Summary of Lake Mendocino Water Management Issues

Forecast Informed Reservoir Operations Workshop

August, 2014

This document summarizes the significant water supply, flood control, and environmental resource management issues associated with the operation of Coyote Valley Dam.

1.0 General Background

Lake Mendocino is located on the East Fork of the Russian River, about 5 miles northeast of Ukiah in Mendocino County, California (Figure 1). The Coyote Valley Dam project was authorized by the Flood Control Act of 1944 and completed in 1958 for purposes of flood control, water supply, recreation and stream flow regulation. Lake Mendocino has a total storage capacity of 122,500acre-feet, of which the water conservation pool comprises between 68,500 acre-feet to 111,000 acre-feet, depending on the time of year. The United States Army Corps of Engineers owns the project and coordinates flood control releases in accordance with the Water Control Manual. The original manual was issued in April 1959 with the most recent revision issued in August 1986. The Russian River watershed has three species of salmonids listed under the federal and state Endangered Species Act. The National Marine Fisheries Service issued a biological opinion in September 2008 specifying several projects and actions required to improve habitat for salmonids.

2.0 Water Supply Management

The Sonoma County Water Agency (Water Agency) is the local sponsor for the project and controls and coordinates water supply releases from the Coyote Valley Dam project in accordance with its water rights permits and provisions of Decision 1610 (Table A-1), which the State Water Resources Control Board (State Water Board) adopted on April 17, 1986. The Water Agency's permits authorize diversions to storage in Lake Mendocino and rediversions of water released from storage and direct diversions at points downstream. The Water Agency makes releases from Coyote Valley Dam to: (1) meet downstream demands from hundreds of agricultural and residential water users and several public and municipal systems;, and (2) maintain minimum in-stream flows in the upper river down to its confluence with Dry Creek. These minimum flow requirements vary based on the hydrologic year type, which are also prescribed as a hydrologic index specified by Decision 1610. There is little to no coordination between water diverters below Lake Mendocino, nor between water diverters and the Water Agency. The Water Agency's operations are also subject to the Russian River Biological Opinion issued by the National Marine Fisheries Service on September 24, 2008.

The hydrologic year type for the Russian River system is based on cumulative inflow into Lake Pillsbury. Lake Pillsbury, located on the upper Eel River, was formed in 1921 by the construction of Scott Dam (Figure 1). Lake Pillsbury is part of the Potter Valley Hydroelectric Project (PVP), a 9.4 megawatt storage and diversion project, that has been in operation for more than 100 years. PVP is owned and operated by Pacific Gas & Electric Company (PG&E). Operation of the project results in an inter-basin transfer of water from the upper Eel River into the East Branch Russian River across a natural divide. PVP consists of Lake Pillsbury formed by Scott Dam, Lake Van Arsdale formed by Cape Horn Dam, the trans-mountain diversion tunnel and the powerhouse located on the East Branch Russian River.

PG&E schedules releases from Lake Pillsbury to: (1) meet minimum in-stream flow requirements in the Eel River; and (2) divert water at the intake located at Lake Van Arsdale through the trans-mountain tunnel to the PVP Powerhouse. The maximum reported capacity through the diversion tunnel is approximately 300 cfs. Eel River flows diverted through the PVP powerhouse are released into the East Branch Russian River. A portion of the released water is diverted by the Potter Valley Irrigation District at two canals located just below the powerhouse. The Irrigation District has a contract with PG&E for use of up to 50 cfs, for which PG&E holds several water rights. The remaining diverted Eel River water is abandoned into the East Branch Russian River resulting as inflow into Lake Mendocino.

At the time that: (1) the Coyote Valley Dam/Lake Mendocino project was designed; (2) the Water Control Manual was developed for Lake Mendocino; and (3) the State Water Resources Control Board approved Decision 1610, diversions from the Eel River through PVP averaged 172,000 acre-feet annually. In November 2002, National Marine Fisheries Service issued a Biological Opinion for a licensing amendment that was being proposed by FERC for the PVP due to the listing of coho salmon, Chinook salmon and steelhead as either threatened or endangered in the Eel River. Based on the findings of the Biological Opinion, FERC amended PG&E's license to Operate PVP in January 2004. Although the amended license was issued in 2004, it was not correctly implemented until 2006 due to a misinterpretation of the license terms by PG&E. Since 2006, the diversion through PVP has averaged 72,000 acre-feet annually, representing a significant reduction of inflow into Lake Mendocino. Furthermore, much of the reduction in PVP diversions since 2006 is a result of the amended license significantly constraining PVP operations during the spring. Reduced inflow from PVP during the spring directly conflicts the with Lake Mendocino's design as a smaller reservoir with an increasing water supply pool in the spring as flood risks decrease.

As mentioned above, the most recent revision of the Flood Control Manual was issued in August 1986 and Decision 1610 was adopted by the State Water Board in April 1986. Since the preparation of the manual and adoption of Decision 1610, significant changes have occurred throughout the Russian River system. Several of these changes include:

(1) listing of Chinook, coho and steelhead as threatened or endangered; (2) significant reductions in releases from Pacific, Gas & Electric's Potter Valley Project; and (3) less understood changes that may be occurring due to climate change. These and other changes have resulted in greater challenges for managing the Russian River system. Consequently, there is a critical need to manage the Russian River system differently to address these challenges. To accomplish this, it will be necessary to: (1) evaluate modifying Lake Mendocino's Water Control Manual to incorporate Forecast Informed Reservoir Operations; and (2) changing the index for how the hydrologic year type (i.e., hydrologic index) is determined to a metric that is more reflective of actual water supply conditions in the Russian River watershed.

3.0 Flood Control Management

Coyote operations are governed by a water control manual that dictates ranges of release flows depending on pool level, non-regulated flows in the Russian, damaging flood stages downstream of the dam and on current releases. The rate of change standards were developed as part of consultations with NMFS and from geotechnical considerations to prevent stranding fish and to minimize bank damage. In general, the operation is designed to store water during a flood event, then release soon thereafter to create storage space for another potential event. Seasonal differences in flood space required result from nearly 100 years of hydromet data, and are based on typical weather patterns - wet during the winter, dry otherwise. Since much of the basin is not regulated by dam operations, the water control manual is designed to prevent flooding when possible in the Hopland and Guerneville areas, and in concert with Warm Springs dam operations. See the attached water control diagram for specifics (Figure 2).

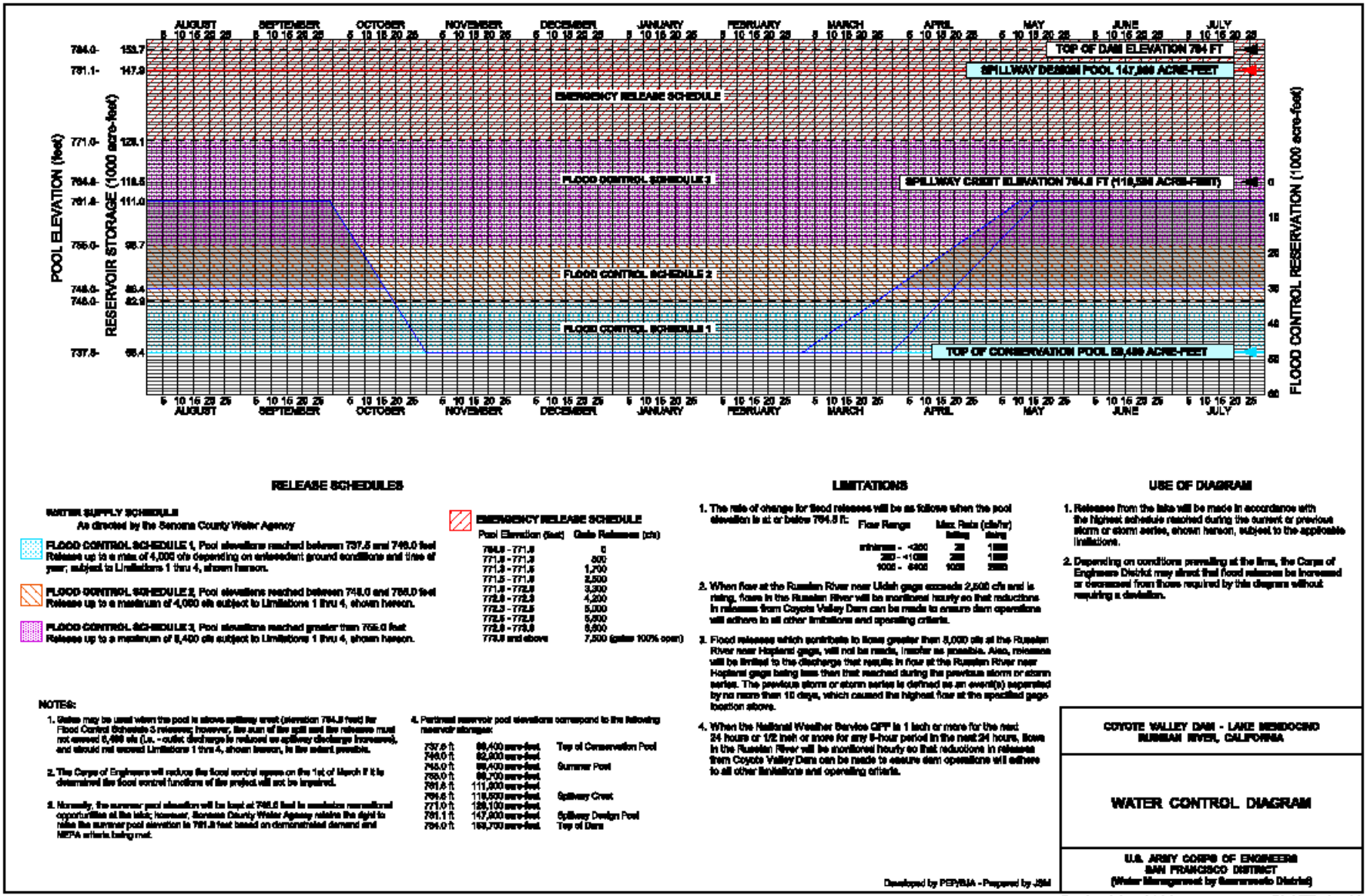
4.0 Environmental Resource Management

The National Marine Fisheries Service (NMFS) has issued two biological opinions that pertain to water storage in the Russian River: (1) the Potter Valley Project Biological Opinion in 2002 (Eel and Russian rivers transbasin diversion); and (2) the Russian River Biological Opinion in 2008. Project elements addressed in the Russian River BiOp include operations and water supply releases at Warm Springs and Coyote Valley dams, flood control operations, channel maintenance (SCWA and MCRRFCD), estuary/lagoon management, fish hatchery operations at Don Clausen Fish Hatchery (WSD) and Coyote Valley Fish Facility (CVD), and other SCWA water diversion facilities and operations (Wohler). Specific to Lake Mendocino and CVD operations, the Russian River BiOp identifies three primary project elements impacting fisheries: (1) higher summer flows/velocity from CVD releases effecting juvenile steelhead rearing habitat in the upper mainstem Russian River (modify Decision 1610); (2) chronic turbidity issues associated with Lake Mendocino discharge; and (3) water discharge ramping rates (up/down) and annual dam inspections (suspended releases to the East Branch

Russian River). Other environmental resource management (fisheries) consideration regarding future operations at CVD include; coldwater pool management for juvenile steelhead rearing and fall-run adult Chinook salmon within the upper mainstem Russian River, fall release flows for upstream migrating adult Chinook salmon during dry and critically dry fall/early winter periods, combined release strategies with Warm Springs Dam influencing estuary and lower river flow conditions, and blockwater allocations for critical and/or emergency fisheries management situations. NMFS believes that improved reservoir water storage reliability within Lake Mendocino will afford more operational flexibility that can aid and enhance fisheries management. Additionally, with improved forecast reliability, fisheries managers can better prepare for drought scenarios that impact hatchery operations and recreational fishing opportunities within the mainstem Russian River.

Attachments

Figure 1: Upper Russian River System



RELEASE SCHEDULES

WATER SUPPLY SCHEDULE
As directed by the Sonoma County Water Agency

FLOOD CONTROL SCHEDULE 1, Pool elevations reached between 737.5 and 746.0 feet
Release up to a rate of 4,000 cfs depending on antecedent ground conditions and time of year; subject to Limitations 1 thru 4, shown hereon.

FLOOD CONTROL SCHEDULE 2, Pool elevations reached between 746.0 and 756.0 feet
Release up to a maximum of 4,000 cfs subject to Limitations 1 thru 4, shown hereon.

FLOOD CONTROL SCHEDULE 3, Pool elevations reached greater than 755.0 feet
Release up to a maximum of 8,400 cfs subject to Limitations 1 thru 4, shown hereon.

EMERGENCY RELEASE SCHEDULE

Pool Elevation (feet)	Gate Releases (cfs)
764.6 - 771.0	0
771.0 - 771.3	800
771.3 - 771.5	1,200
771.5 - 771.8	2,500
771.8 - 772.0	3,300
772.0 - 772.3	4,200
772.3 - 772.5	5,000
772.5 - 772.8	5,900
772.8 - 773.0	6,800
773.0 and above	7,500 (gates 100% open)

LIMITATIONS

1. The rate of change for flood releases will be as follow when the pool elevation is at or below 764.6 ft:

Flow Range	Max Rate (cfs/hr)	
	falling	rising
minimum - <300	25	1000
300 - <1000	100	1000
1000 - 8400	1000	2000

2. When flow at the Russian River near Ukiah gage exceeds 2,500 cfs and is rising, flows in the Russian River will be monitored hourly so that reductions in releases from Coyote Valley Dam can be made to ensure dam operations will adhere to all other limitations and operating criteria.
3. Flood releases which contribute to flows greater than 8,000 cfs at the Russian River near Hopland gage, will not be made, insofar as possible. Also, releases will be limited to the discharge that results in flow at the Russian River near Hopland gage being less than that reached during the previous storm or storm series. The previous storm or storm series is defined as an event(s) separated by no more than 10 days, which caused the highest flow at the specified gage location above.
4. When the National Weather Service QPF is 1 inch or more for the next 24 hours or 1/2 inch or more for any 6-hour period in the next 24 hours, flows in the Russian River will be monitored hourly so that reductions in releases from Coyote Valley Dam can be made to ensure dam operations will adhere to all other limitations and operating criteria.

USE OF DIAGRAM

1. Releases from the lake will be made in accordance with the highest schedule reached during the current or previous storm or storm series, shown hereon, subject to the applicable limitations.
2. Depending on conditions prevailing at the time, the Corps of Engineers District may direct that flood releases be increased or decreased from those required by the diagram without requiring a deviation.

NOTES:

1. Gates may be used when the pool is above spillway crest (elevation 764.6 feet for Flood Control Schedule 3 releases); however, the sum of the spill and the releases must not exceed 8,400 cfs (i.e. - outlet discharge is reduced as spillway discharge increases), and should not exceed Limitations 1 thru 4, shown hereon, to the extent possible.
2. The Corps of Engineers will reduce the flood control space on the 1st of March if it is determined the flood control functions of the project will not be impaired.
3. Normally, the summer pool elevation will be kept at 766.0 feet to maximize recreational opportunities at the lake; however, Sonoma County Water Agency retains the right to raise the summer pool elevation to 781.8 feet based on demonstrated demand and NEPA criteria being met.
4. Pertinent reservoir pool elevations correspond to the following reservoir storages:

737.5 ft	66,400 acre-feet	Top of Conservation Pool
746.0 ft	82,900 acre-feet	
766.0 ft	59,400 acre-feet	Summer Pool
755.0 ft	98,700 acre-feet	
761.8 ft	111,000 acre-feet	
764.6 ft	116,500 acre-feet	Spillway Crest
771.0 ft	128,100 acre-feet	
781.1 ft	147,000 acre-feet	Spillway Design Pool
784.0 ft	153,700 acre-feet	Top of Dam

Developed by PEP/RIA - Prepared by JSM

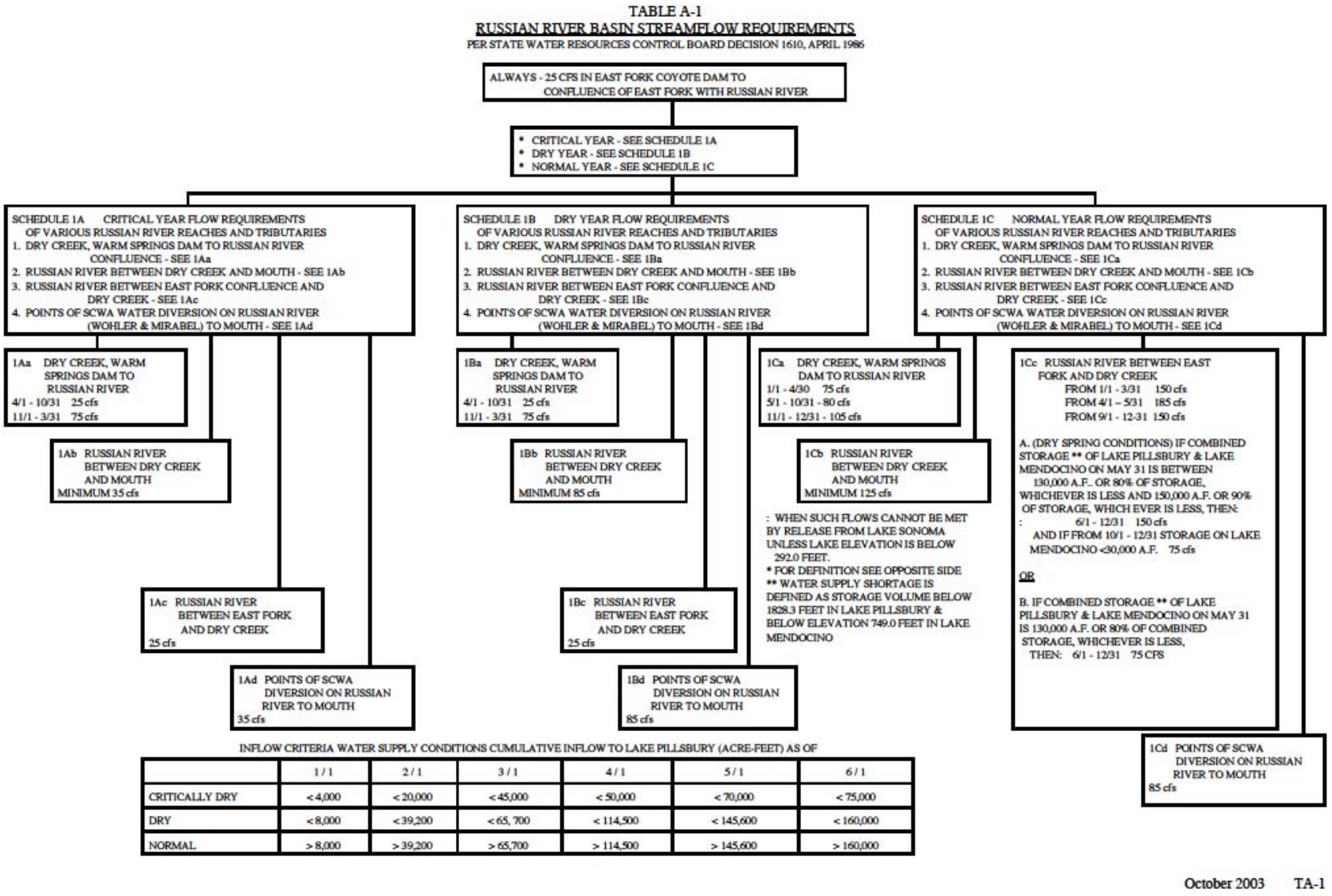
COYOTE VALLEY DAM - LAKE MENDOCINO
RUSSIAN RIVER, CALIFORNIA

WATER CONTROL DIAGRAM

U.S. ARMY CORPS OF ENGINEERS
SAN FRANCISCO DISTRICT
(Water Management by Sacramento District)

Revised Jan 2004 PLATE A - 10

Figure 2: Water Control Diagram, Coyote Valley Dam



	1/1	2/1	3/1	4/1	5/1	6/1
CRITICALLY DRY	< 4,000	< 20,000	< 45,000	< 50,000	< 70,000	< 75,000
DRY	< 8,000	< 39,200	< 65, 700	< 114,500	< 145,600	< 160,000
NORMAL	> 8,000	> 39,200	> 65,700	> 114,500	> 145,600	> 160,000

Table A-1: Decision 1610 Russian River Basin Streamflow Requirements