needs.**

Statistical analyses of pre-dam gage data along Coyote Creek (Attachment 1) shows that CDFW flow recommendations for Ecosystem Baseflows exceed pre-dam median flows in all months, and significantly exceed the pre-dam median flows in December through May. This means that over 50 percent of the time, the unobstructed pre-dam flows in these months would not have met the CDFW Ecosystem Baseflow recommendations. The CDFW flow recommendations state that "when reservoir inflows naturally fall below the flow recommendations, releases should be equal to inflows to the reservoir." However, there are no existing gages currently in operation to measure real-time tributary inflows to the reservoir. All gages have been damaged by heavy sediment loads following the 2017 Thomas Fire.

Additional information and evaluation is needed to understand how the system would be operated for the recommended peak, pulse, and Ecosystem Baseflow releases. Casitas is concerned about the magnitude of water supply impacts, particularly since the area is already prone to extended drought periods and future water availability could be reduced with climate change.

Furthermore, the Ecosystem Baseflows flows "are not specific to steelhead flow needs" as stated on page 24 of the Draft Instream Flow Recommendations. Therefore, it is unclear how the proposed flows would be beneficial to steelhead and may have unintended consequences, as described further herein.

3. **Unsuitable Habitat in Coyote Creek Would be More Costly with Less Benefit Compared with More Suitable Habitat in San Antonio Creek and Ventura River.**

The current condition of Coyote Creek is severely degraded and mitigation projects in other parts of the watershed would be more biologically beneficial than the cost of mitigation within Coyote Creek. A watershed-wide evaluation of suitable habitat is necessary to prioritize which areas will provide the most benefit to steelhead.

A recent habitat survey conducted by Casitas using CDFW survey methodology verified the degraded conditions. The habitat survey subsampled approximately 13% of the reach in Coyote Creek and recorded cobble embeddedness at 97.9%. This level of embeddedness would be unsuitable for steelhead spawning and significantly limit macroinvertebrate food production necessary for juvenile rearing. Furthermore, silt composed 96.3% of the habitat substrate and gravel only represented 0.2% of the substrate, which only underscores the lack of suitable habitat for steelhead. Rearing and holding habitat created by boulder and cobble substrate was lacking and only represented 1.7% and 1.6%, respectively. The Coyote Creek reach was covered with dense vegetation debris up to a depth of 3 ft and covered 81.9% of the total habitat surveyed.

Riparian vegetation through most of this reach covers the historic channel to a degree that clear channel characteristics are difficult to even discern. Terrace and floodplain riparian vegetation is also dense and would likely alter high-flow processes. Therefore, the biologic benefit of CDFW's recommended instream flows to the Ventura River steelhead population would not be realized in Coyote Creek.

In addition, non-native warm water species that are known to prey on juvenile steelhead are abundant within Lake Casitas. Additional evaluation is needed on whether releasing flows from Lake Casitas would have unintended consequences by creating habitat favorable to non-native warm-water species within Coyote Creek and thus increase the proliferation of species that prey on juvenile steelhead. As non-native species exist in Lake Casitas, it will be difficult to control their populations in Coyote Creek and the Ventura River with releases of water downstream.

Based on Casitas' Fisheries Program experience and local understanding of the watershed, habitat mitigation projects in the Ventura River and San Antonio Creek would have far greater benefit to steelhead than additional flows in Coyote Creek and be much more cost-effective.

4. Potential Unintended Consequences of Coyote Creek Flows Have Not Been Fully Disclosed or Analyzed.

A full evaluation of potential unintended consequences of Coyote Creek flows has not been disclosed or analyzed. Unintended consequences may include, but are not limited to the following:

- Flooding of nearby private property owners. Numerous existing structures have been erected very close to the stream.
- Releases of water from Casitas Dam could prevent Casitas from utilizing approved copper-containing algaecides and/or molluscicides, and may increase the risks of future quagga mussel infestations (Attachment 2).
- Releases of water from Casitas Dam could lead to spreading of non-native species that are known to exist in Lake Casitas. In addition, the releases from Casitas Dam could create habitat favorable to non-native warm-water species within Coyote Creek, and thus increase the proliferation of species that prey on juvenile steelhead throughout the Ventura River.

Peak flows in the CDFW Instream Flow Recommendations could be as high as 2,480 CFS for a 10-year storm. The existing Casitas Dam outlet works were not designed for controlled releases of this magnitude. The existing 48-inch hollow jet valve has a capacity that is significantly lower than the recommended peak flows. Further engineering evaluation of safe flow rates and velocities to be released downstream in accordance with the proposed flow recommendation would be necessary.

Casitas is concerned about the unintended impacts of Coyote Creek releases, particularly when habitat mitigation projects in other parts of the watershed would be more cost-effective in providing benefits to steelhead.

5. Proposed Lower Ventura River Flows Exceed Historic Flows and Would Cause Significant Water Supply Impacts.

Casitas is concerned about the water supply impacts of Lower Ventura River flow recommendations. The CDFW Instream Flow Recommendations exceed historical (pre-Casitas Dam and pre-Robles Diversion) median flows in nearly all months, and significantly exceed historical median flows in April through January (Attachment 1).

The CDFW report states that "when flows naturally fall below the flow recommendations, full natural flows should be maintained." The natural flows are not specified in the Draft Instream Flow Recommendations. However, if the assumption is that natural flows are based on the CDFW *Instream Flow Regime Criteria on a Watershed Scale - Ventura River* dated May 2020, these CDFW flow estimates to reflect no human influence are problematic since the Draft Instream Flow Recommendations exceed the moderate (median) natural flows in the majority of months out of the year. This would have a significant water supply impact to the stakeholders, particularly since the area is already prone to extended drought periods and future water availability could be reduced with climate change.

6. Methods for Developing Lower Ventura River and Coyote Creek Instream Flows are Based on Qualitative Judgment and Lack Site-Specific Biological Validation.

The majority of methods used by CDFW to develop the Draft Instream Flow Recommendations rely on qualitative ecological principles and regional data. As a result, the flow recommendations are highly subjective and could be substantially different if they were based on site-specific studies that are more directly relevant for defining relationships between discharge and habitat conditions, water quality, fish responses, channel characteristics, and other features of the aquatic environment within the Ventura River watershed. In addition, the Draft Instream Flow Recommendations are based on qualitative judgments and assumptions tending towards restoring unimpaired flow hydrology, and do not account for human uses and other water management objectives that are intended to be balanced under the California Environmental Flows Framework. A full peer review of the methods used by CDFW is included as Attachment 3.

7. Incorrect Flow Requirements for 2003 Biological Opinion for Robles Diversion and Fish Passage Facility.

The CDFW Instream Flow Recommendations report states:

> "The Robles Diversion Dam has a required minimum bypass flow of 50 cfs when flows are available within the fish passage season (January 1 – June 30) and a minimum bypass flow of 20 cfs outside this season" (Section 3.5, page 19).

The above statement is incorrect and should be changed to properly reflect the governing 2003 Biological Opinion:

> The Robles Diversion Dam has a required minimum bypass flow of 30 cfs once a peak occurs and requires bypass flows of 50-170 cfs for 10-12 days within the fish passage

season (January 1 – June 30), outside this season a minimum bypass flow up to 20 cfs is generally released downstream.

8. Conclusion

The CDFW *Draft Instream Flow Recommendations* present complex technical, biological, and environmental impact issues. Understandably, reaching appropriate and supportable conclusions must be an iterative process. Casitas appreciates the opportunity to provide these comments, and suggest that CDFW and SWRCB take steps to evaluate site-specific habitat conditions to help prioritize areas within the watershed that will be the most cost-effective for providing benefits to steelhead. With regard to CDFW flow recommendations, Casitas is left with many unanswered questions regarding the data and methods used, as well as the potential unintended consequences of the flow recommendations that have not been fully evaluated or disclosed. How will CDFW implement due process to acknowledge and address all the comments received? Will a full environmental analysis consistent with CEQA and NEPA be completed prior to finalizing the recommended flow regime?

Sincerely,

Michael Flood
General Manager

c: Charlton Bonham, Director, CDFW
Brionna Drescher, Senior Environmental Scientist, CDFW
Eileen Sobeck, Executive Director, SWRCB
Erik Ekdahl, Deputy Director, Division of Water Rights, SWRCB
Erin Ragazzi, Assistant Deputy Director, Division of Water Rights, SWRCB
Daniel Worth, Senior Environmental Scientist, Division of Water Rights, SWRCB
Kevin Delano, Geologist, Division of Water Rights, SWRCB

ATTACHMENT 1

DRAFT CDFW FLOW RECOMMENDATIONS COMPARED WITH HISTORICAL FLOWS

The Casitas Dam and Robles Diversion Facilities were constructed by the United States Bureau of Reclamation in the late 1950s. Historical daily flow measurement data exists for pre-dam and pre-diversion conditions at the following gage locations:

- USGS 11118000 located on Coyote Creek downstream of Casitas Dam (1927-1955), and
- USGS 11118500 located on the Lower Ventura River

Statistical analyses of pre-dam gage data are shown in Figures 1 (Coyote Creek) and Figure 2 (Lower Ventura River). For comparison, the monthly CDFW Draft Instream Flow Recommendations are plotted (excluding the peak and pulse flow recommendations).

Figure 1 (Coyote Creek) shows that CDFW Draft Instream Flow Recommendations exceed historical pre-dam median flows in all months, and significantly exceed the historical median flows in December through May.

Figure 2 (Reach 3 of Lower Ventura River) shows that CDFW Draft Instream Flow Recommendations exceed historical pre-dam and pre-diversion median flows in nearly all months, and significantly exceed historical median flows in April through January.

As stated on page 25 of the CDFW Draft Instream Flow Recommendations, “changes in temperature and precipitation could result in alteration to existing freshwater systems and an overall reduced availability of water.”

With the understanding that historical flows did not meet the flow recommendations over 50 percent of the time in nearly all months, coupled with the understanding that future availability of water could be reduced with climate change, revised flow recommendations are necessary for different hydrologic year types (critically dry, dry, normal, wet), to acknowledge the extreme fluctuations in precipitation and streamflow, and the impacts of extended drought periods.

The CDFW Draft Instream Flow Recommendations for Coyote Creek state that “when reservoir inflows naturally fall below the flow recommendations, releases should be equal to inflows to the reservoir.” For the Lower Ventura River flows, the report states that “when flows naturally fall below the flow recommendations, full natural flows should be maintained.”

Table 1 the CDFW *Instream Flow Regime Criteria on a Watershed Scale - Ventura River* dated May 2020 presents estimated natural flows which “would be expected with no human influence”. The CDFW estimated natural flows are compared with the Draft Instream Flow Recommendations for Coyote Creek and Lower Ventura River in Figures 3 and 4. As shown, the flow recommendations exceed the moderate (median) dry natural flows that would be expected with no human influence. This means there would be no water supply available many months, particularly with more frequent dry conditions expected to occur with climate change.

Figure 1

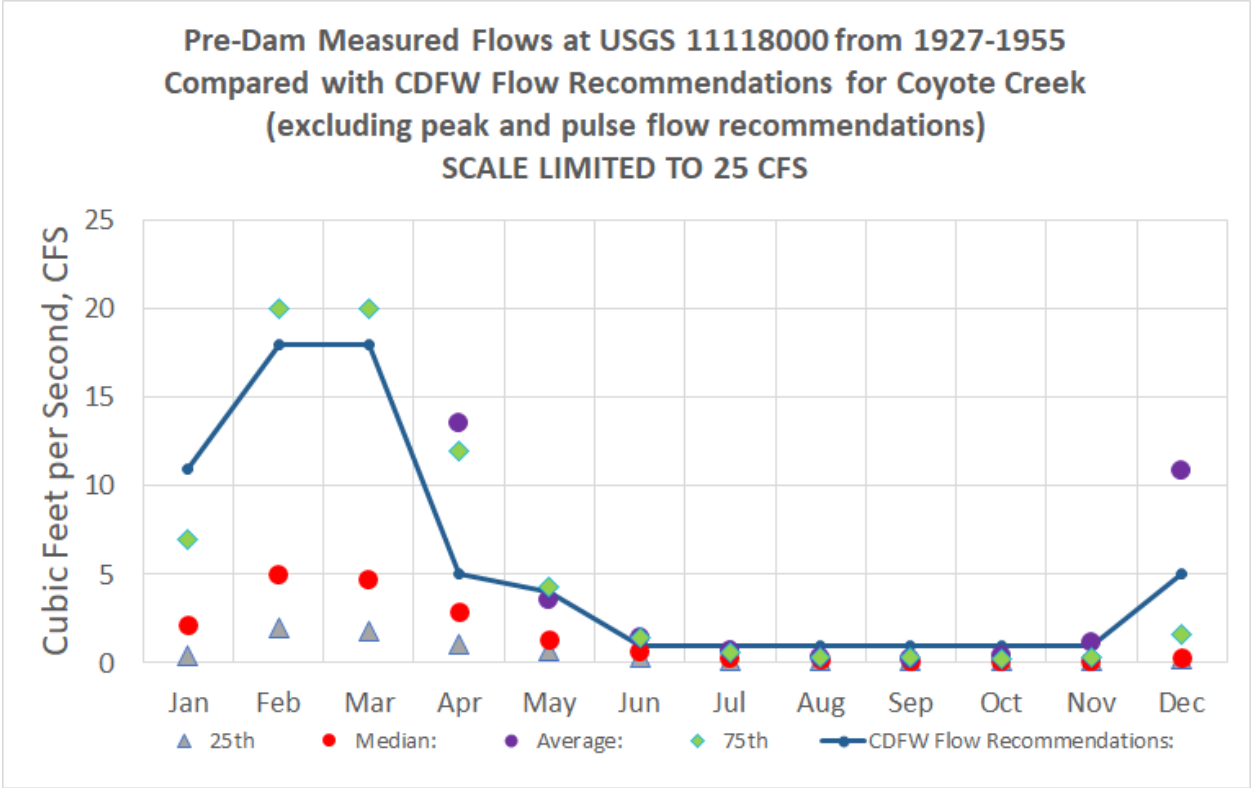


Figure 2

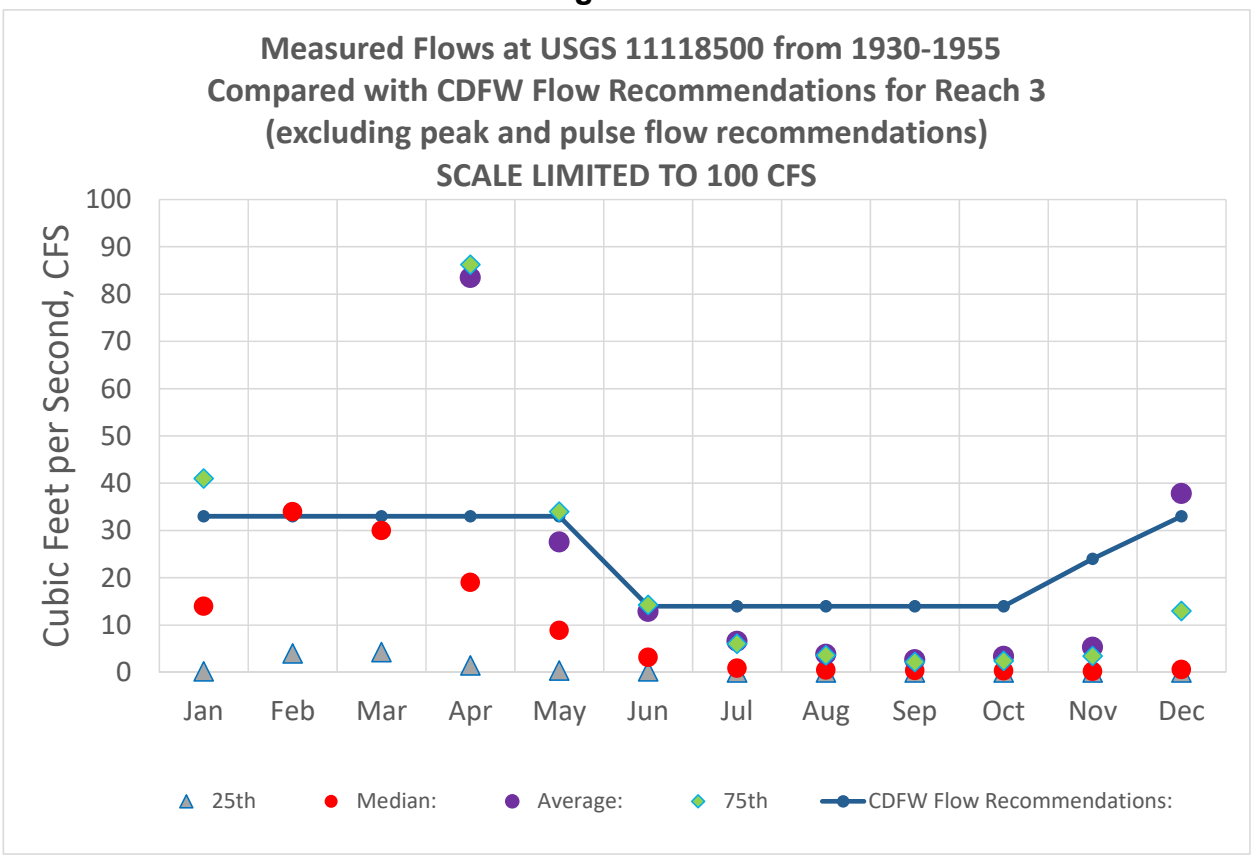


Figure 3

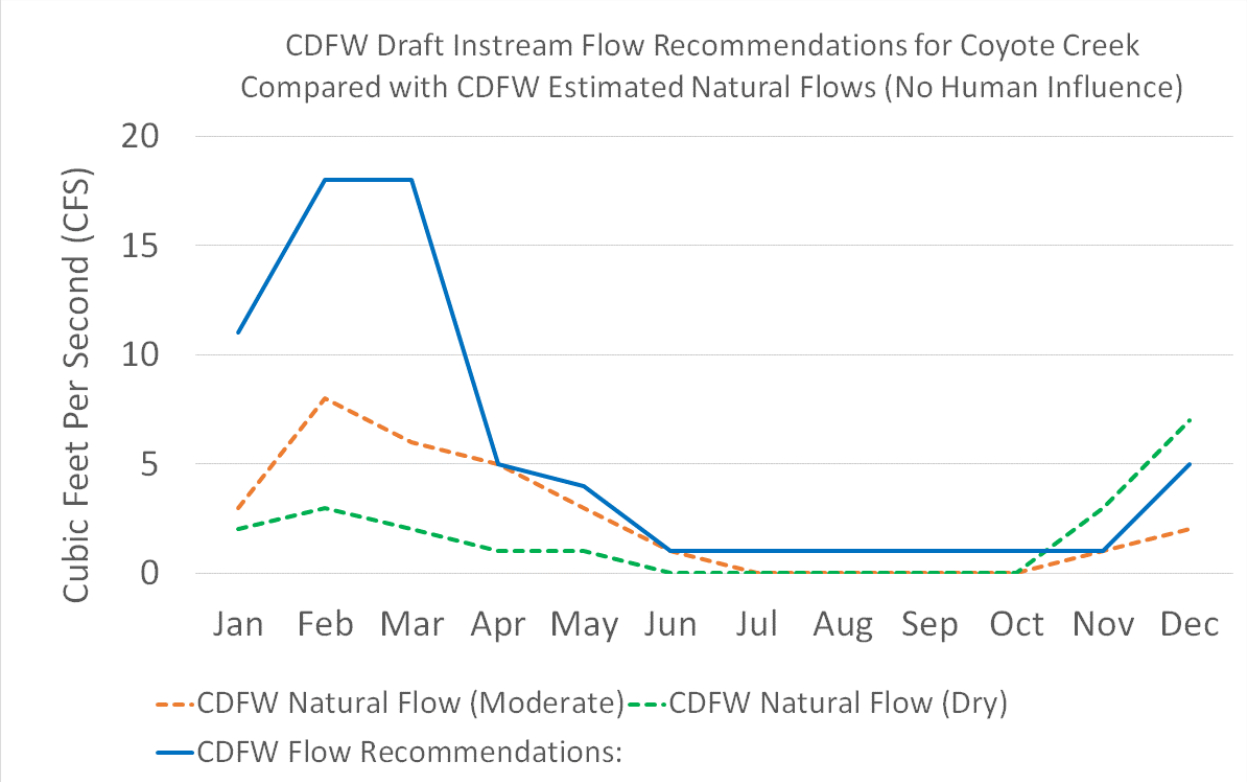
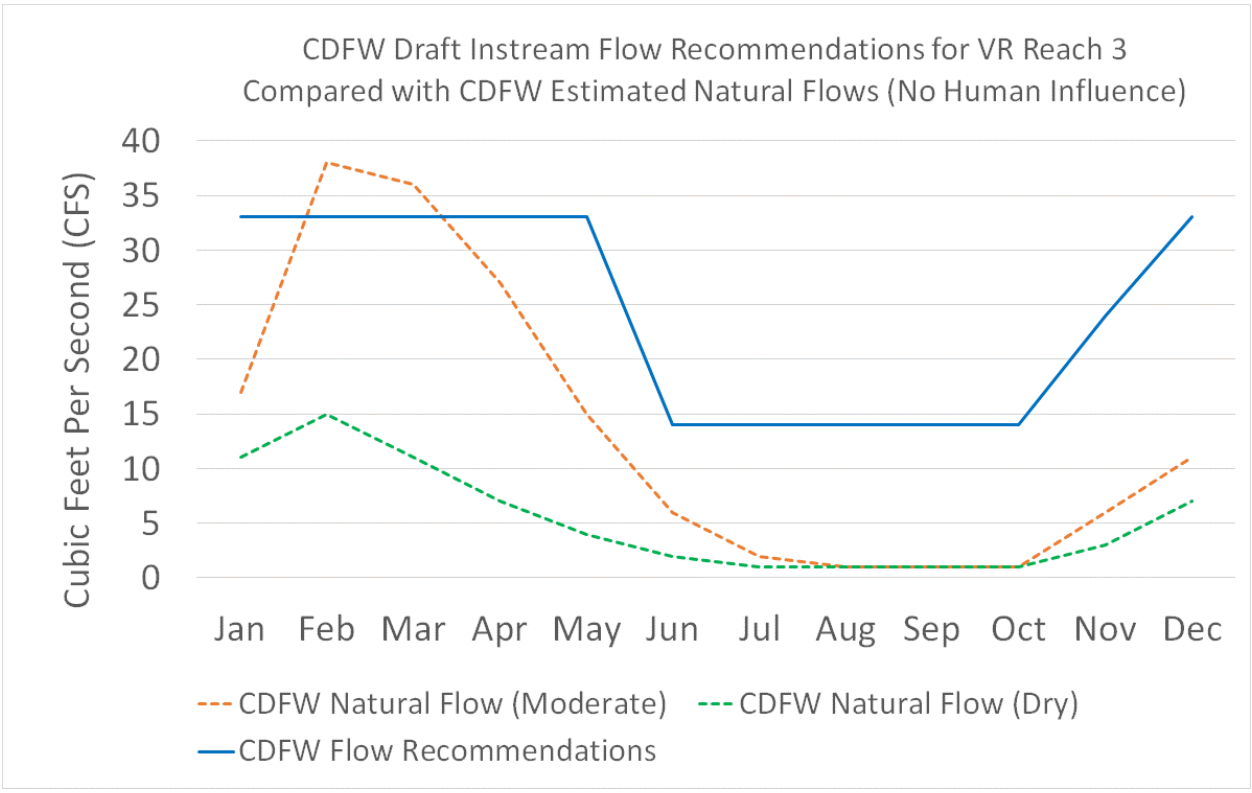


Figure 4



ATTACHMENT 2

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Potential Impacts of the Proposed CDFW Draft Instream Flow Recommendations to Casitas Municipal Water District's Planned Dreissenid Mussel and Algae Control Approach

The California Department of Fish and Wildlife (CDFW) released Draft Instream Flow Recommendations for the Lower Ventura River and Coyote Creek on February 26, 2021, and is currently soliciting comments from stakeholders. This document has been prepared on behalf of Casitas Municipal Water District for purposes of providing comments on the CDFW Draft Instream Flow Recommendations.

Casitas Municipal Water District (CMWD) operates Casitas Dam and manages Lake Casitas. Although occurrences have not yet been documented in Lake Casitas, infestations of dreissenid mussels; specifically, zebra mussels (*Dreissena polymorpha*) and quagga mussels (*Dreissena rostriformis bugensis*) represent an emerging threat to operational functions and ecosystem health within the lake. Dreissenid mussels are harmful fouling organisms and efficient filter feeders, able to colonize in and block water delivery infrastructure and strip food from the water that is necessary to sustain other aquatic life. Direct economic costs are on the order of $100 million a year in the eastern United States and could be greater in the West, as cities, farms, and industries in the West depend on the effective transport of huge quantities of water across large distances through complex and vulnerable systems of canals, pipes, reservoirs, and pumping stations (Cohen et al. 2007). Quagga mussels have already been discovered in nearby waterbodies, including Lake Piru, Lower Piru Creek, and the Santa Clara River.

Consistent with California Department of Fish and Wildlife requirements presented in California Code of Regulations (CCR) Title 14 §672 and elsewhere, CMWD has implemented a Dreissenid Mussel control, prevention and inspection program. Further, CMWD has received funding from the California Division of Boat and Waterways to implement the "Lake Casitas Quagga and Zebra Mussel Prevention Public Outreach and Education" program. Last, CMWD is currently in the process of preparing CEQA documentation for a proposed project to utilize California Department of Pesticide Regulation (DPR) approved copper-based molluscicides under Water Quality Order No. 2011-0003-DWQ (General Permit No. CAG 990006) *Statewide General National Pollutant Discharge Elimination System (NPDES) Permit For Residual Pesticide Discharges to Water of the United States From Aquatic Animal Invasive Species Control Applications*, to respond rapidly to a discovery of dreissenid mussels, should they be detected. CMWD has successfully utilized copper-based algaecides for the control of nuisance and potentially harmful algae in Lake Casitas under Water Quality Order 2013-002-DWQ (General Permit No. GAC 990005) *Statewide General National Pollutant Discharge Elimination System (NPDES) Permit for Residual Aquatic Pesticide Discharges to Water of the United States from Algae and Aquatic Weed Control Applications*.

Releases of water from Lake Casitas to Coyote Creek may occur through a valve at the bottom of Casitas Dam spillway or over the top of the spillway. Spills from Lake Casitas are rare, and only occur during winter rainfall events. As necessary, CMWD applies copper-containing algaecides at rates appropriate for control of target algae species and makes applications at times where spills are unlikely (i.e., during

dry summer months). To date, no application of copper for the control of quagga mussel has been needed. The Instream flow recommendations released by CDFW suggest that the source of water needed to achieve base, peak, and pulse flows would necessarily come via environmental releases from Casitas Dam. Releases may result in discharge of water containing copper at concentrations that exceed the either the California Toxics Rule freshwater criteria and/or those tolerable to fisheries, and as a result may reduce or prevent CMWD from utilizing approved copper-containing algaecides and/or molluscicides.

CMWD and other similar entities must consider potential conflict(s) and balance risks and benefits between CDFW's proposed instream flow requirements and CDFW's quagga mussel control requirements.

References:

Cohen, A. N.; Moll, R.; Carlton, J. T.; O'Neil, C. R.; Anderson, L.; Moyle, P. B. 2007. California's Response to the Zebra/Quagga Mussel Invasion in the West.

ATTACHMENT 3

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April 13, 2021
Project No: 21-11141

Mike Flood
General Manager
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Subject: **Peer Review of and Comments on the California Department of Fish and Wildlife Draft Instream Flow Recommendations – Lower Ventura River and Coyote Creek and Relevant Documents**

Dear Mr. Flood:

Rincon Consultants, Inc. (Rincon) and Kleinschmidt Group are pleased to submit this peer review of the *Draft Instream Flow Recommendations – Lower Ventura River and Coyote Creek, Ventura County* (California Department of Fish and Wildlife) and related documents. The CDFW documents reviewed included:

- Study Plan - Habitat and Instream Flow Evaluation for Steelhead in the Ventura River, Ventura County (CDFW 2017a)
- Addendum to: Habitat and Instream Flow Evaluation for Steelhead in the Ventura River Study Plan (January 2017) (CDFW 2017b)
- Instream Flow Regime Criteria on a Watershed Scale - Ventura River (CDFW 2020a)
- Appendix B - Supplemental Information on Field Methods for the Ventura River Watershed Criteria Report (CDFW 2020b)
- Standard Operating Procedure for the Wetted Perimeter Method in California (CDFW 2020c)
- Draft Instream Flow Recommendations for the Lower Ventura River and Coyote Creek (CDFW 2021)

Peer Review Results

Herein is an overview of the instream flow goals and objectives and our professional opinions on the study methods and results. In summary, our review found that the instream flow recommendations are based mostly on regional habitat-flow or hydrologic relationships, or general ecological principles and professional judgment tending towards restoring relatively unimpaired flow hydrology. We would expect that site specific studies collecting data more directly relevant to defining relationships between discharge and habitat quantity, water quality, fish responses, channel form, and other features of the aquatic environment would result in instream flow recommendations that could be substantially different. We also note some aspects of the recommendations methods are not explained sufficiently to fully understand the basis behind the recommended number.

Intent of the Instream Flow Recommendations

The instream flow recommendations are presented as the necessary flows to protect all steelhead life stages and the habitats that support them in the Lower Ventura River, between Shell Road and the confluence with

San Antonio Creek, and in Coyote Creek below Casitas Dam. The recommendations consist of a range of monthly and instantaneous target flows that reflect different habitat needs of specific biota in the aquatic environment. The habitat needs addressed include the following instream flow criteria (IFC):

- Emulating the natural variability in the annual hydrograph through flows that represent the following specific portions of the curve comprising 'Functional Flows": fall pulse, winter floods, winter base flow, spring recession, and summer base flow;
- Ecosystem Baseflows, which are taken as a proportion of monthly natural baseflows at a level assumed to preserve a healthy stream ecosystem based on professional biological judgment that reflects prior observations or judgments of what represents a healthy aquatic ecosystem elsewhere;
- Sensitive Period Flows, which are minimum summer base flows needed to protect Benthic Macroinvertebrate (BMI) habitat;
- Optimal flows for juvenile steelhead rearing (Steelhead Habitat Optimum Flows); and
- Minimum flows protecting upstream passage of adult steelhead (Steelhead Passage Flows).

Specifying different flow targets reflects ecological and geomorphic principles that comprise a part of the California Environmental Flows Framework (CEFF) addressing ecosystem needs. The CEFF is an approach under development by the State to manage instream flows equitably across multiple beneficial uses to the extent that the public trust natural resource is not adversely affected. The other part of the CEFF that addresses environmental flow recommendations and that takes human uses and other water management objectives into consideration is not part of the instream flow recommendations proffered by the CDFW. Most importantly, however, is the observation that the quantitative criteria on which the CEFF is dependent on for scientific defensibility are not well established through data. The definition and quantification of instream flow needs of many of the components within the framework, rely instead on qualitative judgments and assumptions, as summarized below.

Review of the Instream Flow Criteria and Their Basis

The IFC were developed via a variety of approaches ranging from professional judgment, to regionally derived empirical criteria, to site specific criteria derived with field data:

1) **Functional Flows**: The main purpose for defining different parts or elements of the annual hydrograph is to develop instream flow recommendations for each part that taken together result in a managed hydrograph that resembles or emulates the seasonal variation in flow magnitudes. The general scientific consensus is that a more variable annual hydrograph pattern is associated with a healthier aquatic environment than a steadier hydrograph. Specific elements relevant to protecting steelhead habitat include the following.
    - Pulse flows are considered important for open coastal lagoons initiating steelhead adult upstream migration. The flows needed to affect these events are respectively highly stream specific and uncertain. Typically, a hydrologically based approach is used to specify flows that are derived from empirical evidence.
    - Peak floods are included in the scheme because of their influence on channel morphology and processing of coarse and fine sediments through the channel network. These processes control aquatic habitat formation and maintenance as determined by physical geomorphic processes. Their determination is highly stream specific, requires site specific data and hydraulic and sediment transport analyses, and can be uncertain.
    - Winter base flows are most important for protecting steelhead spawning and incubation habitat from becoming dewatered. These flows are typically determined using site specific data.

- The springtime receding limb of the winter flow hydrograph occurs generally during the time of year when steelhead smolts outmigrate to the ocean. There are no good mechanistic, quantitative measures of flow needs for this life stage, thus instream flow recommendations typically rely on an indirect, qualitative hydrologic approach linked to empirical evidence of outmigration behavior.
- Summer base flows are most important in southern California for providing refuge habitat from high water temperature and low dissolved oxygen impacts that may preclude survival of juvenile, and in some cases holding adult, steelhead. Their determination is site specific and depends on measurements of water quality conditions in pool habitats.

The corresponding flow recommendations were derived using the least flow-impaired data from gages on the Ventura River and Coyote Creek. Therefore, they represent hydrographs of relatively unimpaired flow conditions in the basin, which may not be realistically achieved without a broader basinwide modification of water demands and sources that makes water more available for instream flow uses.

2) **Ecosystem Base Flows**: These are considered by the CDFW to be general flow magnitudes that preserve a healthy stream ecosystem and thus effectively result in fish habitat in good condition and vary throughout the year. They were specified as a percentage of monthly and annual flows using the least flow-impaired data from US Geological Survey stream gages on the Ventura River (Station 11118501, water years 1965–2007) and Coyote Creek (Station 11118000, water years 1928-1955), and thus also represent hydrographs of relatively unimpaired flow conditions in the basin. Moreover, their magnitude was determined using criteria that were based strictly on professional judgment derived from older studies of what percentage of natural hydrologic flows is associated with healthy conditions, without specific biological validation (cf., Hatfield et al. 2003).

3) **Sensitive Period Flows**: These flows are based on the premise that maintaining wetted conditions of the channel bottom between streambanks is a minimum sufficient condition to protect BMI production, which is a primary juvenile steelhead food source during the late spring through early fall growth period. Site specific data were used to implement CDFW's wetted perimeter, which is a relatively simple approach. There is some subjectivity involved in picking an instream flow criterion off the resulting flow-wetted perimeter curve, and greater uncertainty in quantifying the biological significance of what the percent of bankfull wetted perimeter criterion means.

4) **Steelhead Habitat Optimum Flows**: These are flows that are associated with greater areas of the stream with suitable depths and velocities for juvenile steelhead. They are based on the Hatfield and Bruce (2000) regional regression developed based on a compilation of site specific instream flow studies performed previously nationwide. The regression was developed for use in project scoping and planning, and adaptive management where the results inform more detailed follow-up experimentation and monitoring. They are used where site specific data and analyses have not been performed. In the North Coast Instream Policy analyses, the predictions were noted to fall in the mid-range of flow recommendations for a stream of a given drainage area, and they represent an average condition estimate. The resulting regression predictions are not equivalent to a minimum sufficient instream flow and may be higher.

5) **Steelhead Passage Flows**: These are considered minimum instream flows at limiting hydraulic control cross-sections at the pool-riffle interface (i.e., where other hydraulic control transects in the assessed reach are passable at lower flows). The reported goal was to preserve connectivity between mesohabitat units within the project reach. This flow criterion was determined using site specific data and hydraulic modeling. However, rather than use CDFW's Critical Riffle Depth (CRD) methodology which was designed specifically for assessing upstream passage flows along the length of a critical passage riffle, CDFW's Habitat Retention Method (HRM) was implemented instead, which is a more generalized approach focusing on hydraulic conditions at the upstream end of the riffle and thus, may result in specifying a

higher or lower minimum instream flow criterion depending on channel morphology. The method used a conservative minimum passage depth criterion for adult steelhead (mean depth of 0.7 feet at the hydraulic control, following the North Coast Instream Flow Policy), while also meeting additional criteria for percent wetted perimeter or velocity. Study reaches were limited to public lands and accessible private properties. Additional site-specific study sites may be needed to determine minimum passage flows for adult steelhead at other potential critical passage riffles.

Instream Flow Criteria Conclusions

In general, the Sensitive Period Flow criteria are the most site specific of the various instream flow recommendations because they are based on physical data from the study streams. However, the method used generally yields a scoping level estimate of BMI habitat flow needs. The Steelhead Passage Flows are also based on site specific data, but are potentially conservative because of the method used and also reflect a scoping level evaluation. The Steelhead Habitat Optimum Flow criteria have a physical and biological basis directly derived from instream flow needs studies, but are based on large scale, regional criteria and are not site specific. The Functional Flows and Ecosystem Base Flow criteria are least site specific and are based primarily on conceptual frameworks that are difficult to test, and accordingly represent surrogate flow levels for general ecological concepts. As a consequence, the instream flow recommendations may be collectively considered scoping level criteria at best. More in depth study and data collection would yield more site specific recommendations.

Feasibility of Implementing the Instream Flow Recommendations

The natural flows used to define the Functional and Ecosystem Base Flows were taken from The Nature Conservancy (TNC) Natural Flows Database. The flows were predicted based on a statewide statistical analysis of relatively unimpaired gages performed by TNC, U.S. Geological Survey, and University of California, Berkeley. Thus, the flows used to define the Functional and Ecosystem Base Flows appear to represent unimpaired conditions. Consequently, given the extent to which surface water and groundwater uses have been developed in the basin, it may not be hydrologically feasible to implement these two sets of flows as currently recommended when they are based on the Natural Flows Database. In addition, the Functional Flow durations in particular appear to be specified based on a natural hydrograph, not a managed one, and it may not be feasible to provide flows for the duration indicated.

In addition, the Sensitive Period Flows, Steelhead Habitat Optimum Flows, and potentially Steelhead Passage Flows may not translate downriver, depending on the extent to which the reaches of the lower river may be losing reaches and potentially affected by groundwater pumping. In recognition of this, the recommendations report states: “Integration of the Department’s study results with the State Water Board’s groundwater-surface water model will be an important step in implementation of these flows within the Ventura River watershed.” As part of that effort, it will be critical to assess the extent to which the flow recommendations will be effective downriver. The results could lead to reducing the effective duration of time when specific instream flow needs would need to be implemented.

Miscellaneous Comments and Questions

- The majority of criteria used in the instream flow study rely on qualitative ecological principles and regional data. In the document “Overview of analysis for instream flow regime criteria on a watershed scale, Version 2.” (CDFW 2020a), it states that in cases where additional information is needed to make an instream flow determination, a multiyear instream flow study may be necessary. Hatfield and Bruce

(2020), which is the study where the CDFW used equations from Physical Habitat Simulation (PHABSIM) studies from across the western United States cautions; "some resource managers will be tempted to use our equations uncritically because so little information or effort is required to complete the calculations. We stress, however, that considerable statistical and ecological uncertainty would remain after such a calculation. We have presented a tool that is a reasonable alternative or companion to a full-blown PHABSIM study, but fluvial systems are complex and many factors determine a healthy river. Natural resources cannot be well managed in the absence of acknowledging and planning for uncertainty (Ludwig et al. 1993). To do otherwise is to risk implementing faulty management decisions." This can be interpreted to mean that where water availability is limited, a more focused instream flow study is needed to identify site specific instream flow criteria more accurately.

- It is unclear why the Habitat Retention Method (HRM) was implemented for determining upstream passage flows instead of CDFW's Critical Riffle Depth (CRD) methodology. The HRM may recommend a higher or lower flow than the CRD method depending on riffle morphology downstream of the control sampled by the HRM. Both methods assume a stable gravel and/or cobble bed and may not be extrapolated downriver to more easily mobilized sand bed reaches. Recommend requesting photographs of the critical riffle transects that were surveyed and modeled to confirm they were representative of a stable gravel and/or cobble bed?
- In the wetted perimeter method, the breakpoint criterion on the flow-wetted perimeter curve has the most direct biological meaning. The use of a percent of bankfull criterion as an alternative metric is somewhat arbitrary and may be biased high depending on channel morphology in a way that may be unrelated to providing wetted habitat for BMI production. For example, bankfull depths and widths will vary with slope, channel forming discharge, geology, entrenchment, and other factors that can result in different flow recommendations for two channels with the same active channel toe width. The rationale for selecting a specific percent-based criterion as being applicable to the Ventura River study is not provided.
- The instream flow recommendations report states, "the functional flow metric values have been updated slightly in this report based on recent calculator updates." The rationale and method were not explained, however.
- The basis behind the professional opinion of the life cycle periodicities in Figure 3 in the instream flow recommendations report is unclear. Fish and drainage specific data are sparse in southern California and we are interested in these data to support management actions. The CMWD has some data on Ventura River steelhead migration periodicities and we are aware of robust life cycle migratory data from the Santa Clara River (Booth 2020 and Dagit et al. 2020). These data could be considered during development of the IFC.

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