WEST YOST ASSOCIATES
Consulting Engineers

TECHNICAL MEMORANDUM

DATE: May 18, 2018

Project No.: 229-12-17-12
SENT VIA: EMAIL

TO: State Water Resources Control Board,
Division of Water Rights Staff

FROM: Polly Boissevain, PE, RCE #36164, West Yost Associates

REVIEWED BY: Elizabeth Drayer, PE, RCE #46872, West Yost Associates

SUBJECT: Water Supply Report in Support of Water Rights Application 32815 by Semitropic Improvement District of Semitropic Water Storage District

The Kings River currently is designated by the State Water Resources Control Board (State Water Board) as a fully appropriated stream (FAS) system. Semitropic Improvement District of Semitropic Water Storage District (Semitropic) has submitted a Petition to Revise and/or Review the Declaration of Fully Appropriated Stream Systems (FAS Declaration) for the Kings River (Petition), dated May 25, 2017, along with a water rights application to appropriate unappropriated flood flows, for its proposed Tulare Lake Storage and Floodwater Protection Project (Project) (Semitropic, 2017a). The Project proposes to divert and regulate surplus floodwater from the Kings River to the Semitropic Groundwater Bank and other places of storage for later beneficial use.

This technical memorandum presents a Water Availability Analysis to provide additional support for Semitropic's Petition to revise or review the current FAS status of the Kings River.[1]

This Technical Memorandum covers the following topics:

- Overview of the Kings River System;
- Project Description;
- Summary of Kings River Water Rights; and
- Water Availability Analysis.

[1] This analysis is conservative, in that it does not consider abandonment or forfeiture issues that may be associated with the Kings River Water Association's licensed rights.

OVERVIEW OF THE KINGS RIVER SYSTEM

An overview of the Kings River system in relation to the Project is provided on Figure 1. The Kings River is controlled by Pine Flat Dam, constructed in 1954, in the lower Sierra foothills, east of Fresno, shown in the upper right corner of Figure 1. Pine Flat Reservoir holds 1 million acre-feet (AF) of storage, and is owned and operated by the United States Army Corps of Engineers (Corps). Pacific Gas and Electric Company has two smaller reservoirs, Courtright Lake (123,300 AF) and Wishon Reservoir (128,400 AF), associated with hydroelectric operations upstream of the dam (KRCD, 2009).

The river traverses southwesterly into the San Joaquin Valley, crossing the Friant Kern Canal, and Highway 99. Just north of the City of Lemoore, the river splits into the North Fork and the Clark's Fork/South Fork. The Clark's Fork/South Fork of the river drains to the former Tulare Lake Bed, shown at the bottom of Figure 1, where Empire Weir No. 2 delivers water to a series of canals. The lake bed is the historical outlet for the river. The river now principally drains to the North Fork, to James Bypass (historically to Fresno Slough), and then to the San Joaquin River at Mendota Pool. Flood flows are typically directed to James Bypass to protect areas that are under agricultural production in the former Tulare Lake Bed.

Along the river, there are a series of weirs that are used to make diversions to water users, and stream gages to measure flow and make adjustments to delivery amounts. The Project, shown on the bottom of Figure 1, would divert floodwater at the existing weir structures (Army Weir, Crescent Weir, Empire Weir No. 1 and Empire Weir No. 2, shown in red on Figure 1) to existing facilities in the former Tulare Lake Bed. New facilities would be constructed to convey, store and deliver water to the California Aqueduct for delivery to the Semitropic Groundwater Storage Bank.

There are 28 member agencies within the Kings River Water Association (KRWA) with entitlements to Kings River water. Entitlements are allocated between the 28 member agencies based on natural flow calculations for Piedra, the historical gaging station used prior to construction of Pine Flat Reservoir. An entitlement schedule is used to establish the daily water entitlement for each agency. Agencies order water based on their entitlement amount and water available in the river. Each day, the Water Master determines the water available for distribution, based on Pine Flat releases plus the unregulated flow from Mills Creek and Hughes Creek, two unregulated tributaries just downstream from the dam. Agencies then operate downstream weirs to take water at various canal headgates and/or pump water from the river.

The hydrology of the river is highly variable. Average annual runoff is around 1.7 million AF, with a range from 392,000 AF in Water Year 1924 to 4.5 million AF in Water Year 1983. In wetter years, the Corps makes flood releases from Pine Flat Reservoir. Flood releases average 200,000 AF per year (AFY) (KRCD, 2009). Figure 2 shows calculated Piedra natural flow from 1955 through 2017 (Pine Flat Reservoir was completed in 1954), and the portion of Piedra natural flow that was recorded in James Bypass. As the figure shows, flow occurred in James Bypass in about 30 percent of years. Since 1954, a total of 11.4 million AF has flowed through James Bypass.

Since part of the function of Pine Flat Reservoir is to provide flood protection for the Kings River, Pine Flat Reservoir has defined conservation and flood pools. The reservoir conservation pool ranges from 0.5 million AF to 1.0 million AF, depending on the time of year. Once reservoir levels exceed the conservation pool and encroach into the flood pool, the Corps makes flood releases until the water level in the reservoir is brought back down to the conservation pool. Flood releases of up to 4,750 cubic feet per second (cfs) are diverted to James Bypass via the North Fork Kings

River, the approximate channel capacity of the bypass. When flood releases greater than this amount are required, flows are also diverted to the former Tulare Lake Bed via the Clark's Fork/South Fork of the Kings River

PROJECT DESCRIPTION

The proposed Tulare Lake Storage and Floodwater Projection Project would develop new surface water storage and conveyance facilities, and use existing facilities and conjunctive use capacity south of the Delta to provide for groundwater banking of Kings River floodwater. The Project, shown on Figure 3, includes the following:

- Construction of a 16,700-acre leveed impoundment, Kettleman Reservoir, within the Tulare Lake Bed, capable of storage of 15,000 AF to 30,000 AF, depending on levee height;
- Construction of the Kettleman Canal and Kettleman Pumping Plant #1, to convey up to 2,100 cfs of water from the existing South Fork Canal to the Kettleman Reservoir and/or the California Aqueduct;
- Construction of an Aqueduct Intertie and Kettleman Pumping Plant #2, to convey up to 2,100 cfs of water in both directions between the storage reservoir and the California Aqueduct; and
- Improvements to the existing Empire Weir No. 2 to convey up to 2,200 cfs, South Fork Canal to convey up to 2,100 cfs, and Blakely Canal to convey up to 100 cfs, to divert and convey water to and from the new storage facilities and the Aqueduct Intertie.

Water conveyed through Project facilities would be delivered to storage facilities in Kern County, including the Semitropic Groundwater Storage Bank, and places of use in Kern and Kings Counties.

The Project would be operated when there are flood flows in the Kings River that currently are directed to James Bypass. As described above, flows would be diverted into the South Fork of the Kings River, to Empire Weir No. 2, where the water would then be diverted into the South Fork Canal. Floodwaters would be conveyed through the Kettleman Canal to and through the surface storage reservoir, and into the California Aqueduct, when there is capacity in the California Aqueduct to receive and convey flows south to Semitropic's existing banking or other storage facilities, or to meet irrigation demands. When capacity in the California Aqueduct is limited, flows would be diverted into storage cells in the Kettleman Reservoir for temporary storage, until capacity is available in the California Aqueduct. In years when the reservoir is empty, it would be used for dry grazing or other agricultural operations (Semitropic, 2017b).

SUMMARY OF KINGS RIVER WATER RIGHTS

The principal water rights on the Kings River are License Nos. 11517, 11518, 11519, 11520, 11521 and 11522 for diversion and storage of Kings River water. Water rights permits were issued as part of the State Water Board's predecessor agency, State Water Rights Board Decision 1290 (D 1290) in 1967, which also determined that no additional water was available for appropriation. In 1989, the State Water Board included the Kings River in Order 89-25, designating fully appropriated streams in California. Water rights licenses were issued in 1984. Table 1 summarizes key aspects of the water rights licenses, including application and license number, number of diversion points, diversion and storage amounts and season. The table lists the total number of historical diversion points listed in

D 1290 and the licenses. Information in the State Water Board's electronic Water Rights Information Management System (eWRIMS) indicates that 44 points of diversion are currently active.

Table 2 summarizes other users that claim riparian or pre-1914 rights on the Kings River downstream of Pine Flat Dam,[2] based on Statements of Diversion and Use on file with the State Water Board, identified using eWRIMS. Figure 4 summarizes the points of diversion for the KRWA licenses and other water rights holders on the Kings River.

There are two appropriative water rights applications that have been filed, A032815 by Semitropic, and A032810 by Consolidated Irrigation District and others. Both applications are summarized in Table 3.

Table 1. Summary of Kings River Water Association Water Rights Licenses

Application/License	Diversion Point/Storage Location	Amount	Season	Maximum Annual Amount
A360/L11518	Point of diversion at Pine Flat Reservoir. Points of re-diversion at 61 locations downstream of Pine Flat Reservoir. Storage in Pine Flat Reservoir(a)	Direct Diversion: 5,000 cfs	1/1 – 12/31	2,786,000 AFY, combined limit for Licenses 11518 and 11519
		Storage: 600,000 AFY	9/1 – 7/31	
A5640/L11519	Point of diversion at Pine Flat Reservoir. Points of re-diversion at 61 locations downstream of Pine Flat Reservoir. Storage in Pine Flat Reservoir(a)	Direct Diversion: 3,059 cfs	5/1 – 7/31	
		Storage: 355,200 AFY	9/1 – 7/31	
A10979/L11520	Point of diversion at Wishon Dam. Points of re-diversion at 61 locations downstream of Pine Flat Reservoir. Storage in Wishon Reservoir(a)	Storage: 128,000 AFY	1/1 – 12/31	--
A16469/L11522	Point of diversion at Courtright Dam. Points of re-diversion at 61 locations downstream of Pine Flat Reservoir. Storage in Courtright Reservoir(a)	Storage: 102,500 AFY	9/1 – 7/31	--
A353/L11517	Point of diversion at Empire Weir 2 Storage in Tulare Lake Sump Reservoir	Direct Diversion: 613 cfs	6/1 – 6/30	224,500 AFY
		Storage: 188,000 AFY	1/1 – 6/30	
A15231/L11521	Points of diversion and re-diversion at variable points on perimeter of Tulare Lake Sump Reservoir. Storage in Tulare Lake Sump Reservoir	Direct Diversion: 1,096 cfs	1/1 – 12/31	960,700 AFY
		Storage: 796,000 AFY	1/1 – 6/30	
			Total	**3,971,200 AFY**

(a) Licenses list 61 points of diversion. The State Board's eWRIMS database reports 44 points of diversion.

[2] Only water rights holders downstream of the dam are considered, since water availability calculations are based on estimated unimpaired flow at Piedra, the historical point of measurement just downstream of Pine Flat Reservoir. Any water use upstream of the dam would be accounted for in the Piedra natural flow.

Table 2. Statements of Diversion and Use Filed by Others

Application Number	Status	Status Date	Location[a]	Diversion Season	Direct Diversion Rate, cfs
S000366	Claimed	3/7/1967	Cole Slough	1/1 - 12/31[b]	4
S000381	Claimed	1/3/1965	Byrd Slough	1/1 - 12/31[b]	2
S000412	Claimed	3/15/1967	South Fork Kings River-North Fork Kings River	6/1 - 10/31	27
S000420	Claimed	3/21/1967	South Branch Island Canal-Kings River	3/1 - 8/31	3
S000434	Claimed	3/23/1967	South Branch Island Canal-Kings River	5/1 - 10/31	4.5
S000436	Claimed	3/24/1967	Boggs Slough-Fresno Slough	2/1 - 11/30	0
S000561	Claimed	4/18/1967	South Branch Island Canal-Kings River	6/1 - 8/31	3.342
S000586	Claimed	4/19/1967	Byrd Slough	1/1 - 12/31[b]	2.23
S000625	Claimed	4/25/1967	South Branch Island Canal-Kings River	6/1 - 9/30	3.78
S000793	Claimed	6/2/1967	Collins Creek-Kings River	3/1 - 10/31	3.75
S000797	Claimed	6/5/1967	South Fork Kings River-North Fork Kings River	5/1 - 8/31	3.56
S001131	Claimed	1/1/1975	South Branch Island Canal-Kings River	2/1 - 11/30	12.83
S001132	Claimed	1/1/1969	South Fork Kings River-North Fork Kings River	3/1 - 8/31	3.34
S001157	Claimed	1/1/1969	Cole Slough	1/1 - 12/31[b]	0
S001183	Claimed	1/1/1975	South Fork Kings River-North Fork Kings River	5/1 - 10/31	2
S001217	Claimed	1/1/1975	South Branch Island Canal-Kings River	1/1 - 10/31	4
S001462	Claimed	1/1/1966	South Fork Kings River-North Fork Kings River	1/1 - 12/31	3.3
S001596	Claimed	1/1/1969	South Fork Kings River-North Fork Kings River	8/1 - 10/31	5.6
S001597	Claimed	1/1/1972	South Fork Kings River-North Fork Kings River	4/1 - 5/31	2.7
S001804	Claimed	1/1/1966	Boggs Slough-Fresno Slough	4/1 - 10/31	2.7
S001914	Claimed	1/1/1975	Boggs Slough-Fresno Slough	1/1 - 12/31[b]	5
S001915	Claimed	1/1/1975	Turner Ditch-Fresno Slough	1/1 - 12/31[b]	6.7
S001916	Claimed	1/1/1975	Turner Ditch-Fresno Slough	1/1 - 12/31[b]	6.7
S001917	Claimed	1/1/1975	Turner Ditch-Fresno Slough	1/1 - 12/31[b]	6.7
S016554	Claimed	6/23/2010	South Branch Island Canal-Kings River	1/1 - 12/31[b]	1.458
S016555	Claimed	6/23/2010	South Branch Island Canal-Kings River	1/1 - 12/31[b]	1.739
S017023	Claimed	7/1/2010	South Fork Kings River-North Fork Kings River	1/1 - 12/31[b]	0
S018184	Claimed	6/22/2010	Holland Creek-Kings River	1/1 - 12/31[b]	3.119
S020059	Claimed	6/28/2010	South Fork Kings River-North Fork Kings River	1/1 - 12/31[b]	0.33
S021604	Claimed	7/6/2010	Collins Creek-Kings River	1/1 - 12/31[b]	2.674
S025621	Claimed	5/19/2016	South Branch Island Canal-Kings River	1/1 - 12/31[b]	2.23
S027252	Claimed	7/5/2017	Kings River	1/1 - 12/31[b]	7.8[c]
S027253	Claimed	7/5/2017	Kings River	1/1 - 12/31[b]	7.8[c]
S027254	Claimed	7/5/2017	Kings River	1/1 - 12/31[b]	7.8[c]
S027255	Claimed	7/5/2017	Kings River	1/1 - 12/31[b]	7.8 [c]
S027256	Claimed	6/5/2017	Kings River	1/1 - 12/31[b]	7.8[c]
S027257	Claimed	7/5/2017	Kings River	1/1 - 12/31[b]	7.8[c]
S027258	Claimed	7/5/2017	Kings River	1/1 - 12/31[b]	7.8[c]
S027364	Claimed	7/12/2017	Kings River	1/1 - 12/31[b]	4.46
S027365	Claimed	7/12/2017	Kings River	1/1 - 12/31[b]	4.46
S027366	Claimed	6/12/2017	Kings River	1/1 - 12/31[b]	5.57
				Total Other Users	**199.372**

(a) Location based on USGS Hydrologic Unit Code 12 location, as reported in eWRIMS.
(b) No season reported. Assumed to be year-round.
(c) Statement of Diversion and Use does not list diversion rate. Diversion rate reported in eWRIMS.

Table 3. Water Rights Applications Filed with State Water Board

Application	Diversion Point/Storage Location	Amount	Season	Annual Limit
A032815	Army Weir, Crescent Weir, Empire Weir No. 2, Kettleman Canal Turn-In (South Fork Canal)	Direct Diversion: 2,200 cfs	1/1 – 12/31	1,600,000 AFY
A032810	Same points of diversion as existing licenses L11518 and L11519.	Direct Diversion: 4,500 cfs Storage: 1,000,000 AFY	1/1 – 12/31	500,000 AFY direct diversion, 1,000,000 AFY storage.

WATER AVAILABILITY ANALYSIS

This water availability analysis compares the unimpaired water supply to the demand by senior diverters, including demands by those claiming riparian and pre-1914 appropriative rights. The analysis is performed along the water flow path in the river, taking into account water rights priority, and analyzes available supply and demand at points of analysis, based on the points of diversion for senior diverters, where demands are based on the 'face value' of the water rights. The face value is the maximum annual diversion amount, based on direct diversion, and storage amounts for a water right, and annual limitation, if applicable. Use of the face value of KRWA water rights for the purposes of this analysis does not constitute an admission by Semitropic, express or implied, as to the validity or extent of such rights and Semitropic reserves all rights in this regard.

Since Semitropic seeks to appropriate water during flood conditions, the analysis uses daily flow records that account for the extreme variability of flows that occurs during flood years. The Water Availability Analysis compares daily unimpaired flows to the allowable storage and direct diversion limits for senior water rights holders. Daily values are then summed to report annual demands by senior water rights holders, based on the face value of their rights.

All allocations of flow for the KRWA to its 28 member agencies are based on computed daily natural flow at Piedra, the historical gage station located downstream of Pine Flat Dam. The natural flow at Piedra is computed as the sum of the inflow above Pine Flat Dam (estimated from Pine Flat Reservoir operational records), and the flows of Mill Creek and Hughes Creek, two small unregulated tributaries that flow into the Kings River between the Pine Flat Reservoir and the historical Piedra gaging station. Therefore, calculations for the water availability analysis are based on the daily natural flow at Piedra, using the following assumptions for the methodology:

- Calculations are based on daily flows at Piedra, as reported in annual KRWA Water Master Reports.
- The analysis period is Water Year 1955 to Water Year 2017, based on completion of Pine Flat Reservoir in 1954. The annual average for Piedra natural flow for this period is 1.72 million acre-feet/year (MAF), very similar to the long-term average of 1.69 MAF from 1896 through 2017.

- Flows are calculated for three points of analysis (shown on Figure 4). Other points along the Kings River are not analyzed because: (1) individual diversion capacities for the 44 active KRWA points of diversion associated with License 11518 and 11519 are not reported; and (2) the purpose of the analysis is to demonstrate water available for the proposed project associated with Application 32815.
- River losses were included, to estimate unimpaired flow at the points of analysis, using river loss data presented in the KRWA Water Master Reports for each year analyzed. Monthly river losses are reported based on total diversions in various reaches of the river and flows at stream gages located along the river. For the analysis, annual river losses were used for Piedra to Island Weir, on the mainstem of the Kings River, and from Army Weir to Empire Weir No. 2 on the South Fork of the Kings River. In years where Water Master Reports show that the river gains flow, a loss of zero percent is used. In years where river losses were not available (1961, 2009 through 2017), the average of all other years was used.
- For the licenses, calculations first deduct collection to storage from the daily unimpaired flow during the allowable storage season, up to the annual storage limit, and then deduct direct diversions, based on the maximum direct diversion amounts listed in the license, up to the total annual limit.
- For other users, which only report direct diversion amounts, calculations deduct direct diversions from the daily unimpaired flow, based on the maximum direct diversion rates and diversion seasons reported in eWRIMS.

The following equation illustrates the calculation:

Point of Analysis:

$Q_{POA} - St - DD = WAA$, where

Q_{POA} is defined as the natural flow at the point of analysis;

St is defined as collection to storage, during the storage season, up to the daily natural flow, until the cumulative annual limit is reached;

DD is defined as direct diversion, up to the maximum diversion amount if flow is available, until the cumulative annual limit is reached; and

WAA is defined as water available for appropriation.

Table 4 summarizes long-term average calculations for the 1955 through 2017 analysis period. Annual calculations are included in Attachment A. The table shows estimates of unimpaired flow at Piedra, and unimpaired flows (supply) and use based on the face value of senior rights holders (demands) for the three points of analysis shown on Figure 4. Water rights are shown in order of priority, from left to right, with Point of Analysis 1 – users claiming pre-1914 or riparian rights shown first, followed by Point of Analysis 2 - License 11517, Point of Analysis 1 - Licenses 11518 and 11519 (combined), Point of Analysis 2 - License 11521, and Point of Analysis 3 - Application 32815. For 1984 and later, actual use is also shown for License 11517 and License 11521.

The unimpaired flow estimate at Point of Analysis 1 is calculated as the unimpaired flow at Piedra minus channel losses between Piedra and Empire Weir No. 2. Calculations show that for the period of analysis, just under 55,000 AFY is available for appropriation, of which 18,500 AFY would be used by Application 32815 on a long-term average basis.

Table 4. Water Available for Appropriation after Accounting for Existing Paper Rights[a]

Parameter	Natural Flow at Piedra	Point of Analysis 1, Claimed Pre-1914 and Riparian Rights Holders	Point of Analysis 2, License 11517	Point of Analysis 1, License 11518, 11519	Point of Analysis 2, License 11521	Point of Analysis 3, Application 32815
Long-term Average (1955 through 2017)						
Unimpaired Flow (Supply), AFY	1,724,006	1,631,621	1,520,035	1,298,147	250,838	54,844
Losses, AFY	92,384	--	--	--	--	--
Use based on Face Value of Water Right (Demand), AFY	--	111,586	221,888	1,047,309	195,994	18,506
Water Available for Appropriation, AFY	1,619,442	1,520,035	1,298,147	250,838	54,844	36,338
Water Available for Appropriation, Percent of Supply		93%	85%	19%	22%	66%

(a) For yearly calculations see Attachment A

A similar analysis that includes Water Rights Application 32810 for the Kings River shows that there is water available for either of the two applications, but not for both, based on comparisons of the unimpaired supply with demand based on the face value of the rights.

Figure 5 presents a flow frequency analysis of annual unimpaired flow volumes for the period of 1955 to 2017, using the Weibull formula to determine flow frequency. The figure shows flow frequency for the lower priority licenses and Application 32815. The annual unimpaired flow at Piedra is shown in blue, Point of Analysis 1 for Licenses 11518 and 11519 in gray, Point of Analysis 2 for license 11521 in gold, and at Point of Analysis 3, for Application 32815 shown in orange. As the figure shows, water is typically available for Application 32815 once the unimpaired flow at Piedra is at least 3.0 MAF, flows which are exceeded in just under 20 percent of all years for the period of record.

Therefore, this analysis shows that there is water available exceeding the face value of existing appropriative water rights for the Kings River to support Application 32815.

REFERENCES

[1] GEI Consultants. 2017. *Tulare Lake Storage and Floodwater Protection Feasibility Report*. Semitropic Water Storage District.

[2] Kings River Conservation District and Kings River Water Association. 2009. *The Kings River Handbook*.

[3] Kings River Water Association. *Water Master Report*. 1955 through Water Year 2009 Reports, and data for Water Years 2010 through 2017.

[4] Semitropic Water Storage District. 2017a. *Petition to Revise and/or Revoke Declaration of Fully Appropriated Stream Systems for the Kings River; Application to Appropriate Water*. May 25, 2017.

[5] Semitropic Water Storage District, 2017b. *Tulare Lake Storage and Floodwater Protection Project. Environmental Impact Report, Public Draft.* August 2017.

[6] State of California. State Water Rights Board, 1967. Decision D 1290. In the matter of applications 353, 360, 5640, 10750, 10979, 11023, 11075, 15231 and 16496 held by Fresno Irrigation District as Trustee, 14608 and 15609 of City of Fresno, and 19836, 20002, 20098, 20486, 20585 and 20679 of Others. Adopted November 30, 1967.

[7] State Water Resources Control Board, 1984. License for Diversion and Use. License 11517, 11518, 11519, 11520, 11521 and 11522.

[8] State Water Resources Control Board. 1989. Order WR 89-25. Order Adopting Declaration of Fully Appropriated Streams Systems and Specifying Conditions for Acceptance of Applications and Registrations.

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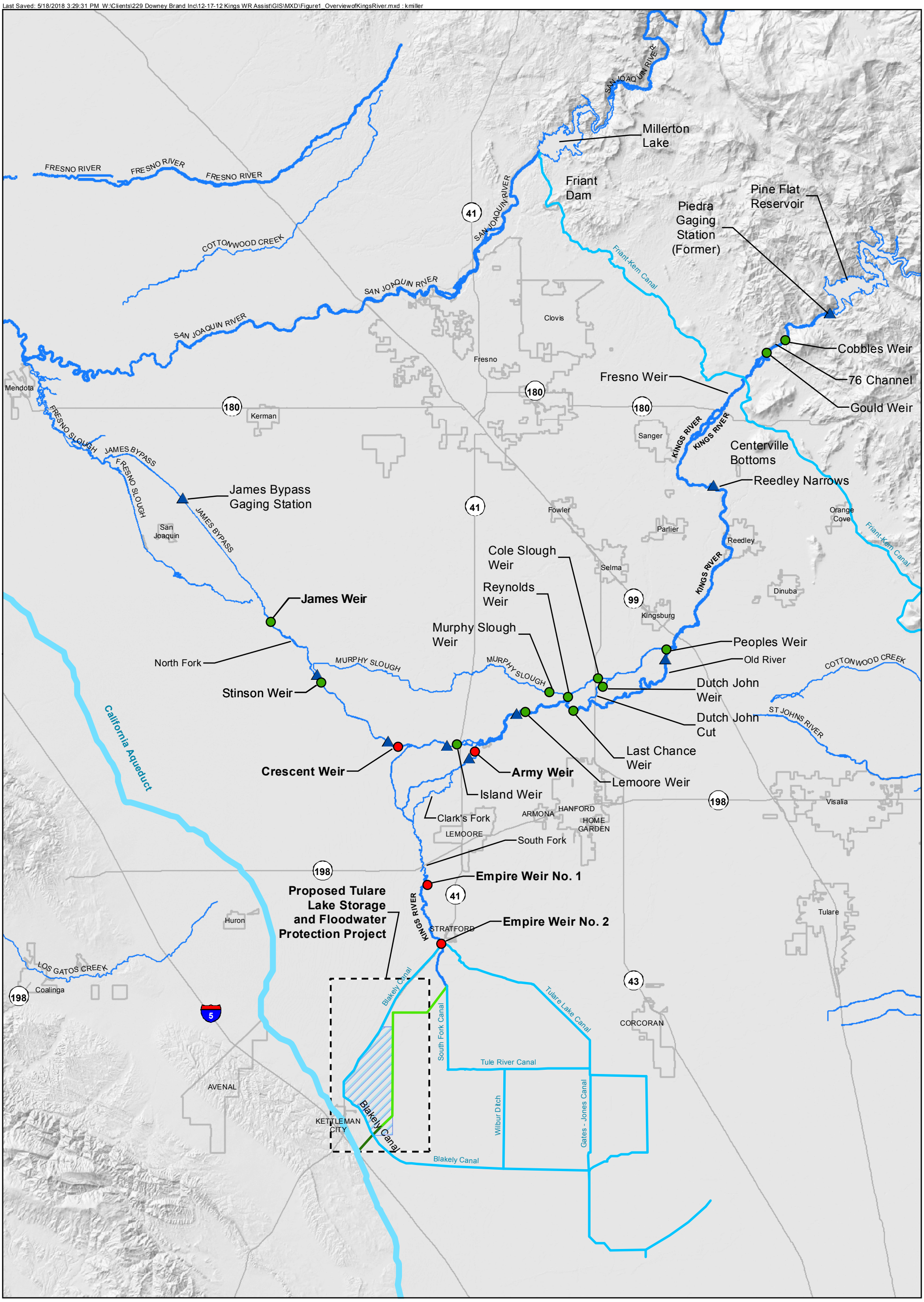

California Aqueduct
Canal
Proposed Kettleman Canal
Proposed Aqueduct Intertie
Fresno/Kings/San Joaquin River
River/Creek/Slough

Weir
Weir - Proposed Point of Diversion
Proposed Reservoir
City Limits
Gaging Station

N

0 2.5 5
Miles

Figure 1

Overview of the Kings River

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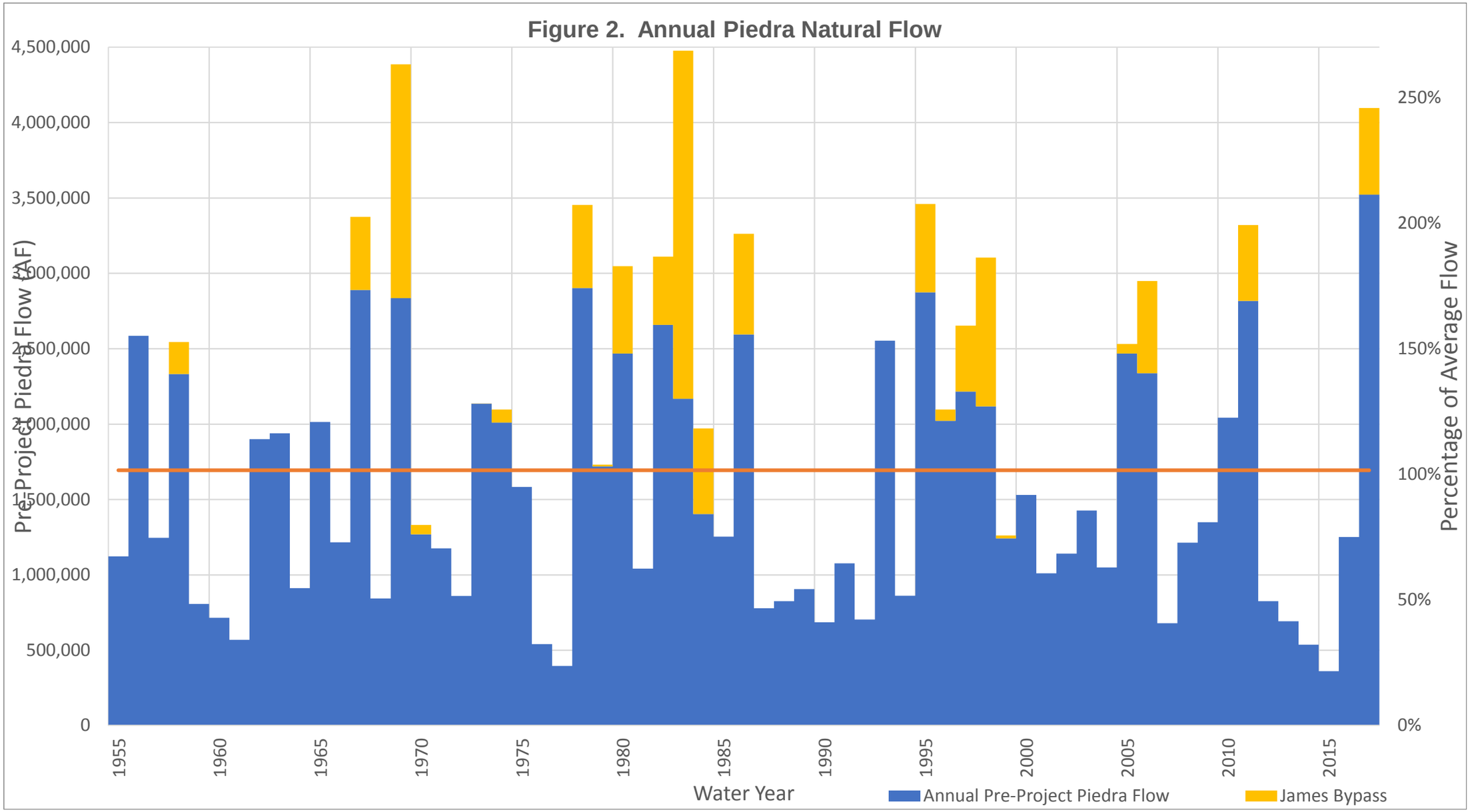
Semitropic Improvement District of
Semitropic Water Storage District
Water Availability Analysis

Figure 2. Annual Piedra Natural Flow



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Semitropic Improvement District of
Semitropic Water Storage District
Water Availability Analysis

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Kings River
AVENAL CUTOFF
21ST AVE
JERSEY AVE
JAVA AVE
15TH AVE
11TH AVE
KENT AVE
14TH AVE
KANSAS AVE
17TH AVE
16TH AVE
13TH AVE
KING AVE
LANSING AVE
18TH AVE
22ND AVE
EMPIRE RD
LAUREL AVE
LINCOLN AVE
LAKEVIEW AVE
20 1/2 AVE
20TH AVE
19TH AVE
MADISON AVE
MEDFORD RD
14 1/2 AVE
10 1/2 AVE
MANTECA AVE
NEVADA AVE
Blakely Canal
W
PS
Proposed Kettleman #1 Pumping Plant
NEWTON AVE
NILES AVE
12TH AVE
Tulare Lake Canal
41
OMAHA AVE
South Fork Canal
PUEBLO AVE
Tule River Canal
10TH AVE
Proposed Kettleman Reservoir
Proposed Kettleman Canal
REDDING AVE
Wilbur Ditch
Gates - Jones Canal
PS
Proposed Kettleman #2 Pumping Plant
25TH AVE
Proposed Aqueduct Intertie
Blakely Canal
5
UTICA AVE
California Aqueduct

- California Aqueduct
- Canal
- Proposed Kettleman Canal
- Proposed Aqueduct Intertie
- Fresno/Kings/San Joaquin River
- River/Creek/Slough
- Empire Weir No. 2
- New Aqueduct Turnin/Out
- New Pumping Plant
- New Weir
- Reservoirs

N

0 1 2
Miles

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Figure 3

Proposed Tulare Lake Project Facilities

Semitropic Improvement District of
Semitropic Water Storage District
Water Availability Analysis

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Millerton Lake
Friant Dam
Pine Flat Reservoir
Friant-Kern Canal
SAN JOAQUIN RIVER
FRESNO RIVER
COTTONWOOD CREEK
Clovis
Fresno
Mendota
Kerman
Sanger
Reedley
Parlier
Fowler
Selma
Orange Cove
Dinuba
Kingsburg
San Joaquin
Huron
Coalinga
LOS GATOS CREEK
FRESNO SLOUGH
JAMES BYPASS
KINGS RIVER
MURPHY SLOUGH
ST JOHNS RIVER
California Aqueduct
ARMONA
HANFORD
HOME GARDEN
LEMOORE
STRATFORD
AVENAL
KETTLEMAN CITY
CORCORAN
Visalia
Tulare
Blakely Canal
South Fork Canal
Kettlemen Canal
Tule River Canal
Wilbur Ditch
Gates - Jones Canal
Tulare Lake Canal

S018184
S000793
S000586
S021604
S000381
S001157
S027254
S027258
S027252
S027253
S000434
S000436
S016555
S027255
S016554
S020059
S000366
S001915
S001917
S001596
S027364
S000420
S001916
S027256
S027257
S001914
S025621
S001131
S001804
S027366
S001597
S027365
S017023
S000412
S001217
S001132
S000625
S001462
S000797
S000561
S001183

Empire Weir No. 1
(Point of Analysis 1)

Empire Weir No. 2
(Point of Analysis 2)

Point of Analysis 3

Proposed Aqueduct Intertie

Kings River POD - A360 and A5640
Tulare Lake Bed POD - A353 and A1523
Statements of Diversion
California Aqueduct
Canal
Proposed Kettleman Canal
Proposed Aqueduct Intertie
Fresno/Kings/San Joaquin River
River/Creek/Slough
City Limits

N
0 17,000 34,000
Feet

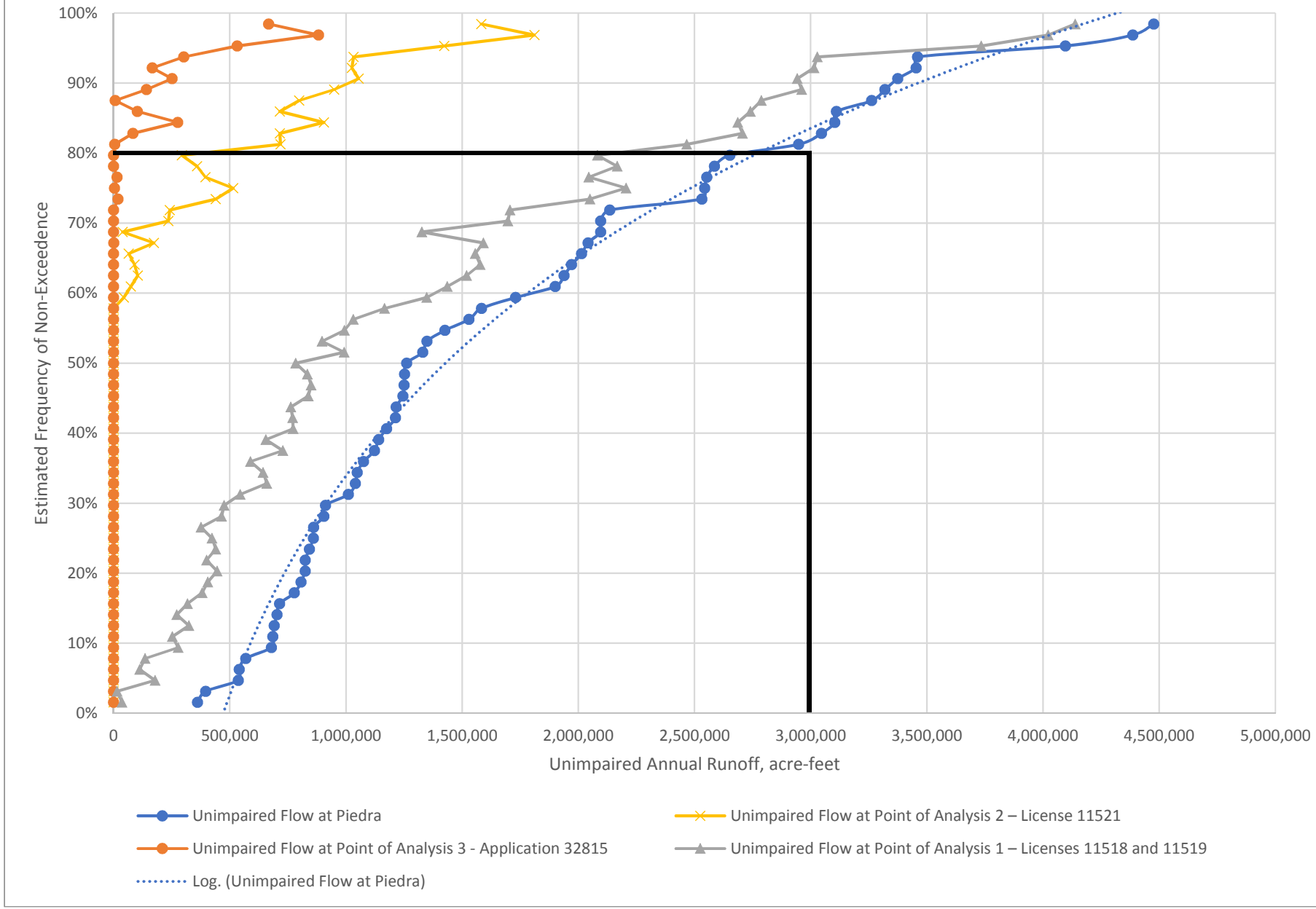
Figure 4

Points of Analysis

Semitropic Improvement District of
Semitropic Water Storage District
Water Availability Analysis

WEST YOST ASSOCIATES

Figure 5. Flow Frequency Analysis, 1955 - 2017



ATTACHMENT A

Water Available for Appropriation after
Accounting for Existing Paper Rights, 1955-2017

Attachment A. Water Available for Appropriation after Accounting for Existing Paper Rights, 1955 through 2017

Parameter	Natural Flow at Piedra	Point of Analysis 1		Point of Analysis 2		Point of Analysis 3
		Other Users	License 11518, 11519	License 11517	License 11521	Application 32815
WY 1955						
Unimpaired Flow (Supply), AFY	1,122,885	1,062,404	728,179	951,882	-	-
Losses, AFY	60,481					
Use based on Face Value of Water Right (Demand), AFY		110,522	728,179	223,703	-	-
Water Available for Appropriation, AFY	1,062,404	951,882	-	728,179	-	-
Water Available for Appropriation, Percent of Supply		90%	0%	76%	0%	0%
WY 1956						
Unimpaired Flow (Supply), AFY	2,585,683	2,502,496	2,167,124	2,390,827	359,154	354
Losses, AFY	83,187					
Use based on Face Value of Water Right (Demand), AFY		111,669	1,807,971	223,703	358,800	353
Water Available for Appropriation, AFY	2,502,496	2,390,827	359,154	2,167,124	354	1
Water Available for Appropriation, Percent of Supply		96%	17%	91%	0%	0%
WY 1957						
Unimpaired Flow (Supply), AFY	1,245,233	1,175,932	837,691	1,061,394	-	-
Losses, AFY	69,301					
Use based on Face Value of Water Right (Demand), AFY		114,538	837,691	223,703	-	-
Water Available for Appropriation, AFY	1,175,932	1,061,394	(0)	837,691	-	-
Water Available for Appropriation, Percent of Supply		90%	0%	79%	0%	0%
WY 1958						
Unimpaired Flow (Supply), AFY	2,544,176	2,544,176	2,205,922	2,429,625	514,314	4,366
Losses, AFY	-					
Use based on Face Value of Water Right (Demand), AFY		114,551	1,691,608	223,703	509,948	4,367
Water Available for Appropriation, AFY	2,544,176	2,429,625	514,314	2,205,922	4,366	(1)
Water Available for Appropriation, Percent of Supply		95%	23%	91%	1%	0%
WY 1959						
Unimpaired Flow (Supply), AFY	806,741	741,493	405,555	629,206	-	-
Losses, AFY	65,248					
Use based on Face Value of Water Right (Demand), AFY		112,287	405,555	223,651	-	-
Water Available for Appropriation, AFY	741,493	629,206	-	405,555	-	-
Water Available for Appropriation, Percent of Supply		85%	0%	64%	0%	0%
WY 1960						
Unimpaired Flow (Supply), AFY	714,451	646,357	318,332	541,207	-	-
Losses, AFY	68,094					
Use based on Face Value of Water Right (Demand), AFY		105,151	318,332	222,875	-	-
Water Available for Appropriation, AFY	646,357	541,207	-	318,332	-	-
Water Available for Appropriation, Percent of Supply		84%	0%	59%	0%	0%
WY 1961						
Unimpaired Flow (Supply), AFY	568,993	465,918	135,726	357,799	-	-
Losses, AFY	103,074					
Use based on Face Value of Water Right (Demand), AFY		108,119	135,726	222,073	-	-
Water Available for Appropriation, AFY	465,919	357,799	-	135,726	-	-
Water Available for Appropriation, Percent of Supply		77%	0%	38%	0%	0%
WY 1962						
Unimpaired Flow (Supply), AFY	1,900,229	1,770,525	1,436,394	1,660,097	74,420	-
Losses, AFY	129,704					
Use based on Face Value of Water Right (Demand), AFY		110,427	1,361,974	223,703	74,420	-
Water Available for Appropriation, AFY	1,770,525	1,660,097	74,420	1,436,394	(0)	-
Water Available for Appropriation, Percent of Supply		94%	5%	87%	0%	0%
WY 1963						
Unimpaired Flow (Supply), AFY	1,939,139	1,856,555	1,519,061	1,742,764	104,681	407
Losses, AFY	82,584					
Use based on Face Value of Water Right (Demand), AFY		113,790	1,414,381	223,703	104,274	407
Water Available for Appropriation, AFY	1,856,555	1,742,764	104,681	1,519,061	407	0
Water Available for Appropriation, Percent of Supply		94%	7%	87%	0%	0%
WY 1964						
Unimpaired Flow (Supply), AFY	911,642	812,505	476,014	699,717	-	-
Losses, AFY	99,137					
Use based on Face Value of Water Right (Demand), AFY		112,788	476,014	223,703	-	-
Water Available for Appropriation, AFY	812,505	699,717	-	476,014	-	-
Water Available for Appropriation, Percent of Supply		86%	0%	68%	0%	0%
WY 1965						
Unimpaired Flow (Supply), AFY	2,013,721	1,891,399	1,556,650	1,780,353	65,308	-
Losses, AFY	122,322					
Use based on Face Value of Water Right (Demand), AFY		111,046	1,491,342	223,703	65,308	-
Water Available for Appropriation, AFY	1,891,399	1,780,353	65,308	1,556,650	0	-
Water Available for Appropriation, Percent of Supply		94%	4%	87%	0%	0%
WY 1966						
Unimpaired Flow (Supply), AFY	1,215,778	1,098,915	762,866	986,569	-	-
Losses, AFY	116,863					
Use based on Face Value of Water Right (Demand), AFY		112,346	762,866	223,703	-	-
Water Available for Appropriation, AFY	1,098,915	986,569	-	762,866	-	-
Water Available for Appropriation, Percent of Supply		90%	0%	77%	0%	0%
WY 1967						
Unimpaired Flow (Supply), AFY	3,374,400	3,277,503	2,942,056	3,165,759	1,054,718	252,075
Losses, AFY	96,896					
Use based on Face Value of Water Right (Demand), AFY		111,744	1,887,338	223,703	802,643	85,893
Water Available for Appropriation, AFY	3,277,504	3,165,759	1,054,718	2,942,056	252,075	166,182
Water Available for Appropriation, Percent of Supply		97%	36%	93%	24%	66%
WY 1968						
Unimpaired Flow (Supply), AFY	843,204	772,348	439,283	662,986	-	-
Losses, AFY	70,856					
Use based on Face Value of Water Right (Demand), AFY		109,361	439,283	223,703	-	-
Water Available for Appropriation, AFY	772,348	662,986	-	439,283	-	-
Water Available for Appropriation, Percent of Supply		86%	0%	66%	0%	0%
WY 1969						
Unimpaired Flow (Supply), AFY	4,386,300	4,359,826	4,022,485	4,246,188	1,810,953	881,768
Losses, AFY	26,474					
Use based on Face Value of Water Right (Demand), AFY		113,638	2,211,532	223,703	929,185	244,490
Water Available for Appropriation, AFY	4,359,826	4,246,188	1,810,953	4,022,485	881,768	637,278
Water Available for Appropriation, Percent of Supply		97%	45%	95%	49%	72%
WY 1970						
Unimpaired Flow (Supply), AFY	1,330,595	1,330,595	992,300	1,216,003	-	-
Losses, AFY	-					
Use based on Face Value of Water Right (Demand), AFY		114,592	992,300	223,703	-	-
Water Available for Appropriation, AFY	1,330,595	1,216,003	-	992,300	-	-
Water Available for Appropriation, Percent of Supply		91%	0%	82%	0%	0%
WY 1971						
Unimpaired Flow (Supply), AFY	1,174,952	1,110,217	772,542	996,245	-	-
Losses, AFY	64,735					
Use based on Face Value of Water Right (Demand), AFY		113,972	772,542	223,703	-	-
Water Available for Appropriation, AFY	1,110,217	996,245	-	772,542	-	-
Water Available for Appropriation, Percent of Supply		90%	0%	78%	0%	0%
WY 1972						
Unimpaired Flow (Supply), AFY	859,583	759,316	423,573	647,276	-	-
Losses, AFY	100,267					
Use based on Face Value of Water Right (Demand), AFY		112,041	423,573	223,703	-	-
Water Available for Appropriation, AFY	759,316	647,276	-	423,573	-	-
Water Available for Appropriation, Percent of Supply		85%	0%	65%	0%	0%

Attachment A. Water Available for Appropriation after Accounting for Existing Paper Rights, 1955 through 2017

Parameter	Natural Flow at Piedra	Point of Analysis 1		Point of Analysis 2		Point of Analysis 3
		Other Users	License 11518, 11519	License 11517	License 11521	Application 32815
WY 1973						
Unimpaired Flow (Supply), AFY	2,135,442	2,043,864	1,705,547	1,929,250	242,260	-
Losses, AFY	91,578					
Use based on Face Value of Water Right (Demand), AFY		114,614	1,463,287	223,703	242,260	-
Water Available for Appropriation, AFY	2,043,864	1,929,250	242,260	1,705,547	0	-
Water Available for Appropriation, Percent of Supply		94%	14%	88%	0%	0%
WY 1974						
Unimpaired Flow (Supply), AFY	2,095,945	2,035,183	1,696,867	1,920,570	235,850	-
Losses, AFY	60,761					
Use based on Face Value of Water Right (Demand), AFY		114,614	1,461,017	223,703	235,850	-
Water Available for Appropriation, AFY	2,035,184	1,920,570	235,850	1,696,867	0	-
Water Available for Appropriation, Percent of Supply		94%	14%	88%	0%	0%
WY 1975						
Unimpaired Flow (Supply), AFY	1,583,365	1,504,054	1,165,878	1,389,581	-	-
Losses, AFY	79,310					
Use based on Face Value of Water Right (Demand), AFY		114,473	1,165,878	223,703	-	-
Water Available for Appropriation, AFY	1,504,055	1,389,581	-	1,165,878	-	-
Water Available for Appropriation, Percent of Supply		92%	0%	84%	0%	0%
WY 1976						
Unimpaired Flow (Supply), AFY	540,664	435,770	111,918	325,637	-	-
Losses, AFY	104,895					
Use based on Face Value of Water Right (Demand), AFY		110,132	111,918	213,720	-	-
Water Available for Appropriation, AFY	435,769	325,637	-	111,918	-	-
Water Available for Appropriation, Percent of Supply		75%	0%	34%	0%	0%
WY 1977						
Unimpaired Flow (Supply), AFY	395,994	280,589	15,425	179,429	-	-
Losses, AFY	115,405					
Use based on Face Value of Water Right (Demand), AFY		101,160	15,425	164,004	-	-
Water Available for Appropriation, AFY	280,589	179,429	(0)	15,425	-	-
Water Available for Appropriation, Percent of Supply		64%	0%	9%	0%	0%
WY 1978						
Unimpaired Flow (Supply), AFY	3,453,853	3,347,488	3,014,526	3,238,229	1,025,091	166,366
Losses, AFY	106,364					
Use based on Face Value of Water Right (Demand), AFY		109,259	1,989,435	223,703	858,725	97,295
Water Available for Appropriation, AFY	3,347,489	3,238,229	1,025,091	3,014,526	166,366	69,071
Water Available for Appropriation, Percent of Supply		97%	34%	93%	16%	42%
WY 1979						
Unimpaired Flow (Supply), AFY	1,729,846	1,685,999	1,347,682	1,571,385	44,138	-
Losses, AFY	43,847					
Use based on Face Value of Water Right (Demand), AFY		114,614	1,303,544	223,703	44,138	-
Water Available for Appropriation, AFY	1,685,999	1,571,385	44,138	1,347,682	0	-
Water Available for Appropriation, Percent of Supply		93%	3%	86%	0%	0%
WY 1980						
Unimpaired Flow (Supply), AFY	3,046,952	3,044,816	2,706,499	2,930,202	715,795	83,293
Losses, AFY	2,136					
Use based on Face Value of Water Right (Demand), AFY		114,614	1,990,704	223,703	632,502	55,020
Water Available for Appropriation, AFY	3,044,816	2,930,202	715,795	2,706,499	83,293	28,273
Water Available for Appropriation, Percent of Supply		96%	26%	92%	12%	34%
WY 1981						
Unimpaired Flow (Supply), AFY	1,040,415	997,154	659,081	882,784	-	-
Losses, AFY	43,261					
Use based on Face Value of Water Right (Demand), AFY		114,370	659,081	223,703	-	-
Water Available for Appropriation, AFY	997,154	882,784	-	659,081	-	-
Water Available for Appropriation, Percent of Supply		89%	0%	75%	0%	0%
WY 1982						
Unimpaired Flow (Supply), AFY	3,111,011	3,078,871	2,740,554	2,964,257	715,349	101,852
Losses, AFY	32,140					
Use based on Face Value of Water Right (Demand), AFY		114,614	2,025,205	223,703	613,497	34,361
Water Available for Appropriation, AFY	3,078,871	2,964,257	715,349	2,740,554	101,852	67,491
Water Available for Appropriation, Percent of Supply		96%	26%	92%	14%	66%
WY 1983						
Unimpaired Flow (Supply), AFY	4,476,391	4,476,391	4,138,074	4,361,777	1,582,315	667,137
Losses, AFY	-					
Use based on Face Value of Water Right (Demand), AFY		114,614	2,555,759	223,703	915,178	162,155
Water Available for Appropriation, AFY	4,476,391	4,361,777	1,582,315	4,138,074	667,137	504,982
Water Available for Appropriation, Percent of Supply		97%	38%	95%	42%	76%
WY 1984						
Unimpaired Flow (Supply), AFY	1,971,145	1,915,524	1,577,207	1,800,910	90,240	-
Losses, AFY	55,621					
Use based on Face Value of Water Right (Demand), AFY		114,614	1,486,967	223,703	90,240	-
Water Available for Appropriation, AFY	1,915,524	1,800,910	90,240	1,577,207	(0)	-
Water Available for Appropriation, Percent of Supply		94%	6%	88%	0%	0%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				0	0	
WY 1985						
Unimpaired Flow (Supply), AFY	1,252,501	1,172,104	833,806	1,057,509	-	-
Losses, AFY	80,397					
Use based on Face Value of Water Right (Demand), AFY		114,595	833,806	223,703	-	-
Water Available for Appropriation, AFY	1,172,104	1,057,509	-	833,806	-	-
Water Available for Appropriation, Percent of Supply		90%	0%	79%	0%	0%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				16,800	0	
WY 1986						
Unimpaired Flow (Supply), AFY	3,262,516	3,126,343	2,788,026	3,011,729	798,947	6,621
Losses, AFY	136,174					
Use based on Face Value of Water Right (Demand), AFY		114,614	1,989,079	223,703	792,326	6,621
Water Available for Appropriation, AFY	3,126,342	3,011,729	798,947	2,788,026	6,621	0
Water Available for Appropriation, Percent of Supply		96%	29%	93%	1%	0%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				29,600	0	
WY 1987						
Unimpaired Flow (Supply), AFY	778,157	718,656	381,196	604,899	-	-
Losses, AFY	59,501					
Use based on Face Value of Water Right (Demand), AFY		113,757	381,196	223,703	-	-
Water Available for Appropriation, AFY	718,656	604,899	-	381,196	-	-
Water Available for Appropriation, Percent of Supply		84%	0%	63%	0%	0%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				0	0	
WY 1988						
Unimpaired Flow (Supply), AFY	827,211	738,595	400,813	624,516	-	-
Losses, AFY	88,616					
Use based on Face Value of Water Right (Demand), AFY		114,079	400,813	223,703	-	-
Water Available for Appropriation, AFY	738,595	624,516	-	400,813	-	-
Water Available for Appropriation, Percent of Supply		85%	0%	64%	0%	0%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				0	0	
WY 1989						
Unimpaired Flow (Supply), AFY	905,599	798,064	464,074	687,680	-	-
Losses, AFY	107,535					
Use based on Face Value of Water Right (Demand), AFY		110,384	464,074	223,606	-	-
Water Available for Appropriation, AFY	798,064	687,680	(0)	464,074	-	-
Water Available for Appropriation, Percent of Supply		86%	0%	67%	0%	0%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				0	0	

Attachment A. Water Available for Appropriation after Accounting for Existing Paper Rights, 1955 through 2017

Parameter	Natural Flow at Piedra	Point of Analysis 1		Point of Analysis 2		Point of Analysis 3
		Other Users	License 11518, 11519	License 11517	License 11521	Application 32815
WY 1990						
Unimpaired Flow (Supply), AFY	685,125	585,990	253,147	476,793	-	-
Losses, AFY	99,135					
Use based on Face Value of Water Right (Demand), AFY		109,197	253,147	223,645	-	-
Water Available for Appropriation, AFY	585,990	476,793	0	253,147	-	-
Water Available for Appropriation, Percent of Supply		81%	0%	53%	0%	0%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				0	0	
WY 1991						
Unimpaired Flow (Supply), AFY	1,075,608	922,992	588,940	812,643	-	-
Losses, AFY	152,616					
Use based on Face Value of Water Right (Demand), AFY		110,350	588,940	223,703	-	-
Water Available for Appropriation, AFY	922,992	812,643	-	588,940	-	-
Water Available for Appropriation, Percent of Supply		88%	0%	72%	0%	0%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				0	0	
WY 1992						
Unimpaired Flow (Supply), AFY	705,243	591,246	272,317	485,942	-	-
Losses, AFY	113,998					
Use based on Face Value of Water Right (Demand), AFY		105,304	272,317	213,625	-	-
Water Available for Appropriation, AFY	591,245	485,942	-	272,317	-	-
Water Available for Appropriation, Percent of Supply		82%	0%	56%	0%	0%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				0	0	
WY 1993						
Unimpaired Flow (Supply), AFY	2,553,114	2,378,969	2,045,297	2,269,000	395,440	14,752
Losses, AFY	174,145					
Use based on Face Value of Water Right (Demand), AFY		109,968	1,649,857	223,703	380,688	14,752
Water Available for Appropriation, AFY	2,378,969	2,269,000	395,440	2,045,297	14,752	0
Water Available for Appropriation, Percent of Supply		95%	19%	90%	4%	0%
Actual Use for Licenses L11517 and L11521, AFY [(a)]						
WY 1994						
Unimpaired Flow (Supply), AFY	861,045	707,216	375,832	599,535	-	-
Losses, AFY	153,829					
Use based on Face Value of Water Right (Demand), AFY		107,681	375,832	223,703	-	-
Water Available for Appropriation, AFY	707,216	599,535	-	375,832	-	-
Water Available for Appropriation, Percent of Supply		85%	0%	63%	0%	0%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				0	0	
WY 1995						
Unimpaired Flow (Supply), AFY	3,460,047	3,367,300	3,028,983	3,252,686	1,032,786	301,503
Losses, AFY	92,747					
Use based on Face Value of Water Right (Demand), AFY		114,614	1,996,197	223,703	731,283	107,547
Water Available for Appropriation, AFY	3,367,300	3,252,686	1,032,786	3,028,983	301,503	193,956
Water Available for Appropriation, Percent of Supply		97%	34%	93%	29%	64%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				0	0	
WY 1996						
Unimpaired Flow (Supply), AFY	2,095,921	1,664,558	1,326,241	1,549,944	39,216	-
Losses, AFY	431,363					
Use based on Face Value of Water Right (Demand), AFY		114,614	1,287,025	223,703	39,216	-
Water Available for Appropriation, AFY	1,664,558	1,549,944	39,216	1,326,241	(0)	-
Water Available for Appropriation, Percent of Supply		93%	3%	86%	0%	0%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				0	0	
WY 1997						
Unimpaired Flow (Supply), AFY	2,652,074	2,420,224	2,082,075	2,305,778	293,852	-
Losses, AFY	231,851					
Use based on Face Value of Water Right (Demand), AFY		114,446	1,788,223	223,703	293,852	-
Water Available for Appropriation, AFY	2,420,223	2,305,778	293,852	2,082,075	0	-
Water Available for Appropriation, Percent of Supply		95%	14%	90%	0%	0%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				0	90,700	
WY 1998						
Unimpaired Flow (Supply), AFY	3,104,090	3,024,440	2,686,124	2,909,827	905,048	275,520
Losses, AFY	79,650					
Use based on Face Value of Water Right (Demand), AFY		114,614	1,781,076	223,703	629,528	106,199
Water Available for Appropriation, AFY	3,024,440	2,909,827	905,048	2,686,124	275,520	169,321
Water Available for Appropriation, Percent of Supply		96%	34%	92%	30%	61%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				0	2,800	
WY 1999						
Unimpaired Flow (Supply), AFY	1,261,024	1,122,108	783,792	1,007,495	-	-
Losses, AFY	138,916					
Use based on Face Value of Water Right (Demand), AFY		114,614	783,792	223,703	-	-
Water Available for Appropriation, AFY	1,122,108	1,007,495	-	783,792	-	-
Water Available for Appropriation, Percent of Supply		90%	0%	78%	0%	0%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				0	0	
WY 2000						
Unimpaired Flow (Supply), AFY	1,534,654	1,367,905	1,031,481	1,255,184	-	-
Losses, AFY	166,749					
Use based on Face Value of Water Right (Demand), AFY		112,721	1,031,481	223,703	-	-
Water Available for Appropriation, AFY	1,367,905	1,255,184	0	1,031,481	-	-
Water Available for Appropriation, Percent of Supply		92%	0%	82%	0%	0%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				0	0	
WY 2001						
Unimpaired Flow (Supply), AFY	1,010,201	875,309	545,256	768,225	-	-
Losses, AFY	134,892					
Use based on Face Value of Water Right (Demand), AFY		107,084	545,256	222,969	-	-
Water Available for Appropriation, AFY	875,309	768,225	-	545,256	-	-
Water Available for Appropriation, Percent of Supply		88%	0%	71%	0%	0%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				0	0	
WY 2002						
Unimpaired Flow (Supply), AFY	1,141,149	984,643	655,228	878,931	-	-
Losses, AFY	156,506					
Use based on Face Value of Water Right (Demand), AFY		105,712	655,228	223,703	-	-
Water Available for Appropriation, AFY	984,643	878,931	-	655,228	-	-
Water Available for Appropriation, Percent of Supply		89%	0%	75%	0%	0%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				0	0	
WY 2003						
Unimpaired Flow (Supply), AFY	1,426,166	1,327,564	992,940	1,216,643	-	-
Losses, AFY	98,602					
Use based on Face Value of Water Right (Demand), AFY		110,921	992,940	223,703	-	-
Water Available for Appropriation, AFY	1,327,564	1,216,643	-	992,940	-	-
Water Available for Appropriation, Percent of Supply		92%	0%	82%	0%	0%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				0	0	
WY 2004						
Unimpaired Flow (Supply), AFY	1,051,241	974,025	643,400	867,103	-	-
Losses, AFY	77,216					
Use based on Face Value of Water Right (Demand), AFY		106,922	643,400	223,703	-	-
Water Available for Appropriation, AFY	974,025	867,103	-	643,400	-	-
Water Available for Appropriation, Percent of Supply		89%	0%	74%	0%	0%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				0	0	

Attachment A. Water Available for Appropriation after Accounting for Existing Paper Rights, 1955 through 2017

Parameter	Natural Flow at Piedra	Point of Analysis 1		Point of Analysis 2		Point of Analysis 3
		Other Users	License 11518, 11519	License 11517	License 11521	Application 32815
WY 2005						
Unimpaired Flow (Supply), AFY	2,531,370	2,386,755	2,050,132	2,273,835	439,063	18,945
Losses, AFY	144,615					
Use based on Face Value of Water Right (Demand), AFY		112,920	1,611,070	223,703	420,118	18,003
Water Available for Appropriation, AFY		2,273,835	439,063	2,050,132	18,945	942
Water Available for Appropriation, Percent of Supply		95%	21%	90%	4%	5%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				0	0	
WY 2006						
Unimpaired Flow (Supply), AFY	2,948,677	2,804,446	2,466,129	2,689,832	718,207	5,066
Losses, AFY	144,231					
Use based on Face Value of Water Right (Demand), AFY		114,614	1,747,922	223,703	713,141	5,067
Water Available for Appropriation, AFY	2,804,446	2,689,832	718,207	2,466,129	5,066	(1)
Water Available for Appropriation, Percent of Supply		96%	29%	92%	1%	0%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				0	147,800	
WY 2007						
Unimpaired Flow (Supply), AFY	679,047	607,801	278,133	497,250	-	-
Losses, AFY	71,246					
Use based on Face Value of Water Right (Demand), AFY		110,551	278,133	219,117	-	-
Water Available for Appropriation, AFY	607,801	497,250	0	278,133	-	-
Water Available for Appropriation, Percent of Supply		82%	0%	56%	0%	0%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				0	39,700	
WY 2008						
Unimpaired Flow (Supply), AFY	1,216,651	1,103,990	770,835	994,538	-	-
Losses, AFY	112,662					
Use based on Face Value of Water Right (Demand), AFY		109,451	770,835	223,703	-	-
Water Available for Appropriation, AFY	1,103,989	994,538	-	770,835	-	-
Water Available for Appropriation, Percent of Supply		90%	0%	78%	0%	0%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				0	14,300	
WY 2009						
Unimpaired Flow (Supply), AFY	1,348,201	1,231,966	896,867	1,120,570	-	-
Losses, AFY	116,234					
Use based on Face Value of Water Right (Demand), AFY		111,396	896,867	223,703	-	-
Water Available for Appropriation, AFY	1,231,967	1,120,570	-	896,867	-	-
Water Available for Appropriation, Percent of Supply		91%	0%	80%	0%	0%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				0	855	
WY 2010						
Unimpaired Flow (Supply), AFY	2,042,166	1,928,636	1,591,686	1,815,389	173,485	1,313
Losses, AFY	113,530					
Use based on Face Value of Water Right (Demand), AFY		113,247	1,418,201	223,703	172,172	1,313
Water Available for Appropriation, AFY	1,928,636	1,815,389	173,485	1,591,686	1,313	0
Water Available for Appropriation, Percent of Supply		94%	11%	88%	1%	0%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				0	45,376	
WY 2011						
Unimpaired Flow (Supply), AFY	3,319,830	3,299,793	2,961,476	3,185,179	949,428	141,710
Losses, AFY	20,037					
Use based on Face Value of Water Right (Demand), AFY		114,614	2,012,048	223,703	807,718	54,858
Water Available for Appropriation, AFY	3,299,793	3,185,179	949,428	2,961,476	141,710	86,852
Water Available for Appropriation, Percent of Supply		97%	32%	93%	15%	61%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				0	89,114	
WY 2012						
Unimpaired Flow (Supply), AFY	825,683	779,781	445,328	667,505	-	-
Losses, AFY	45,902					
Use based on Face Value of Water Right (Demand), AFY		112,276	445,328	222,177	-	-
Water Available for Appropriation, AFY	779,781	667,505	-	445,328	-	-
Water Available for Appropriation, Percent of Supply		86%	0%	67%	0%	0%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				0	24,963	
WY 2013						
Unimpaired Flow (Supply), AFY	691,301	652,870	324,057	543,969	-	-
Losses, AFY	38,431					
Use based on Face Value of Water Right (Demand), AFY		108,901	324,057	219,912	-	-
Water Available for Appropriation, AFY	652,870	543,969	-	324,057	-	-
Water Available for Appropriation, Percent of Supply		83%	0%	60%	0%	0%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				0	0	
WY 2014						
Unimpaired Flow (Supply), AFY	536,924	507,074	178,922	399,609	-	-
Losses, AFY	29,849					
Use based on Face Value of Water Right (Demand), AFY		107,465	178,922	220,688	-	-
Water Available for Appropriation, AFY	507,075	399,609	-	178,922	-	-
Water Available for Appropriation, Percent of Supply		79%	0%	45%	0%	0%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				0	0	
WY 2015						
Unimpaired Flow (Supply), AFY	360,979	340,911	36,107	241,551	-	-
Losses, AFY	20,068					
Use based on Face Value of Water Right (Demand), AFY		99,361	36,107	205,444	-	-
Water Available for Appropriation, AFY	340,911	241,551	-	36,107	-	-
Water Available for Appropriation, Percent of Supply		71%	0%	15%	0%	0%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				0	0	
WY 2016						
Unimpaired Flow (Supply), AFY	1,253,961	1,184,250	849,959	1,073,662	-	-
Losses, AFY	69,711					
Use based on Face Value of Water Right (Demand), AFY		110,587	849,959	223,703	-	-
Water Available for Appropriation, AFY	1,184,250	1,073,662	(0)	849,959	-	-
Water Available for Appropriation, Percent of Supply		91%	0%	79%	0%	0%
Actual Use for Licenses L11517 and L11521, AFY [(a)]				0	32,115	
WY 2017						
Unimpaired Flow (Supply), AFY	4,096,148	4,071,425	3,733,635	3,957,338	1,422,736	532,119
Losses, AFY	24,723					
Use based on Face Value of Water Right (Demand), AFY		114,087	2,310,900	223,703	890,617	167,171
Water Available for Appropriation, AFY	4,071,425	3,957,338	1,422,736	3,733,635	532,119	364,948
Water Available for Appropriation, Percent of Supply		97%	38%	94%	37%	69%
Actual Use for Licenses L11517 and L11521, AFY [(a)]						
Long-term Average						
Unimpaired Flow (Supply), AFY	1,724,006	1,631,621	1,298,147	1,520,035	250,838	54,844
Losses, AFY	92,384					
Use based on Face Value of Water Right (Demand), AFY		111,586	1,047,309	221,888	195,994	18,506
Water Available for Appropriation, AFY	1,619,442	1,520,035	250,838	1,298,147	54,844	36,338
Water Available for Appropriation, Percent of Supply		93%	19%	85%	22%	66%

(a) Use reported for calendar year.