Attachment P: Estimated Non-Capital Costs of Agency and Conservation Groups' Proposed Non-Flow Measures

Proposed Non-Flow Measure	Proposed By	Citation	Cost-Estimate
Salmonid Monitoring[i]	NMFS	Section 10 (a) and 10(j) Condition #4: Salmonid Monitoring Plan	$915,000 Annually
	USFWS	FPA § 10(j) USFWS Condition 5: Salmonid Monitoring	$885,000 Annually
	CDFW	CDFW Measure No. 11: Coordinated Salmonid Monitoring Program and Adaptive Management	$800,000 Annually
Annual Fish Counting Weir and Installation of a Temporary Weir[ii]	Conservation Groups	Annual Fish Counting Weir and Installation of a Temporary Weir to Capture and Remove Non-Salmonid Piscivorous Fish in Critically Dry and Super Critically Dry Water Years	$633,300 Annually
Fisheries Genetic Management Plan[iii]	CDFW	Measure No. 7-1.1: Fisheries Genetic Management, Reservoir Fish Stocking and Recreation Enhancement	$590,000
Conservation Hatchery Plan[iv]	CDFW	Measure No. 7-1.2: Conservation Hatchery Plan required by Measure 8 (Fish Passage) as attachment to Fisheries Genetics Management Plan	$500,000
Large Woody Debris Management Plan[v]	USFWS	USFWS FPA § 10(j) Condition 9: Revise the AFLA Woody Debris Management Plan Include Rapid LWM and Woody Debris Removal	$75,000 Annually
	BLM	FPA § 4(e) BLM Condition No. 4 - Large Woody Debris Material Management Plan	
	CDFW	CDFW Measure 4-6: Large Woody Material Monitoring and Replenishment	
	SWRCB	Large Woody Material Management Plans	
	NMFS	Section 10(a) and 10(j) Condition #3: Large Woody Debris Enhancement and Management	
Reservoir Fish Stocking[vi]	CDFW	Measure No. 7-2: Fisheries Genetic Management, Reservoir Fish Stocking and Recreation Enhancement	$140,000 Annually
Fish Rescue Plan for Modesto Irrigation District Diversion[vii]	USFWS	FPA § 10(j) Condition 12: Fish Rescue Plan for Modesto Irrigation District Diversion	$150,000 Annually
Fish Protection Facilities of the Projects[viii]	CDFW	CDFW Measure 8-1: Fish Protection from Facilities of the Projects	$60,000/event
Water Quality Monitoring[ix]	CDFW	Measure No. 12: Modification of Recommendations after Biological Opinion or Water Quality Certification	$85,000 Annually
	SWRCB	Water Quality Monitoring Plan	
Water Temperature Monitoring[x]	USFWS	FPA § 10(j) USFWS Condition 6: Develop and Implement Water Temperature Monitoring Plan	$360,000 Annually
	CDFW	Measure No. 2: Tuolumne River Water Temperature Management Plan	
	SWRCB	Water Temperature Monitoring Plan	

Proposed Non-Flow Measure	Proposed By	Citation	Cost-Estimate
Removal of Construction Materials	Tuolumne River Conservancy	Removal of Construction Damage caused during Building of New Don Pedro Dam and related Tuolumne River Restoration	$250,000 (one time cost)
Predator Management and Suppression[xi]	CDFW	Measure No. 6: Predator Management and Suppression	Not Estimated Separately

[i] Estimated costs are based on 2018 pricing.

Estimated snorkeling expenses: NMFS - Snorkeling for abundance census and woody debris placement – $80,000 (pre-weir deployment specific survey, assumes surveys could occur in locations where woody debris is placed to for pre-survey assessment that covers all of the river, then 2 targeted follow-up surveys). USFWS and CDFW: Woody Debris pre/post placement snorkeling surveys - $50,000.

Estimated expenses for paired rotary screw traps: One at RM 5.3 (Grayson RST) and one at RM 29.8 (Waterford RST), operated in a manner consistent with the 1997 USFWS (CAMP) Implementation Plan (Attachment 4) and the USFWS 2008 Draft Rotary Screw Trap Protocol (Attachment 3): Current RST budget is approximately $500,000/year.

Estimated expenses for the operation and maintenance of the existing Seasonal Adult Counting Weir at RM 24.5 through June 15th; CDFW Timeline - Proposed budget for Jan- June 15: $165,000/yr. This budget is an average that accommodates purchases and labor for equipment maintenance, adding $100,000 to the total to reflect technology upgrades. USFWS and NMFS - Current weir budget is $250,000/year (Sept through mid-April), assumes USFWS and NMFS are using standard sampling timeline.

Estimated expenses to conduct annual carcass surveys with the following details: Measurement of fall-run Chinook salmon escapement by conducting annual carcass surveys: From October 1st through December 1st and continued until two weeks after surveyors find less than 5 new fish-carcasses in a week; Consistent with the modified Cormack-Jolly-Seber (CJS) methodology described in the CDFW 2012 Central Valley Chinook Salmon In-River Escapement Monitoring Plan (Bergman et al. 2012); Noting stream-reach locations for each carcass. Morphometric measurements: Of 100% of the Chinook salmon carcasses downstream of the Fish Counting Weir at RM 24.5, surveying to at least RM 23.5; Of the first 500 Chinook salmon carcasses found upstream of the Fish Counting Weir; Measuring an additional 5% of the Chinook salmon carcasses above the first 500 Chinook salmon carcasses, but not more than 1000 in given year; Shall include: i. Scale and otolith collection; ii. Length; iii. Sex; iv. Coded-wire-tag; and v. Fecundity data (for estimating pre-spawn mortality). Proposed budget for carcass sampling survey to collect biological data and recover CWTs $85,000/year.

[ii] Estimated costs are based on 2018 pricing. Estimated cost of $500,000 for year-round weir monitoring, with increased effort during relocation activities. Estimated cost of $20,000 for permitting in Year 1. Estimated cost of $110,000 for fish transportation, assuming 100 days requiring 6 hours of transportation. Estimated cost of $3,300 for snorkel surveys. Year-round operation and relocation of fish would be pursuant to approval from state and federal agencies.

[iii] Estimated costs are based on 2018 pricing; the development of the management plan itself is a one time cost. Cost to develop genetic goals and objectives (M7-1.1(a-b)) of the Fisheries Genetic Management Plan is estimated at $30,000 per species to be considered. CDFW identifies five species (Chinook, *O. mykiss*, White Sturgeon, Red Hills Roach, and Pacific lamprey) in their January 29, 2019 Response to Notice of Ready for Environmental Analysis for a total of $150,000. Any additional species would add $30,000/each. The recreation fish stocking component (M7-1.1(c)) is estimated at $30,000 per species requiring a stocking plan. However, CDFW did not identify any species proposed for recreational stocking. According to the Districts' Hatchery Stocking Practices Review Study Report, between three and six species have been stocked annually in Don Pedro Reservoir since 2010. Costs estimated for

an assumed four species requiring stocking plans would amount to $120,000. Note also that per M7-1.1(a). CDFW proposes that genetic goals and objectives be developed for "any species that will be part of reservoir fish stocking" requiring the assumed four species requiring stocking plans to also have genetic goals and objectives amounting to an additional $120,000. Cost estimated for consultation with the TREG for development of this plan and all sub-plans as $200,000. Total estimated costs of $590,000 for the assumptions listed for development of FGMP (genetics and stocking plans and TREG consultation).

Evaluation of Feasibility of CDFW's proposal - In theory, Hatchery Genetic Management Plans would exist for all operating artificial propagation programs, which could then be interweaved into a larger master plan (i.e. Fisheries Genetics Management Plan) that manages the genetic resources of all native fish across the Don Pedro Project Area. In practice, no hatchery operated by the State of California in the Central Valley has an approved HGMP. The Federal winter-run Chinook Salmon program at Livingston Stone is the only approved HGMP in the Central Valley. There are many hatchery programs that interact within the Project Area and none are under the control of the Districts. For example, artificially propagated species released by CDFW above Don Pedro are i) recreational rainbow trout (*O. mykiss*) and golden trout (*O. mykiss*) that are genetically distinct from the *O. mykiss* residing in the upper and lower Tuolumne, ii) Pacific Salmon species (chinook, sockeye), iii) non-native European brown trout, iv) non-native black bass (largemouth, smallmouth), and v) non-native char (brook trout). Given the purpose of an HGMP is to specify a hatchery program's purpose and performance measures that would evaluate said purpose, it is unlikely that agreements would be achievable on hatchery program specifics external to the Districts' purview. Perhaps more importantly, genetic goals have not been articulated for protected species, let alone genetic goals for unprotected native species. It is unlikely that the Districts would successfully determine matters of CDFW policy regarding native species conservation goals.

The FGMP as requested by CDFW unrealistically assumes serial single-species management could achieve agreed upon objectives. Hatcheries, fisheries, and native species conservation/management all interact across the landscape. The non-independence of objectives would require prioritization and may require changes to State policy. For example, would non-native bass be prioritized over reservoir-rearing (i.e. ad fluvial) heritage trout genetic viability? Would there be a genetic viability trigger that alters the prioritization of non-native bass over heritage trout or vice versa? This is only one example interaction from a defined region within the larger Project geographic footprint. The competing objectives within CDFW and among other regional stakeholders would likely not be resolvable without a dramatic shift to ecosystem management or habitat zoning (i.e. approved uses by area). The reality is that there is currently no framework by which the Districts could create a FGMP as requested by CDFW. It is aspirational at best that CDFW requests the Districts to create a master plan for CDFW hatcheries and fisheries that are in harmony with protection of native species' viability residing (fully or partly) in some region of the Tuolumne River watershed. Therefore, the costs listed here are at best, preliminary as they assume standards exists, activities within the Project Area do not substantially interact, and activities external to the Project do not substantially interact with the performance of Project activities.

[iv] Estimated costs are based on 2018 pricing; development of the management plan is a one-time cost. Cost estimating that two species (spring run Chinook and steelhead) would need to be considered in the event of a fish passage/reintroduction program. Plan development cost per species would be $250,000 each for a total of $500,000. The estimate is based upon costs for the past development of a Feather River Spring Run Hatchery Plan (which is currently not yet approved). Note that 1) plan development does not consider consultation/approvals with the TREG, and 2) study information provided to FERC previously by the Districts have shown that a fish passage/reintroduction program is not feasible and/or not appropriate and as such, the Districts disagree with CDFW's Measure 8 and the need for a Conservation Hatchery Plan (for fish passage/reintroduction).

[v] Estimated costs are based on 2018 pricing and historical expenses associated with large woody debris management and removal and are subject to annual changes based upon conditions.

[vi] Estimated costs are based on 2018 pricing. Cost estimate of $4/lbs of rainbow trout stocked (estimate from Dr. Mark Clifford (CDFW Statewide Hatchery Coordinator) in "Is There a California Trout Shortage? The CDFW Comes Clean!"). 35,000 lbs of rainbow trout x $4/lbs = $140,000 *See* Kellog, C. 2016. Is there a California trout

shortage? The CDFW comes clean! The Fish Sniffer. Available at: http://fishsniffer.com/index.php/2016/02/12/is-there-a-california-trout-shortage-the-cdfw-comes-clean/ [Accessed 23 April, 2018].

[vii] Estimated costs of $150,000 is based on 2018 pricing. Cost assumes similar effort to RST sampling at Waterford. It is unknown if sampling upstream of the tunnel is feasible, and serious concerns regarding safety of crews working directly upstream of the tunnel entrance. The 2017 rescue event removed ~1,000 O. mykiss, but based on initial conversations with MID staff it had been over 10 years since the last dewatering event. Other options could include 1) video monitoring to estimate the number of O. mykiss entrained annually at $20,000 a year, or 2) annual dewatering and fish rescue events at $3,500 a year.

[viii] Estimated costs of $60,000 is based on 2018 pricing. Estimated cost for CDFW Measure 8-1: Fish Protection from Facilities of the Projects items a, b, c, d, f, & g. A monitoring program (Item E) and associated price would be recommended based on initial assessments.

[ix] Estimated costs are based on 2018 pricing and are based on the Districts' review of previously performed efforts and budgets related to similar water quality monitoring efforts.

[x] Estimated costs are based on 2018 pricing and are based on the Districts' review of previously performed efforts and budgets related to similar water temperature monitoring efforts.

[xi] The Predator Management and Suppression Plan as proposed by CDFW is not specific enough to provide a cost estimate. In the Don Pedro AFLA, the Districts have proposed a comprehensive Predator Control and Suppression Plan, including a monitoring program and associated cost estimate to evaluate the effectiveness of the Districts' Preferred Plan.