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To: Governance Committee (GC), Water Advisory Committee (WAC) and Executive Director's Office (EDO) of the Platte River Recovery Implementation Program (PRRIP)

From: Jon Altenhofen, P.E., Colorado Water User Member, WAC 

Memo Subject: Colorado's Annual Report for 2019 for Tamarack 1

Colorado's Initial Water Project (Tamarack 1)—Annual Review 2019

The Colorado Tamarack 1 Project based on the historic study period of 1947-1994 developed an average annual yield of 10,000 acre-feet of target flow shortage reduction. This yield is the result of diversions to managed groundwater recharge sites during times when the river flows are in excess to target flows. The accretions returning to the river later from these recharge diversions and reaching below the Nebraska Stateline when no river calls are credited to Tamarack 1 during times of shortage to target flows. As with the CPFD (Colorado Plan for Future Depletions) operations, SPWRAP operates and pays electrical costs and maintains dedicated recharge projects (i.e., Tamarack Wildlife Area and Heyborne projects) and pays for Tamarack 1 creditable accretions not used by existing recharge plans. South Platte Water Related Activities Program (SPWRAP) is a non-profit group of mainly municipal Colorado water users collecting assessments (\$1.02 per tap in 2019) to pay for Colorado's water obligations for PRRIP in partnership with the State of Colorado where the State covers other Program costs. For 2007-2019, SPWRAP paid a total of about \$7,500,000 for CPFD and Tamarack 1 creditable supplies. The Table below shows the Tamarack 1 credits actually developed from all these operations since the start of the PRRIP in January 2007 with an average annual yield for shortage reduction of 8,270 acre-feet for the years of full operations.

The 10,000 ac-ft goal has not yet been reached on average because the flow frequency for excess to targets has been less for the starting years of PRRIP as compared to the historic period. December through March are the months of greatest excess and for the historic period of 1947 through 1994, 59% of these months had excess flows above target flows. However, for the first 13 years of the Program for December through March, only 41% of these months had excess flows, thus limiting the amount of water available for Tamarack 1 operations. An estimate of the Tamarack 1 credit achievable if actual flows similar to historic excesses had occurred can be estimated as follows: divide the actual 8,270 ac-ft average in table below by the water availability ratio of 0.695 (=41/59) which results in 11,900 ac-ft.

The Program document recognizes the possibility that reductions in actual yield might occur in paragraph IIIC of the Tamarack 1 description in PRRIP Attachment 5 Section 3 which states "...as long as Tamarack 1 is constructed and operated as described herein, the target flow shortage reduction credited to Tamarack 1 individually or to the three initial water projects collectively will not be reduced even if the real time frequency and magnitude of flows in excess to targets at Grand

Island causes Tamarack 1 to produce an average annual yield that is less than that projected under historic flow conditions, regardless of the reasons for the change.”

Colorado recognizes that with changing hydrologic conditions, additional capacity is required to meet the Tamarack 1 objectives, and this is why the Tamarack Wildlife Area water right allows the addition of 7 more recharge wells. The drilling of 6 of these wells at a cost of about \$1.2M (paid for by SPWRAP and State of Colorado) was completed in December 2013. SPWRAP has also completed a pipeline south under Interstate 76 in order to recharge further from the river so more flexibility in when accretions return to the river and recharge began in this new system in December 2017. Tamarack 1 project has an overall limit on average annual net diversions (diversions into and seeped from recharge ponds minus accretions back to the river when diversions occurring) of 30,000 ac-feet and for the first 13 years of operations these actual net diversions have annually averaged 19,800 ac-ft, so additional diversion capacity exists. The Table below lists by month the Tamarack 1 credit for shortage reduction. Also, the far-right column lists the annual net diversion to recharge when excess to target flows by year routed to the Colorado-Nebraska Stateline.

Tamarack 1 Credits for Shortage Reduction at Stateline; acre-feet (PRRIP start January 2007)													Total Annual Net Diversions	
	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	Total	Diversions-Accretions at Stateline
2007			641	587	506	345	0	698	0	0	0	515	3291	10597
2008	480	0	0	3038	1666	721	0	0	66	274	50	460	6754	14543
2009	0	1024	932	951	699	680	278	377	345	441	436	430	6593	1457
2010	0	0	0	2520	1255	1828	861	0	0	0	0	824	7288	13428
2011	374	0	0	2365	0	0	0	0	0	0	0	0	2739	30753
2012	0	0	0	2562	3130	2291	100	0	134	109	84	807	9219	10219
2013	614	0	0	2544	1697	1295	0	0	0	0	452	0	6602	10495
2014	886	791	0	2707	2108	1870	1443	0	723	724	594	1082	12927	10133
2015	868	0	0	1951	3608	2554	691	0	0	0	0	1407	11079	15714
2016	0	0	0	2235	2315	1801	0	0	0	147	0	1906	8404	20091
2017	0	0	0	2272	1111	2500	462	953	187	0	0	1134	8620	11960
2018	0	0	0	3385	3174	2893	0	0	190	731	0	1149	11522	14151
2019	0	0	0	3786	1223	0	0	1215	0	0	0	1224	7448	22438
												Avg 2008-2019	8266	14615