BUREAU OF RECLAMATION

Technical Memorandum for the Upper Red River Basin Study

Formulation of Stream-Water Rights Management Alternatives in the Tom Steed Reservoir Hydrologic Basin

March 2022

BUREAU OF RECLAMATION

State of Oklahoma OWRB Water Resources Board the water agency

Contents

PART I: INTRODUCTION

Background and Goals

This Technical Memorandum (TM) was developed in support of the Upper Red River Basin Study (URRBS). Among the many water management strategies identified in the URRBS was the adoption of hydrologic thresholds that could be used to protect the yield of Tom Steed Reservoir from diversions from existing and future stream permit holders during drought periods. The reader is strongly encouraged to read the URRBS report for a thorough understanding on the background and need for such a strategy, but for the purposes of this TM, only a brief explanation is provided.

Under Oklahoma statute, junior stream permit holders are not allowed to interfere with senior permit holders by taking their water out-of priority ahead of a senior permit holder. A senior permit holder can file a complaint with the Oklahoma Water Resources Board (OWRB), but Oklahoma statutes do not set forth any specific authority for the OWRB to be proactive in protecting an individual claimant's water rights from interference by others (Kershen, 2021). Yet, assuming the OWRB has authority to create an administrative enforcement procedure to protect senior priority stream water permits, OWRB could create an administrative procedure to stop or prevent interference with senior priority rights or to prevent out-of-priority use of water rights. What is lacking in the statutes, the regulations, and the case law is any definition of interference or any identification of thresholds that can be invoked to protect the water rights of senior holders (Kershen, 2021). To this end, the Mountain Park Master Conservancy District, who holds a right to municipal and industrial (M&I) water out of Tom Steed Reservoir, could collaborate with the OWRB, who has authority to issue stream permits in Oklahoma, to identify hydrologic thresholds that define when interference by junior stream permit holders is occurring against senior

stream permit holders. These hydrologic thresholds could take into account the relevant hydrological conditions and needed reservoir yield specific to the North Fork Red River (NFRR) and Tom Steed Reservoir, respectively, and then OWRB could adopt those thresholds into new interference regulations that are specific to the Tom Steed Reservoir hydrologic basin.

This TM describes the methods and assumptions used to identify the range of thresholds that could be used for such a purpose. To be clear, the purpose is of these thresholds would be to protect reservoir storage, but to do so in a manner that maximizes beneficial use of water and considers impacts on all other existing and future permit holders within the basin as a whole. The thresholds selected through this analysis were evaluated using the Upper Red River Surface Water Allocation Model (SWAM) to assess their impacts on reservoir storage and water availability in the basin as compared to a status quo future with no curtailment of junior stream permits. The water availability analysis results can be found in the URRBS report. Importantly, regardless of the findings presented in this TM, under no circumstance were any of the thresholds be recommended for implementation as part of the URRBS. The authority to implement such measures resides solely with the OWRB.

Overview

This TM is divided into six Parts:

Part I: This section describes the goals of this TM and establishes definitions of key terminology.

Part II: This section identifies a range of drought indicators that exist both nationally and globally. Several screening criteria were applied to narrow these down to only three indicators for further analyses in combination with reservoir inflow: Palmer Drought Severity Index (PDSI), Palmer Hydrological Drought Index (PHDI), and Standard Precipitation Index (SPI). These were considered both individually and in combination with reservoir inflow in Part III.

Part III: This section analyzes the indicators selected in Part II in terms of their ability to predict observed, historical droughts – both individually and in combination with reservoir inflow. Fifteen drought definitions (scenarios) were identified. Predictive models were built through logistic regression to test how well these indicators explained the variation involved in predicting drought. The relative performance of the logistic regression models was tested using standard techniques to evaluate how well model predictions matched with observed droughts (as defined by the drought scenarios) over seven different time periods used in a cross-validation of the logistic regression models. Through this analysis, the list of indicators selected in Part II was narrowed down to only one indicator for further testing with inflow: PDSI. Results showed that PDSI was found to perform better in combination with inflow than when considered individually.

Part IV: This section focuses specifically on the logistic regression models derived by inflow-PDSI in Part III, and evaluates the impact that each drought scenario and model period have on model performance. Through this analysis, of the 15 drought scenarios originally considered, only six were carried forward for further analysis. Similarly, of the seven model periods considered, three were carried forward for further analyses.

Part V: This section focuses on how well the full range of 441 potential inflow-PDSI thresholds predicted observed, historical conditions as defined by the droughts and model periods that are selected in Part IV. This number (441) was a result of the experimental design using a combination of inflow and PDSI thresholds that were analyzed from a minimum value (0th percentile) to maximum value (100th percentile) in five percent increments. This resulted in a matrix of 21 × 21 threshold values or 441 threshold values in total. Each combination of thresholds was analyzed using proven atmospheric science methods used to test meteorological forecasting. Of the 441 threshold combinations considered, four were inflow-PDSI thresholds were selected as preferred thresholds that would make up the Stream-Water Rights Management Alternatives described in Part VI.

Part VI. This section describes the final formulation of Stream-Water Rights Management Alternatives. The Alternatives were derived in part by the indicators and thresholds selected through Parts II-V, but other important factors were considered, namely conditions at the reservoir itself, the timing of curtailments, and the types of stream water permits to be curtailed.

Definitions

1. **Trigger**: a "threshold" that when reached, signals "action" during the onset or occurrence of a "drought".
2. **Threshold**: numerical value(s) of a Regional Drought Index or Local Drought Indicator.
3. **Regional Drought Index (RDI)**: a cumulative measurement or calculation of a combination of "Local Drought Indicators". Typically detects conditions on a regional scale.
4. **Local Drought Indicator (LDI)**: a parameter used to describe the type and severity of drought. Typically detects conditions on a local scale.

For example, the *Standard Precipitation Index (SPI)* is a "RDI" derived from the "LDI", *Precipitation*; if SPI falls below a "threshold" of - *2*, then the curtailment of junior water rights could be "triggered".

5. **Drought**: the term "drought" can be defined in many different ways as discussed in Part III. Generally, four types of commonly accepted droughts exist, listed in order of progression. Different indicators and indices can be used to monitor the onset, duration, and end of different types of droughts:
    a. *Meteorological*: prolonged period of time when precipitation is below normal, often accompanied by higher temperatures.

b. *Agricultural*: the combined precipitation and temperature conditions cause a reduction in soil moisture that negatively affects crop growth.

c. *Hydrological*: conditions progress and cause a reduction in the groundwater table, streamflow, and reservoir storage.

d. *Socioeconomic*: conditions progress to a point where extended periods of reduced water availability affect social, ecological, and/or economic well-being and viability.

For the purposes of this analysis, "drought" was defined from a hydrological perspective in terms of observed water availability over the period of record. Fifteen drought definitions were identified, ranging from deviations in long-term mean and median streamflow, deviations in precipitation and temperature, and reductions in reservoir storage.

6. **Action**: for the purpose of this analysis, action was defined as the curtailment (i.e., management) of junior stream water rights. It is recognized that other adaptation measures, such as water conservation of reservoir users and other shared shortage provisions also must be considered, but those are discussed in other chapters of the URRBS report and were considered beyond the scope of this TM.

7. **Models**: Predictive models were built through logistic regression to test how well inflow, PDSI, PHDI, and SPI predicted a range of drought scenarios. Logistic regression is a standard statistical method used to estimate the probability of occurrence of an event, specifically, drought event in this study, using a set of predictors. The relative performance of the logistic regression models was tested in terms of how well model

predictions matched up with observed droughts (as defined by the drought scenarios) over the model period and the validation period.

8. **Model Periods**: Model Periods were the subsets of the observed period of record used to both develop logistic regression models and to test how well inflow, PDSI, PHDI, and SPI predicted drought scenarios.
9. **Validation Period:** Validation Periods were the remaining subsets of the observed period that were not used as part of the Model Period. For example, if Model Period B included January 1926 to December 1975, then Validation Period B included January 1976 to December 2016.

Types of RDIs

Several Drought Indicators and Indices exist both nationally and globally. Two notable and relevant publications are summarized in Table 1 and Table 2 below. It is worth noting that the indices cited below focus exclusively on detecting meteorological, agricultural, and/or hydrologic droughts. Detecting/measuring a socioeconomic drought was not considered within the scope of this RDI analysis:

1. Table 1 summarizes the "Handbook of Drought Indicators and Indices" (World Meteorological Organization (WMO) and Global Water Partnership (GWP), 2016).
2. Table 2 summarizes "The Quantification of Drought: An Evaluation of Drought Indices" (Keyantash and Dracup, 2002).

Table 1. Summary of commonly used RDIs and input parameters for three types of drought: Meteorological, Agricultural, and Hydrological, along with an ease of use classification where resource needs increase from green (low) to yellow (moderate) to red (high). (Adapted from WMO and GWP, 2016.)

Meteorological Drought	**Ease of Use[1]**	**Indicator/Input Parameters[2]**	**Additional Information**
Aridity Anomaly Index (AAI)	Green	P, T, PET, ET	Operationally available for India
Deciles	Green	P	Easy to calculate; examples from Australia are useful
Keetch–Byram Drought Index (KBDI)	Green	P, T	Calculations are based upon the climate of the area of interest
Percent of Normal Precipitation	Green	P	Simple calculations
Standardized Precipitation Index (SPI)	Green	P	Highlighted by the World Meteorological Organization as a starting point for meteorological drought monitoring
Weighted Anomaly Standardized Precipitation (WASP)	Green	P, T	Uses gridded data for monitoring drought in tropical regions
Aridity Index (AI)	Yellow	P, T	Can also be used in climate classifications
China Z Index (CZI)	Yellow	P	Intended to improve upon SPI data
Crop Moisture Index (CMI)	Yellow	P, T	Weekly values are required
Drought Area Index (DAI)	Yellow	P	Gives an indication of monsoon season performance
Drought Reconnaissance Index (DRI)	Yellow	P, T	Monthly temperature and precipitation are required
Effective Drought Index (EDI)	Yellow	P	Program available through direct contact with originator
Hydro-thermal Coefficient of Selyaninov (HTC)	Yellow	P, T	Easy calculations and several examples in the Russian Federation
NOAA Drought Index (NDI)	Yellow	P	Best used in agricultural applications
Palmer Drought Severity Index (PDSI)	Yellow	P, T, AWC	Not green due to complexity of calculations and the need for serially complete data

Meteorological Drought Cont.	Ease of Use[1]	Indicator/Input Parameters[2]	Additional Information
Palmer Z Index	Yellow	P, T, AWC	One of the many outputs of PDSI calculations
Rainfall Anomaly Index (RAI)	Yellow	P	Serially complete data required
Self-Calibrated Palmer Drought Severity Index (sc-PDSI)	Yellow	P, T, AWC	Not green due to complexity of calculations and serially complete data required
Standardized Anomaly Index (SAI)	Yellow	P	Point data used to describe regional conditions
Standardized Precipitation Evapotranspiration Index (SPEI)	Yellow	P, T	Serially complete data required; output similar to SPI but with a temperature component
Agricultural Drought/Soil Moisture	**Ease of use[1]**	**Indicator/Input Parameters[2]**	**Additional Information**
Soil Moisture Anomaly (SMA)	Yellow	P, T, AWC	Intended to improve upon the water balance of PDSI
PDSI Evapotranspiration Deficit Index (ETDI)	Red	Mod	Complex calculations with multiple inputs required
Soil Moisture Deficit Index (SMDI)	Red	Mod	Weekly calculations at different soil depths; complicated to calculate
Soil Water Storage (SWS)	Red	AWC, RD, ST, SWD	Owing to variations in both soil and crop types, interpolation over large areas is challenging
Hydrologic Drought	**Ease of use[1]**	**Indicator/Input Parameters[2]**	**Additional Information**
Palmer Hydrological Drought Severity Index (PHDI)	Yellow	P, T, AWC	Serially complete data required
Standardized Reservoir Supply Index (SRSI)	Yellow	RD	Similar calculations to SPI using reservoir data
Standardized Streamflow Index (SSFI)	Yellow	SF	Uses the SPI program along with streamflow data
Standardized Water-level Index (SWI)	Yellow	GW	Similar calculations to SPI, but using groundwater or well-level data instead of precipitation
Streamflow Drought Index (SDI)	Yellow	SF	Similar calculations to SPI, but using streamflow data instead of precipitation

Hydrologic Drought Cont.	Ease of Use[1]	Indicator/Input parameters[2]	Additional Information
Surface Water Supply Index (SWSI)	Yellow	P, RD, SF, S	Many methodologies and derivative products are available, but comparisons between basins are subject to the method chosen
Aggregate Dryness Index (ADI)	Red	P, ET, SF, RD, AWC, S	No code, but mathematics explained in the literature
Standardized Snowmelt and Rain Index (SMRI)	Red	P, T, SF, Mod	Can be used with or without snowpack information

[1]Indicators and indices are sorted by 'ease of use' and then alphabetically within each 'ease of use' category.

[2]Key to variables:

AWC = available water content
CC = crop coefficient
CD = crop data
ET = evapotranspiration
GW = groundwater
Mod = modelled
Multiple = multiple indicators used
P = precipitation
PET = potential evapotranspiration
Rad = solar radiation
RD = reservoir
S = snowpack
SF = streamflow
ST = soil type
SWD = soil water deficit
T = temperature
Td = dewpoint temperature
W = wind data

Table 2. Summary of drought indicators and indices taken from Keyantash and Dracup, 2002.

Drought Index	Drought Indicator / Input Parameter	Type of Drought
Discrete, Cumulative Precipitation	Precipitation	Meteorological
Computed Soil Moisture	Soil Moisture	Agricultural
Total Water Deficit	Streamflow	Hydrologic
Cumulative Streamflow Anomaly	Streamflow	Hydrologic

Another Indicator of a Hydrologic Drought is **Reservoir Storage**. As such, Reservoir Storage was included as an input parameter in the Standardized Reservoir Supply Index (SRSI) and Surface Water Supply Index (SWSI) listed in Table 1. These indices are useful in measuring drought conditions on a regional scale, such as a river basin, and can take into account multiple variables including snowpack, precipitation, streamflow, and storage levels of more than one reservoir. In lieu of calculating an RDI such as SRSI or SWSI, reservoir storage can be used either alone or in combination with other parameters, such as streamflow, to trigger water management actions. Current examples include the Integrated Management Plan for the Republican River (2016) and the Colorado River Drought Contingency Plan (2019).

PART II: INITIAL RDI SCREENING

Before discussing the methods used to select drought indicators/indices, it should be recognized that no "one size fits all" exists. Flexibility and adaptability are key. It often takes a system of trial and error to determine the best fit for any given location, area, basin or region. In light of the goals established under Part I, one or more indicators/indices should be selected that is useful at monitoring/detecting conditions directly at the **reservoir (i.e., LDI)**, and one or more indicators/indices should be selected that is useful for monitoring/detecting conditions for the **entire basin (i.e., RDI)**. For the reservoir, calculation of an index is not required. Two obvious LDIs selected are:

- Streamflow/Inflow into Tom Steed Reservoir
- Tom Steed Reservoir storage

For the basin, the selection of one or more RDIs is needed to combine with the two LDIs. Numerous criteria were used to help aid in the selection of the RDIs. The following criteria were adapted from guidance provided by two sources: WMO and GWP (2016); and Keyantash and Dracup (2002).

Evaluation Criteria:

1. Allows for timely detection of the onset of a drought that is severe enough to trigger appropriate communication and coordination of drought response or mitigation actions, but which is not overly sensitive, meaning it either falsely indicates the onset of a drought or indicates the onset of only a abnormally dry period (Jolliffe et al, 2012).
2. Must be relevant to the issues and conditions within the region of interest, namely water rights management in western Oklahoma.
3. Must be responsive and reflective of the impacts occurring on the ground both on a local scale (i.e., at Tom Steed Reservoir) and on a regional scale (i.e., the Elk Creek and West Otter-Glen Creek basins).

4. Data must exist over a long period of record, thus allowing for strong historical and/or statistical correlations.
5. Must provide value added and avoid redundancy with another indices.
6. Must be relatively easy to calculate, monitor, and implement, with preference given towards one or more indices that are readily available and calculated by independent third-parties. For example,
    a. The U.S. Drought Monitor (USDM), through a partnership between the National Drought Mitigation Center (NDMC) at the University of Nebraska-Lincoln, the U.S. Department of Agriculture (USDA), and the National Oceanic and Atmospheric Administration (NOAA), produce weekly drought reports for the U.S, including Oklahoma. Numeric inputs into the drought report include PDSI and SPI, among others.
    b. The OWRB produces a monthly "Water Resources Bulletin" that includes various climate/weather statistics by climate division across Oklahoma, including but not limited to precipitation, soil moisture, streamflow/inflow, PDSI, SPI, and reservoir storage (OWRB, 2019). Drawing largely, upon products and information developed by the NDMC and USDM described above, the Bulletin provides a monthly drought status and outlook.
7. Must have a proven record of use/applicability in the U.S.

RDIs Considered but Eliminated

- These criteria were applied to the full list of indicators/indices cited in the previous section. Most of the indicators/indices were eliminated because they did not meet the selection criteria.
- "Composite/Hybrid" Indices were also considered, namely the U.S. Drought Monitor, which uses a combination of PDSI, soil moisture, streamflow, and SPI to assign Drought Categories (e.g., D0-D5) on a weekly basis on a varying spatial scale (county, watershed, etc.). Drought

Categories for western Oklahoma have been assigned since the year 2000. This Index did not meet the aforementioned criterion which prioritizes datasets that exist over a long period of record, and thus support relatively strong historical and/or statistical correlations.

RDIs Advanced for Further Consideration

The following three RDIs were not eliminated and are therefore carried forward for further analysis as potential triggers.

- **PDSI**: targets detection of agricultural/hydrologic drought conditions on a region/basin scale; uses a soil model to calculate the onset and ending of a drought through the trending of soil moisture conditions.
- **PHDI**: targets detection of hydrologic drought conditions on a region/basin scale; it is similar to PDSI and uses the same soil model, but PHDI lags further because it calculates the onset and ending of a drought by a more defined threshold. In other words, while PDSI calculates conditions that are either trending as wet or dry, PHDI calculates whether a wet or dry condition either exists or does not).
- **SPI**: has the potential to target any of the three types of drought. This analysis selected 12-month SPI to detect hydrologic drought conditions on a region/basin scale.

Figure 1 below summarizes the results thus far:

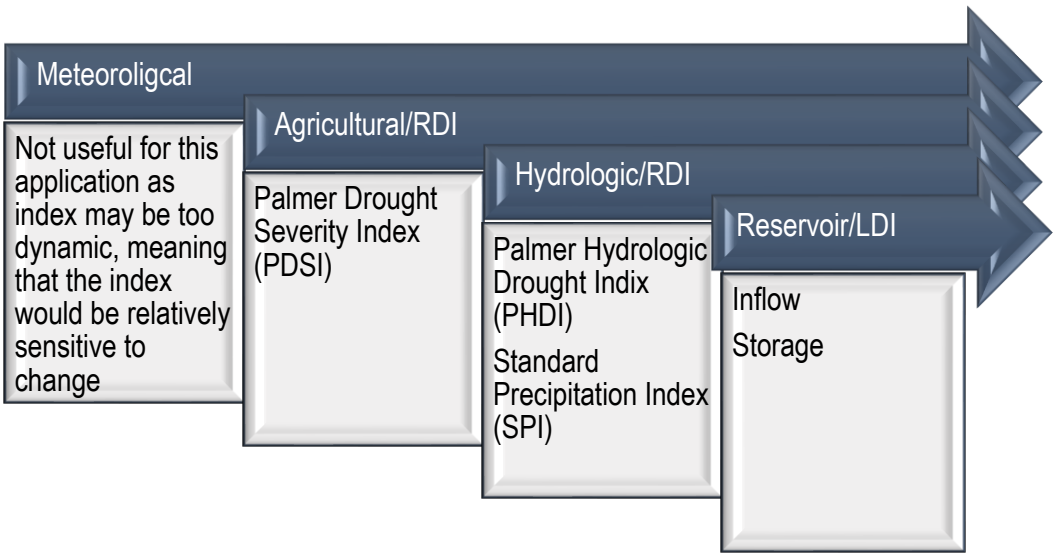

Figure 1. Summary of indicators and indices, including the corresponding drought and domain of applicability, that were selected for further examination.

PART III: EVALUATE AND SELECT RDI

Approach

In this section, the three RDIs selected in Part II were tested in terms of their ability to predict the occurrence of observed[1], historical droughts. After providing an inventory of baseline conditions over the historical record, multiple drought definitions (scenarios) were identified. Predictive models were then built through logistic regression to test how well inflow, PDSI, PHDI, and SPI predicted these drought scenarios. Logistic regression is a standard statistical method used to estimate the probability of occurrence of an event, specifically, a drought event in this study, using a set of predictors. The relative performance of the logistic regression models was tested in terms of how well model predictions matched up with observed droughts (as defined by the drought scenarios) over the model period. This was done by calculating the Adjusted Deviance R^2 and Bayesian Information Criterion (BIC), both of which are discussed in detail below.

[1] Technically, a drought was not observed; rather, it was identified based on the parameters used to define the drought, but for the purposes of this report, the term "observed" is used to describe the occurrence of historical droughts.

Selecting a Climate Division for Tom Steed Reservoir

PDSI, PHDI, and SPI are produced by NOAA's National Climate Data Center (NCDC). Monthly data are available from 1895 to present for nine "Climate Divisions" across the state (Figure 2). The Tom Steed Reservoir watershed encompasses Climate Divisions 4 and 7 (Figure 3). A comparison of PDSI between both divisions is provided in Figure 4.

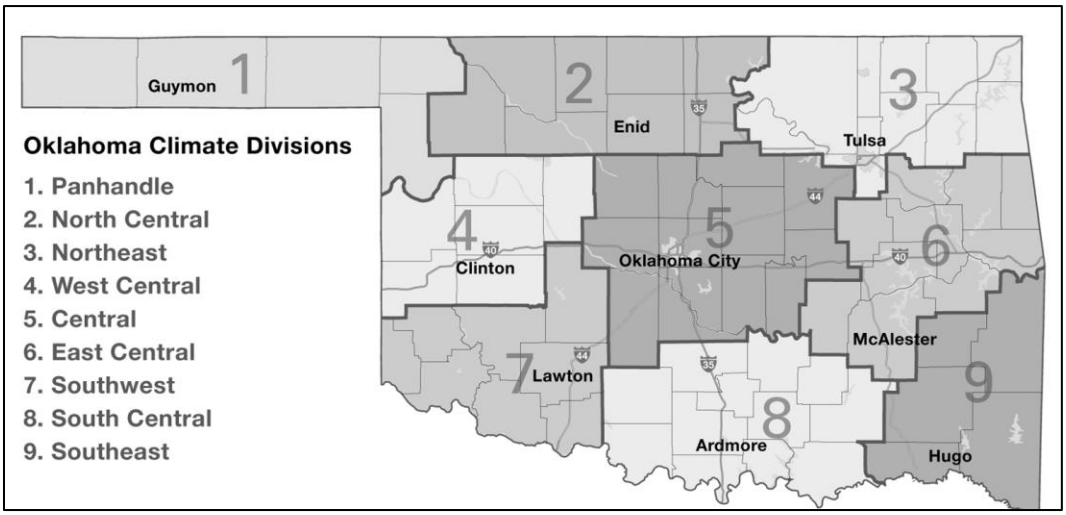

Figure 2. Oklahoma Climate Divisions according to NOAA's National Climate Data Center.

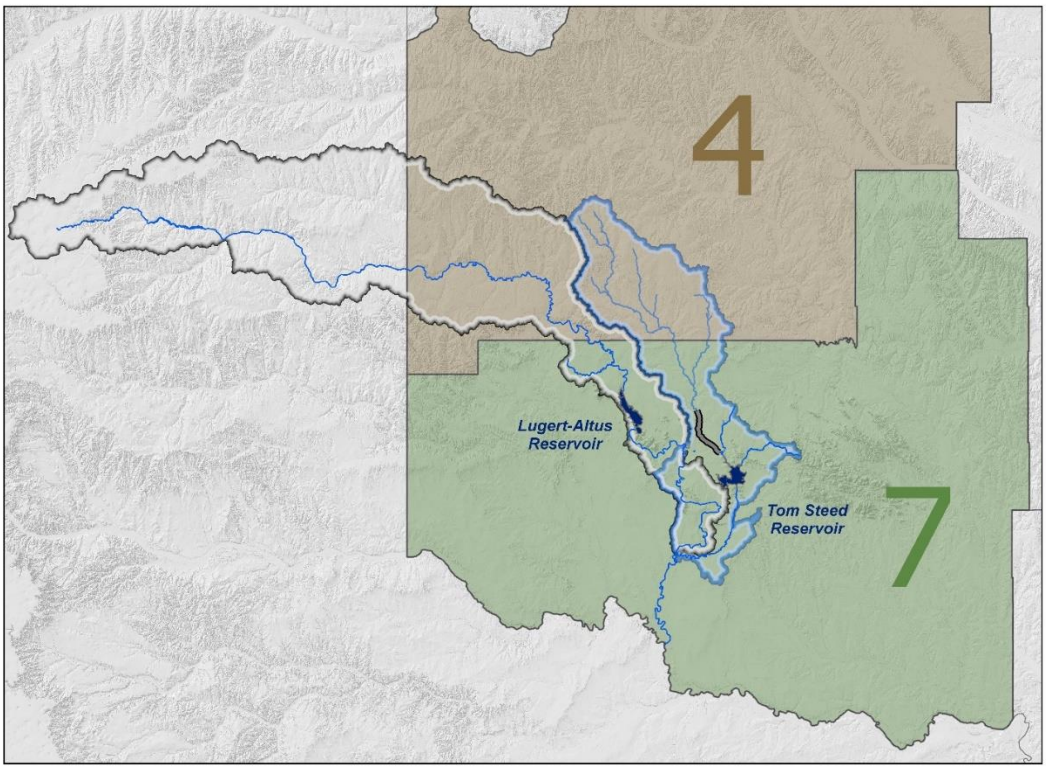

Figure 3. Oklahoma Climate Divisions according to NOAA's National Climate Data Center

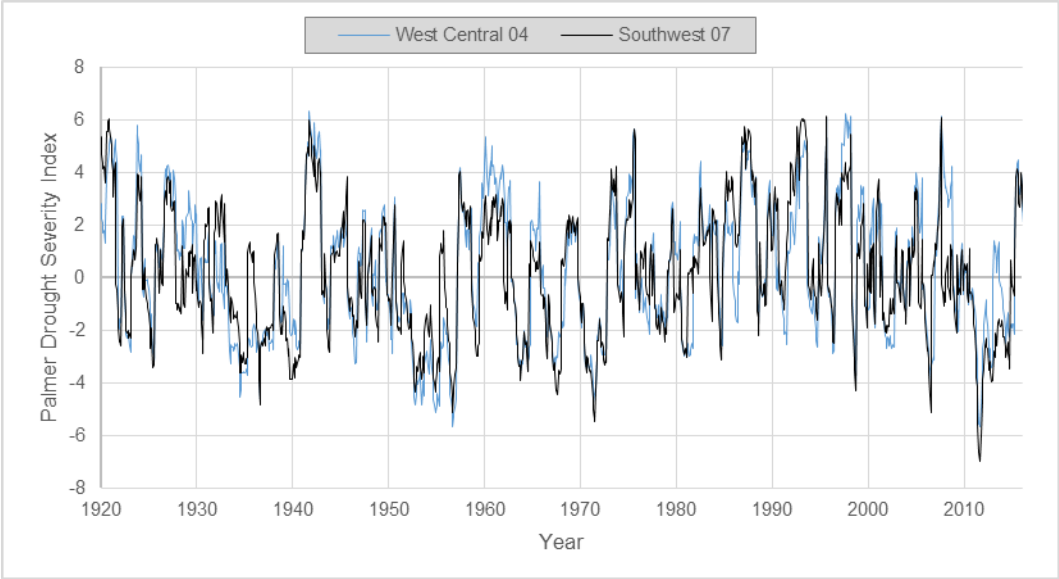

Figure 4. A comparison of PDSI between two climate divisions in western Oklahoma.

Overall, the two Climate Divisions showed similar observed PDSI values; however, the values diverged at times during historic droughts. For example, Climate Division 4 experienced a more significant drought (i.e., lower PDSI) during the 1950s drought but a less significant drought (i.e., higher PDSI) during

the 2010s drought. Next, a statistical analysis was performed to determine how various drought indices produced by NOAA for the two climate divisions correlated with inflow into Tom Steed Reservoir (Table 3). The Southwest (07) climate division resulted in higher correlation coefficients for each of the RDIs evaluated. Based on this comparison, the Southwest (07) climate division was selected to present baseline conditions and for further analysis in the Tom Steed Reservoir Hydrologic Basin.

Table 3. A comparison of Correlation Coefficients between drought indices and observed inflow into Tom Steed Reservoir at two NOAA climate divisions in southwest Oklahoma.

	NOAA Climate Division	
Drought Index	**West Central 04**	**Southwest 07**
Palmer Drought Severity Index	0.37	0.40
Palmer Drought Severity Index (Running 12-month Average)	0.62	0.69
Palmer Hydrological Drought Index	0.33	0.35
Palmer Hydrological Drought Index (Running 12-month Average)	0.60	0.65
Standardized Precipitation Index	0.48	0.49
12-month Standardized Precipitation Index	0.73	0.75

Note: All the correlation coefficients in the table were significant at the five percent significance level ($\alpha=0.05$)—$|r_{critical}|=0.206$ for $n = (2016-1926+1)=91$, degrees of freedom, $df = (91-2)=89$.

Baseline Conditions

Baseline inflow and RDI conditions are presented for the period of record 1926-2016[2] as monthly data and/or as standardized frequency distributions of running 12-month totals and/or averages. While RDI data are presented as running 12-month averages, inflow data are presented as running 12-month totals to be consistent with reservoir storage calculations. Twelve months was selected as the optimum time lag to evaluate inflow-RDI conditions, including the occurrence of drought, because it reduces the variability of conditions observed over shorter 3- and 6-month (seasonal) time lags while avoiding the "smoothing out" of conditions observed over longer 18- and 24-month time lag. This was further demonstrated by comparing slopes of the lines that plot RDI-inflow correlations over various time lags (percentages shown in Figure 5).

The running 12-month total inflow time series, along with its cumulative frequency distribution, is presented in Figure 6. The monthly PDSI, PHDI, and SPI time series is presented in Figure 7, Figure 9, and Figure 11, respectively. The 12-month average values and the corresponding cumulative frequency distribution of the three indices (RDIs), PDSI, PHDI, and SPI, are presented in Figure 8, Figure 10, and Figure 12, respectively. Values for selected percentiles (0 to 100 in five percent increments) for inflow and RDIs are presented individually (Table 4) and jointly in Table 5, Table 6, and Table 7.

[2] The period of record was selected based on the earliest available reservoir inflow record begins in 1926 and the models developed by Reclamation and OWRB continue through the year 2016.

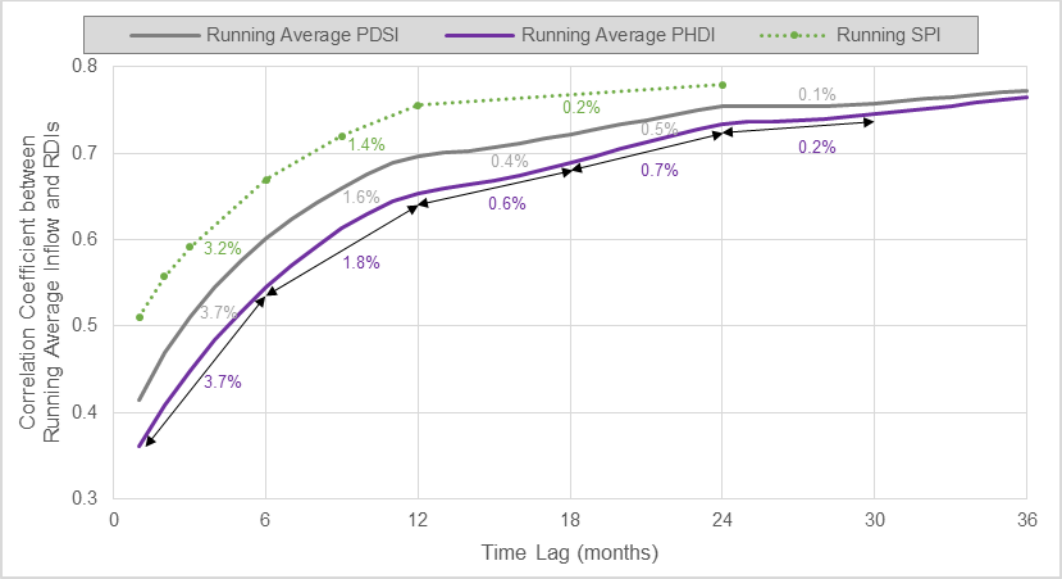

Figure 5. Correlation Coefficients between the running average Inflow and each RDI across time lags from one to 36 months. The slopes of each line between time lag intervals are indicated as percentages below the line. Note: hashed line for SPI denotes interpolated data because data are not available at all time intervals.

Inflow – Running 12-month total and Distribution of running 12-month total

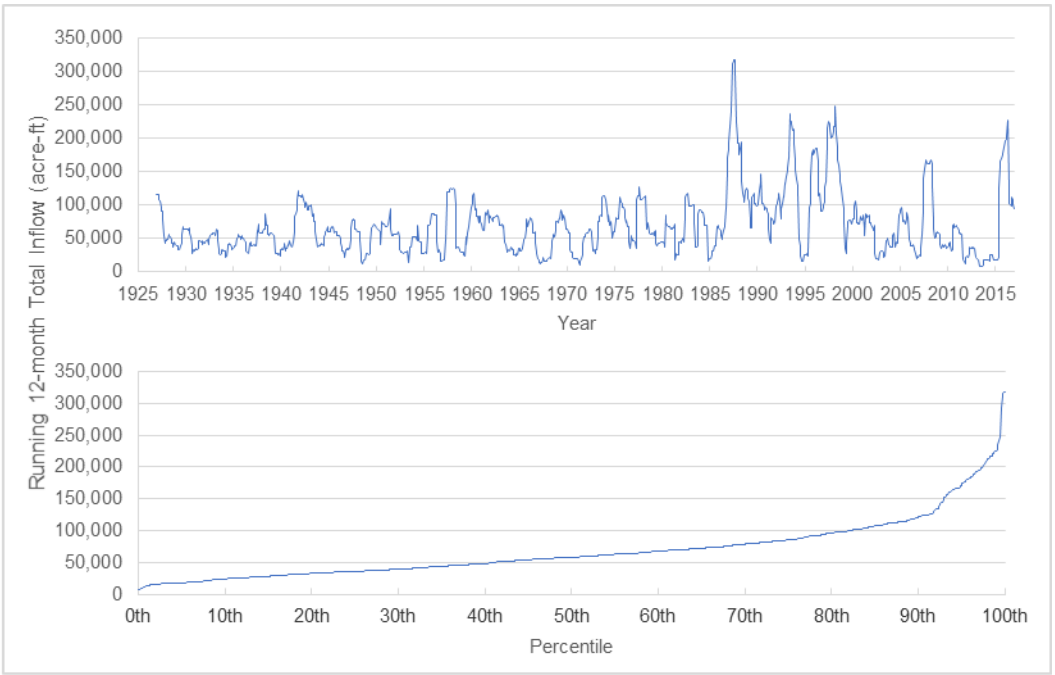

Figure 6. Running 12-month total inflow (top) and cumulative frequency distribution (bottom) of inflow over the period of record (1926-2016).

Regional Drought Indices: PDSI, PHDI, and SPI

PDSI – Monthly

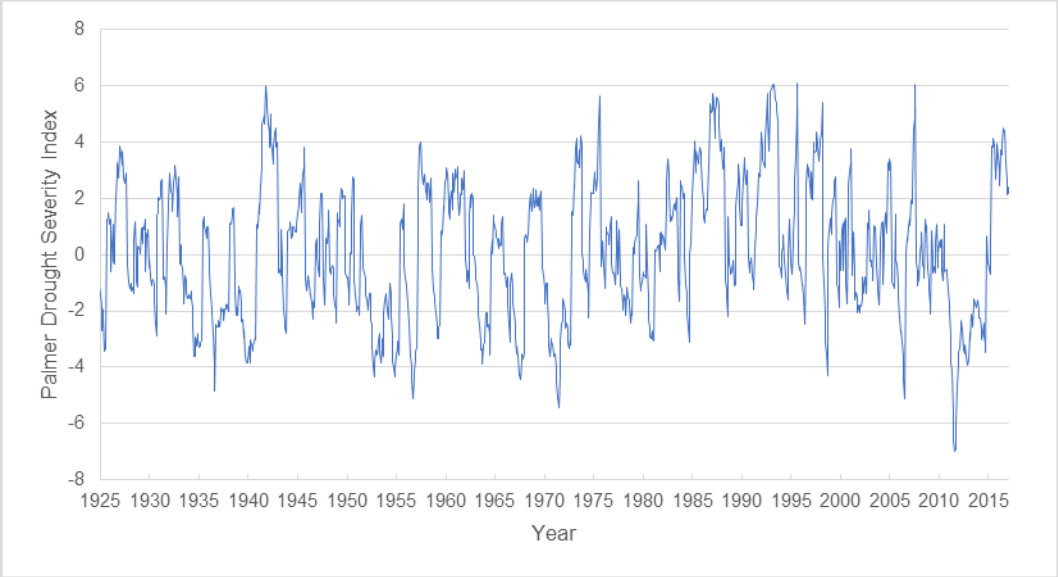

Figure 7. Monthly PDSI over the period of record (1926-2016).

PDSI – Running 12-month average

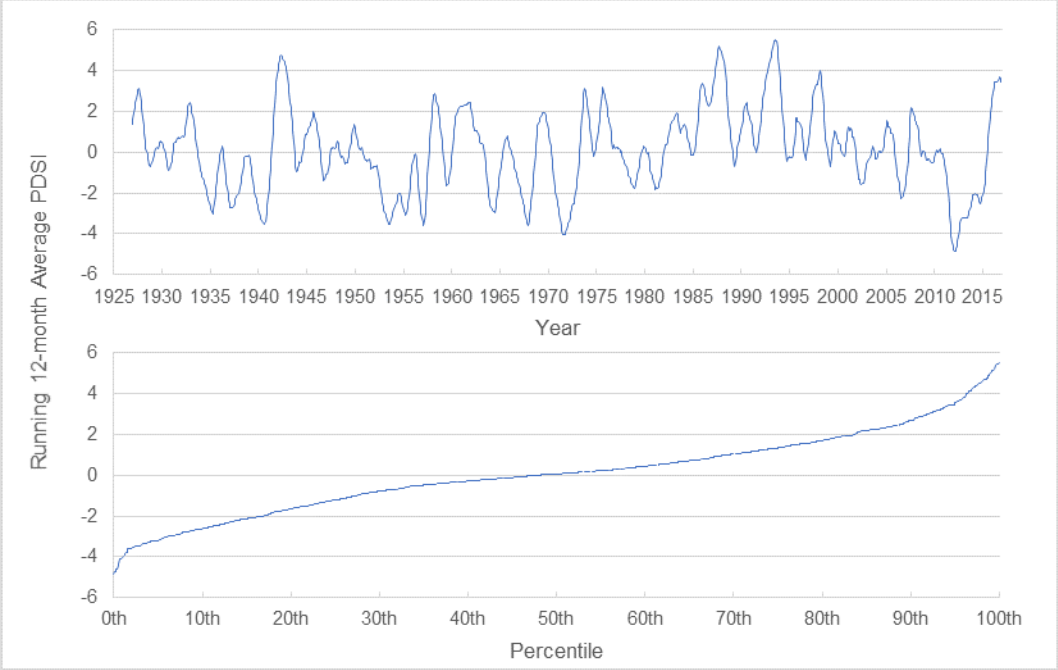

Figure 8. Running 12-month average (top) and cumulative frequency distribution (bottom) of PDSI over the period of record (1926-2016).

PHDI – Monthly

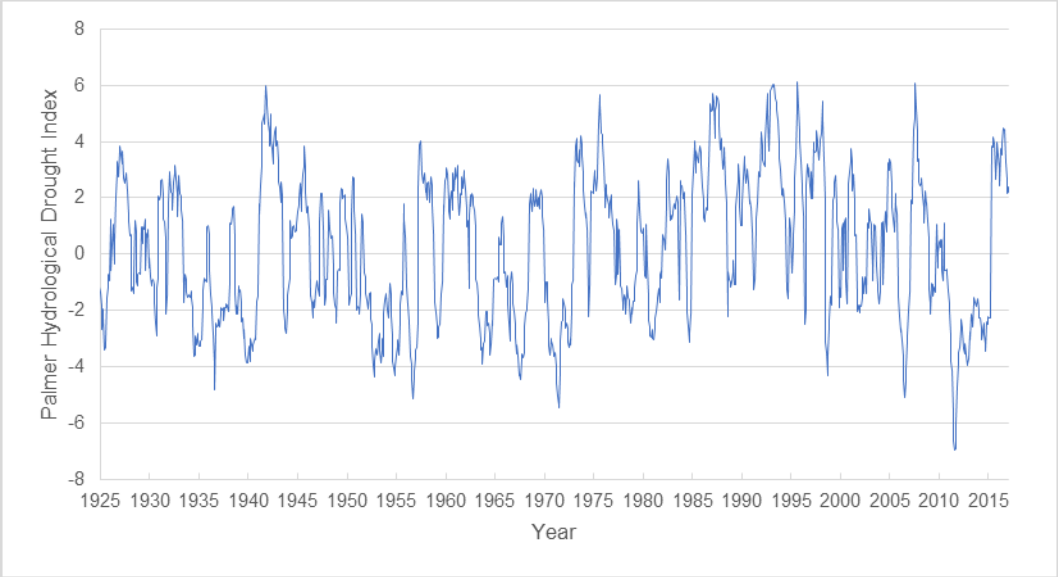

Figure 9. Monthly PHDI over the period of record (1926-2016).

PHDI – Running 12-Month Average

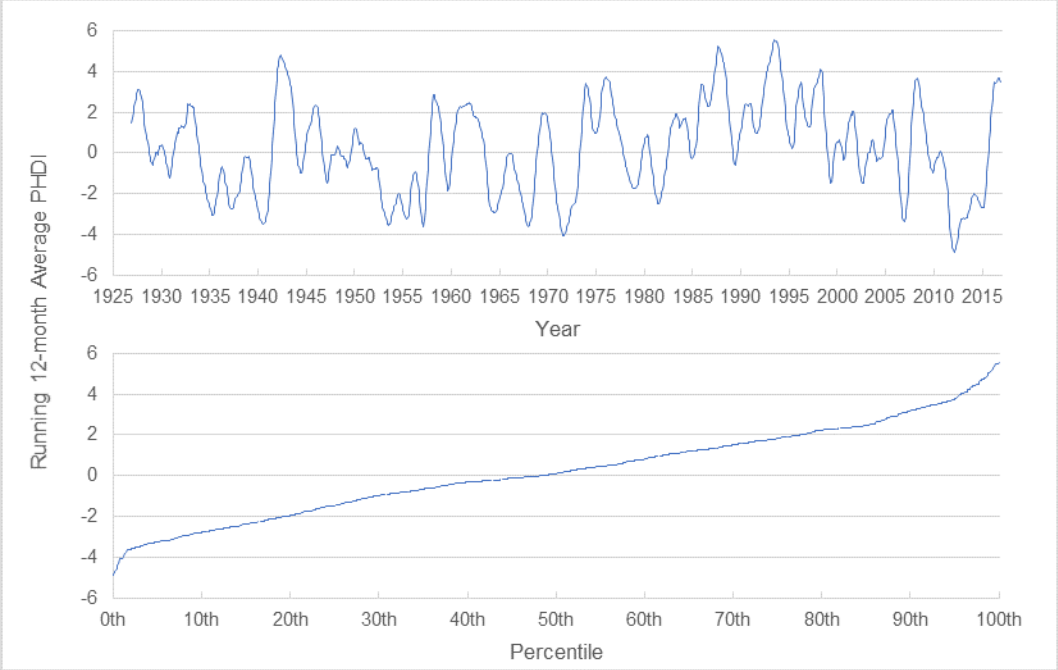

Figure 10. Running 12-month average (top) and cumulative frequency distribution (bottom) of PHDI over the period of record (1926-2016).

SPI - Monthly

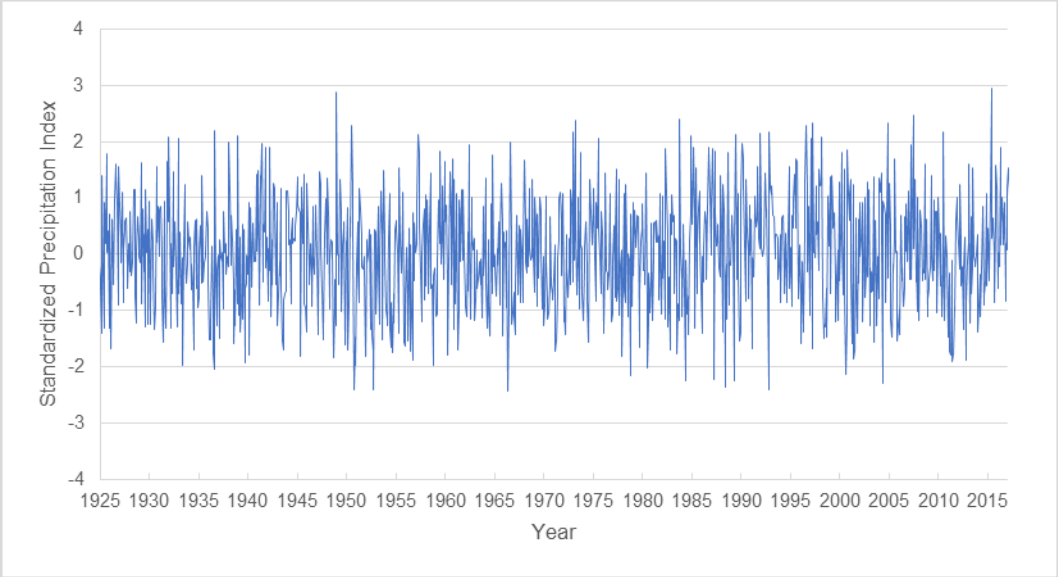

Figure 11. Monthly SPI over the period of record (1926-2016).

12-Month SPI

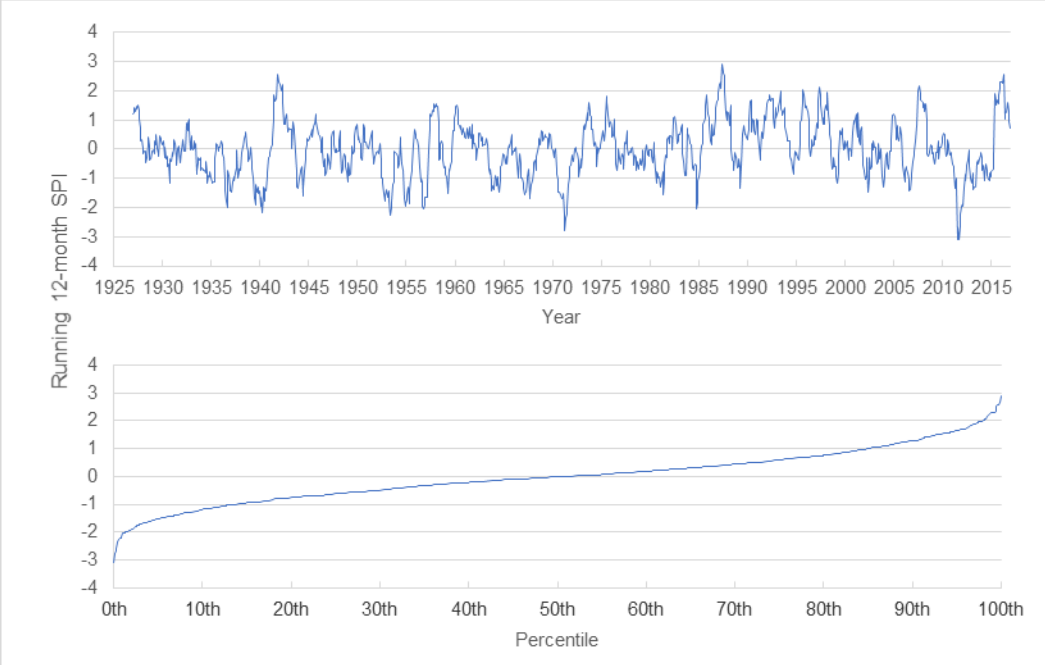

Figure 12. Running 12-month (top) and frequency distribution (bottom) of SPI over the period of record (1926-2016).

Table 4. Standardized distribution of inflow, PDSI, PHDI, and SPI over the period of record (1926-2016).

Percentile	Running 12-month Total Inflow (acre-ft)	Running 12-month Average Palmer Drought Severity Index (PDSI)	Running 12-month Average Palmer Hydrological Drought Index (PHDI)	Running 12-month Standardized Precipitation Index (SPI)
0th	7,300	-4.87	-4.87	-3.09
5th	18,100	-3.20	-3.24	-1.54
10th	24,600	-2.62	-2.78	-1.19
15th	28,600	-2.13	-2.39	-0.96
20th	33,000	-1.66	-1.97	-0.76
25th	36,300	-1.23	-1.46	-0.63
30th	39,700	-0.78	-0.97	-0.50
35th	44,000	-0.49	-0.66	-0.34
40th	48,500	-0.29	-0.31	-0.22
45th	54,800	-0.12	-0.13	-0.11
50th	58,200	0.06	0.10	-0.02
55th	63,400	0.21	0.45	0.07
60th	67,800	0.43	0.83	0.17
65th	72,200	0.71	1.19	0.30
70th	79,200	1.04	1.52	0.43
75th	85,500	1.34	1.83	0.59
80th	96,200	1.70	2.23	0.76
85th	107,800	2.17	2.46	0.99
90th	120,800	2.68	3.16	1.27
95th	171,000	3.51	3.75	1.64
100th	317,000	5.53	5.53	2.90

Table 5. Occurrence (percentiles) of combined inflow/PDSI thresholds over the period of record (1926-2016).

Occurrence of Threshold Combinations (Non-Exceedance Frequency)			12-month Running Average PDSI Thresholds																			
			-4.9	-3.2	-2.6	-2.1	-1.7	-1.2	-0.8	-0.5	-0.3	-0.1	0.1	0.2	0.4	0.7	1.0	1.3	1.7	2.2	2.7	3.5	5.5
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	18,100	5th	0	1	2	3	4	4	4	4	4	5	5	5	5	5	5	5	5	5	5	5	5
	24,600	10th	0	2	4	6	7	8	8	8	9	9	10	10	10	10	10	10	10	10	10	10	10
	28,600	15th	0	3	5	7	9	11	11	12	13	14	14	15	15	15	15	15	15	15	15	15	15
	33,000	20th	0	3	5	8	11	13	14	15	16	18	19	19	19	19	20	20	20	20	20	20	20
	36,300	25th	0	4	7	10	13	15	17	19	20	22	23	23	24	24	24	24	25	25	25	25	25
	39,700	30th	0	4	8	12	14	17	20	21	23	26	27	28	28	28	29	29	30	30	30	30	30
	44,000	35th	0	4	8	12	15	19	21	24	27	29	30	32	32	33	33	34	34	35	35	35	35
	48,500	40th	0	4	8	12	16	19	22	25	27	30	32	34	36	37	38	38	39	40	40	40	40
	54,800	45th	0	5	9	13	17	20	24	27	30	32	35	37	39	41	42	43	43	44	44	45	45
	58,200	50th	0	5	9	14	18	22	26	29	33	36	39	41	43	45	46	47	48	49	49	50	50
	63,400	55th	0	5	10	14	19	23	27	31	34	38	41	44	46	49	50	51	52	53	54	55	55
	67,800	60th	0	5	10	15	19	24	28	32	36	39	43	46	49	52	54	55	57	58	59	60	60
	72,200	65th	0	5	10	15	20	25	29	33	37	41	45	49	52	56	58	60	61	63	64	65	65
	79,200	70th	0	5	10	15	20	25	29	33	38	42	46	50	54	58	61	63	65	67	69	70	70
	85,500	75th	0	5	10	15	20	25	29	34	38	42	47	51	55	60	64	67	69	71	74	75	75
	96,200	80th	0	5	10	15	20	25	30	34	39	43	48	52	57	61	65	69	72	75	78	80	80
	107,800	85th	0	5	10	15	20	25	30	34	39	44	48	53	58	62	67	71	74	78	81	84	85
	120,800	90th	0	5	10	15	20	25	30	35	40	45	50	55	59	64	69	73	77	81	85	88	90
	171,000	95th	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	79	84	89	92	95
	317,000	100th	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100

Table 6. Occurrence (percentiles) of combined inflow/PHDI thresholds over the period of record (1926-2016).

Occurrence of Threshold Combinations (Non-Exceedance Frequency)			12-month Running Average PHDI Thresholds																			
			-4.9	-3.2	-2.8	-2.4	-2.0	-1.5	-1.0	-0.7	-0.3	-0.1	0.1	0.4	0.8	1.2	1.5	1.8	2.2	2.5	3.2	3.7	5.5
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	18,100	5th	0	1	2	3	4	4	4	4	4	5	5	5	5	5	5	5	5	5	5	5	5
	24,600	10th	0	2	4	6	7	7	8	8	8	9	9	10	10	10	10	10	10	10	10	10	10
	28,600	15th	0	3	5	7	9	10	11	11	12	13	13	14	14	15	15	15	15	15	15	15	15
	33,000	20th	0	3	5	8	10	12	13	14	15	16	17	18	18	19	19	20	20	20	20	20	20
	36,300	25th	0	4	7	10	13	14	17	18	19	20	21	22	23	23	24	24	24	25	25	25	25
	39,700	30th	0	4	8	11	15	16	19	20	22	24	25	26	27	28	28	29	29	30	30	30	30
	44,000	35th	0	4	8	12	15	18	20	22	25	27	28	30	31	32	33	34	34	34	35	35	35
	48,500	40th	0	4	8	12	16	19	22	24	26	29	31	33	34	35	37	38	39	39	40	40	40
	54,800	45th	0	5	9	13	17	20	24	26	29	32	33	35	37	39	41	42	43	44	45	45	45
	58,200	50th	0	5	9	14	18	22	25	29	32	35	37	39	41	43	45	46	47	48	50	50	50
	63,400	55th	0	5	10	15	19	23	27	31	34	37	40	42	44	46	48	49	51	53	55	55	55
	67,800	60th	0	5	10	15	19	24	27	32	35	39	42	45	47	50	52	54	56	58	59	60	60
	72,200	65th	0	5	10	15	20	24	28	32	37	41	44	48	51	54	56	58	60	63	64	65	65
	79,200	70th	0	5	10	15	20	24	28	33	37	42	46	50	53	57	60	62	64	67	69	70	70
	85,500	75th	0	5	10	15	20	25	29	33	38	42	47	51	55	59	62	65	68	72	74	75	75
	96,200	80th	0	5	10	15	20	25	29	34	38	43	48	52	56	60	64	68	71	75	78	80	80
	107,800	85th	0	5	10	15	20	25	30	34	39	43	48	53	57	61	66	70	74	79	81	84	85
	120,800	90th	0	5	10	15	20	25	30	35	40	44	49	54	59	64	68	73	77	81	85	88	90
	171,000	95th	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	74	79	84	88	92	95
	317,000	100th	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100

Table 7. Occurrence (percentiles) of combined inflow/SPI thresholds over the period of record (1926-2016).

Occurrence of Threshold Combinations (Non-Exceedance Frequency)			12-month SPI Thresholds																				
			-3.1	-1.5	-1.2	-1.0	-0.8	-0.6	-0.5	-0.3	-0.2	-0.1	0.0	0.1	0.2	0.3	0.4	0.6	0.8	1.0	1.3	1.6	2.9
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	18,100	5th	0	2	2	3	3	4	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	24,600	10th	0	3	4	5	6	7	8	9	9	10	10	10	10	10	10	10	10	10	10	10	10
	28,600	15th	0	4	6	8	10	11	12	13	14	15	15	15	15	15	15	15	15	15	15	15	15
	33,000	20th	0	4	7	10	12	14	15	17	18	19	19	19	20	20	20	20	20	20	20	20	20
	36,300	25th	0	5	8	11	14	16	18	20	21	23	23	24	24	25	25	25	25	25	25	25	25
	39,700	30th	0	5	9	13	16	19	21	23	25	26	27	28	28	29	30	30	30	30	30	30	30
	44,000	35th	0	5	10	14	18	21	23	26	28	30	31	32	33	34	35	35	35	35	35	35	35
	48,500	40th	0	5	10	14	18	21	24	27	29	32	34	36	37	38	39	40	40	40	40	40	40
	54,800	45th	0	5	10	14	18	22	25	28	31	34	37	39	40	42	43	44	44	45	45	45	45
	58,200	50th	0	5	10	14	19	23	26	30	34	37	41	43	45	47	48	49	49	50	50	50	50
	63,400	55th	0	5	10	14	19	23	27	31	35	39	43	46	48	50	52	53	54	55	55	55	55
	67,800	60th	0	5	10	15	20	24	28	32	36	41	45	48	51	54	56	57	58	59	60	60	60
	72,200	65th	0	5	10	15	20	25	30	34	38	43	47	50	54	57	60	62	63	64	65	65	65
	79,200	70th	0	5	10	15	20	25	30	34	39	43	48	52	56	59	62	65	67	69	70	70	70
	85,500	75th	0	5	10	15	20	25	30	34	39	43	48	53	57	61	65	68	71	73	75	75	75
	96,200	80th	0	5	10	15	20	25	30	34	39	44	48	53	57	62	66	70	74	77	79	79	80
	107,800	85th	0	5	10	15	20	25	30	35	39	44	49	53	58	63	67	72	77	80	83	84	85
	120,800	90th	0	5	10	15	20	25	30	35	40	45	50	54	59	64	69	74	78	83	86	88	90
	171,000	95th	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	84	89	92	95
	317,000	100th	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100

Drought Scenarios

Prior to testing how well various thresholds predict observed, historical drought, the term "drought" must be defined. Earlier, four types of droughts were defined in terms of their progression and scale/severity of impacts: meteorological, agricultural, hydrological, socioeconomic. For the purposes of this analysis, "drought" is defined from a hydrological perspective in terms of observed water availability over the period of record. Indeed, if the purpose is to test and compare performance of inflow and RDIs at predicting historical droughts, a set of parameters is needed that defines those droughts.

Most definitions of a hydrological drought center on conditions of a parameter deviate from a historical, long-term mean or median (Loon, 2015). While parameters such as precipitation, temperature, and soil moisture are good indicators of drought, because the focus here is on planning for hydrological droughts, and hence on water management and availability, historical droughts are considered primarily in terms of deviations in streamflow and reservoir storage, although USGS (2017) used deviations from mean precipitation and temperature.

For this analysis, fifteen drought definitions were considered (Table 8). Scenarios 1-5 defined drought in terms of variable deviations from long-term mean and median streamflow. Streamflow was defined as the combined flows of both Elk Creek and West Otter Creek which form the inflow into Tom Steed Reservoir[3]. Henceforth, streamflow is referred to as "Inflow". Scenario 6 defined drought primarily using an approach incorporated by USGS in its 2017 Scientific Investigations Report on the NFRR Aquifer (USGS, 2017). The approach combined local precipitation and temperature with state-wide deviations in mean streamflow that had been calculated and compared by USGS as part of previous efforts to define and compare historical droughts across the state of Oklahoma (Tortorelli, 2008; Shivers et al, 2013). That said, Scenario 6 incorporated an

[3] The methods for computing inflow from the combined streamflows of Elk Creek and West Otter Creek are described in the URRBS report.

additional drought that was observed between 1984 and 1986 using deviations in local data at the Hobart streamgage on Elk Creek (Tortorelli et al., 1991). Unlike the other six drought scenarios which used a January to December calendar year to define a water year, both USGS (2017) and Tortorelli et al. (1991) used an October to September time frame to define a water year. Scenario 7-15 defined drought based on reservoir storage. Figure 13 illustrates the frequency of occurrence, expressed as percentiles, of modeled reservoir storage over the period of record (1926 to 2017). Based off of this figure, the 15th percentile storage of 52,800 acre-ft was selected as a storage threshold such that if Tom Steed Reservoir dropped to this level, it would signify the occurrence of a drought; the duration of the drought was subsequently defined as the time between which the reservoir dropped below conservation pool to the time when the reservoir filled back up to conservation pool.

Figure 14 though Figure 22 illustrate the occurrence of drought under each of these scenarios over the period of record. Depending on the drought definition, droughts were observed between 12 and 63 percent of months over the period of record. The number and percent of months that were defined as either a drought or non-drought (wet) under each of the scenarios are displayed in Table 9. An illustrative comparison of drought occurrences across all scenarios is provided in Figure 23.

Figure 13. Distribution of end-of-month modeled storage of Tom Steed Reservoir over the period record (1926-2016). Assumes a fixed demand of 16,100 acre-ft/yr and 2060 sediment conditions.

Table 8. Seven scenarios that define the initiation and end of historical drought periods.

Scenario	Drought Initiates	Drought Ends
1	Annual streamflow below long-term mean	Annual streamflow above long-term mean
2	Annual streamflow below long-term median	Annual streamflow above long-term median
3	Two consecutive years of streamflow below long-term median	Two consecutive years of streamflow above long-term median
4	Three-year running average streamflow below long-term mean	Three-year running average streamflow above long-term mean
5	Five-year running average streamflow below long-term mean	Five-year running average streamflow above long-term mean
6	USGS – Annual precipitation below long-term mean and annual temperature above long-term mean	USGS – Annual precipitation above long-term mean and annual temperature below long-term mean
7	Tom Steed reservoir storage drops below conservation pool, but under condition that storage falls to 52,800 acre-ft	Tom Steed reservoir storage reaches the top of conservation pool
8	Tom Steed reservoir storage drops below 85,000 acre-ft, but under condition that storage falls to 52,800 acre-ft	Tom Steed reservoir storage reaches 85,000 acre-ft
9	Tom Steed reservoir storage drops below 80,000 acre-ft, but under condition that storage falls to 52,800 acre-ft	Tom Steed reservoir storage reaches 80,000 acre-ft
10	Tom Steed reservoir storage drops below 75,000 acre-ft, but under condition that storage falls to 52,800 acre-ft	Tom Steed reservoir storage reaches 75,000 acre-ft
11	Tom Steed reservoir storage drops below 70,000 acre-ft, but under condition that storage falls to 52,800 acre-ft	Tom Steed reservoir storage reaches 70,000 acre-ft
12	Tom Steed reservoir storage drops below 65,000 acre-ft, but under condition that storage falls to 52,800 acre-ft	Tom Steed reservoir storage reaches 65,000 acre-ft
13	Tom Steed reservoir storage drops below 60,000 acre-ft, but under condition that storage falls to 52,800 acre-ft	Tom Steed reservoir storage reaches 60,000 acre-ft
14	Tom Steed reservoir storage drops below 55,000 acre-ft, but under condition that storage falls to 52,800 acre-ft	Tom Steed reservoir storage reaches 55,000 acre-ft
15	Tom Steed reservoir storage drops below 50,000 acre-ft	Tom Steed reservoir storage reaches 50,000 acre-ft

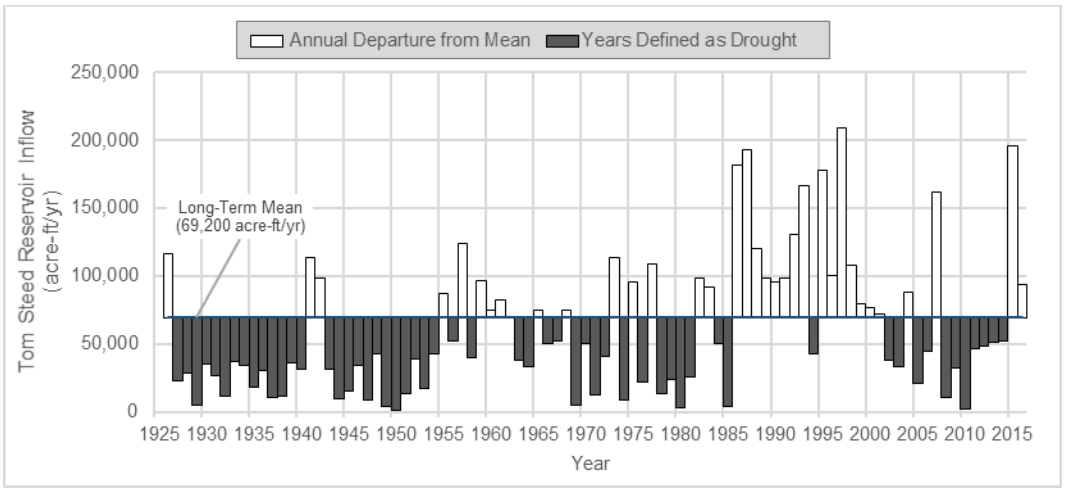

Figure 14. Observed droughts (dark gray shading) under Scenario 1, where droughts are defined such that a drought is initiated when annual streamflow is below the long-term mean, and the drought ends when annual streamflow is above the long-term mean.

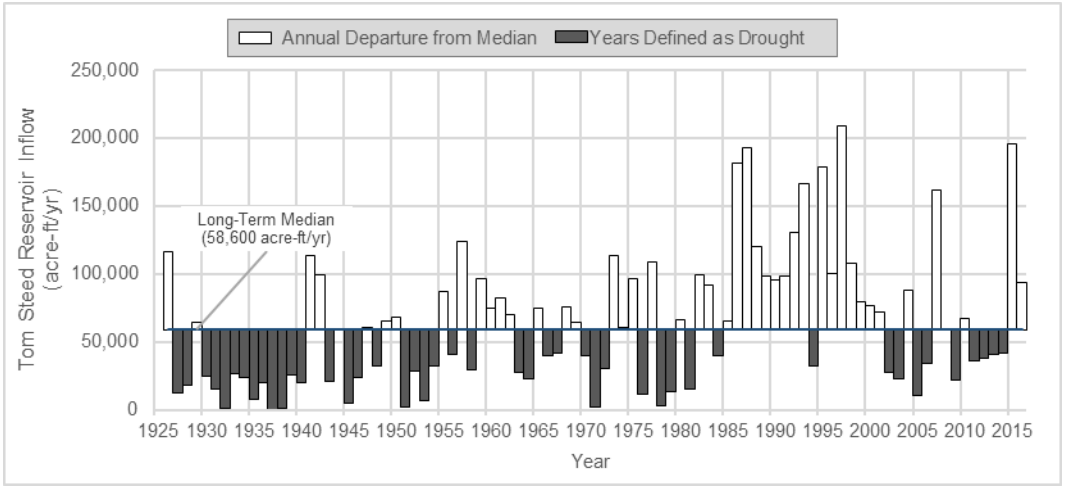

Figure 15. Observed droughts (dark gray shading) under Scenario 2, where droughts are defined such that a drought is initiated when annual streamflow is below the long-term median, and the drought ends when annual streamflow is above the long-term median.

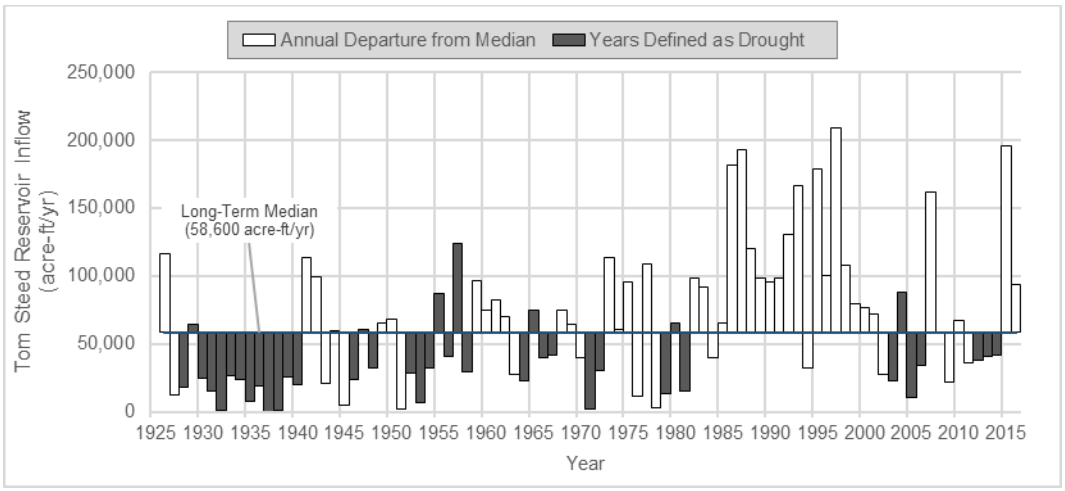

Figure 16. Observed droughts (dark gray shading) under Scenario 3, where droughts are defined such that a drought is initiated when annual streamflow is below the long-term median for two consecutive years, and the drought ends when annual streamflow is above the long-term median for two consecutive years.

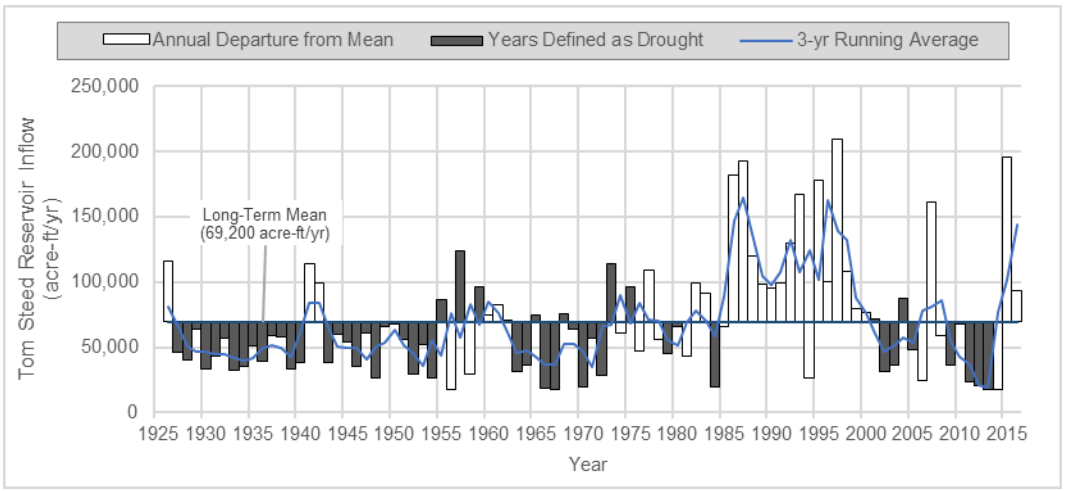

Figure 17. Observed droughts (dark gray shading) under Scenario 4, where droughts are defined such that a drought is initiated when the three-year running average streamflow (blue line) is below the long-term mean, and the drought ends when the three-year running average streamflow is above the long-term mean.

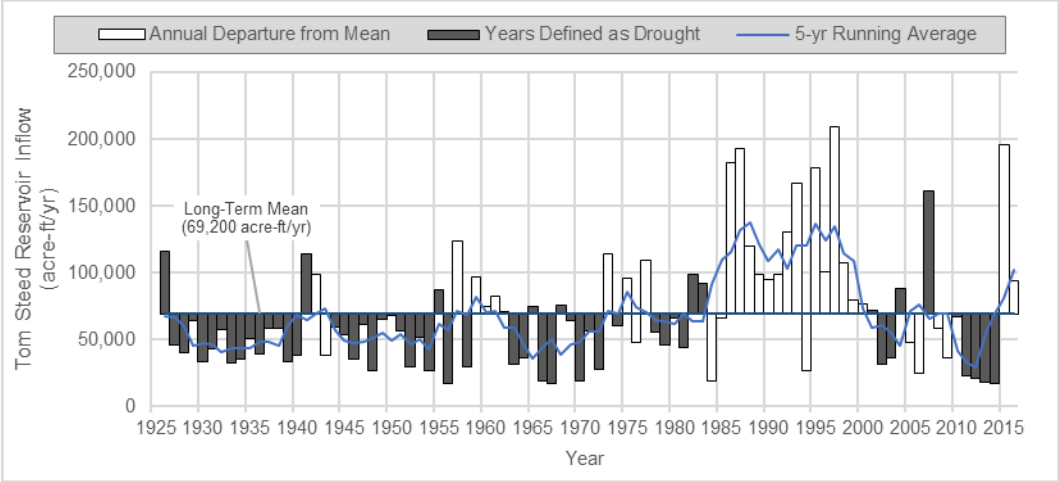

Figure 18. Observed droughts (dark gray shading) under Scenario 5, where droughts are defined such that a drought is initiated when the five-year running average streamflow (blue line) is below the long-term mean, and the drought ends when the five-year running average streamflow is above the long-term mean.

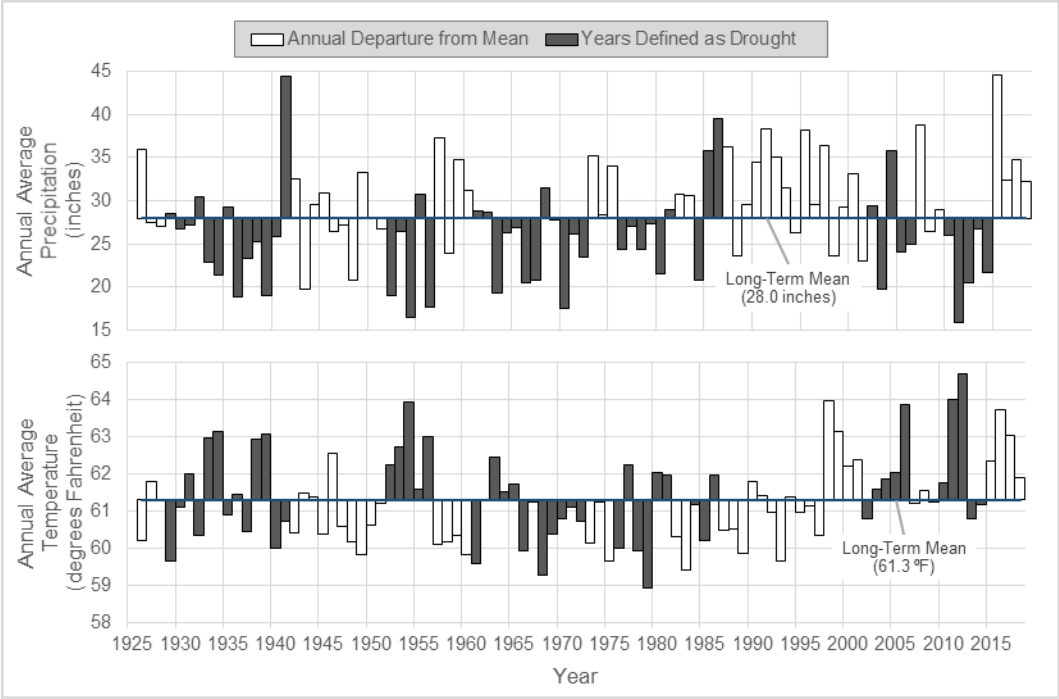

Figure 19. Observed droughts (dark gray shading) under Scenario 6, where droughts are defined such that a drought is initiated when annual precipitation and temperature trends are below the long-term mean, and the drought ends when annual precipitation and temperature trends are above the long-term mean.

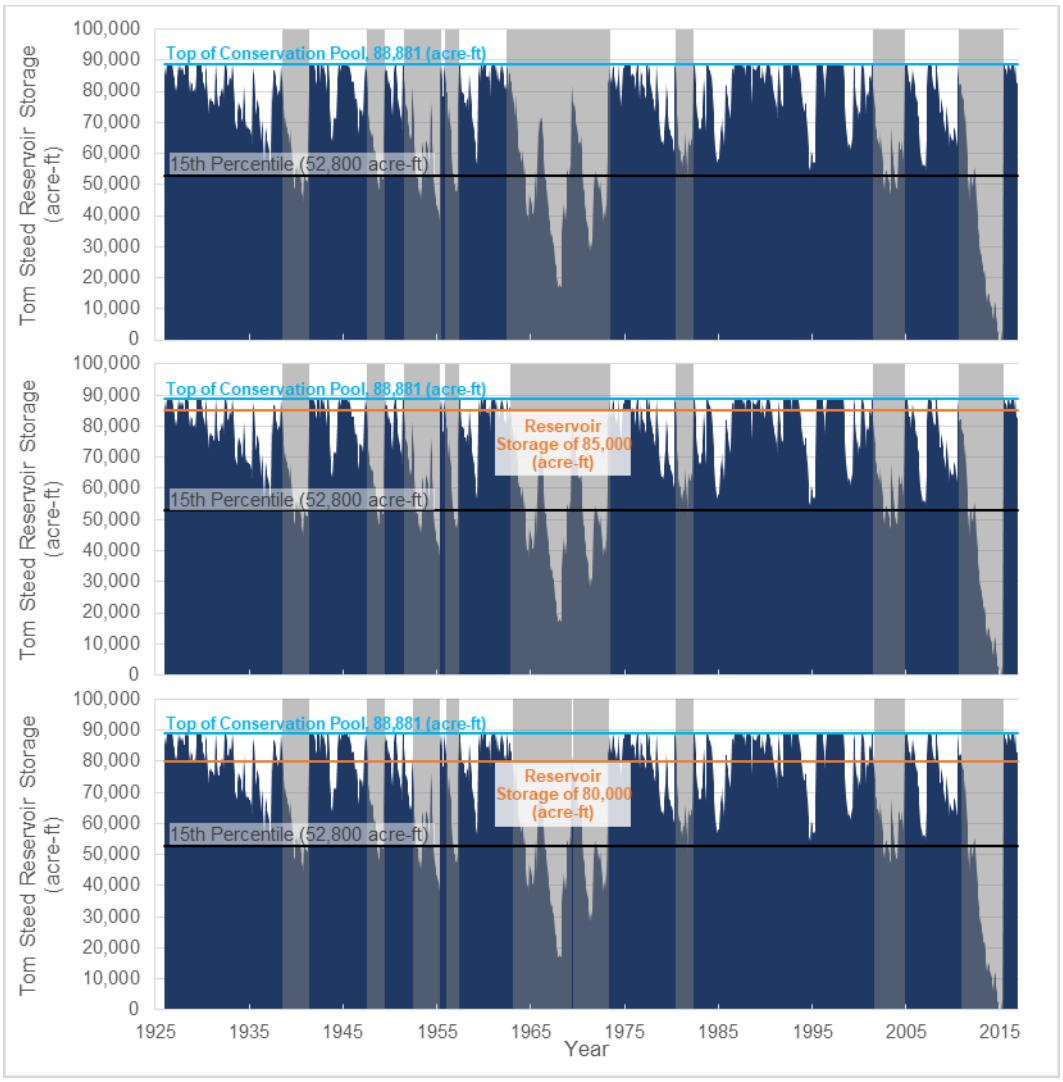

Figure 20. TOP: Observed droughts (light gray shading) under Scenario 7, where droughts are defined such that a drought occurs when the end-of-month modeled reservoir storage drops to 58,500 acre-ft. For modeling purposes, the drought is initiated when reservoir storage falls below conservation pool, and the drought ends when reservoir storage returns to the top of conservation pool. Note: storage is simulated applying a fixed demand of the permitted amount of 16,100 acre-ft/yr over the entire model period (1926 to 2016) and 2060 sediment conditions. MIDDLE: Observed droughts under Scenario 8 (defined using an upper limit of reservoir storage of 85,000 acre-ft) and BOTTOM: Observed drought under Scenario 9 (defined using an upper limit of reservoir storage of 80,000 acre-ft).

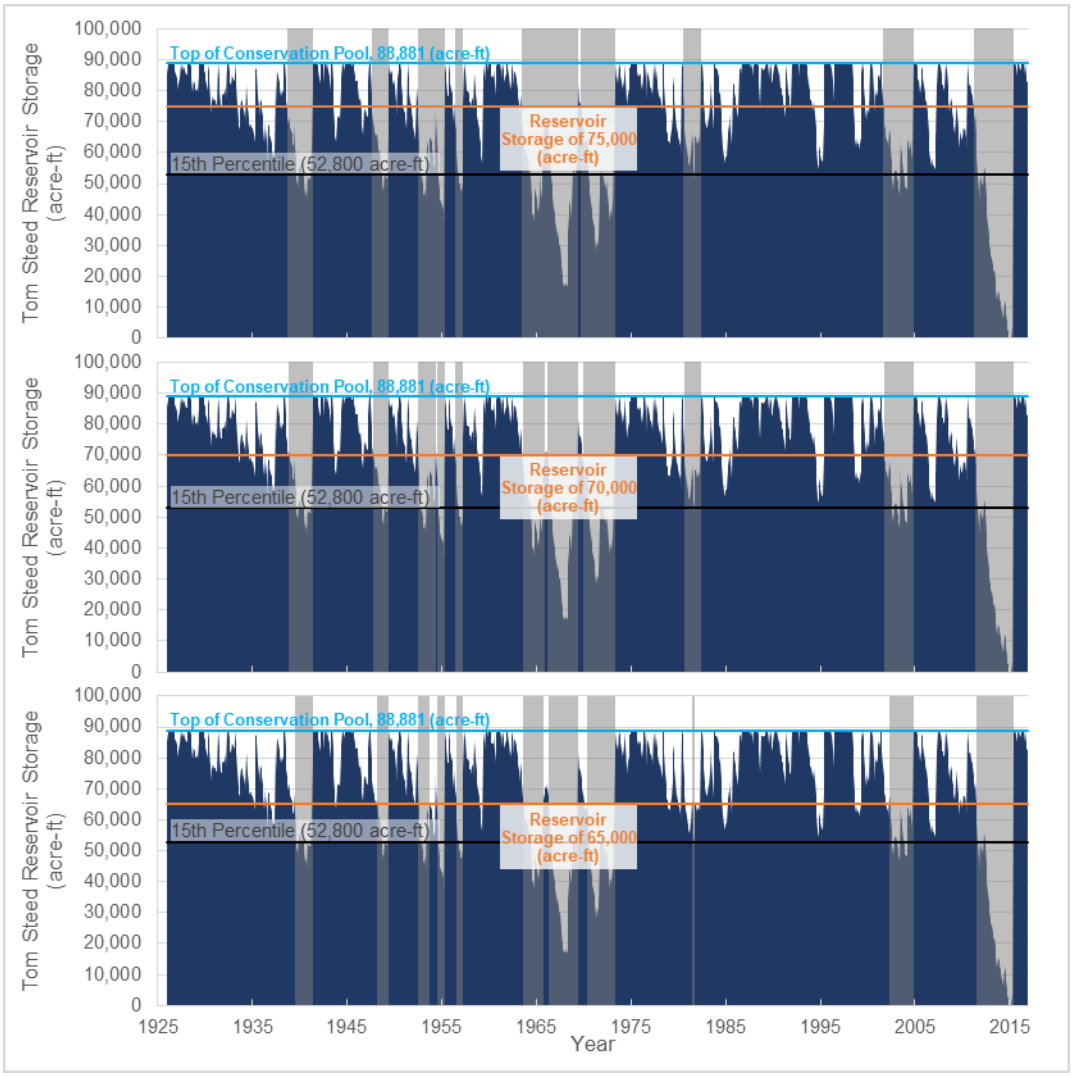

Figure 21. TOP: Observed droughts (light gray shading) under Scenario 10, where droughts are defined such that a drought occurs when the end-of-month modeled reservoir storage drops to 58,500 acre-ft. For modeling purposes, the drought is initiated when reservoir storage falls below 75,000 acre-ft and the drought ends when reservoir storage returns to 75,000 acre-ft. Note: storage is simulated applying a fixed demand of the permitted amount of 16,100 acre-ft/yr over the entire model period (1926 to 2016) and 2060 sediment conditions. MIDDLE: Observed droughts under Scenario 11 (defined using an upper limit of reservoir storage of 70,000 acre-ft) and BOTTOM: Observed drought under Scenario 12 (defined using an upper limit of reservoir storage of 65,000 acre-ft).

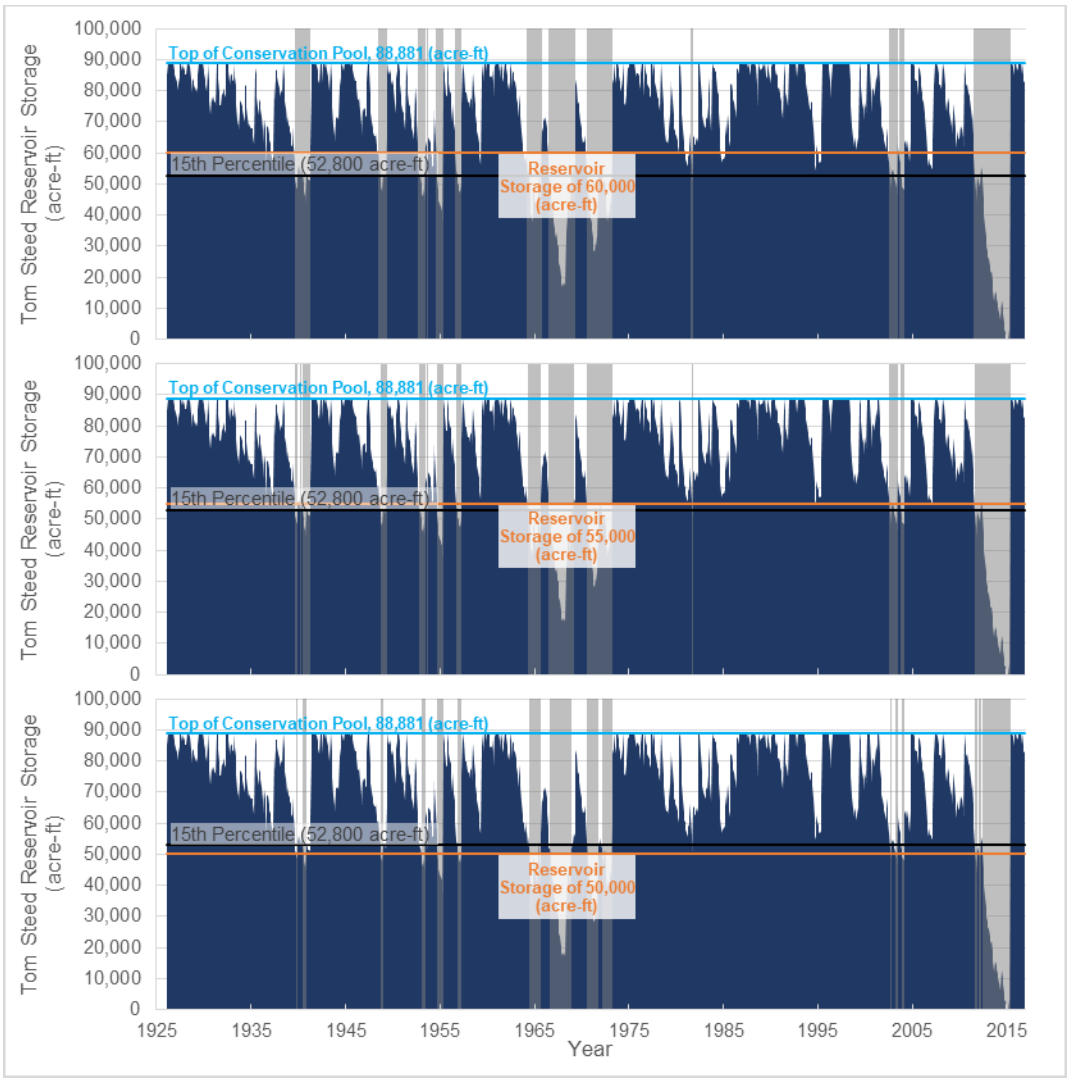

Figure 22. TOP: Observed droughts (light gray shading) under Scenario 13, where droughts are defined such that a drought occurs when the end-of-month modeled reservoir storage drops to 58,500 acre-ft. For modeling purposes, the drought is initiated when reservoir storage falls below 60,000 acre-ft and the drought ends when reservoir storage returns to 60,000 acre-ft. Note: storage is simulated applying a fixed demand of the permitted amount of 16,100 acre-ft/yr over the entire model period (1926 to 2016) and 2060 sediment conditions. MIDDLE: Observed droughts under Scenario 14 (defined using an upper limit of reservoir storage of 55,000 acre-ft) and BOTTOM: Observed drought under Scenario 15 (defined using an upper limit of reservoir storage of 50,000 acre-ft).

Table 9. Number and percent of months that are defined as either a drought or non-drought (wet) under 15 drought scenarios over the observed period of record (1926-2016).

		Observations				
Drought Scenario		Number of Modeled Months	Number of Observed Drought Months	Percent of Months that are Drought	Number of Observed Wet Months	Percent of Months that are Wet
Inflow-Defined Droughts	1	1,081	672	62	409	38
	2	1,081	540	50	541	50
	3	1,081	468	43	613	57
	4	1,081	660	61	421	39
	5	1,081	685	63	396	37
Temp-Precip Defined-Drought	6	1,081	588	54	493	46
Reservoir-Defined Droughts	7	1,081	374	35	707	65
	8	1,081	366	34	715	66
	9	1,081	339	31	742	69
	10	1,081	317	29	764	71
	11	1,081	299	28	782	72
	12	1,081	240	22	841	78
	13	1,081	210	19	871	81
	14	1,081	186	17	895	83
	15	1,081	130	12	951	88

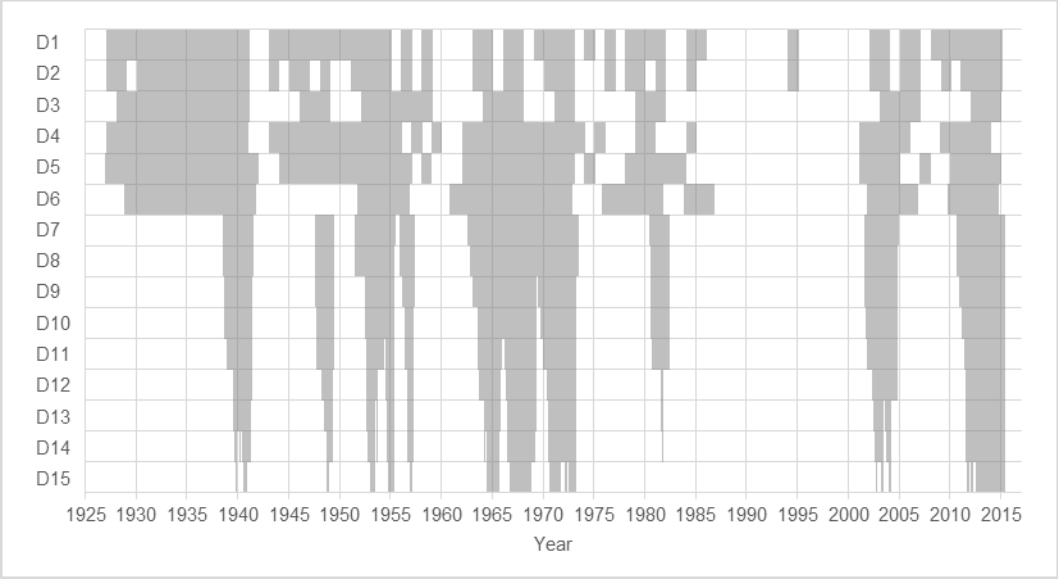

Figure 23. Occurrence of observed droughts (gray shading) under 15 drought scenarios (D1-D15) over the period of record (91 years; 1,081 months). Each bar on the figure represents one month.

Logistic Regression

Next, predictive models were built through logistic regression to test how well inflow, PDSI, PHDI, and SPI predicted these drought scenarios. A total of 105 logistic regression models were developed: one for each of the four indices alone, as well as for inflow-PDSI; inflow-PHDI; and inflow-SPI combinations – with each of these developed based on 15 drought scenarios. By building models based on all 15 drought scenarios, robust dataset was developed from which to select preferred models. The approach employed for this analysis was called Regression Estimation of Event Probabilities (Glahn, 1985). Here, logistic regressions were fit to binary predictions of either a drought or non-drought (i.e., wet) month, according to the nonlinear equation:

$$p_i = \frac{\exp\left(b_0 + b_1 x_1 + b_2 x_2\right)}{1 + \exp\left(b_0 + b_1 x_1 + b_2 x_2\right)}$$

Where p_i is the ***"Event Probability" (EP)*** of a drought occurring for each month "i", such that a "1" means that there is a 100 percent probability of a drought, and a "0" means that there is a zero percent probability of a drought. When this equation is applied, a model is developed accounting for the combined variables inflow and PDSI, as follows:

- Variable *"x_1"* represents inflow and "x_2" represents PDSI.
- Variable *"b_0", "b_1",* and *"b_2"* are coefficients derived by the model using the Log-Likelihood equation:

$$L(b) = \sum_{i=1}^{n} \{y_i(b_0 + b_1x_1 + b_2x_2) - \ln [1 + \exp(b_0 + b_1x_1 + b_2x_2)]\}$$

The Log-Likelihood [L(b)] equation adjusts b_0, b_1, and b_2 through an iterative process and builds a model that maximizes L(b) based on observed data, namely inflow (x_1) and PDSI (x_2) conditions each month (i) over the model period and whether or not a drought was observed (y = 1) or not observed (y =0). Importantly, if a model is developed for only one index, x_1 would equal either inflow, PDSI, PHDI, or SPI; and if a model is developed for a combination of indices, then x_1 would equal inflow and x_2 would equal either PDSI, PHDI, or SPI. Each of the 105 logistic regression models predicted 1,081 EPs over the model period.

Adjusted Deviance R-Squared

Next, the relative performance of each of the 105 logistic regression models was tested in terms of how well model predictions matched up with observed drought months over the model period (as defined by observed drought scenario definitions on Page 30). This was done by calculating the Adjusted Deviance R^2 (Minitab, 2020), which measures how well each model accounts for the different variables (variation) involved with predicting each definition of drought. The Adjusted Deviance R^2 ranges from zero to one, with a zero indicating the model performs poorly and accounts for none of the variation and a one indicating that the model performs well and accounts for 100 percent of the

variation; therefore, the higher the Adjusted Deviance R^2, the better the model prediction.

To calculate Adjusted Deviance R^2, the Deviance R^2 or Likelihood Ratio R^2 first had to be calculated using the following equation (McFadden, 1974 and Smith and McKenna, 2013):

$$R^2 = 1 - \frac{L(b)}{L(b)_{null}}$$

- Log Likelihood, L(b) is also called the error deviance as previously described at the beginning of this section.
- Null Log Likelihood, $L(b)_{null}$ is the total deviance and repeats the L(b) without the use of variables for prediction.

$$D_T = L(b)_{null} = \sum_{i=1}^{n} \{y_i(b_0) - \ln [1 + \exp(b_0)]\}$$

Similar to L(b), the $L(b)_{null}$ equation adjusts b_0 through an iterative process and builds a model that maximizes $L(b)_{null}$ based on the model period and whether or not a drought was observed (y = 1) or not observed (y =0). In this case, b_0 was determined to be the value that results in an EP equal to the frequency of observed drought in the model period.

$$R^2_{Adj} = R^2 - \frac{(p)\varphi}{L(b)_{null}} = 1 - \frac{L(b) - 1}{L(b)\_null}$$

- p is the regression degrees of freedom. This is equal to the number of variables used.
- φ is one for binomial and Poisson models.

Results showed that models comprised of two indices have higher Adjusted Deviance R^2 values than models comprised of only one indicator (Figure 24; Table 10). The difference in model performance was more pronounced for more "strict" drought scenarios that defined drought based on relatively dryer conditions and thus triggered the onset of drought less frequently. In other words, the more strict a drought definition was (e.g., drought scenario 15 was more strict than drought scenario 1), the more important the role was of more than one indicator in accounting for the variation involved with predicting

drought. Results also showed that among the models comprised of two indices, Inflow-SPI models had the lowest Adjusted Deviance R^2values relative to Inflow-PDSI and Inflow-PHDI models, the latter of which were grouped together with higher Adjusted Deviance R^2values. Although Inflow-PHDI models performed better than Inflow-PDSI models across most drought scenarios, the differences were relatively minor compared to Inflow-SPI models.

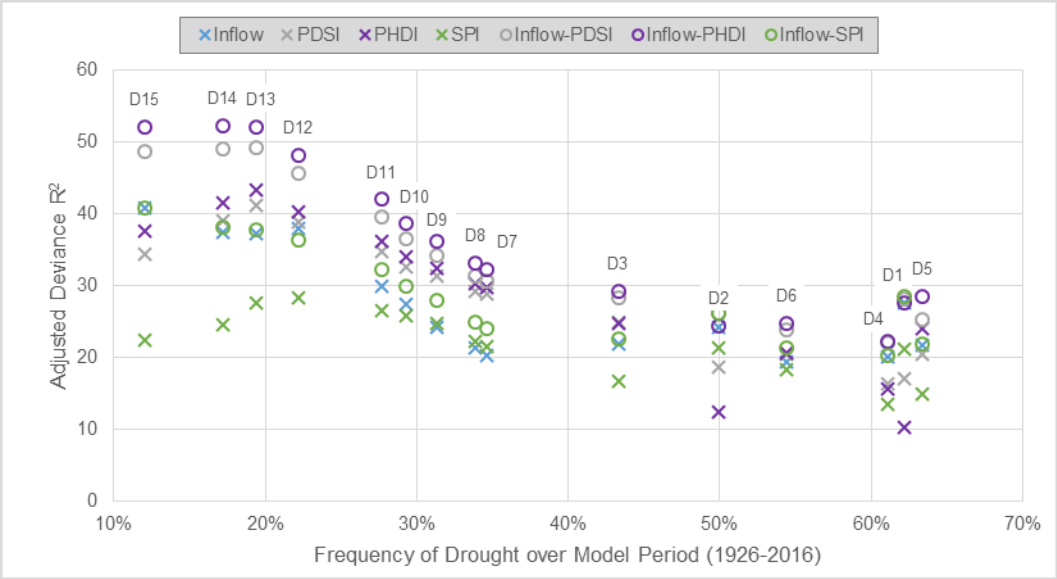

Figure 24. Adjusted Deviance R^2 values for 105 logistic regression models comprised of either a single indicator or two indices across 15 drought scenarios that vary in occurrence frequency.

Table 10. Adjusted Deviance R^2 values for 105 logistic regression models comprised of either a single indicator or two indices across 15 drought scenarios that vary in occurrence frequency.

Drought Scenario	Adjusted Deviance R^2 for Model Period 1926-2016						
	Inflow	PDSI	PHDI	SPI	Inflow-PDSI	Inflow-PHDI	Inflow-SPI
D1	28	17	10	21	28	28	29
D2	24	19	12	21	26	24	26
D3	22	25	25	17	28	29	23
D4	20	16	16	14	22	22	20
D5	22	20	24	15	25	28	22
D6	19	21	21	18	24	25	21
D7	20	29	30	22	31	32	24
D8	21	29	30	22	31	33	25
D9	24	31	32	25	34	36	28
D10	27	33	34	26	36	39	30
D11	30	35	36	27	40	42	32
D12	38	39	40	28	46	48	36
D13	37	41	43	28	49	52	38
D14	37	39	42	25	49	52	38
D15	41	34	38	22	49	52	41

Bayesian Information Criterion (BIC)

According to Wilks (2011), when multiple alternative logistic regression models are being considered, computation of a Bayesian Information Criterion (BIC) is a useful means of testing the multiplicity of the models and assessing whether the addition of multiple variables sufficiently offsets model complexity (Schwarz 1978). The BIC is determined by the following equation:

$$BIC = -2L(b) + (K+1)\ln(n)$$

- "n" = sample size
- "K" = number of variables used
- L(b) is the Log Likelihood equation previously at the beginning of this section

The BIC statistic consists of twice the negative of the Log Likelihood plus a penalty for the number of variables used in the model, so the preferred models are those with the lowest BIC value.

Similar to Adjusted Deviance R^2, results showed that among the models comprised of two indices, Inflow-SPI models had the highest BIC scores relative to Inflow-PDSI and Inflow-PHDI models, the latter of which were grouped together with lower BIC scores (Figure 25; Table 11). And although Inflow-PHDI models performed better than Inflow-PDSI models across most drought scenarios, the differences were relatively minor compared to Inflow-SPI models.

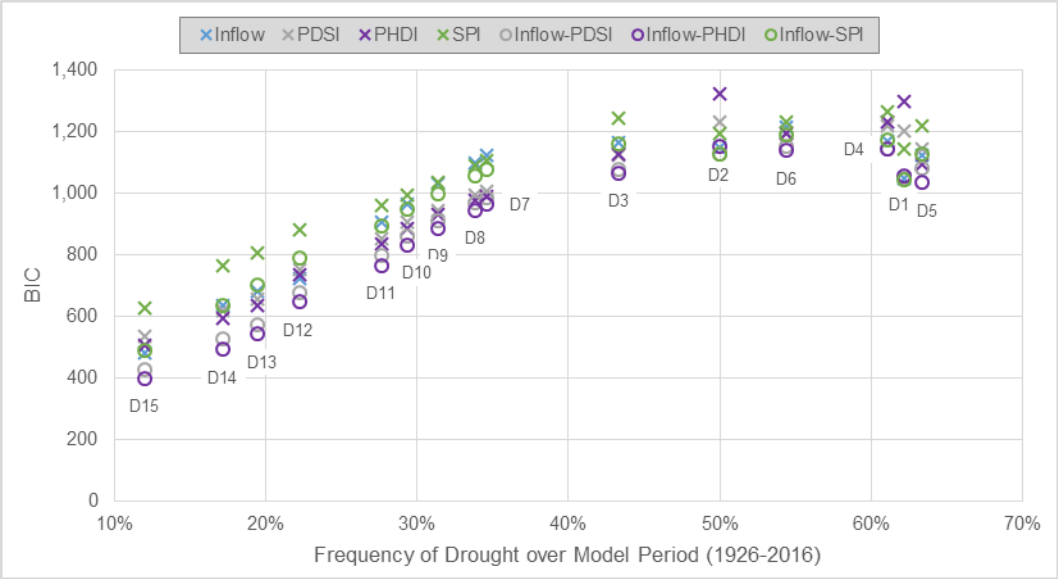

Figure 25. BIC values for 105 logistic regression models comprised of either a single indicator or two indices across 15 drought scenarios that vary in occurrence frequency.

Table 11. BIC values for 105 logistic regression models comprised of either a single indicator or two indices across 15 drought scenarios that vary in occurrence frequency.

Drought Scenario	BIC for Model Period 1 (1926-2016) (Models with lowest score perform best)						
	Inflow	PDSI	PHDI	SPI	Inflow-PDSI	Inflow-PHDI	Inflow-SPI
D1	1,050	1,203	1,298	1,143	1,048	1,056	1,044
D2	1,149	1,231	1,325	1,192	1,126	1,151	1,126
D3	1,167	1,124	1,127	1,243	1,078	1,065	1,162
D4	1,167	1,221	1,231	1,263	1,146	1,142	1,172
D5	1,124	1,143	1,092	1,220	1,080	1,035	1,127
D6	1,215	1,198	1,195	1,230	1,153	1,140	1,189
D7	1,125	1,006	991	1,106	987	964	1,078
D8	1,100	994	978	1,091	970	945	1,058
D9	1,032	945	932	1,036	911	887	996
D10	963	905	887	996	861	833	947
D11	906	854	835	959	797	766	892
D12	724	753	736	881	677	647	791
D13	681	657	635	805	576	543	701
D14	634	621	595	764	527	495	634
D15	483	535	508	629	427	400	489

Conclusions

Based on the Adjusted Deviance $R^2$and BIC scores above, single-indicator models were eliminated from further consideration. Among the models with two indices, Inflow-SPI models also were eliminated from further consideration. As noted above, Inflow-PHDI models performed similarly relative to all other models, although Inflow-PHDI performed slightly better than Inflow-PDSI models across most drought scenarios. Given the similarities in model performance, some additional considerations were used in the selection of either PHDI or PDSI to combine with inflow. A pragmatic approach was to seek guidance using a national resource that is broadly used by stakeholders such as the United States Drought Monitor (USDM). The USDM uses drought intensity categories which, among other considerations, uses two of the RDIs used in this analysis, namely, PDSI and SPI. Because SPI already was eliminated from consideration, PDSI was selected as the RDI to combine with inflow for further

analysis in Part V on preferred thresholds that could be used as Stream-Water Management Alternatives.

PART IV: EVALUATE AND SELECT DROUGHT SCENARIOS FOR THRESHOLD TESTING

Approach

In the previous section, using the full range of inflow and RDI conditions observed over the period of record, a total of 105 logistic regression models (15 drought scenarios × 7 model periods) was developed and evaluated in terms of their ability to account for the amount of variation in drought occurrence across 15 different drought scenarios. Subsequently, models using only Inflow and PDSI as predictors were selected as the preferred models to carry forward for further analysis in Part V. In Part V, the focus is specifically on how well Inflow-PDSI *thresholds* predict drought, and preferred thresholds were selected that help define the final range of Stream-Water Rights Management Alternatives that are discussed in Part VI. However, before focusing specifically on performance of Inflow-PDSI thresholds, this analysis revisits the role that each drought scenario played in affecting model performance. The objective here was to identify the highest performing models. A common statistical method used to test the validity of logistic regression models is the Hosmer-Lemeshow Goodness of Fit (H-L GOF) Test (Chen et al., 2020). In addition to H-L GOF, a One-way Analysis of Variance (ANOVA) was performed to check model validity (Hosmer and Lemeshow, 2000). Validity testing was based on logistic regression models derived using the same 15 drought scenarios previously discussed, as well as on observed inflow and PDSI data over smaller data subsets (split samples) within the period of record.

Model Periods

Each model's performance was tested in terms of its ability to predict droughts within its respective model period, as well as its ability to predict droughts within the non-model period (a.k.a., "Validation Period"). The sub-setting of time periods was based on known dry and wet periods in the Basin so that model performance could be evaluated over a broad range of hydrologic conditions. Seven model periods, designated as "A through G", were evaluated; each of these model periods had a corresponding Validation Period (Table 12). To be clear, each of the seven Model Periods "A-G" was used to generate 15 models, one for each drought scenario "D1-D15", yielding a total of 105 models (Figure 26). Each model was tested for validity through the H-L GOF and ANOVA as discussed below.

Table 12. Years of monthly data encompassed within seven Model and Validation Periods that are used to derive and test logistic regression models that predict occurrence of drought.

Name	Model Period	Validation Period
A	1926-2016	-[1]
B	1926-1975	1976-2016
C	1976-2016	1926-1975
D	1926-1942	1943-2016
E	1942-1960	1926-1941, 1961-2016
F	1960-1987	1926-1959, 1988-2016
G	2000-2016	1926-1999

[1] Model Period A does not have a corresponding Validation Period because it encompasses the entire period of record.

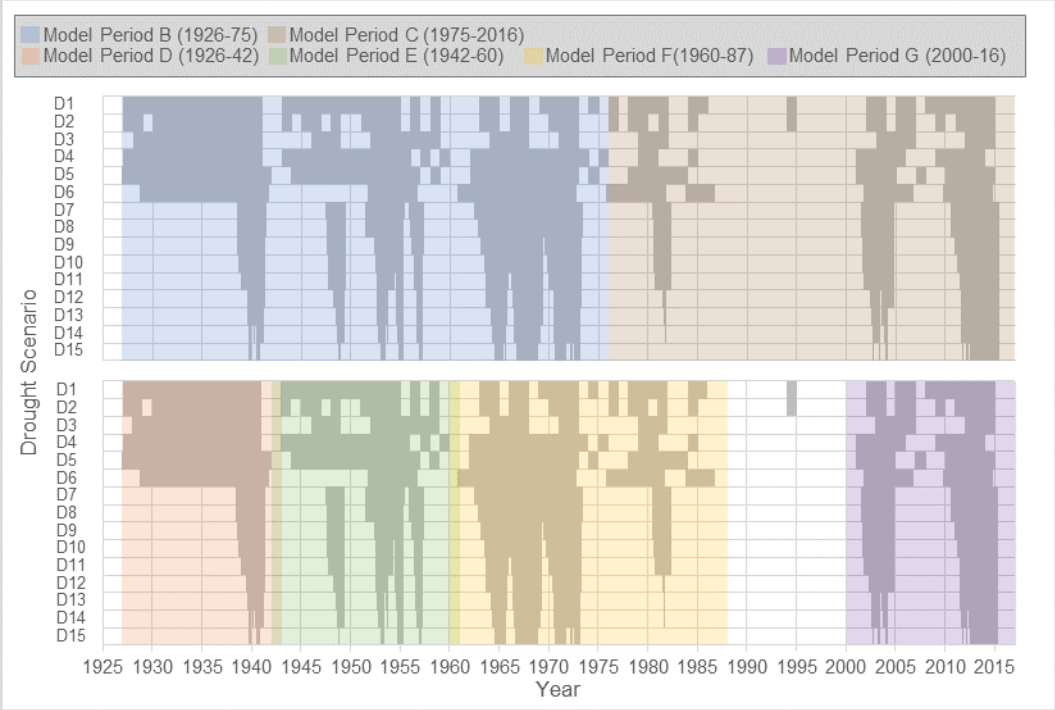

Figure 26. A visual representation of observed droughts (dark shading) under 15 drought scenarios (defined in the Drought Scenarios section starting on page 30), as well as the six Model Periods (light colored shading, Period B through G) used to derive and test logistic regression models.

Hosmer-Lemeshow Goodness of Fit (H-L GOF)

The H-L GOF Test is a chi-square test where model predictions are tested against observations made within multiple subgroups of the overall dataset, as follows:

$$H - L_{stat} = \sum_{i=1}^{g} \sum_{j=1}^{2} \frac{\left(obs_{ij} - \exp_{ij}\right)^2}{exp_{ij}}$$

- *"g"* is the number of subgroups. Here, each Model and Validation Period was divided into ten subgroups. Table 13 lists the sample size (months) for each Model and Validation Period; the sample size for each subgroup was derived by dividing the sample size by ten (e.g., for Model Period "B", each subgroup is comprised of 58 months within the Model Period and 49 months within the Validation Period).

- *"obs_{ij}"* is the number of observed drought or wet months within each subgroup.
- *"exp_{ij}"* is the number of predicted (expected) drought or wet months within each subgroup.
- The test used is chi-square with (g – 2) degrees of freedom.

Table 13. Sample size encompassed within seven Model and Validation Periods that are used to derive and test logistic regression models that predict occurrence of drought.

Name	Sample Size (months)	
	Model Period	Validation Period
A	1,081	-[1]
B	589	492
C	492	589
D	193	888
E	228	853
F	336	745
G	204	877

[1] Model Period A does not have a corresponding Validation Period because it encompasses the entire period of record.

In the H-L GOF Test, the *p*-value is calculated as the right-hand tail probability of the corresponding chi-squared distribution using the calculated test statistic. A lower *p*-value is indicative of poor fit model, and if $p < 0.05$, then the model was rejected (i.e., a low *p*-value indicated that the model simulations are significantly different from the observations). In other words, the null hypothesis was not rejected[4]. An example is provided below of how the H-L GOF Test performed on a model derived based on Model Period A for Drought 13 (Figure 27, Table 14), where:

- obs_i was the Observed Drought months within each subgroup, ranging from zero to 104 observed drought months per subgroup.
- obs_j was the Observed Wet (non-drought) months within each subgroup, ranging from four to 108 observed wet months per subgroup.

[4] The null hypothesis was that a model prediction did not match the observed condition. A null hypothesis was rejected when a model was accepted (i.e., not rejected), and the null hypothesis was not rejected when a model was rejected.

- exp_i was the Expected Drought months within each subgroup. This was derived multiplying the average Event Probably within each subgroup by its subgroup size.
- exp_j was the Observed Wet (non-drought) months within each subgroup. This was derived by subtracting the total months classified as expected drought from its subgroup size.

In this example, the H-L GOF score was a 105, which resulted in a *p*-value of 0.000; therefore, the model was rejected. Results of the H-L GOF test for all 105 models are displayed in Table 15. A model was rejected when the *p*-value from the H-LGOF test was less than 0.05 for both the Model Period and the Validation Period. If the model's *p*-value exceeded 0.05 for one of the Periods, then it was not rejected (i.e., the null hypothesis was rejected). Using this logic, rejected models are illustrated by brown shading, and models that were not rejected remain unshaded (Table 15). Results showed that models derived by more strict drought definitions [(that trigger the onset of drought less frequently (closer to D15)] were rejected less than models derived by less strict drought definitions [(that trigger the onset of drought more frequently (closer to D1)]. Similarly, models derived by reservoir-storage-defined drought scenarios (D7-D15) were rejected less than models that were derived by droughts defined by streamflow (D1-D5) and precipitation/temperature (D6).

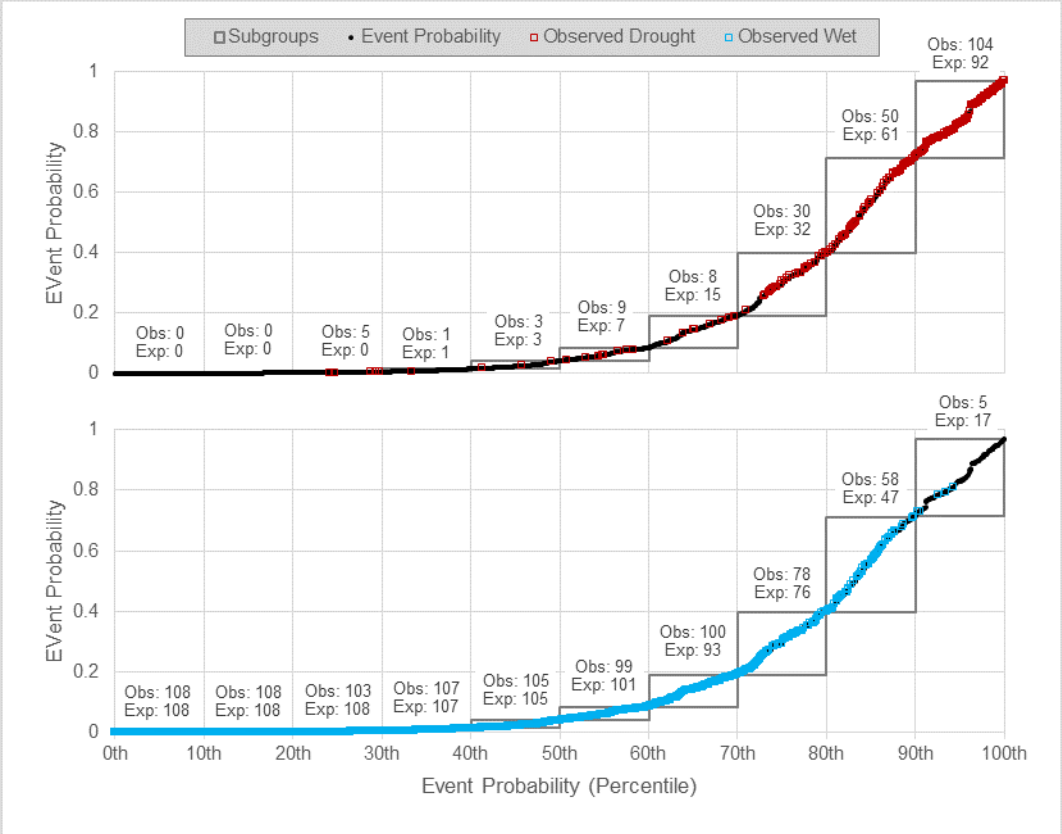

Figure 27. A comparison of observed ("Obs") and expected ("Exp") drought and wet months within each of ten subgroups used to calculate the H-L GOF statistic for a logistic regression model derived by Drought 13, Model Period A.

Table 14. A sample calculation of the H-L GOF statistic and corresponding p-value for a logistic regression model derived for Drought 13, Model Period A. The equation for this statistic is shown on page 51. The equation sums each subgroup's ability to correctly predict which months were classified as being either a drought or wet period. Expected drought months were determined by taking the sample size (108) multiplied by the average event probability in the subgroup. Because Model Period A consists of 108 months, observed drought and wet months cannot exceed 108 together (i.e. Observed and Expected Wet months are simply determined by taking 108 minus the Observed and Expected Drought months).

10 Subgroups		Average Event Probability in Group	Drought		Wet		$H\text{-}L_{Stat}$	
			Observed	Expected	Observed	Expected	Drought	Wet
1	0.0000-0.0001	0.0000	0	108(0.00002) = 0.0018	108-0 = 108	108-0.0018 = 108	$(0\text{-}0.0018)^2/0.0018 = 0$	$(108\text{-}108)^2/108 = 0$
2	0.0001-0.0011	0.0005	0	108(0.0005) = 0.0489	108-0 = 108	108-0.0489 = 108	$(0\text{-}0.0489)^2/0.0489 = 0$	$(108\text{-}107.95)^2/107.95 = 0$
3	0.0012-0.0043	0.0024	5	108(0.0024) = 0.2638	108-5 = 103	108-0.2638 = 108	$(5\text{-}0.2638)^2/0.2638 = 85$	$(103\text{-}107.74)^2/107.74 = 0.21$
4	0.0043-0.0138	0.0084	1	108(0.0084) = 0.9078	108-1 = 107	108-0.908 = 107	$(1\text{-}0.9078)^2/0.9078 = 0$	$(107\text{-}107.09)^2/107.09 = 0$
5	0.0138-0.0397	0.0236	3	108(0.0236) = 2.545	108-3 = 105	108-2.545 = 105	$(3\text{-}2.5449)^2/2.5449 = 0$	$(105\text{-}105.46)^2/105.46 = 0$
6	0.0403-0.0845	0.0617	9	108(0.0617) = 6.662	108-9 = 99	108-6.662 = 101	$(9\text{-}6.662)^2/6.662 = 1$	$(99\text{-}101.34)^2/101.34 = 0.05$
7	0.0855-0.1900	0.1396	8	108(0.1396) = 15.08	108-8 = 100	108-15.08 = 93	$(8\text{-}15.08)^2/15.08 = 3$	$(100\text{-}92.92)^2/92.92 = 0.54$
8	0.1912-0.3989	0.2940	30	108(0.294) = 31.75	108-30 = 78	108-31.75 = 76	$(30\text{-}31.75)^2/31.75 = 0$	$(78\text{-}76.25)^2/76.25 = 0.04$
9	0.4005-0.7141	0.5627	50	108(0.5627) = 60.77	108-50 = 58	108-60.77 = 47	$(50\text{-}60.77)^2/60.77 = 2$	$(58\text{-}47.23)^2/47.23 = 2.46$
10	0.7148-0.9697	0.8412	104	108(0.8412) = 91.69	108-104 = 5	108-91.69 = 17	$(104\text{-}91.69)^2/91.69 = 2$	$(5\text{-}17.31)^2/17.31 = 8.76$
							$\sum H\text{-}L_{Stat}$	105
							H-L GOF *p*-value	0.000

Table 15. p-values calculated by the H-L GOF test for 105 logistic regression models derived by a range of drought definitions and Model-Validation Periods.

H-L GOF Inflow-PDSI *p*-value for Model Period / Validation Period Brown Shading = Model Rejected based on *p*-value for Model and Validation Period							
Drought Scenario	Model Period A	Model Period B	Model Period C	Model Period D	Model Period E	Model Period F	Model Period G
D1	0.00	0.00 / 0.00	0.04 / 0.00	0.00 / 0.00	0.01 / 0.00	0.09 / 0.00	0.01 / 0.00
D2	0.04	0.00 / 0.00	0.04 / 0.00	0.04 / 0.00	0.08 / 0.00	0.60 / 0.00	0.00 / 0.00
D3	0.18	0.09 / 0.00	0.01 / 0.00	0.00 / 0.00	0.01 / 0.00	0.17 / 0.00	0.04 / 0.00
D4	0.00	0.06 / 0.00	0.00 / 0.00	0.00 / 0.00	0.02 / 0.00	0.00 / 0.00	0.00 / 0.00
D5	0.00	0.00 / 0.00	0.00 / 0.00	-[a]	0.00 / 0.00	0.00 / 0.00	0.47 / 0.00
D6	0.00	0.00 / 0.01	0.01 / 0.00	0.74 / 0.00	0.23 / 0.00	0.14 / 0.00	0.30 / 0.00
D7	0.00	0.00 / 0.00	0.35 / 0.00	0.00 / 0.00	0.01 / 0.00	0.02 / 0.00	0.04 / 0.00
D8	0.01	0.00 / 0.00	0.44 / 0.00	0.00 / 0.00	0.02 / 0.00	0.09 / 0.00	0.04 / 0.00
D9	0.00	0.00 / 0.01	0.42 / 0.00	0.01 / 0.00	0.03 / 0.00	0.09 / 0.00	0.06 / 0.00
D10	0.00	0.00 / 0.03	0.77 / 0.00	0.00 / 0.00	0.00 / 0.00	0.04 / 0.00	0.09 / 0.00
D11	0.00	0.00 / 0.01	0.16 / 0.00	0.15 / 0.00	0.00 / 0.00	0.02 / 0.00	0.07 / 0.00
D12	0.00	0.00 / 0.15	0.21 / 0.00	0.28 / 0.00	0.04 / 0.00	0.00 / 0.00	0.19 / 0.00
D13	0.00	0.00 / 0.14	0.87 / 0.00	1.00 / 0.00	1.00 / 0.00	0.01 / 0.00	0.79 / 0.00
D14	0.00	0.00 / 0.10	0.69 / 0.00	1.00 / 0.00	1.00 / 0.00	0.01 / 0.00	0.82 / 0.00
D15	0.06	0.00 / 0.34	0.78 / 0.00	1.00 / 0.00	1.00 / 0.00	0.10 / 0.00	0.89 / 0.00

[a] The set of conditions associated with this model period and drought scenario does not have a solution for L(b) in the logistic regression equation and therefore no results are available.

Analysis of Variance (ANOVA)

Next, an ANOVA was performed to test the reduction in deviance for models derived based on individual variables relative to models derived by both variables, inflow and PDSI (Minitab, 2020). This served as an added validation to ensure the model was not overly dependent on either inflow or PDSI alone, which was shown previously in Part III to be less desirable. Unlike the H-L GOF test, in an ANOVA test, a model was rejected when the *p*-value was greater than 0.05. To complete this test, the Log Likelihood was first solved with one of the variables removed, similar to the Null Log Likelihood ($L(b)_{null}$)[5] when both variables were zeroed out.

[5] Null Log Likelihood is $L(b)_{null} = \sum_{i=1}^{n}\{y_i(b_0) - \ln[1 + \exp(b_0)]\}$

$$L(b)_{without\ PDSI} = \sum_{i=1}^{n} \{y_i(b_0 + b_1 x_1) - \ln [1 + \exp(b_0 + b_1 x_1)]\}$$

Or

$$L(b)_{without\ Inflow} = \sum_{i=1}^{n} \{y_i(b_0 + b_2 x_2) - \ln [1 + \exp(b_0 + b_2 x_2)]\}$$

Similar to L(b), the $L(b)_{\text{without Variable}}$ equation adjusts b_0 and b_1 through an iterative process and builds a model that maximizes $L(b)_{\text{without Variables}}$ based on the model period and whether or not a drought was observed (y = 1) or not observed (y =0).

Next, using the ratio below, a chi-square value is generated, along with a corresponding *p*-value.

$$Log - likelihood\ Ratio = -2(L(b) - L(b)_{Without\ Variable})$$

The model without inflow *p*-values corresponded to models derived based on PDSI alone, and without PDSI *p*-values corresponded to models derived based on inflow alone. The ANOVA results for PDSI alone and inflow alone are displayed in Table 16 and Table 17, respectively. Unlike the H-L GOF test, which rejected a model when the *p*-value was less than 0.05, in the ANOVA test, a model was rejected when the resulting *p*-value was greater than 0.05 (i.e., the null hypothesis was not rejected). If the *p*-value was less than 0.05 for either the Model or the Validation Period, then the model was not rejected (i.e., the null hypothesis was rejected). Using this logic, rejected models are illustrated by brown shading, and models that are not rejected remain unshaded (Table 16 and Table 17).

Of the 105 models derived based on PDSI alone, only one model (D6-Period E) was rejected. Of the 105 models derived based on inflow alone, four models were rejected: D1-Period B; D1-Period D; D2-Period E; and D4-Period G.

Table 16. p-values calculated by an ANOVA (model without Inflow) for 105 logistic regression models derived by a range of drought definitions and Model-Validation Periods.

Inflow *p*- value for Model Period / Validation Period Brown Highlight = Model Rejected based on *p*-value for Model and Validation Period							
Drought Scenario	Model Period A	Model Period B	Model Period C	Model Period D	Model Period E	Model Period F	Model Period G
D1	0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00
D2	0.00	0.00 / 0.00	0.00 / 0.00	0.01 / 0.00	0.00 / 0.00	0.10 / 0.00	0.00 / 0.00
D3	0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.40 / 0.00	0.08 / 0.00	0.00 / 0.13
D4	0.00	0.05 / 0.00	0.00 / 0.00	0.00 / 0.00	0.57 / 0.00	0.01 / 0.00	0.00 / 0.00
D5	0.00	0.00 / 0.00	0.10 / 0.00	-[a]	0.00 / 0.00	0.91 / 0.00	0.23 / 0.00
D6	0.00	0.05 / 0.00	0.00 / 0.00	0.53 / 0.00	0.49 / 1.00	0.00 / 0.00	0.00 / 0.00
D7	0.00	0.04 / 0.00	0.00 / 0.00	0.42 / 0.01	0.00 / 1.00	0.00 / 0.00	0.02 / 0.00
D8	0.00	0.00 / 0.00	0.00 / 0.00	0.42 / 0.00	0.00 / 1.00	0.00 / 0.00	0.02 / 0.00
D9	0.00	0.00 / 0.00	0.00 / 0.00	0.15 / 0.00	0.00 / 1.00	0.00 / 0.00	0.01 / 0.00
D10	0.00	0.00 / 0.00	0.00 / 0.00	0.10 / 0.00	0.00 / 1.00	0.00 / 0.00	0.00 / 0.00
D11	0.00	0.00 / 0.00	0.00 / 0.00	0.02 / 0.00	0.00 / 1.00	0.00 / 0.00	0.00 / 0.00
D12	0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 1.00	0.00 / 0.00	0.00 / 0.00
D13	0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 1.00	0.00 / 1.00	0.00 / 0.00	0.00 / 0.00
D14	0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 1.00	0.00 / 0.00	0.00 / 0.00
D15	0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 1.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00

[a] The set of conditions associated with this model period and drought scenario does not have a solutions for L(b) in the logistic regression equation and therefore no results are available.

Table 17. p-Values calculated by an ANOVA (Model without PDSI) for 105 logistic regression models derived by a range of drought definitions and Model-Validation Periods. Note that no model could be developed for D5 and Model Period D using Inflow-PDSI.

PDSI *p*-value for Model Period / Validation Period Brown Highlight = Model Rejected based on *p*-value for Model and Validation Period							
Drought Scenario	Model Period A	Model Period B	Model Period C	Model Period D	Model Period E	Model Period F	Model Period G
D1	0.00	0.94 / 0.55	0.00 / 1.00	0.15 / 1.00	0.01 / 1.00	0.00 / 1.00	0.00 / 1.00
D2	0.00	0.03 / 0.00	0.00 / 1.00	0.02 / 1.00	0.32 / 1.00	0.00 / 1.00	0.00 / 1.00
D3	0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 1.00	0.00 / 0.00	0.00 / 1.00	0.47 / 0.00
D4	0.00	0.00 / 1.00	0.00 / 0.00	0.15 / 0.00	0.00 / 1.00	0.00 / 0.10	0.38 / 1.00
D5	0.00	0.00 / 0.00	0.00 / 1.00	-[a]	0.08 / 0.00	0.00 / 1.00	0.00 / 0.00
D6	0.00	0.00 / 1.00	0.00 / 0.00	0.00 / 1.00	0.00 / 1.00	0.00 / 1.00	0.02 / 0.00
D7	0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00
D8	0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00
D9	0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00
D10	0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.01	0.00 / 0.00
D11	0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 0.02	0.00 / 0.00
D12	0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 1.00	0.00 / 1.00	0.00 / 0.00	0.12 / 0.00
D13	0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 1.00	0.00 / 1.00	0.00 / 0.00	0.01 / 0.00
D14	0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 1.00	0.00 / 1.00	0.00 / 0.00	0.02 / 0.00
D15	0.00	0.00 / 0.00	0.00 / 0.00	0.00 / 1.00	0.00 / 0.10	0.00 / 0.00	0.13 / 0.00

[a] The set of conditions associated with this model period and drought scenario does not have a solutions for L(b) in the logistic regression equation and therefore no results are available.

Selection of Drought Scenarios

Drought scenarios were selected based on the combined results of the H-F GOF test and two ANOVA tests, as well as other qualitative criteria discussed below. Statistical results are provided here in terms of whether each set of models, D1-D15, was rejected or not rejected based on their respective *p*-values (identified above) for each of the seven Model and Validation Periods (Table 18). A model was rejected when it did not pass all three statistical tests (H-L GOF for inflow-PDSI combined; ANOVA for PDSI alone; ANOVA for inflow alone), whether it was for the Model Period or the Validation Period. Rejected models are illustrated by brown shading, and models that are not rejected remain unshaded (Table 18).

Models derived by more strict drought definitions [(that trigger the onset of drought less frequently (closer to D15)] were rejected less than models derived by less strict drought definitions [(that trigger the onset of drought more frequently (closer to D1)]. Similarly, models derived by reservoir-storage-defined drought scenarios (D7-D15) were rejected less than models that were derived by droughts defined by streamflow (D1-D5) and precipitation/temperature (D6). This is likely because conditions are more variable during early-onset droughts that are streamflow, precipitation, and/or temperature driven than it is for later-onset droughts driven by reservoir storage. As a drought worsens, conditions become less variable and easier to predict using indicators such as inflow and PDSI. In addition to drought scenarios, interesting patterns also emerged regarding the impact of model periods on model performance. All but two of the models derived using Model Period A were rejected; twelve of the 15 models derived using Model Period E were rejected; nine of the 15 models derived using Model Periods B and D were rejected; and eight models derived using Model Period F were rejected. Models derived from Model Periods C and G performed the best, with only six of the 15 models rejected. The consistent rejection of models derived by Model Period A is likely explained by the larger variation of conditions encompassing drought and non-drought periods over such a long

period of record. The positive performance of models derived by Model Periods C and G is likely explained by the fact that both periods contain the 2010-2015 drought of record; as previously stated, as a drought becomes more severe, conditions become less variable and easier to predict using indicators such as inflow and PDSI. In other words, the stability of the physical hydrologic system (i.e., drought conditions) is reflected in both lower inflow and PDSI values; therefore, both of these variables contribute to the prediction skills of the logistic regression model.

Table 18. Statistical findings based on p-values calculated by H-L GOF for inflow-PDSI; ANOVA for PDSI alone; and ANOVA for inflow alone.

Brown Shading = Model Rejected								
Drought Scenario	Model Period A	Model Period B	Model Period C	Model Period D	Model Period E	Model Period F	Model Period G	Number of Models Not Rejected
D1	Reject	Reject	Reject	Reject	Reject	Not Reject	Reject	1 out of 7
D2	Reject	Reject	Reject	Reject	Reject	Not Reject	Reject	1 out of 7
D3	Not Reject	Not Reject	Reject	Reject	Reject	Not Reject	Reject	3 out of 7
D4	Reject	Not Reject	Reject	Reject	Reject	Reject	Reject	1 out of 7
D5	Reject	Reject	Reject	Reject	Reject	Reject	Not Reject	1 out of 7
D6	Reject	Reject	Reject	Not Reject	Reject	Not Reject	Not Reject	3 out of 7
D7	Reject	Reject	Not Reject	Reject	Reject	Reject	Reject	1 out of 7
D8	Reject	Reject	Not Reject	Reject	Reject	Not Reject	Reject	2 out of 7
D9	Reject	Reject	Not Reject	Reject	Reject	Not Reject	Not Reject	3 out of 7
D10	Reject	Reject	Not Reject	Reject	Reject	Reject	Not Reject	2 out of 7
D11	Reject	Reject	Not Reject	Not Reject	Reject	Reject	Not Reject	3 out of 7
D12	Reject	Not Reject	Not Reject	Not Reject	Reject	Reject	Not Reject	4 out of 7
D13	Reject	Not Reject	Not Reject	Not Reject	Not Reject	Reject	Not Reject	5 out of 7
D14	Reject	Not Reject	Not Reject	Not Reject	Not Reject	Reject	Not Reject	5 out of 7
D15	Not Reject	Not Reject	Not Reject	Not Reject	Not Reject	Not Reject	Not Reject	7 out of 7

To help bring clarity to these results, additional qualitative criteria were identified to narrow the range of drought scenarios carried forward for further analysis as part of the inflow-PDSI threshold performance testing. Namely, even though reservoir storage-defined drought scenarios performed the best (see Table 18 for statistics for drought scenarios D11-D15), to increase the robustness of the analysis, inflow-PDSI threshold performance testing should be completed on the broadest range of drought scenarios permittable by the statistical results [(i.e., inflow-, temperature-, and precipitation-defined drought scenarios (D1-

D6)]. This means testing should be performed on scenarios that were based on more than one set of conditions that can impact drought frequency and severity. Drought scenarios D1-D5 were based on streamflow conditions; D6 was based on precipitation and temperature conditions; and D7-D15 were based on reservoir conditions.

Among the D1-D5 models, D3 models performed the best and should be selected for further analysis, albeit only for Model Periods that were not rejected (Model Period A, B, and F). Recall that Model Period rejection was based on statistical findings using *p*-values calculated by H-L GOF for inflow-PDSI; ANOVA for PDSI alone; and ANOVA for inflow alone (see Table 18). The D6 models were the only models based on precipitation and temperature, and these were therefore selected for further analysis, albeit only for Model Periods that were not rejected (Model Periods D, F, and G; see Table 18 for details). Among the reservoir-defined models D7-15, only models that were not rejected for the majority of model periods were selected for further analysis. In other words, a minimum of four of the seven models within each drought scenario must not be rejected. This eliminated models derived by D7-D11; therefore, models derived by D12-D15 were selected for further analysis, albeit only for Model Periods that were not rejected by statistical findings. In summary, the following models were carried forward for further consideration (Table 19):

- D3: Model Periods A, B, and F
- D6: Model Periods D, F, and G
- D12: Model Periods B, C, D, and G
- D13: Model Periods B, C, D, E, and G
- D14: Model Periods B, C, D, E, and G
- D15: All Model Periods

BIC Verification

Model BIC scores were calculated to verify the findings and conclusions cited above regarding the selection of drought scenarios and model periods. Table 19 displays BIC scores for models that were not rejected by the H-L GOF and ANOVA tests described above, including the minimum BIC score for each drought scenario (recall that lower BIC scores correspond to better performing models). Overall, BIC scores confirmed the H-L GOF and ANOVA results above, with models derived by more conservative, reservoir-driven drought scenarios having lower BIC scores than models derived by less conservative drought scenarios (Table 19). Of the streamflow-driven drought scenarios D1-D5, D3 had the second lowest BIC score behind D5; yet, more model periods were rejected under D5 than D3. Scenario D6 had the sixth lowest of all minimum BIC scores.

Table 19. BIC scores for logistic regression models passing H-L GOF and ANOVA tests derived by 15 drought definitions and seven model and validation periods.

Drought Scenario	BIC for Model Period / Validation Period							Minimum BIC
	Model Period A	Model Period B	Model Period C	Model Period D	Model Period E	Model Period F	Model Period G	
D1	-	-	-	-	-	356 / 763	-	356
D2	-	-	-	-	-	310 / 967	-	310
D3	1,078	622 / 527	-	-	-	273 / 934	-	273
D4	-	406 / 1,092	-	-	-	-	-	406
D5	-	-	-	-	-	-	250 / 941	250
D6	-	-	-	131 / 1,549	-	294 / 1,207	198 / 990	131
D7	-	-	327 / 724	-	-	-	-	327
D8	-	-	324 / 700	-	-	307 / 813	-	307
D9	-	-	305 / 649	-	-	289 / 789	188 / 756	188
D10	-	-	288 / 591	-	-	-	179 / 696	179
D11	-	-	277 / 534	126 / 928	-	-	172 / 645	126
D12	-	420 / 208	203 / 427	76 / 984	-	-	142 / 561	76
D13	-	414 / 168	153 / 448	64 / 985	76 / 794	-	112 / 522	64
D14	-	390 / 158	145 / 425	67 / 748	78 / 677	-	110 / 501	67
D15	427	306 / 139	131 / 337	35 / 1,023	67 / 456	174 / 369	108 / 373	35

Selection of Model Periods

Before evaluating inflow and PDSI threshold performance in Part V, one final step is taken here to narrow the range of models used in testing. Thus far, 78 of the 105 models originally considered have been eliminated, and 27 models remain as follows (Table 20):

- D3: Model Periods A, B, and F
- D6: Model Periods D, F, and G
- D12: Model Periods B, C, D, and G
- D13: Model Periods B, C, D, E, and G
- D14: Model Periods B, C, D, E, and G
- D15: All Model Periods

Similar to drought scenarios, model periods were selected based on the combined results of the H-F GOF test and two ANOVA tests, as well as other qualitative criteria. Of the seven model periods considered for performance testing, it was determined that even though Period A-models performed the poorest of all model periods, Period A encompasses the entire period of record and the most variation, and thus would be a good test case to compare other model periods against. Next, returning to the H-L GOF and ANOVA results, five out of the six drought scenarios (models) were not rejected under Model Periods B, D, and G; four out of six were not rejected for Model Period C; and only three out of six were not rejected for Model Periods E and F (Table 20). Recall that the performance of models was tested in cross-validation mode, meaning a logistic regression model using a subset of years for each period (e.g., B-G) was developed, and the performance of the developed logistic regression model was tested using the remaining years from that period. Among the relatively best performing B, D, and G Model Periods, Period D had the lowest BIC score, and Period G encompasses the drought of record. It was considered reasonable to select Model Period D based on its BIC score and Model Period G given the importance of simulating water right curtailments during a repeat of the drought

of record. Therefore, of the three, Model Period B was eliminated from further consideration. The remaining Model Periods C, E, and F also were eliminated given their higher statistical rejections and BIC scores relative to other model periods. Given this logic, and the determination to not carry forward any models rejected through statistical testing, the following 12 logistic regression models were carried forward to Part V.

- D3: Model Periods A
- D6: Model Periods D and G
- D12: Model Periods D and G
- D13: Model Periods D and G
- D14: Model Periods D and G
- D15: Model Periods A, D, and G

Table 20. Statistical findings based on p-values calculated by H-L GOF for inflow-PDSI; ANOVA for PDSI alone; and ANOVA for inflow alone. Results are presented only for a narrow range of drought scenarios that were selected for further analysis.

	H-L GOF Inflow-PDSI P Value / ANOVA Inflow *p*-value / ANOVA PDSI *p*-value							
Drought Scenario	Model Period A	Model Period B	Model Period C	Model Period D	Model Period E	Model Period F	Model Period G	Number of Models Not Rejected
D3	Not Reject	Not Reject	-	-	-	Not Reject	-	3 out of 7
D6	-	-	-	Not Reject	-	Not Reject	Not Reject	3 out of 7
D12	-	Not Reject	Not Reject	Not Reject	-	-	Not Reject	4 out of 7
D13	-	Not Reject	Not Reject	Not Reject	Not Reject	-	Not Reject	5 out of 7
D14	-	Not Reject	Not Reject	Not Reject	Not Reject	-	Not Reject	5 out of 7
D15	Not Reject	Not Reject	Not Reject	Not Reject	Not Reject	Not Reject	Not Reject	7 out of 7
Number of Models Not Rejected	2 out of 6	5 out of 6	4 out of 6	5 out of 6	3 out of 6	3 out of 6	5 out of 6	-

PART V: INFLOW-PDSI THRESHOLD PERFORMANCE TESTING

In this section, the range of inflow-PDSI thresholds identified in Part III were tested in terms of its to predict drought as defined through the analysis and findings in Part IV. Recall that the range of thresholds considered was constrained by the conditions observed over the period of record. As noted in Table 5, of the 1,081 months on record, observed running 12-month inflow has historically ranged from 7,300 to 317,000 acre-ft, and observed PDSI historically ranged from -4.87 to 5.53 (black circles on Figure 28). Values for selected percentiles (0 to 100 in five percent increments) within these ranges for inflow and PDSI were used for total of 441 fifth-percentile occurrence thresholds (blue squares on Figure 28). Recognizing that the future does not emulate the past, and that any combination of inflow and PDSI may occur in the future, all 441 thresholds were considered for performance testing.

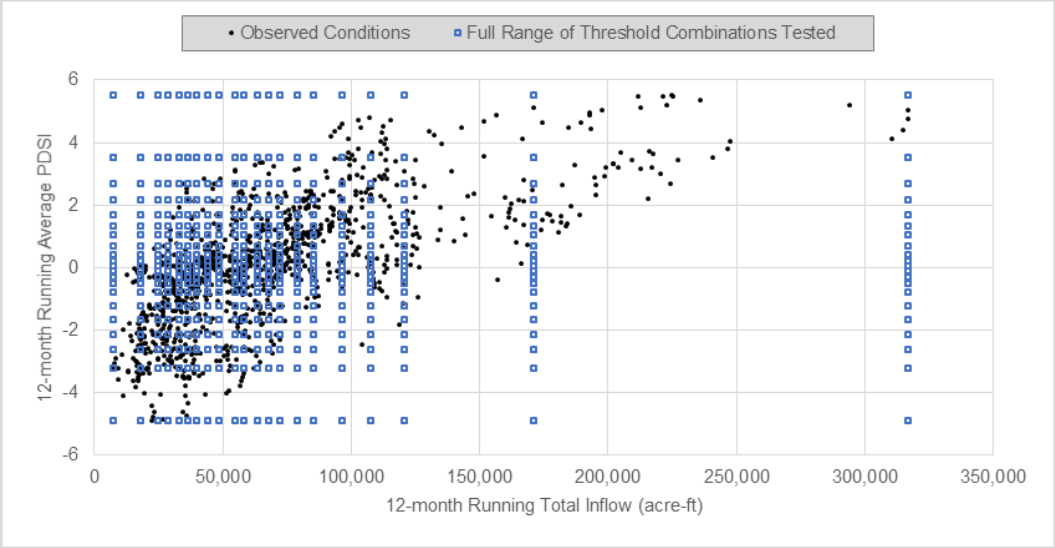

Figure 28. The fifth-percentile thresholds (blue squares) compared to the full range of observed monthly inflow- PDSI conditions (black dots).

When testing the performance these inflow-PDSI thresholds, four outcomes were possible "A", "B", "C", and "D", as follows (Table 21):

"A": A drought was observed, and the threshold correctly predicted it.

"B": A drought was not observed (i.e., wet period), yet the threshold falsely predicted a drought.

"C": A drought was observed, yet the threshold failed to predict it.

"D": A drought was not observed, and the threshold correctly predicted a non-drought period.

The best outcomes are both A and D, meaning the threshold correctly predicted a drought (A) that was known to occur, and it also correctly predicted wet periods (D). The worst outcomes were indicators that predicted droughts that were known not to have occurred (B), resulting in an incorrect prediction, and/or thresholds that missed droughts that were known to have occurred (C).

Table 21. Four possible outcomes (A-D) associated with testing the performance of a threshold at predicting observed, historical droughts.

Variable and Outcome		Observed Drought		Marginal Totals for Predictions
		Yes	No	
Predicted Drought	Yes	A	B	A + B
	No	C	D	C + D
Marginal Totals for Observations		A + C	B + D	-

Two steps were employed to test the performance of all 441 inflow-PDSI thresholds under consideration. In Step 1, returning to the logistic regression models selected in Part IV, the observed inflow-PDSI variable used to generate the models was further tested with each of the 441 inflow-PDSI thresholds under consideration. The model outputs were evaluated to determine which thresholds generated drought predictions over the full period of record (Model Period A: 1926-2016). The range of inflow-PDSI thresholds that did not generate drought predictions were eliminated from further consideration. In Step 2, each of the

thresholds carried forward (not eliminated in Step 1) were analyzed in terms of the four possible outcomes, A, B, C, or D to assess its performance at accurately predicting drought and non-drought periods over the period of record. This was done through calculation of the threshold's Mean Squared Error (MSE) and Conditional Probability, both of which are discussed below.

Step 1. Logistic Regression Model Predictions

Here, each of the 441 inflow-PDSI threshold values were used as inputs in the six logistic regression models as derived from drought scenarios D3, D6, and D12-D15, and model outputs were evaluated to determine which thresholds generate drought predictions. In Step 2, the accuracy of those predictions was tested against the observed record.

Recall that logistic regression models calculate an Event Probability (EP) between "0" and "1", with higher EPs indicating a more likelihood of drought. For this analysis, a drought was considered to be predicted over the model period when the EP exceeded the frequency of observed drought for the model period under consideration (Gold et al., 2020). For example, the frequency of drought as defined by Drought Scenario 15 (D15) was 0.12 (12 percent of the 1,081 months are classified as an observed drought). When the 10th percentile inflow-PDSI threshold (inflow ≤ 36,300 and PDSI ≤ -2.13) was input into the logistic regression model, the EP was 0.25 per the equation below:

$$p_{10} = \frac{\exp\left(0.648 - 0.745(-2.13\ PDSI) - 0.000092(36{,}300\ acre-ft)\right)}{1+\exp\left(0.648 - 0.745(-2.13\ PDSI) - 0.000092(36{,}300\ acre-ft)\right)} = 0.25$$

Because the EP exceeded 0.12, a drought would be predicted anytime inflow ≤ 36,300 and PDSI ≤ -2.1.

When the 25th percentile inflow-PDSI threshold (inflow ≤ 36,300 and PDSI ≤ 2.17) was input into the logistic regression model, the EP was 0.01 per the equation below:

$$p_{25} = \frac{\exp\left(0.648 - 0.745(2.17\ PDSI) - 0.000092(36{,}300\ acre{-}ft)\right)}{1 + \exp\left(0.648 - 0.745(2.17\ PDSI) - 0.000092(36{,}300\ acre{-}ft)\right)} = 0.01$$

Because the EP was less than 0.12, a drought would not be predicted anytime inflow ≤ 36,300 and PDSI ≤ 2.2. Figure 29 below illustrates EPs for all 441 inflow-PDSI threshold combinations for D15. It shows that thresholds below approximately the 20th percentile generally resulted in drought predictions. According to Figure 29, which displays the inflow and PDSI values that correspond to these percentiles, when inflow was ≤ to 67,800 acre-ft/yr and PDSI ≤ 2.2, a drought (as defined by D15) is predicted. In fact, if one variable was held constant, say PDSI, then for each PDSI between -4.9 and 2.2, there was a total of 85 possible inflow thresholds that would predict drought (as illustrated by blue squares within the purple outline). What this means is that out of the 441 inflow-PDSI threshold combinations tested, 85 thresholds would be carried forward for performance testing in Step 2.

These calculations were extended for the other 11 logistic regression models selected in Part IV based on drought scenario and model period (Figure 31). The geometric shapes formed by the colored outlines, each representing a drought scenario, encircle the upper limits of inflow that correspond with each PDSI between 5.5 and -4.9 that resulted in a drought prediction (Figure 31). Under D3, for each PDSI between 5.5 and -4.9, a total of 199 possible inflow thresholds predicted drought; under D6, a total of 271 possible inflow-PDSI thresholds predicted drought under Model Period D, and 195 possible inflow-PDSI thresholds predicted drought under Model Period G (Figure 31). The upper inflow limit (i.e., maximum inflow) for each PDSI value that resulted in a drought prediction for D3 and D6 is tabulated in Table 22, as well as the total number of inflow-PDSI threshold combinations within those limits. Extending these results to the remaining four drought scenarios D12-D15, the geometric shapes formed by the colored outlines in Figure 30 become more

condensed. This is because the upper inflow limit for each PDSI between 5.5 and -4.9 becomes lower under more strictly defined droughts (i.e., reservoir-driven drought scenarios). The upper inflow limit for each PDSI value for D12-D15 that resulted in a drought prediction is tabulated in Table 23, as well as the total number of inflow-PDSI threshold combinations that exist within those limits.

Overall, a total of 5,292 EPs was evaluated (12 models simulating 441 inflow-PDSI thresholds). Of these, 1,362 EPs were found to be drought predictions in accordance with the logic described above, while 3,930 were not. All of the logistic regression drought predictions corresponding to 1,362 EPs are combined and illustrated in Figure 32. Of these, 289 of the inflow-PDSI thresholds corresponding to positive drought predictions were shared among the 12 models (Figure 32). The remaining 152 thresholds that did not predict droughts under any of the 12 models were eliminated from further consideration. Of the 289 remaining, those that predicted drought by only one of the 12 models were considered to be "outliers", and therefore eliminated. This eliminated another 70 thresholds that predicted drought only by model: D6, Model Period D (Figure 32). Once these were eliminated, 219 inflow-PDSI threshold combinations remained and were carried forward to the next step of the analysis (Figure 31; Table 24). In the next section, the accuracy of these drought predictions was tested against observed conditions over the period of record. Results for all threshold combinations are included in Appendix Table 44 through Table 55.

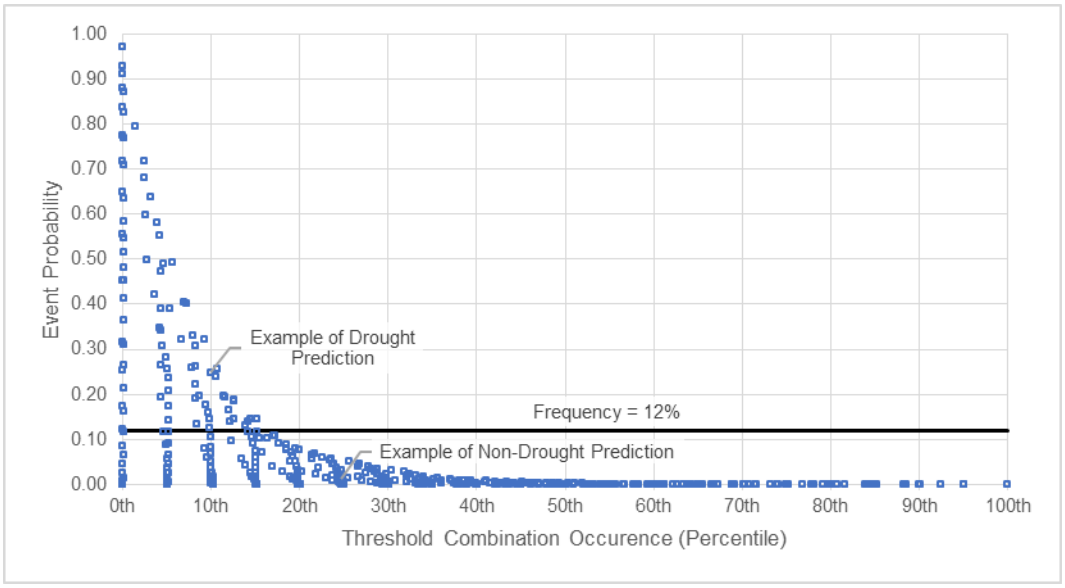

Figure 29. Event Probability outputs from logistic regression models simulating 441 inflow-PDSI threshold combinations for D15. In this case, droughts or non-droughts are predicted when Event Probability exceeds or falls below, respectively, drought frequency (denoted by black line) as defined by D15.

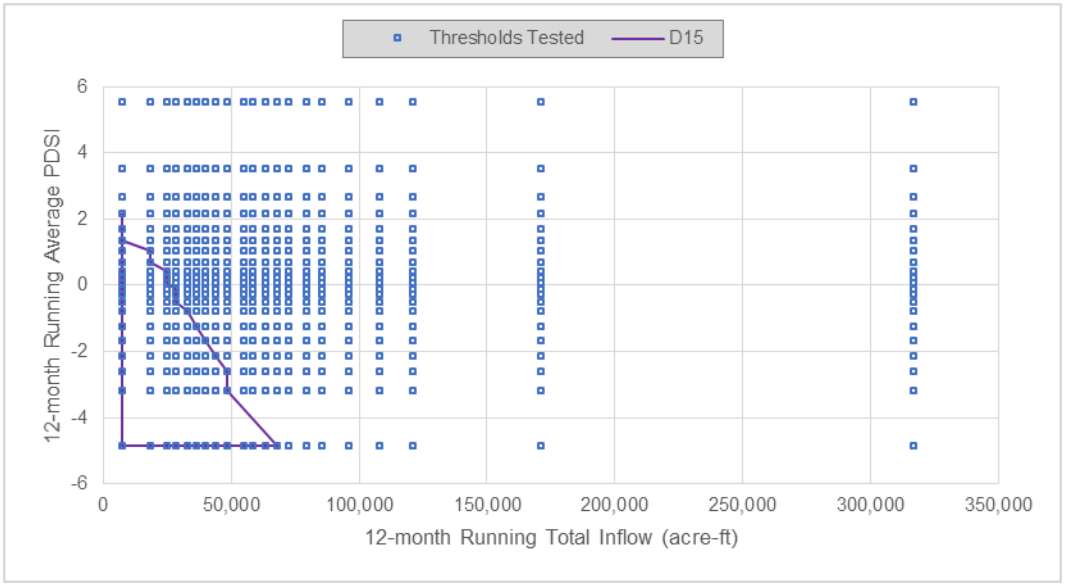

Figure 30. Drought and non-drought predictions of 441 inflow-PDSI thresholds simulated using logistic regression models for D15, Model Period A. Thresholds within the purple geometric shape result in drought predictions.

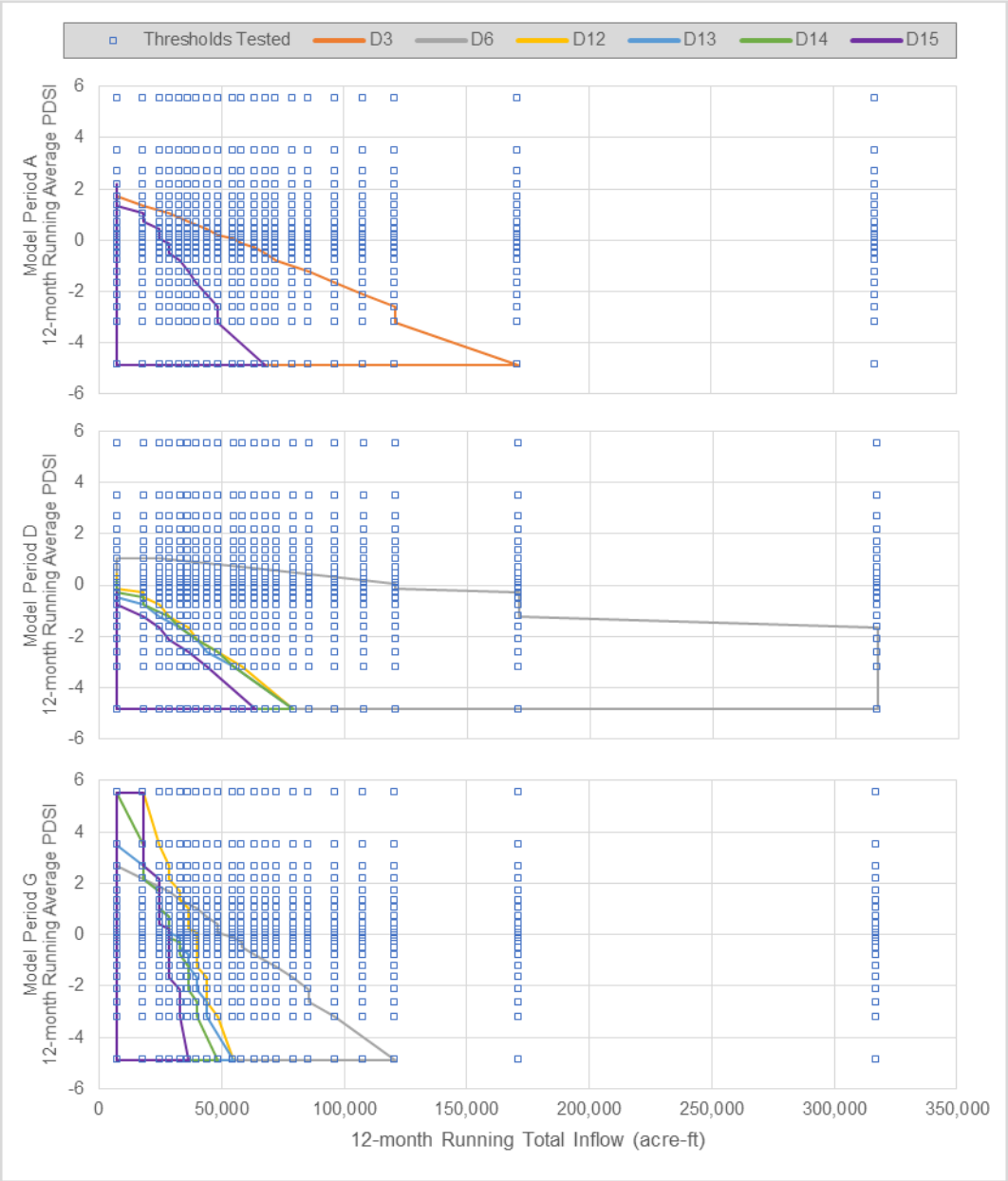

Figure 31. Drought and non-drought predictions of 441 inflow-PDSI thresholds simulated using logistic regression models derived by D3, D6, and D12-D15 and their respective model periods. Thresholds within the colored geometric shapes result in drought predictions.

Table 22. The upper inflow limit corresponding to each PDSI value, as simulated by D3 and D6 logistic regression models, that resulted in drought predictions, as well as the total number of inflow-PDSI threshold combinations within those limits.

PDSI	D3	D6	
	Model Period A	Model Period D	Model Period G
	Upper Inflow Limit (acre-ft)		
5.53	-	-	-
3.51	-	-	-
2.68	-	-	7,300
2.17	-	-	18,100
1.70	7,300	-	28,600
1.34	18,100	-	33,000
1.04	28,600	24,600	39,700
0.71	36,300	58,200	44,000
0.43	44,000	85,500	48,500
0.21	48,500	107,800	48,500
0.06	54,800	120,800	48,500
-0.12	58,200	120,800	54,800
-0.29	63,400	171,000	58,200
-0.49	67,800	171,000	58,200
-0.78	72,200	171,000	63,400
-1.23	85,500	171,000	72,200
-1.66	96,200	317,000	79,200
-2.13	107,800	317,000	85,500
-2.62	120,800	317,000	85,500
-3.20	120,800	317,000	96,200
-4.87	171,000	317,000	120,800
Number of Inflow-PDSI Threshold Combinations Remaining	199	271	195

Table 23. The upper inflow limit corresponding to each PDSI value, as simulated by D12-D15 logistic regression models, that resulted in drought predictions, as well as the total number of inflow-PDSI threshold combinations within those limits.

PDSI	D12		D13		D14		D15		
	Model Period D	Model Period G	Model Period D	Model Period G	Model Period D	Model Period G	Model Period A	Model Period D	Model Period G
	Upper Inflow Limit (acre-ft)								
5.53	-	18,100	-	7,300	-	7,300	-	-	18,100
3.51	-	24,600	-	7,300	-	18,100	-	-	18,100
2.68	-	28,600	-	18,100	-	18,100	-	-	18,100
2.17	-	28,600	-	18,100	-	18,100	7,300	-	24,600
1.70	-	33,000	-	24,600	-	24,600	7,300	-	24,600
1.34	-	33,000	-	24,600	-	24,600	7,300	-	24,600
1.04	-	36,300	-	24,600	-	24,600	18,100	-	24,600
0.71	-	36,300	-	28,600	-	28,600	18,100	-	24,600
0.43	7,300	36,300	-	28,600	-	28,600	24,600	-	24,600
0.21	7,300	36,300	-	28,600	7,300	28,600	24,600	-	28,600
0.06	7,300	39,700	7,300	28,600	7,300	28,600	24,600	-	28,600
-0.12	7,300	39,700	7,300	33,000	7,300	28,600	28,600	-	28,600
-0.29	18,100	39,700	7,300	33,000	7,300	33,000	28,600	7,300	28,600
-0.49	18,100	39,700	7,300	33,000	18,100	33,000	28,600	7,300	28,600
-0.78	24,600	39,700	18,100	36,300	18,100	33,000	33,000	7,300	28,600
-1.23	28,600	39,700	24,600	36,300	28,600	36,300	36,300	18,100	28,600
-1.66	36,300	44,000	33,000	39,700	33,000	36,300	39,700	24,600	28,600
-2.13	39,700	44,000	39,700	39,700	39,700	36,300	44,000	28,600	33,000
-2.62	48,500	44,000	44,000	44,000	48,500	39,700	48,500	36,300	33,000
-3.20	58,200	48,500	54,800	44,000	54,800	39,700	48,500	44,000	33,000
-4.87	79,200	54,800	79,200	54,800	79,200	48,500	67,800	63,400	36,300
Number of Inflow-PDSI Threshold Combinations Remaining	63	132	54	98	58	92	85	38	77

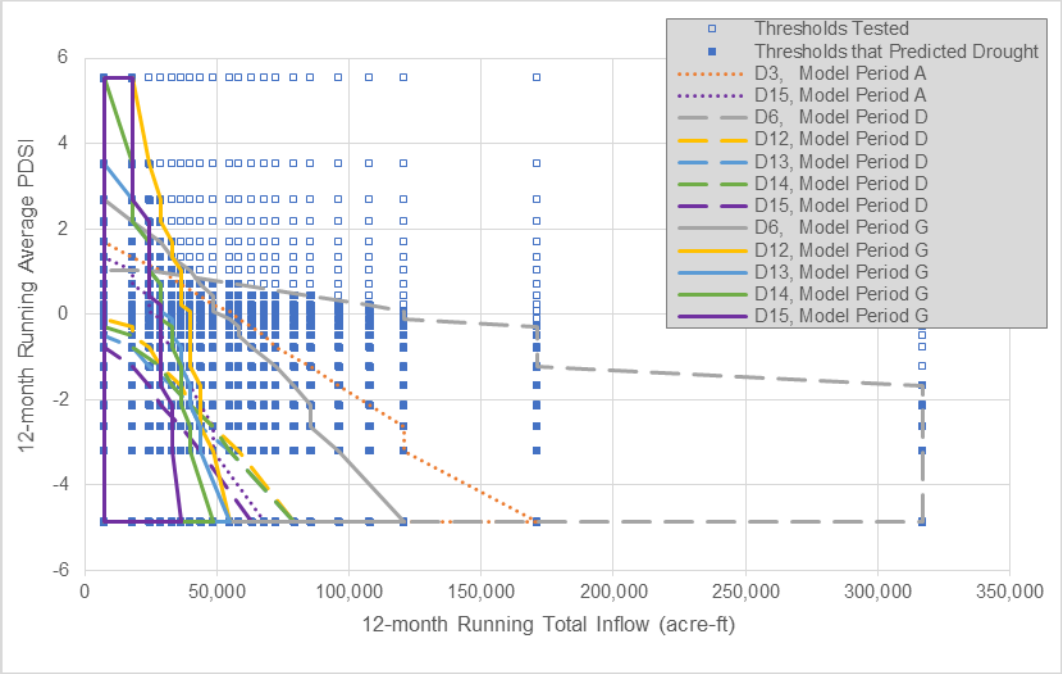

Figure 32. Combined results of 12 logistic regression models in terms of drought predictions (289 thresholds as indicated by the solid blue squares) and non-drought predictions (152 thresholds as indicated by the hollow blue squares).

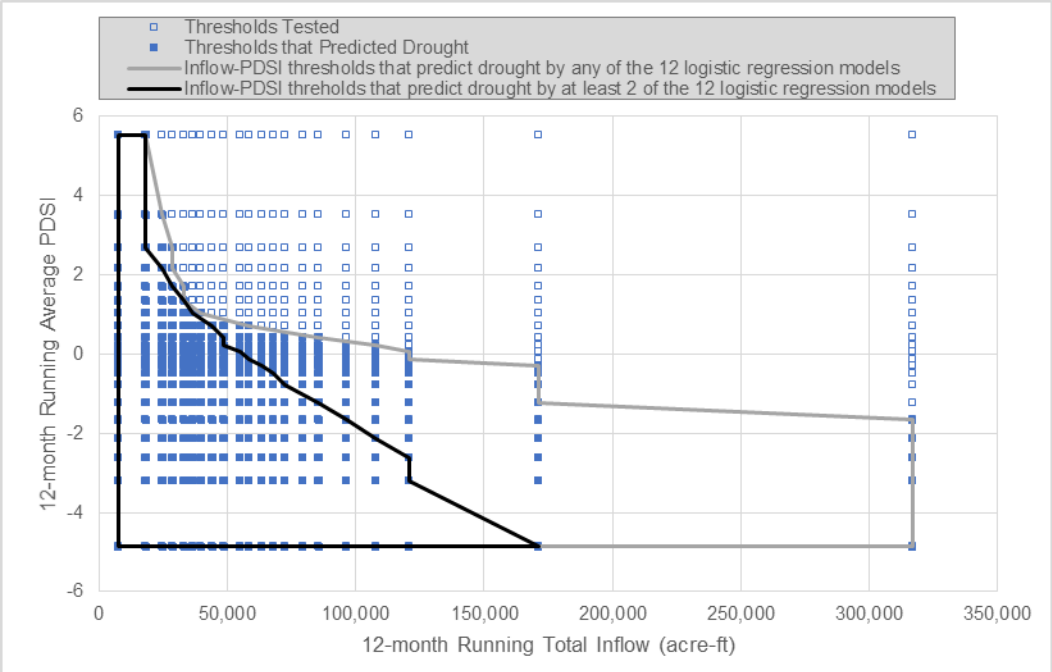

Figure 33. Inflow-PDSI thresholds that result in drought predictions by all 12 logistical regression models (gray line) compared to thresholds that result in drought predictions by at least two of the 12 logistic regression models (black line).

Table 24. Inflow-PDSI thresholds that result in drought predictions by at least two of the 12 logistic regression models.

PDSI	Upper Inflow Limit (acre-ft)
5.53	18,100
3.51	18,100
2.68	18,100
2.17	24,600
1.70	28,600
1.34	33,000
1.04	36,300
0.71	44,000
0.43	48,500
0.21	48,500
0.06	54,800
-0.12	58,200
-0.29	63,400
-0.49	67,800
-0.78	72,200
-1.23	85,500
-1.66	96,200
-2.13	107,800
-2.62	120,800
-3.20	120,800
-4.87	171,000
Number of Inflow-PDSI Threshold Combinations Remaining	219

Step 2. Threshold Performance

In the previous step, logistic regression models were used to narrow down 441 potential inflow-PDSI thresholds to 219 thresholds that yielded drought predictions. In Step 2, the accuracy of those predictions was tested against the observed record. Each of the threshold combinations were analyzed in terms of the four possible outcomes: A, B, C, or D (Table 21). The analysis was based on hydrological and atmospheric science methods that test meteorological forecasting, many of which are detailed in Wilks (2011) and Jolliffe and Stephenson (2012). First, the "Mean Squared Error" (MSE) of each combined inflow-RDI threshold was calculated. The MSE is identical to the Brier Score (Brier, 1950), which is the most commonly used performance measure of precipitation forecasts (Murphy and Winkler, 1987). The MSE quantifies the average squared difference between a threshold's prediction versus the observation (Wilks, 2011). Additionally, the ratio of predicted droughts that were actually observed (i.e., "Probability of Detection") was combined with the ratio of positive versus false-positive predictions (i.e., "Success Ratio") to derive a "Conditional Probability" of each inflow-PDSI threshold (Wilks, 2011).

Mean Squared Error (MSE)

The MSE quantifies the average squared difference between a threshold's prediction versus the observation. Each threshold's occurrence percentile (probability) over the period of record represents the threshold prediction as demonstrated below. Referring to Table 5, an example is presented here where the 30th percentile PDSI (-0.78) was combined with the 30th percentile inflow (39,700 acre-ft). Together, the combined inflow-PDSI threshold lied on the 20th percentile of occurrence over the period record. For the purposes of testing performance using the MSE, the 20th percentile occurrence of this particular threshold (inflow $\leq$ 39,700 acre-ft; PDSI $\leq$ -0.78) corresponded to a drought prediction of 20 percent; similarly, values greater than 39,700 acre-ft or PDSI

of -0.78 corresponded to a non-drought/wet prediction of 80 percent. Next, the MSE (Mean Squared Error) was computed and used to determine if the threshold's drought prediction showed whether or not a drought was actually observed (either "A" or "B"). It did this for each month when the combined condition of inflow $\leq$ 39,700 acre-ft and PDSI $\leq$ -0.78 has occurred. A similar comparison was performed between predictions versus observations of non-drought/wet periods (either "C" or "D").

$$Mean\ Squared\ Error = MSE = \frac{1}{n}\sum_{k=1}^{n}(y_k - o_k)^2$$

Where:

n = number of months evaluated (1,081 months over ~91 years)

y = threshold prediction (when inflow $\leq$ 39,700 acre-ft and PDSI $\leq$ -0.78, there is a 20 percent probability of a drought being predicted; when inflow > 39,700 acre-ft and PDSI > -0.78, there is an 80 percent probability of a non-drought/wet period being predicted)

o = observed drought result (Yes = 1; No = 0).

Result:

$$MSE = \frac{1}{1{,}081}[A(0.15-1)^2 + B(0.15-0)^2 + C(0.85-1)^2 + D(0.85-0)^2] = 0.57$$

This step was repeated for all twenty inflow thresholds (0^{th} to 95^{th} percentile in five percent increments) when combined with the 30^{th} percentile PDSI of -0.78. In this example, performance results are displayed for D15 only. Table 25 presents the prediction outcomes under D15 of the full range of inflow thresholds remaining when combined with a PDSI of -0.78; Table 26 presents the calculations and corresponding MSE scores, and Figure 34 illustrates the MSE scores. The results showed that combining a PDSI of -0.78 with higher inflow thresholds produced lower MSE scores, and thus was better at predicting observed conditions relative to combining a PDSI of -0.78 with lower inflow thresholds. When all 219 MSE scores for D15 were plotted (Figure 35), it was evident that

thresholds falling on the lower end of the occurrence frequency scored higher MSEs than those falling on the higher end of the occurrence frequency.

The MSE scores for all remaining thresholds simulated by each of the six drought scenarios is provided in the Appendix, Table 56 through Table 61. Overall, MSE scores ranged from 0.31 to 0.88 across all models and model periods. Within each of the six drought scenarios, the threshold with the lowest MSE score was identified (Table 27). Of the 219 thresholds evaluated, one threshold had the lowest MSE score across all six drought scenarios: inflow $\leq$ 58,200 acre-ft/yr and PDSI $\leq$ -0.12. This threshold occurred at the 36th percentile of the observed period of record. This threshold was selected for further consideration.

Table 25. Prediction outcomes of a range of inflow thresholds when combined with a PDSI of -0.8; Drought Scenario 15.

		Predictions					
		(A+B)	(C+D)	A	B	C	D
Running 12-month Total Inflow Threshold (Percentile)	Running 12-month Total Inflow Threshold (acre-ft)	Number of Months Predicted as Drought	Number of Months Predicted as Wet	Number of Months Correctly Predicted as Drought	Number of Months Incorrectly Predicted as Drought	Number of Months Incorrectly Predicted as Wet	Number of Months Correctly Predicted as Wet
0th	7,300	1	1,080	1	0	129	951
5th	18,100	46	1035	42	4	88	947
10th	24,600	88	993	67	21	63	930
15th	28,600	123	958	84	39	46	912
20th	33,000	153	928	91	62	39	889
25th	36,300	186	895	103	83	27	868
30th	39,700	212	869	105	107	25	844
35th	44,000	231	850	108	123	22	828
40th	48,500	239	842	109	130	21	821
45th	54,800	256	825	111	145	19	806
50th	58,200	276	805	111	165	19	786
55th	63,400	292	789	114	178	16	773
60th	67,800	303	778	114	189	16	762
65th	72,200	312	769	114	198	16	753

Table 26. Mean Squared Error of a range of inflow thresholds when combined with a PDSI of -0.78; Drought Scenario 15.

	Analysis					
	(A+B)/1,081	A (Probability – 1)^2	B (Probability – 0)^2	C (1 – Probability – 1)^2	D (1 – Probability – 0)^2	[A(Drought Probability-1)^2 +B(Drought Probability-0)^2 +C(Wet Probability-1)^2+D (Wet Probability- 0)^2] /1,081
Running 12-month Total Inflow Threshold (Percentile)	Probability of Predicting a Drought as a percentage of Total Months (1,081) [i.e. Drought Occurrence of Threshold Combination]	Number of Months Correctly Predicted as Drought (A) Weighted Times Probability of Error Squared	Number of Months Incorrectly Predicted as Drought (B) Weighted Times Probability of Error Squared	Number of Months Incorrectly Predicted as Wet (C) Weighted Times Probability of Error Squared	Number of Months Correctly Predicted as Wet (D) Weighted Times Probability of Error Squared	Mean Squared Error
0th	(1+0) / 1,081 = 0%	1(0%-1)2=1	0(0%-0)2=0	129(1-0%-1)2=0	951(1-0%-0)2=951	[1+0+0+951]/1,081 =0.88
5th	(42+4) / 1,081 = 4%	42(4%-1)2=39	4(4%-0)2=0	88(1-4%-1)2=0	947(1-4%-0)2=873	[39+0+0+873]/1,081 =0.84
10th	(67+21) / 1,081 = 8%	67(8%-1)2=57	21(8%-0)2=0	63(1-8%-1)2=0	930(1-8%-0)2=787	[57+0+0+787]/1,081 =0.78
15th	(84+39) / 1,081 = 11%	84(11%-1)2=67	39(11%-0)2=0	46(1-11%-1)2=1	912(1-11%-0)2=722	[67+0+1+722]/1,081 =0.73
20th	(91+62) / 1,081 = 14%	91(13%-1)2=69	62(13%-0)2=1	39(1-13%-1)2=1	889(1-13%-0)2=673	[69+1+1+673]/1,081 =0.69
25th	(103+83) / 1,081 = 17%	103(15%-1)2=74	83(15%-0)2=2	27(1-15%-1)2=1	868(1-15%-0)2=627	[74+2+1+627]/1,081 =0.65
30th	(105+107) / 1,081 = 20%	105(17%-1)2=72	107(17%-0)2=3	25(1-17%-1)2=1	844(1-17%-0)2=581	[72+3+1+581]/1,081 =0.61
35th	(108+123) / 1,081 = 21%	108(19%-1)2=71	123(19%-0)2=4	22(1-19%-1)2=1	828(1-19%-0)2=543	[71+4+1+543]/1,081 =0.57
40th	(109+130) / 1,081 = 22%	109(19%-1)2=72	130(19%-0)2=5	21(1-19%-1)2=1	821(1-19%-0)2=539	[72+5+1+539]/1,081 =0.57
45th	(111+145) / 1,081 = 24%	111(20%-1)2=71	145(20%-0)2=6	19(1-20%-1)2=1	806(1-20%-0)2=516	[71+6+1+516]/1,081 =0.55
50th	(111+165) / 1,081 = 26%	111(22%-1)2=68	165(22%-0)2=8	19(1-22%-1)2=1	786(1-22%-0)2=478	[68+8+1+478]/1,081 =0.51
55th	(114+178) / 1,081 = 27%	114(23%-1)2=68	178(23%-0)2=9	16(1-23%-1)2=1	773(1-23%-0)2=458	[68+9+1+458]/1,081 =0.5
60th	(114+189) / 1,081 = 28%	114(24%-1)2=66	189(24%-0)2=11	16(1-24%-1)2=1	762(1-24%-0)2=440	[66+11+1+440]/1,081 =0.48
65th	(114+198) / 1,081 = 29%	114(25%-1)2=64	198(25%-0)2=12	16(1-25%-1)2=1	753(1-25%-0)2=424	[64+12+1+424]/1,081 =0.46

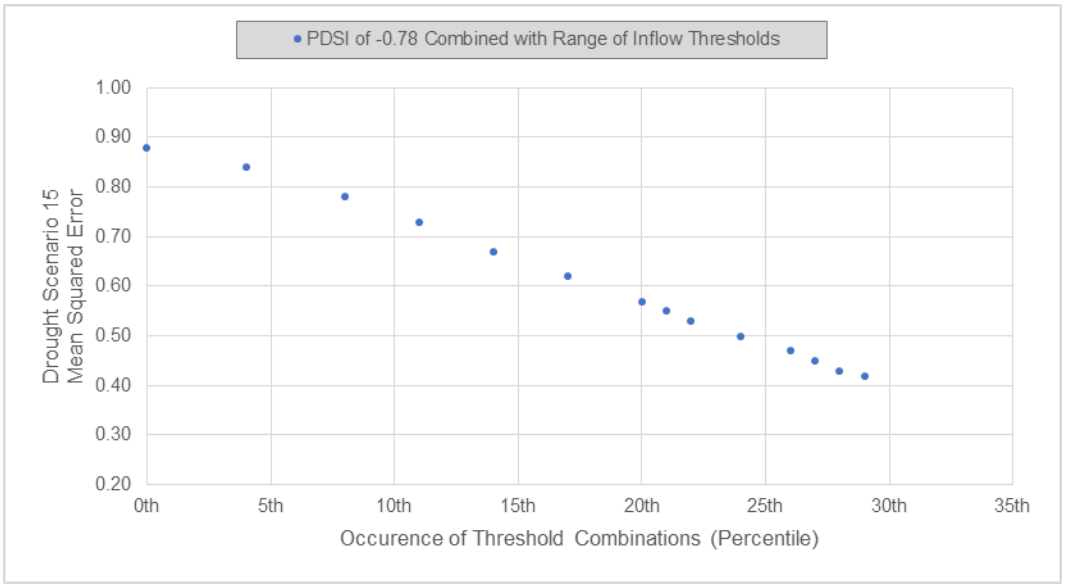

Figure 34. Mean Squared Error of a range of inflow thresholds when combined with a PDSI of -0.78; Drought Scenario 15.

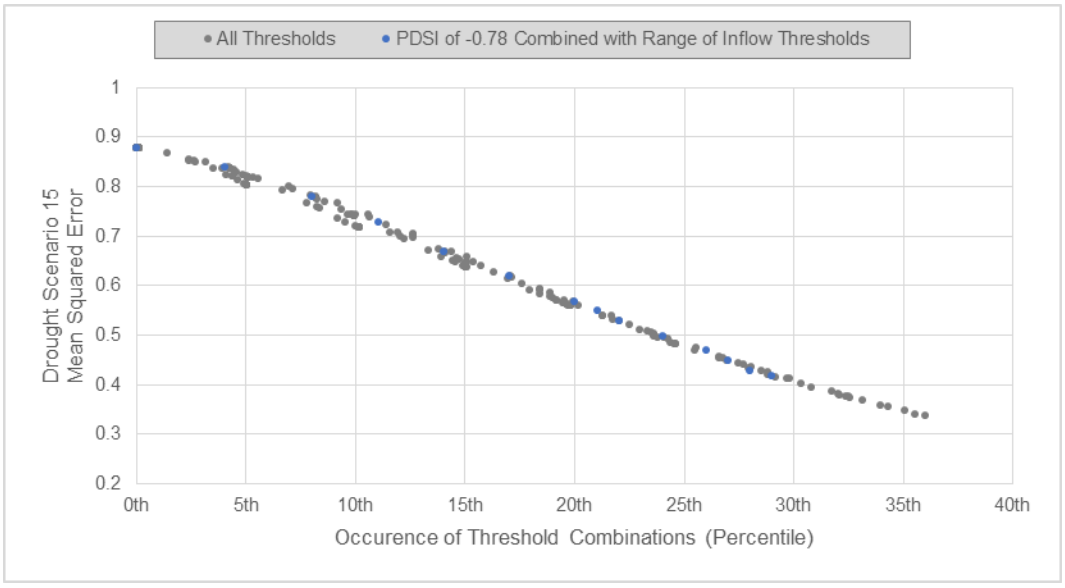

Figure 35. Mean Squared Error of a range of all thresholds for Drought Scenario 15.

Table 27. The inflow-PDSI threshold with the lowest MSE score within each of the six drought scenarios.

Drought Scenario	Minimum MSE Score			
	12-month Running Total Inflow (acre-ft)	12-month Running Average PDSI	Percentile	MSE
D3	58,200	-0.12	36	0.33
D6	58,200	-0.12	36	0.31
D12	58,200	-0.12	36	0.35
D13	58,200	-0.12	36	0.35
D14	58,200	-0.12	36	0.35
D15	58,200	-0.12	36	0.34

Split-Sample Verification of MSE

As a means of verifying MSE results associated with predictions over the period of record, a split-verification verification analysis was performed by comparing the MSEs and corresponding optimum threshold ranges as defined by the period of record with those observed over six subset sample periods within the period of record. Based on previous results obtained so far, two outcomes were expected: (1) Given the lower amount of variability in the smaller sample periods, MSEs of thresholds within those samples should be equal to or lower than those observed over the period of record; and (2) optimum thresholds should be similar between subset samples and the period of record. The same time periods previously identified for logistic regression modeling were used here, albeit for a different purpose (Figure 36). A list of each split-sample's drought frequency as defined by each of the six drought scenarios is provided in Table 28.

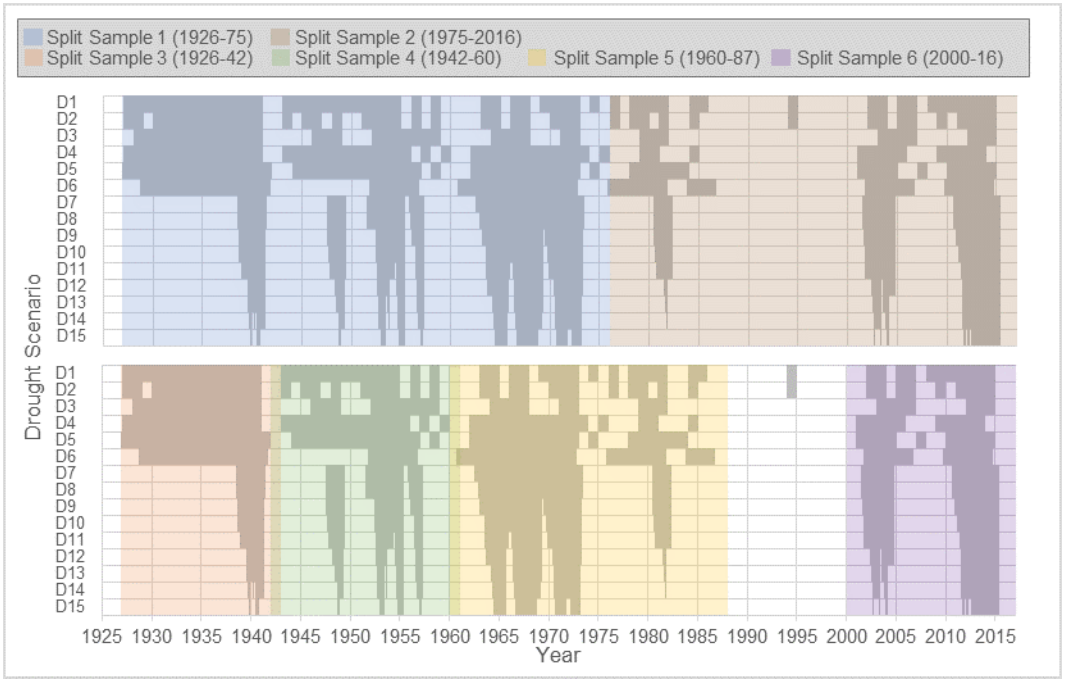

Figure 36. Split-sample periods used to verify MSE results that were calculated over the period of record, 1926-2016.

Table 28. A comparison of drought frequency between the period of record (1926-2016) and six split-sample periods.

Drought Scenarios	Percent of Months Identified as Drought						
	1926-2016 (Period of Record)	1926-1975	1976-2016	1926-1942	1942-1960	1960-1987	2000-2016
D3	43%	59%	24%	81%	53%	32%	41%
D6	54%	62%	46%	81%	28%	75%	59%
D9	31%	38%	23%	17%	32%	42%	45%
D13	19%	24%	13%	10%	17%	26%	31%
D14	17%	21%	12%	7%	14%	24%	29%
D15	12%	15%	9%	3%	7%	19%	22%

Despite the variation in split-sample drought frequencies relative to the period of record, MSEs were lower for all split-samples compared to the period of record (Table 29). As expected, when the number of months evaluated was reduced, the error in correctly identifying drought was reduced. With the exception of split-sample 1926-1942 for D3 and D6, the 36th percentile was confirmed by the other split-samples as the optimum threshold (Table 29). The full suite of results for each split-sample and respective drought scenario is provided in Appendix Table 62 through Table 97.

Table 29. Occurrence of Thresholds with a minimum MSE for each Model Period. Brown highlight shows differences between the results using different model periods.

Drought Scenario	Occurrence (Percentile) of Threshold Combinations with (/) the Minimum MSE						
	1926-2016	1926-1975	1976-2016	1926-1942	1942-1960	1960-1987	2000-2016
D3	36th / 0.33	36th / 0.17	36th / 0.16	7th / 0.03	36th / 0.07	36th / 0.11	36th / 0.06
D6	36th / 0.31	36th / 0.16	36th / 0.14	7th / 0.03	36th / 0.07	0th / 0.08	36th / 0.06
D12	36th / 0.35	36th / 0.19	36th / 0.17	36th / 0.06	36th / 0.07	36th / 0.11	36th / 0.07
D13	36th / 0.35	36th / 0.18	36th / 0.17	36th / 0.05	36th / 0.07	36th / 0.11	36th / 0.07
D14	36th / 0.35	36th / 0.18	36th / 0.17	36th / 0.05	36th / 0.07	36th / 0.11	36th / 0.07
D15	36th / 0.34	36th / 0.17	36th / 0.16	36th / 0.05	36th / 0.07	36th / 0.11	36th / 0.06

Conditional Probability

While the MSE measured how well the RDIs predict historic drought conditions in terms of all four outcomes A, B, C, and D (Table 21), the Conditional Probability Approach, using the same variables and outcomes defined in Table 21, focuses on the combined probability of a threshold correctly predicting an observed drought (i.e., [A/(A+C)]) with the probability of observing a predicted drought [A/(A+B)] (Wilks, 2011). The former is known as the "probability of detection" (POD), while the latter is known as the "success ratio" (SR) (NOAA et al, 2019). Unlike MSE which ideally is low, better performing RDIs have a higher POD and SR.

As was done for MSE, the POD and SR were calculated for all 219 inflow-PDSI thresholds under the six drought scenarios. Similar to MSE, the discussion begins with presenting results for one example PDSI threshold under one drought scenario before presenting results for the other drought scenarios. Referring to Table 5, the same example was considered where the 30th percentile PDSI (-0.78) was combined with the 30th percentile inflow (39,700 acre-ft) to test performance under Drought Scenario 15; here, the conditional probabilities (POD and SR) were calculated as follows:

$$Probability\ of\ Detection\ (POD) = \frac{A}{A+C} = \frac{105}{105+25} = 81\%$$

$$Success\ Ratio\ (SR) = \frac{A}{A+B} = \frac{105}{105+107} = 50\%$$

In other words, of the 130 drought months observed on record (under Drought Scenario 15), this threshold combination correctly predicted 105 of those or 81 percent; the remaining 25 historic droughts months (19 percent) were missed. However, of the 212 droughts that were predicted, 105 (50 percent) were correct, meaning that 107 (50 percent) were false positives (i.e., the threshold predicted a drought, but a drought was not observed). This step was repeated for all 14

inflow thresholds (0^{th} to 65^{th} percentile in five percent increments) when combined with the 30^{th} percentile PDSI of -0.78 (Table 30 and Figure 37). Figure 38 illustrates this example threshold alongside results for all thresholds tested for Drought Scenario 15. The figure shows that lower-percentile thresholds had higher SRs but lower PODs, whereas higher-percentile thresholds had lower SRs but higher PODs. Optimum thresholds would appear to be those that fell somewhere in the middle, and within an area where POD and SR overlapped. For example, for Drought Scenarios 3 and 6, POD and SR approached one another near the 36^{th} percentile, but they did not overlap, so an optimum threshold could not be determined (Figure 39). For Drought Scenarios 12 and 13, POD and SR overlapped at the 22^{nd} and 20^{th} percentiles, respectively (Figure 40). The optimum threshold(s), as denoted by the black squares, were those that occur at those percentiles where the intersection occurs. For Drought Scenarios 14 and 15, POD and SR overlapped at the around the 18^{th} and 12^{th} percentiles, respectively (Figure 41). The percentiles where POD and SR intersected, along with the corresponding optimum inflow-PDSI thresholds for Drought Scenarios 12-15, are listed in Table 31. These 15 thresholds from Table 31 were selected for further consideration, and the rest were eliminated. Results for all threshold combinations are included in Appendix Table 98 through Table 103.

Table 30. Conditional Probability results of a range of inflow thresholds when combined with a PDSI of -0.78; Drought Scenario 15.

Running 12-month Total Inflow Threshold (Percentile)	Observations	Predictions		Analysis		
	(A+C)	(A+B)	A	(A+B)/1,081	A / (A+C)	A / (A+B)
	Number of Observed Drought Months	Number of Months Predicted as Drought	Number of Months Correctly Predicted as Drought (A)	Occurrence Frequency of Threshold Combinations (percent)	Probability of Detection (POD) (percent)	Success Ratio (SR) (percent)
0th	130	1	1	1 / 1,081 = 0	1 / 130 = 1	1 / 1 = 100
5th	130	46	42	46 / 1,081 = 4	42 / 130 = 32	42 / 46 = 91
10th	130	88	67	88 / 1,081 = 8	67 / 130 = 52	67 / 88 = 76
15th	130	123	84	123 / 1,081 = 11	84 / 130 = 65	84 / 123 = 68
20th	130	153	91	153 / 1,081 = 14	91 / 130 = 70	91 / 153 = 59
25th	130	186	103	186 / 1,081 = 17	103 / 130 = 79	103 / 186 = 55
30th	130	212	105	212 / 1,081 = 20	105 / 130 = 81	105 / 212 = 50
35th	130	231	108	231 / 1,081 = 21	108 / 130 = 83	108 / 231 = 47
40th	130	239	109	239 / 1,081 = 22	109 / 130 = 84	109 / 239 = 46
45th	130	256	111	256 / 1,081 = 24	111 / 130 = 85	111 / 256 = 43
50th	130	276	111	276 / 1,081 = 26	111 / 130 = 85	111 / 276 = 40
55th	130	292	114	292 / 1,081 = 27	114 / 130 = 88	114 / 292 = 39
60th	130	303	114	303 / 1,081 = 28	114 / 130 = 88	114 / 303 = 38
65th	130	312	114	312 / 1,081 = 29	114 / 130 = 88	114 / 312 = 37

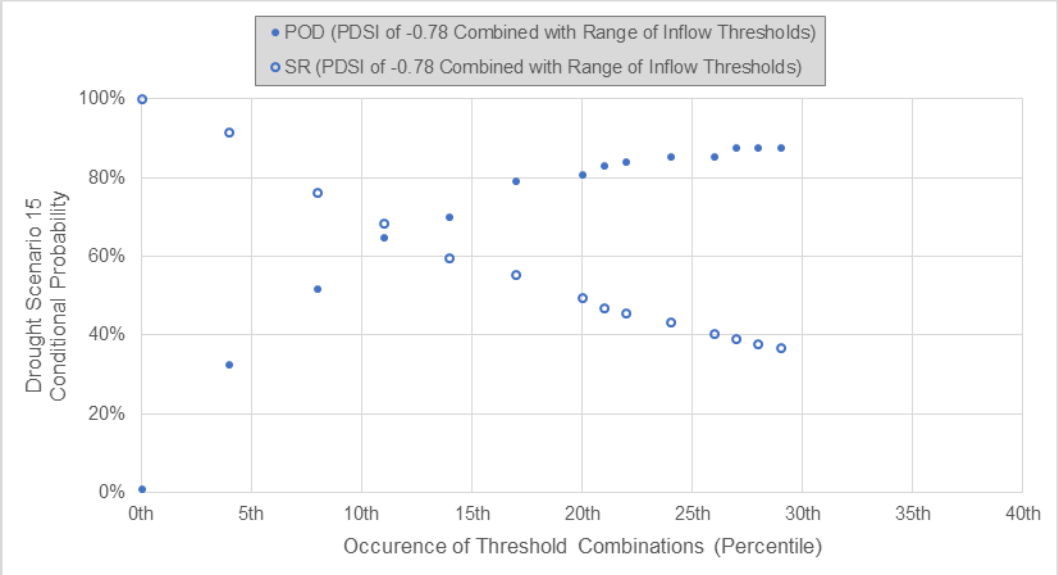

Figure 37. Conditional Probability results of a range of inflow thresholds when combined with a PDSI of -0.78; Drought Scenario 15.

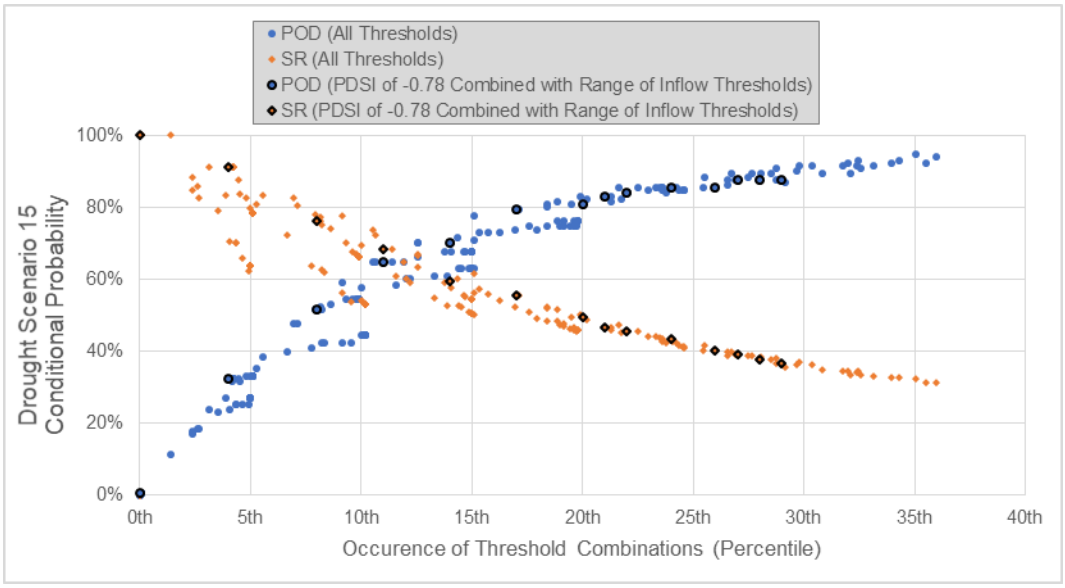

Figure 38. Conditional probability of all inflow-PDSI thresholds for Drought Scenario 15.

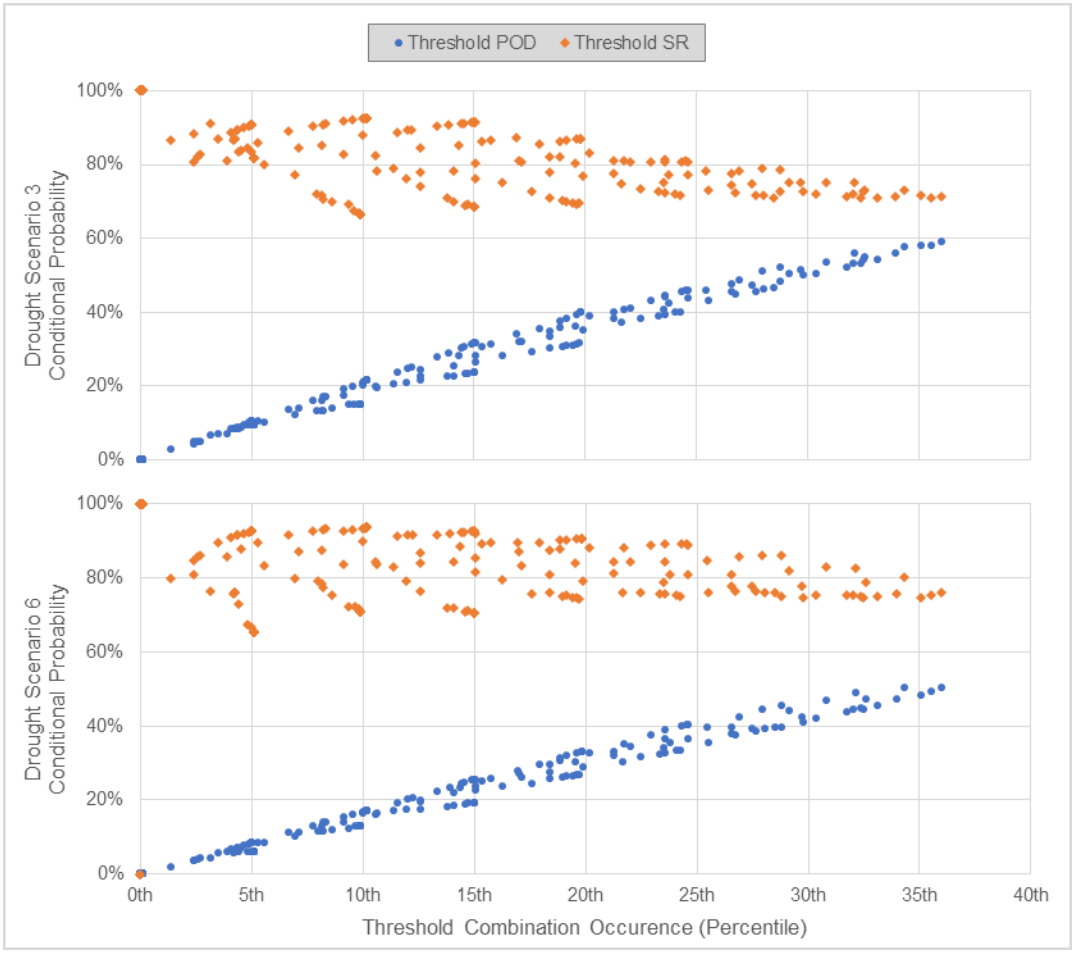

Figure 39. Conditional probability of all inflow-PDSI thresholds for Drought Scenario 3 and 6.

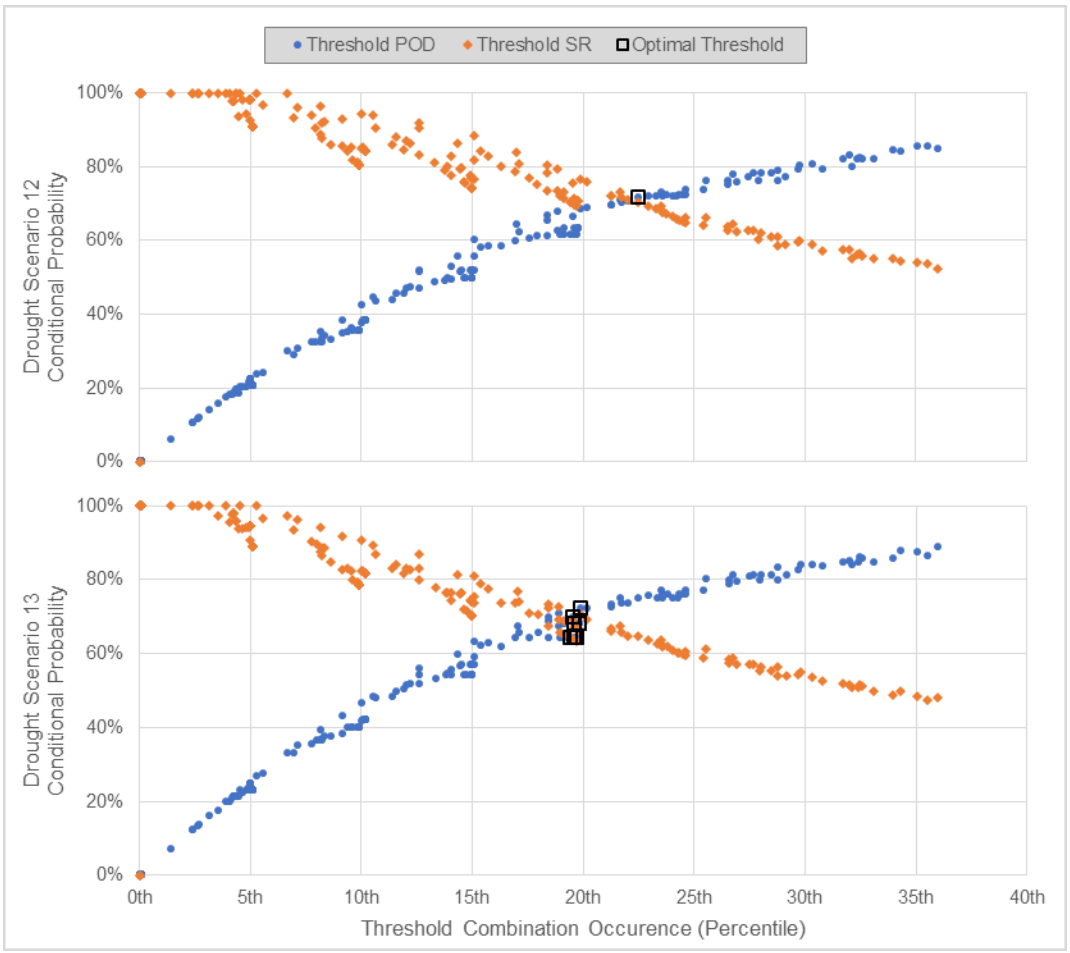

Figure 40. Conditional probability of all inflow-PDSI thresholds for Drought Scenario 12 and 13.

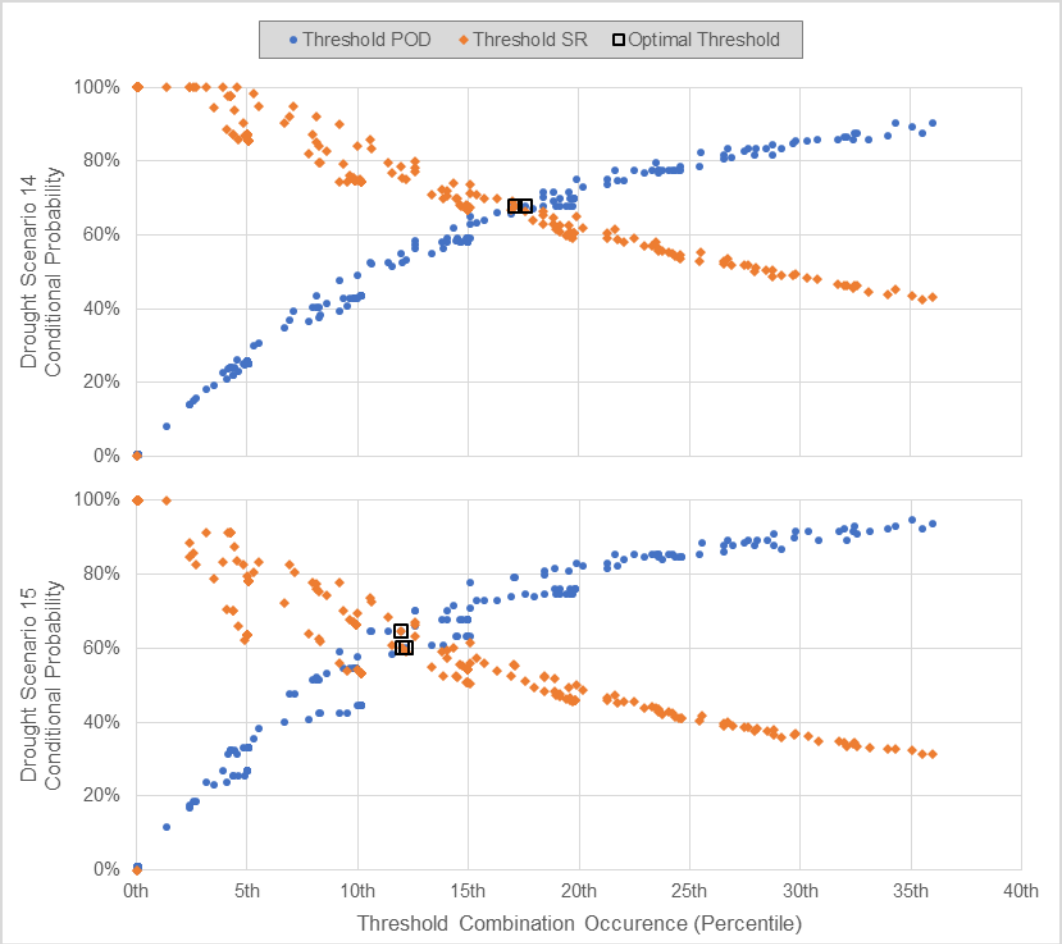

Figure 41. Conditional probability of all inflow-PDSI thresholds for Drought Scenario 14 and 15.

Table 31. Range of optimal inflow-PDSI thresholds and corresponding occurrence percentiles under four drought scenarios as determined by Conditional Probability results. Note: Drought Scenarios 3 and 6 are excluded because POD and SR do not intersect, so an optimum threshold cannot be determined.

Drought Scenario	Optimal Inflow-PDSI Thresholds				
	12-month Running Total Inflow (acre-ft)	12-month Running Average PDSI	Percentile	POD	SR
D12	36,300	0.06	22nd	72%	70%
D13	33,000	0.71	19th	64%	64%
	33,000	1.04	20th	64%	64%
	33,000	1.34	20th	64%	63%
	36,300	-0.29	20th	72%	71%
	39,700	-0.78	20th	70%	69%
	72,200	-1.66	20th	68%	67%
	79,200	-1.66	20th	68%	67%
	85,500	-1.66	20th	68%	67%
	96,200	-1.66	20th	68%	67%
D14	33,000	-0.12	18th	68%	66%
	36,300	-0.78	17th	68%	68%
D15	28,600	-0.49	12th	65%	65%
	44,000	-2.13	12th	60%	60%
	48,500	-2.13	12th	60%	59%

Conclusions

This section began with 219 potential inflow-PDSI thresholds under consideration. Through calculation of each threshold's MSE and Conditional Probability, 16 of the 219 thresholds were selected as optimal in terms of their ability to predict observed, historical conditions as defined by their respective drought scenarios being tested (recall that one threshold was selected from Table 27 and 15 thresholds were selected from Table 31). Recognizing that future droughts can manifest in any of these six forms[6], an important consideration is not just how these thresholds can predict the specific drought being tested, but how it can predict any of the six droughts. For this reason, the term *optimal threshold* was refined by identifying each threshold's minimum MSE, maximum POD and maximum SR associated with *any* of the six drought scenarios under consideration (Table 32). Upon examining the 16 thresholds, it was evident that they can be placed into three groups based on the range of occurrence frequencies shared among groups. Group I was comprised of three thresholds that occurred at the 12th percentile; Group II was comprised of 12 thresholds that occurred between the 17th and 22nd percentile; and Group III was comprised of one threshold that existed at the 36th percentile (Table 32). As a practical matter in terms of the resources needed to model these thresholds and interpret results, the number of thresholds must still be narrowed down further, ideally to a range of three or four thresholds that occur within a low, middle, and high relative occurrence frequency. Selecting at least one representative threshold within each group would avoid redundant and superfluous modeling and results, while still providing stakeholders with a broad range of curtailment options from which to choose[7] depending on how those curtailment options affect water availability in the reservoirs and within the basin as a whole.

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[6] It is recognized that drought can come in any form, not just the six scenarios under consideration here; but drought must be defined in specific terms for the purposes of analysis.

[7] Water availability results are provided in Chapter 8 of the URRBS report. This study did not select or otherwise recommend which curtailment options should be implemented. Any potential recommendations and/or decisions would be made by the OWRB and in coordination with stakeholders upon the completion of this study.

To make this selection, a further examination of the results in Table 32 was required. In addition to selecting thresholds that existed across a range of occurrence frequencies, preferable thresholds were those that minimized overall prediction errors (i.e., have the lowest MSE) and maximized POD and/or SR *within each group*, while also encompassing a high-, middle-, and low- range of inflow and PDSI values *across all three groups*. On the latter criterion, it was determined that PDSI values greater than 0.49 would not be considered, regardless of their MSE, POD, or SR. This was because PDSI values greater than 0.49 are considered to be wet (i.e. non-drought) conditions according to the Palmer Drought Index Categories (Palmer, 1965).

Of the three thresholds within Group I (12th percentile), the threshold, **Inflow ≤ 28,600 acre-ft and PDSI ≤ -0.49**, had the lowest MSE (0.41) and the highest POD (65 percent), so it was selected the preferred threshold within Group I (Table 32). Of the 12 thresholds within Group II (17th-22nd percentile), the threshold, **Inflow ≤ 72,200 acre-ft and PDSI ≤ -1.66**, had the highest SR along with three other thresholds within that group (all four at 91 percent), yet it had the lowest Inflow of the four thresholds (Table 32). All else being equal (which is the case here), a lower inflow threshold was preferred to a higher inflow threshold because a lower threshold would reduce the frequency of curtailments without sacrificing predictive performance. Therefore, it was selected as a preferred threshold within Group II. Another preferred threshold within this group was, **Inflow ≤ 39,700 acre-ft and PDSI ≤ -0.78**. This was because POD and SR were nearly the same (81 and 84 percent, respectively), thereby offering a balanced approach such that a gain in either POD or SR was not selected at the expense of the other (Table 32). Finally, Group III (36th percentile) had only one threshold from which to choose, **Inflow ≤ 58,300 acre-ft and PDSI ≤ -0.12**, so it was selected as the sole representative of Group III (Table 32). This threshold had the lowest MSE (0.31) and highest POD (94 percent) of all 16 thresholds. An illustration of how the inflow and PDSI values of these four threshold selections compared to the other 13 thresholds is provided in Figure 42. In effect, these four thresholds represent a "Medium Inflow-Highest PDSI" option; a "Highest Inflow-

Lowest PDSI" option; and a "Medium Inflow-Medium PDSI" option; and a "Lowest Inflow-Medium PDSI" option (Table 33). In the next section (Part VI), these thresholds were combined with reservoir storage and timing thresholds to formulate a final range of Stream-Water Management Alternatives.

One final note regarding the occurrence frequency of these four thresholds. It should be recognized that the thresholds were reached at the 36th, 20th, and 12th percentiles when considering *all 1,081 months on record.* These frequencies changed slightly if one considers whether the threshold was reached in any given month out of the year (Table 34). For example, although the threshold, Inflow ≤ 58,300 acre-ft and PDSI ≤ -0.12 was reached 36 percent of all 1,081 months, it was reached in 40 percent of all Januarys, 38 percent of all Februarys, and so forth (Table 34). However, while the threshold would be reached 36 percent of all months, this does not mean a curtailment event would occur in 40 percent of all Januarys and 38 percent of all Februarys. Rather, the frequency of threshold occurrence by month depends on which month a curtailment event was *initiated*; in other words, just because a threshold was reached in a particular month, this does not mean that a curtailment would necessarily occur.

Another important factor is reservoir storage. When reservoir storage thresholds were combined with inflow and PDSI thresholds, the occurrence frequency of curtailments changed substantially. An in depth analysis on reservoir storage thresholds and curtailment timing is discussed in the next section, Part IV.

Table 32. Minimum MSE, maximum POD, and maximum SR corresponding to 16 inflow-PDSI thresholds that are grouped by frequency of occurrence (percentile) over the period of record, 1926-2016. The three thresholds selected to be included as part of the Curtailment Alternatives are denoted by gray shading.

	Summary of Threshold Performance					
	12-month Running Total Inflow (acre-ft)	12-month Running Average PDSI	Percentile	Minimum MSE for all Drought Scenarios	Maximum POD for all Drought Scenarios	Maximum SR for all Drought Scenarios
Group I	28,600	-0.49	12th	0.41	65%	85%
	44,000	-2.13	12th	0.44	60%	92%
	48,500	-2.13	12th	0.44	60%	92%
Group II	36,300	-0.78	17th	0.40	79%	83%
	33,000	-0.12	18th	0.39	75%	77%
	33,000	0.71	19th	0.38	75%	75%
	39,700	-0.78	20th	0.40	81%	84%
	33,000	1.04	20th	0.37	75%	75%
	72,200	-1.66	20th	0.41	76%	91%
	33,000	1.34	20th	0.37	75%	74%
	79,200	-1.66	20th	0.41	76%	91%
	85,500	-1.66	20th	0.41	76%	91%
	96,200	-1.66	20th	0.41	76%	91%
	36,300	-0.29	20th	0.38	83%	79%
	36,300	0.06	22nd	0.37	85%	76%
Group III	58,200	-0.12	36th	0.31	94%	76%

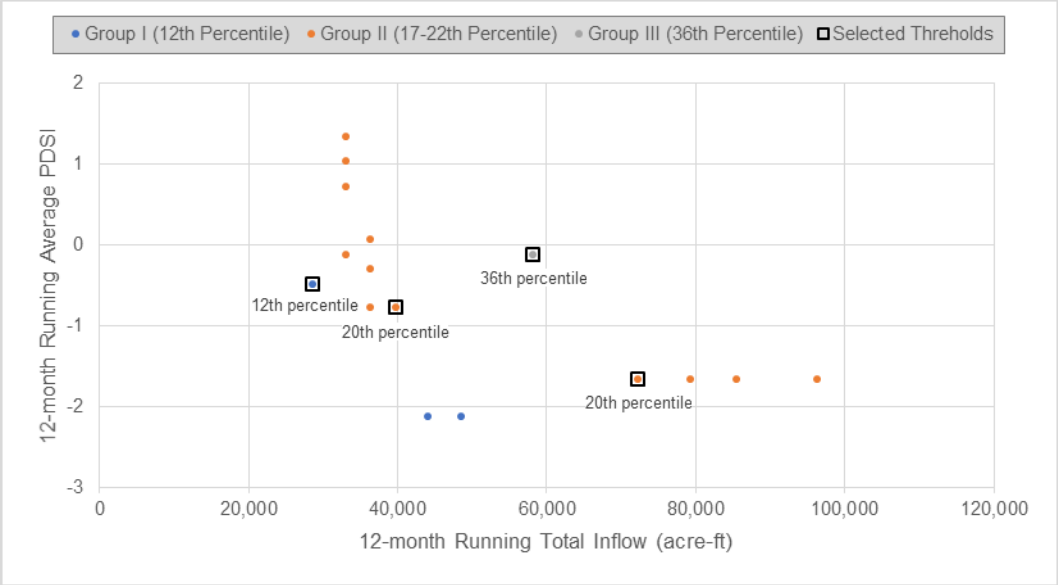

Figure 42. Inflow and PDSI values corresponding to 16 thresholds that are grouped by frequency of occurrence (percentile) over the period of record, 1926-2016. The four thresholds selected to be included as part of the Curtailment Alternatives are denoted by black squares.

Table 33. Summary of proposed inflow-PDSI thresholds to include as part of Curtailment Alternatives.

Alternatives Considered	12-month Running Total Inflow (acre-ft)	12-month Running Average PDSI	Threshold Occurrence (percentile)
Medium Inflow – Highest PDSI	58,200	-0.12	36th
Highest Inflow – Lowest PDSI	72,200	-1.66	20th
Medium Inflow – Medium PDSI	39,700	-0.78	20th
Lowest Inflow – Medium PDSI	28,600	-0.49	12th

Table 34. Percent of months that four proposed inflow-PDSI thresholds are reached over the period of record.

	Inflow-PDSI			
Inflow	≤ 58,200	≤ 72,200	≤ 39,700	≤ 28,600
PDSI	≤ -0.12	≤ -1.66	≤ -0.78	≤ -0.49
Percent of all Months	36	20	20	12
Percent of all Januarys	40	19	23	12
Percent of all Februarys	38	21	21	11
Percent of all Marchs	37	19	21	11
Percent of all Aprils	33	18	16	11
Percent of all Mays	31	17	14	9
Percent of all Junes	30	17	14	9
Percent of all Julys	32	19	17	11
Percent of all Augusts	36	18	20	14
Percent of all Septembers	36	20	20	14
Percent of all Octobers	40	23	22	13
Percent of all Novembers	38	22	22	13
Percent of all Decembers	40	22	23	13

PART VI: FORMULATION OF STREAM-WATER RIGHTS MANAGEMENT ALTERNATIVES

The analysis thus far has culminated in the selection of preferred inflow-PDSI thresholds. The next step was to consider other important factors, such as conditions at the reservoir itself and the timing of curtailments. Recall again that the goal of this effort was to identify and evaluate a range of pre-determined "triggers" (thresholds) to curtail junior surface water rights during droughts to protect reservoir storage, but in a manner that maximizes overall beneficial use of water within the basin. These "triggers" are henceforth referred to as Stream-Water Management Alternatives. In this section, conclusions derived through Parts I-V were used to formulate a range of Stream-Water Management Alternatives. The impacts of these Alternatives on permit availability, permit dependability, reservoir yield, etc. were be evaluated in Chapter 8 of the URRBS report, Water Supply Availability Analysis, where they were compared against impacts of a status quo future where no Stream-Water Management Alternatives were implemented.

Recall that Part III of this analysis discussed how Stream-Water Management Alternatives should be based on a combination of one or more LDIs and RDIs to allow for monitoring/detecting conditions directly at the reservoir and across the basin as a whole, respectively. The two LDIs selected were: (1) Inflow into Tom Steed Reservoir and (2) Tom Steed Reservoir storage. The RDI selected was PDSI.

Inflow-PDSI Thresholds

As demonstrated in Part III, combining inflow and PDSI improved performance relative to using each indicator alone to predict drought. Parts IV and V demonstrated that four inflow-PDSI threshold combinations were preferred:

1. Inflow ≤ 58,300 acre-ft and PDSI ≤ -0.12
2. Inflow ≤ 72,200 acre-ft and PDSI ≤ -1.66
3. Inflow ≤ 39,700 acre-ft and PDSI ≤ -0.78
4. Inflow ≤ 28,600 acre-ft and PDSI ≤ -0.49

Reservoir Storage Thresholds

Consideration was given towards conducting statistical analyses, similar to that used to select inflow-PDSI thresholds, to identify preferred Tom Steed Reservoir storage thresholds. However, while the idea of using reservoir storage to predict droughts seems rather straightforward in concept, it is complicated by factors such as losses from sedimentation, evaporation, and changing demands on the reservoir over time. Further complicating the matter is the diversity of opinions surrounding the extent to which changing storage conditions reflect the occurrence of drought. For example, some believe that a drop in conservation pool storage, however small, constitutes the onset of a drought, and that the duration of the drought is subsequently defined as the time between which the reservoir dropped below conservation pool to the time when the reservoir filled back up to conservation pool. For these reasons, an in-depth analysis on predictive performance of reservoir storage was not performed; rather, a broad range of reservoir storage conditions was selected as thresholds to consider in combination with inflow and PDSI. For each of the four inflow-PDSI thresholds selected, the impacts of curtailments would be evaluated when reservoir storage was < 100 percent full to zero percent full, and every 10 percent increment in between (e.g., ≤ 90 percent, ≤ 80 percent, ≤ 70 percent, ≤ 60 percent, etc.).

Formulating Stream-Water Management Alternatives in this manner was essentially using statistics on predictive performance to constrain the range of inflow and PDSI conditions considered, yet it avoided constraining the range of reservoir storage conditions considered, which arguably is the most important (but complicated) indicator of a hydrologic drought in the context of this basin study. In doing so, it would result in a final range of Stream-Water Management Alternatives that was comprehensive yet not overwhelming for water managers and decision-makers. As a baseline by which to compare, reservoir storage alone also was evaluated.

Overall, ten reservoir storage thresholds were selected, ranging from < 100 percent to zero percent full, with each 10 percent increment in between. The occurrence frequency of these ten reservoir storage thresholds both alone and when combined with the four inflow-PDSI thresholds is provided in Table 35 and illustrated in Figure 43. Without considering inflow and PDSI, reservoir storage was < 100 percent full 83 percent of the time (i.e., the reservoir was full 17 percent of the time), meaning that if curtailments were triggered based on storage alone, when the reservoir drops below conservation pool, those curtailments would occur 83 percent of the time based off the period of record. However, if curtailments were triggered based on all three indicators (storage, inflow, and PDSI), then curtailment frequency would never exceed 36 percent, 20 percent, and 12 percent depending on the inflow-PDSI threshold selected (Table 35; Figure 43). When Tom Steed Reservoir storage was between 50 percent and 100 percent full, inflow and PDSI had a measurable influence on curtailment frequency. However, the influence of inflow and PDSI diminished as storage decreased (as denoted by the converging lines near 50 percent), and when reservoir storage dropped below 50 percent, storage alone became the dominant factor influencing curtailment frequency (Figure 43).

Table 35. Occurrence frequency (percentile) of a range of reservoir storage thresholds alone and when combined with four inflow-PDSI thresholds over the period of record, 1926-2016.

		Occurrence Frequency (Percentile)				
		Reservoir Storage Alone	Reservoir Storage Combined with Inflow-PDSI			
Inflow		-	≤ 58,200	≤ 72,200	≤ 39,700	≤ 28,600
PDSI		-	≤ -0.12	≤ -1.66	≤ -0.78	≤ -0.49
Reservoir Storage Thresholds						
Percent of Conservation Pool	Acre-Feet					
< 100%	88,880	83rd	36th	20th	20th	12th
≤ 90%	80,000	58th	33rd	19th	19th	12th
≤ 80%	71,000	40th	28th	18th	18th	12th
≤ 70%	62,000	26th	21st	16th	15th	11th
≤ 60%	53,000	16th	15th	12th	12th	9th
≤ 50%	44,000	8th	8th	7th	7th	6th
≤ 40%	36,000	5th	5th	5th	5th	5th
≤ 30%	27,000	3rd	3rd	3rd	3rd	3rd
≤ 20%	18,000	2nd	2nd	2nd	2nd	2nd
≤ 10%	9,000	1st	1st	1st	1st	1st

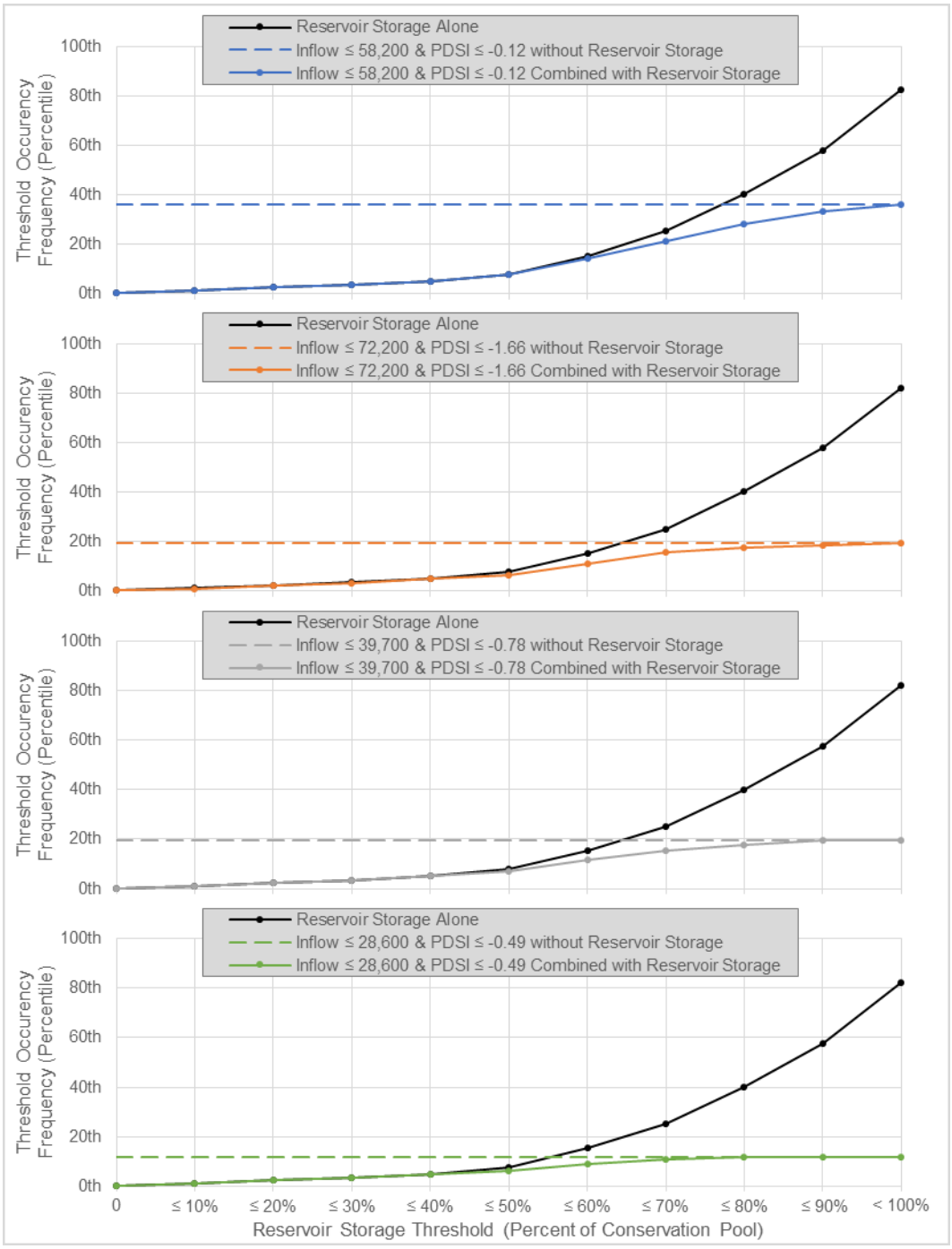

Figure 43. Occurrence frequency of a range of reservoir storage and inflow-PDSI thresholds alone and in combination over the period of record, 1926-2016.

Curtailment Timing Thresholds

Another consideration in formulating the range of Stream-Water Management Alternatives was "*timing*". The results presented thus far reflect the predictive performance of thresholds that have occurred for *all* months throughout the observed period of record. Timing is extremely important for senior and junior water right holders alike because uncertainty can complicate efforts to manage water supplies for intended beneficial uses. For example, farmers assess conditions and make purchases/decisions well in advance and throughout the irrigation season (May through September). This could be taken into consideration in the development of procedures that involve the curtailment of surface water rights. For this reason, inflow-PDSI thresholds were confined to individual months to test how this affects predictive performance. In effect, instead of establishing a curtailment threshold defined by an inflow $\leq x$ acre-ft, PDSI $\leq y$, and reservoir storage $\leq z$ percent full (regardless of the time of year), curtailments could be initiated only when the inflow, PDSI, and reservoir storage conditions were met during the month of – for example - *September*. The results of individual months can then be compared with results obtained in Part V and quantify the extent to which individual months may offer an advantage in terms of accurately predicting the onset/occurrence of drought and/or avoiding false-positive drought predictions. The results not only can help further formulate the Stream-Water Management Alternatives that were evaluated as part of the Water Supply Availability Analysis, but they can inform the degree of flexibility that could potentially be integrated into future curtailment procedures without sacrificing the assumed benefits gained by implementing curtailments in the first place.

Curtailment Frequency

First, this analysis focused on the extent to which initiating a curtailment event in any given month affected the frequency of overall curtailments over the

period of record. For example, looking at September and returning to Table 34, the threshold, Inflow ≤ 58,200 acre-ft and PDSI ≤ -0.12 was reached 36 percent of all Septembers. If September was selected as the month a curtailment event was *initiated*, then the proceeding months may or may not result in continued curtailments depending on whether the threshold continued to be met. In fact, if curtailments were initiated in September, taking into consideration the duration of the curtailments based on the length of time the threshold continues to be met, then curtailments would actually have occurred 26 percent of the time over the entire period of record (Table 36). Similarly, if curtailments were initiated in April (for example) for the same threshold, then curtailments would have occurred 18 percent of the time over the period of record (Table 36). The full range of curtailment percentages that resulted when initiating curtailments within one particular month of the year versus any month of the year for all four thresholds is presented in Table 36. A visual representation of when curtailments would be initiated and the frequency of those curtailments for each of the four proposed thresholds is provided in Figure 44 through Figure 47. These results showed that initiating curtailments between January and June resulted in slightly lower curtailment frequencies than initiating curtailments between July and December. This was because the onset of drought more often occurred between July and December, thus signaling the potential benefits of initiating curtailments in the latter part of the year. The impacts of curtailment initiation on the percentage of monthly curtailments throughout the year is presented in Appendix Table 104 through Table 107. The impacts of curtailment initiation on the number and duration of curtailment events is discussed next.

Table 36. Percent of all months that curtailments would occur over the period of record when initiating curtailments in one particular month of the year versus in any month of the year.

Curtailment Initiation	Inflow ≤ 58,200 PDSI ≤ -0.12	Inflow ≤ 72,200 PDSI ≤ -1.66	Inflow ≤ 39,700 PDSI ≤ -0.78	Inflow ≤ 28,600 PDSI ≤ -0.49
	Percent of all Months Curtailed			
Any Month	36	20	20	12
January Only	21	13	11	6
February Only	20	14	10	5
March Only	20	13	9	5
April Only	18	12	7	4
May Only	21	11	9	5
June Only	23	12	10	5
July Only	25	13	11	6
Aug Only	26	13	12	7
Sep Only	26	15	13	6
Oct Only	27	17	14	7
Nov Only	24	16	13	7
Dec Only	23	15	13	7

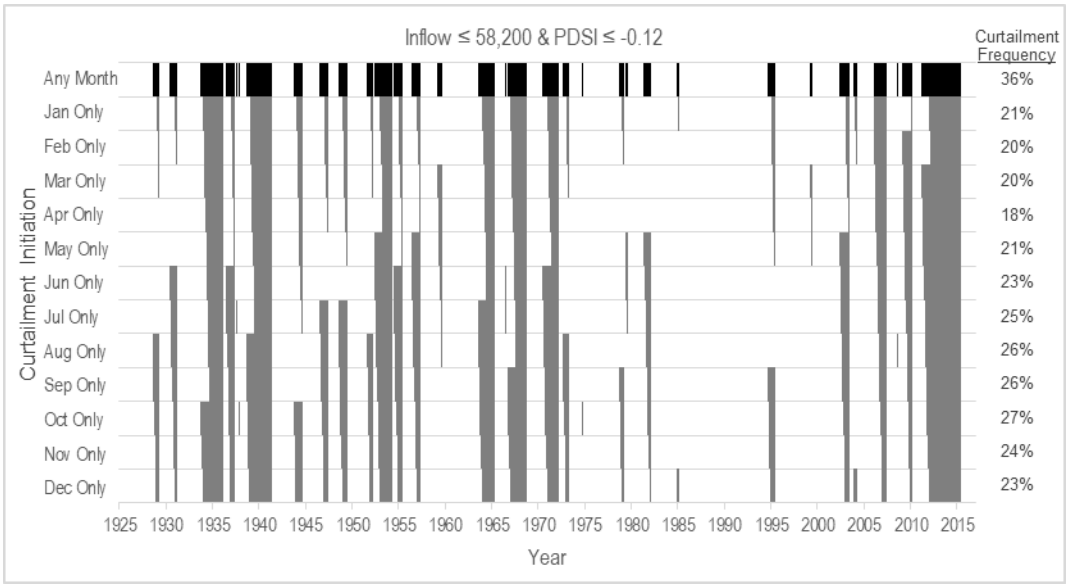

Figure 44. Curtailment initiation and frequency over the period of record when Inflow ≤ 58,200 acre-ft and PDSI ≤ -0.12 on any given month out of the year versus only in one particular month.

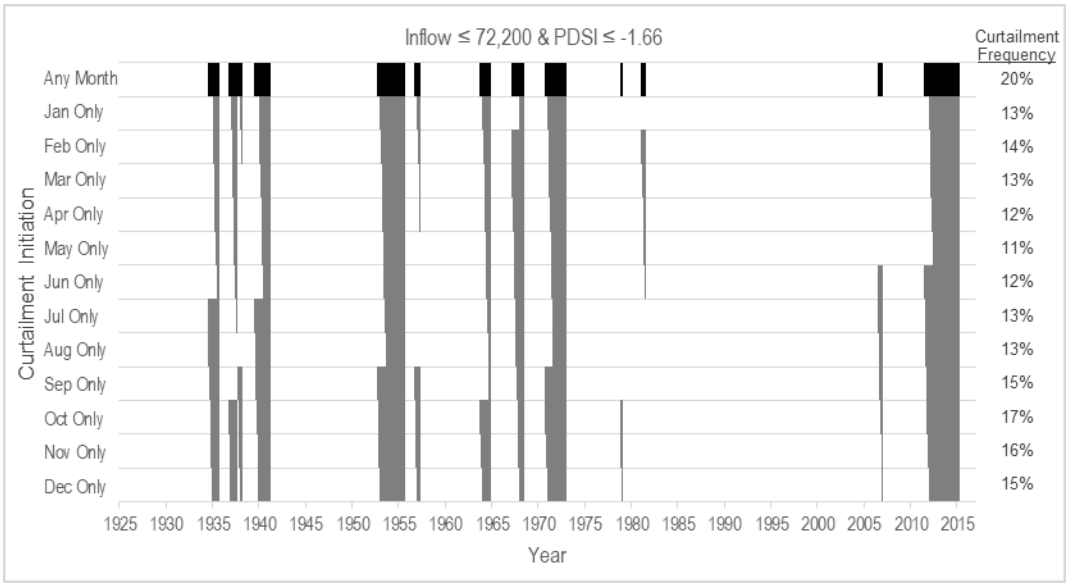

Figure 45. Curtailment initiation and frequency over the period of record when Inflow ≤ 72,200 acre-ft and PDSI ≤ -1.66 on any given month out of the year versus only in one particular month.

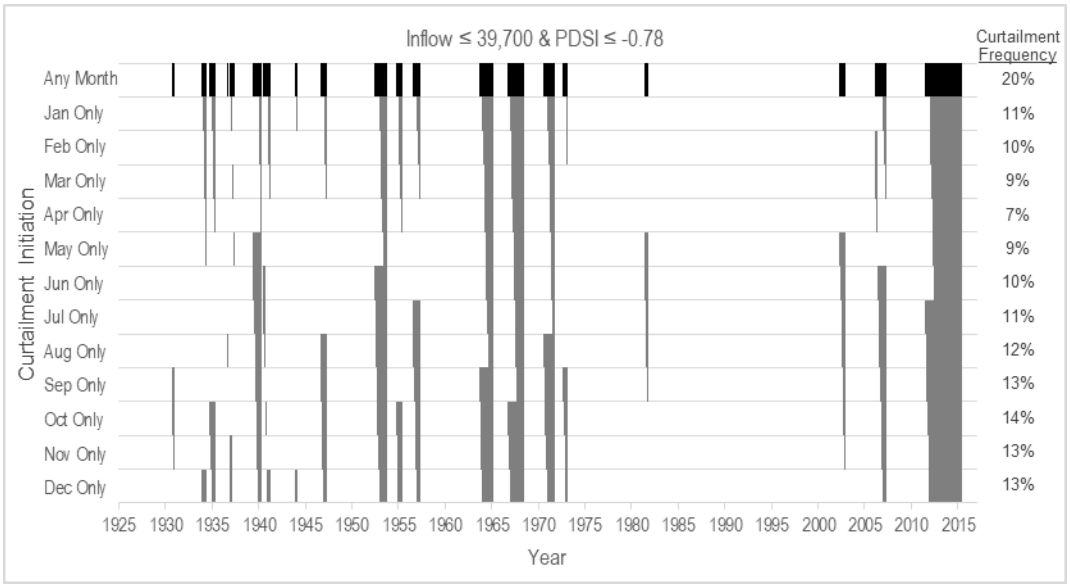

Figure 46. Curtailment initiation and frequency over the period of record when Inflow ≤ 39,700 acre-ft and PDSI ≤ -0.78 on any given month out of the year versus only in one particular month.

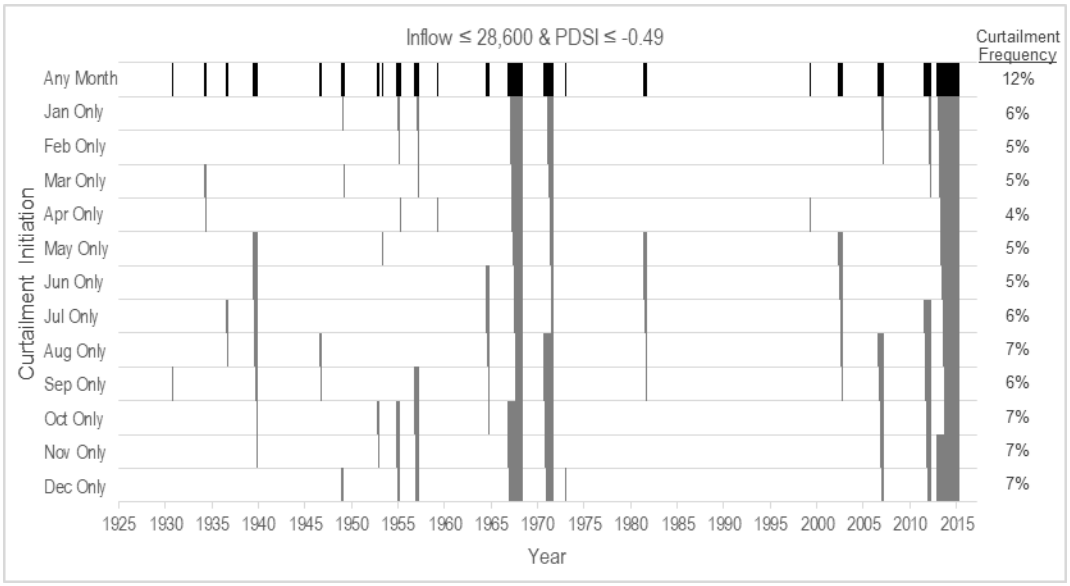

Figure 47. Curtailment initiation and frequency over the period of record when Inflow ≤ 28,600 acre-ft and PDSI ≤ -0.49 on any given month out of the year versus only in one particular month.

Curtailment Duration

In the previous section, the discussion centered on the impacts of curtailment timing on the frequency of curtailments in terms of the percent of months over the period of record that curtailments would occur. Next, this analysis considered the extent to which curtailment timing affected the number of discrete curtailment events and the duration of those events for each of the four thresholds (Table 37 through Table 40). Overall, the number and duration of curtailment events decreased when curtailment initiation was restricted to an individual month versus initiating in any month of the year. However, little to no differences existed when comparing the number and duration of curtailment events among individual months across all four thresholds, although shorter-duration curtailment events (one to six months) were generally more prevalent than longer-duration curtailment events [(longer than 24 months); (Table 37 through Table 40)]. Similarly, curtailment timing had little to no impact on the maximum curtailment duration (Table 41). That said, differences in curtailment events and duration did exist when comparing the four thresholds to one another. The highest threshold, Inflow $\leq$ 58,200 & PDSI $\leq$ -0.12, resulted in more curtailment events that were longer in duration relative to the lowest threshold, Inflow $\leq$ 28,600 & PDSI $\leq$ -0.49.

Table 37. Number and duration of curtailment events over the period of record when initiating a curtailment in any given month out of the year versus only in one particular month for the threshold, Inflow ≤ 58,200 acre-ft and PDSI ≤ -0.12.

Curtailment Initiation	Inflow ≤ 58,200 & PDSI ≤ -0.12					
	Number and Duration of Curtailment Events					Maximum Curtailment Duration (months)
	1 to 6 months	7 to 12 months	13 to 24 months	Longer than 24 months	Total	
Any Month	9	11	8	5	33	50
Jan Only	15	1	5	3	24	40
Feb Only	13	1	6	3	23	39
Mar Only	12	2	6	2	22	50
Apr Only	10	2	5	2	19	49
May Only	8	3	6	3	20	48
Jun Only	4	6	8	1	19	47
Jul Only	5	10	6	1	22	46
Aug Only	3	12	5	2	22	45
Sep Only	2	13	4	3	22	44
Oct Only	6	12	4	3	25	43
Nov Only	7	9	4	3	23	42
Dec Only	12	6	4	3	25	41

Table 38. Number and duration of curtailment events over the period of record when initiating a curtailment in any given month out of the year versus only in one particular month for the threshold, Inflow ≤ 72,200 acre-ft and PDSI ≤ -1.66.

Curtailment Initiation	Inflow ≤ 72,200 & PDSI ≤ -1.66					
	Number of Curtailment Events					Maximum Curtailment Duration (months)
	1 to 6 months	6 to 12 months	12 to 24 months	Longer than 24 months	Total	
Any Month	2	4	4	3	13	46
Jan Only	3	3	1	3	10	39
Feb Only	3	3	3	2	11	38
Mar Only	3	2	3	2	10	37
Apr Only	4	2	2	2	10	36
May Only	3	2	2	2	9	35
Jun Only	4	2	2	2	10	46
Jul Only	2	2	3	2	9	45
Aug Only	2	1	3	2	8	44
Sep Only	2	3	2	3	10	43
Oct Only	3	4	2	3	12	42
Nov Only	3	4	2	3	12	41
Dec Only	4	4	1	3	12	40

Table 39. Number and duration of curtailment events over the period of record when initiating a curtailment in any given month out of the year versus only in one particular month for the threshold, Inflow ≤ 39,700 acre-ft and PDSI ≤ -0.78.

Curtailment Initiation	Inflow ≤ 39,700 & PDSI ≤ -0.78					
	Number of Curtailment Events					Maximum Curtailment Duration (months)
	1 to 6 months	6 to 12 months	12 to 24 months	Longer than 24 months	Total	
Any Month	11	8	5	1	25	46
Jan Only	11	2	2	1	16	40
Feb Only	10	2	2	1	15	39
Mar Only	10	3	1	1	15	38
Apr Only	6	2	1	1	10	37
May Only	5	2	2	1	10	36
Jun Only	3	4	2	1	10	35
Jul Only	4	5	1	1	11	46
Aug Only	4	6	2	1	13	45
Sep Only	3	6	3	1	13	44
Oct Only	4	7	3	1	15	43
Nov Only	7	5	2	1	15	42
Dec Only	10	3	2	1	16	41

Table 40. Number and duration of curtailment events over the period of record when initiating a curtailment in any given month out of the year versus only in one particular month for the threshold, Inflow ≤ 28,600 acre-ft and PDSI ≤ -0.49.

Curtailment Initiation	Inflow ≤ 28,600 & PDSI ≤ -0.49					
	Number of Curtailment Events					Maximum Curtailment Duration (months)
	1 to 6 months	6 to 12 months	12 to 24 months	Longer than 24 months	Total	
Any Month	16	4	2	1	23	30
Jan Only	5	1	1	1	8	28
Feb Only	4	1	1	1	7	27
Mar Only	4	1	1	1	7	26
Apr Only	5	0	1	1	7	25
May Only	4	1	1	1	7	24
Jun Only	4	2	1	0	7	23
Jul Only	6	2	1	0	9	22
Aug Only	6	3	2	0	11	21
Sep Only	6	4	2	0	12	20
Oct Only	5	3	2	0	10	19
Nov Only	6	1	1	1	9	30
Dec Only	6	1	1	1	9	29

Table 41. Maximum duration of curtailment events over the period of record for all four threshold combinations when initiating a curtailment in any given month out of the year versus only in one particular month.

Curtailment Initiation	Maximum Duration of Curtailment Event (months)			
	Inflow ≤ 58,200 & PDSI ≤ -0.12	Inflow ≤ 72,200 & PDSI ≤ -1.66	Inflow ≤ 39,700 & PDSI ≤ -0.78	Inflow ≤ 28,600 & PDSI ≤ -0.49
Any Month	50	46	46	30
Jan Only	40	39	40	28
Feb Only	39	38	39	27
Mar Only	50	37	38	26
Apr Only	49	36	37	25
May Only	48	35	36	24
Jun Only	47	46	35	23
Jul Only	46	45	46	22
Aug Only	45	44	45	21
Sep Only	44	43	44	20
Oct Only	43	42	43	19
Nov Only	42	41	42	30
Dec Only	41	40	41	29

Threshold Timing Performance

Next, each month was examined to assess the extent to which initiating a curtailment in that month affected each threshold's performance at predicting historical, observed droughts. First, MSE scores are displayed for two timing conditions under all six drought scenarios: (1) "Baseline": conditions were at or below the inflow-PDSI thresholds during any month of the year; and (2) "Individual Month": conditions were at or below the inflow-PDSI thresholds during specific months (Table 42). MSE scores also were averaged for each month to facilitate interpretation of results. Months with lower MSEs relative to baseline are shaded in green, and months with MSE scores that were higher than the baseline are not shaded in green. Recall that a lower MSE score signifies better performance. Based on average MSE scores, with the exception of the threshold, Inflow ≤ 58,200 acre-ft and PDSI ≤ -0.12, individual months performed better than the baseline; however, no individual month stood out as a particularly strong performer relative to other months.

Next, POD and SR scores for individual month versus baseline conditions are displayed Table 43. Recall that a higher POD and SR score signified better performance. Relative to the baseline, in many cases, individual month POD increased while individual month SR decreased (and vice versa); therefore, to facilitate interpretation of results, POD and SR were combined together and a net change in combined POD-SR was tabulated for each month relative to the baseline. Months with positive net changes relative to baseline are shaded in green, and months with negative net changes relative to the baseline are not shaded in green. The net change ranged from a ten percent improvement in performance (October and November) to a 28 percent reduction in performance (April). Results varied among each of the four inflow-PDSI thresholds. September resulted in the most frequent performance improvements (a total of seven POD-SR net improvements), while October and November resulted in the highest net improvements of ten percent.

Table 42. Mean Squared Error under six drought scenarios when inflow-PDSI Thresholds are met during any month of the year (Baseline) or only during individual months. Months with lower MSEs relative to baseline are shaded in green, and months with MSE scores that are higher than the baseline are not shaded in green.

Drought Scenario	Baseline (Any Month)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	MSE for Threshold: Inflow ≤ 58,200 acre-ft and PDSI ≤ -0.12												
		MSE Score (Percent Change from Baseline)											
D3	0.33	0.33 (-1)	0.32 (-3)	0.31 (-6)	0.31 (-6)	0.32 (-4)	0.33 (-2)	0.33 (-1)	0.33 (0)	0.33 (-1)	0.33 (-1)	0.33 (-2)	0.33 (-2)
D6	0.31	0.3 (-5)	0.29 (-6)	0.29 (-6)	0.29 (-7)	0.3 (-5)	0.31 (-2)	0.3 (-3)	0.3 (-3)	0.3 (-3)	0.3 (-4)	0.3 (-4)	0.3 (-4)
D12	0.35	0.36 (2)	0.36 (2)	0.36 (1)	0.36 (2)	0.36 (3)	0.37 (4)	0.37 (5)	0.37 (4)	0.37 (4)	0.36 (2)	0.36 (3)	0.36 (3)
D13	0.35	0.37 (4)	0.36 (3)	0.36 (3)	0.36 (4)	0.37 (5)	0.37 (5)	0.37 (6)	0.37 (5)	0.37 (5)	0.36 (3)	0.37 (4)	0.37 (4)
D14	0.35	0.37 (5)	0.36 (5)	0.36 (4)	0.37 (5)	0.37 (5)	0.37 (6)	0.37 (6)	0.37 (6)	0.37 (6)	0.36 (5)	0.37 (5)	0.37 (6)
D15	0.34	0.37 (8)	0.37 (8)	0.36 (8)	0.37 (9)	0.36 (7)	0.36 (7)	0.36 (6)	0.36 (6)	0.36 (7)	0.36 (6)	0.36 (7)	0.37 (8)
Average	0.34	0.35 (2)	0.34 (2)	0.34 (1)	0.34 (1)	0.35 (2)	0.35 (3)	0.35 (3)	0.35 (3)	0.35 (3)	0.35 (2)	0.35 (2)	0.35 (3)
	MSE for Threshold: Inflow ≤ 72,200 acre-ft and PDSI ≤ -1.66												
		MSE Score (Percent Change from Baseline)											
D3	0.47	0.45 (-4)	0.46 (-3)	0.45 (-4)	0.45 (-6)	0.44 (-7)	0.44 (-7)	0.45 (-5)	0.44 (-6)	0.46 (-3)	0.46 (-3)	0.46 (-3)	0.46 (-3)
D6	0.41	0.38 (-7)	0.39 (-6)	0.38 (-7)	0.38 (-9)	0.37(-10)	0.38 (-9)	0.38 (-7)	0.38 (-8)	0.39 (-6)	0.4 (-4)	0.39 (-5)	0.39 (-6)
D12	0.56	0.56 (-1)	0.56 (-1)	0.56 (-1)	0.56 (-1)	0.55 (-1)	0.55 (-1)	0.55 (-1)	0.55 (-2)	0.56 (0)	0.56 (0)	0.56 (0)	0.56 (-1)
D13	0.57	0.57 (0)	0.57 (0)	0.57 (0)	0.57 (0)	0.57 (0)	0.57 (0)	0.57 (0)	0.57 (0)	0.58 (1)	0.57 (0)	0.57 (0)	0.57 (0)
D14	0.57	0.57 (1)	0.58 (1)	0.58 (1)	0.58 (1)	0.58 (1)	0.58 (1)	0.57 (0)	0.57 (1)	0.58 (2)	0.57 (0)	0.57 (0)	0.57 (0)
D15	0.57	0.58 (3)	0.59 (4)	0.59 (4)	0.59 (4)	0.59 (4)	0.58 (3)	0.58 (2)	0.58 (2)	0.58 (3)	0.57 (1)	0.57 (1)	0.58 (2)
Average	0.53	0.52 (-1)	0.52 (0)	0.52 (-1)	0.52 (-1)	0.52 (-2)	0.52 (-2)	0.52 (-2)	0.52 (-2)	0.52 (0)	0.52 (-1)	0.52 (-1)	0.52 (-1)
	MSE for Threshold: Inflow ≤39,700 acre-ft and PDSI ≤ -0.78												
		MSE Score (Percent Change from Baseline)											
D3	0.46	0.43 (-6)	0.43 (-6)	0.42 (-7)	0.42 (-9)	0.42 (-8)	0.42 (-7)	0.42 (-7)	0.43 (-6)	0.43 (-6)	0.44 (-3)	0.44 (-4)	0.44 (-5)
D6	0.40	0.36 (-9)	0.36 (-9)	0.36 (-10)	0.35 (-11)	0.36 (-9)	0.36 (-9)	0.36 (-9)	0.36 (-10)	0.36 (-10)	0.37 (-7)	0.37 (-8)	0.37 (-8)
D12	0.57	0.56 (-2)	0.56 (-3)	0.55 (-3)	0.55 (-4)	0.56 (-3)	0.56 (-3)	0.57 (-1)	0.57 (-1)	0.57 (0)	0.57 (0)	0.57 (-1)	0.56 (-2)
D13	0.57	0.57 (0)	0.57 (-1)	0.57 (-1)	0.57 (-1)	0.57 (-1)	0.57 (-1)	0.58 (1)	0.58 (1)	0.58 (1)	0.58 (1)	0.58 (1)	0.57 (0)
D14	0.57	0.58 (1)	0.58 (1)	0.58 (1)	0.58 (0)	0.57 (0)	0.57 (0)	0.58 (1)	0.58 (2)	0.58 (2)	0.59 (3)	0.58 (2)	0.58 (1)
D15	0.57	0.6 (4)	0.6 (4)	0.6 (4)	0.6 (5)	0.59 (3)	0.59 (2)	0.59 (2)	0.59 (3)	0.59 (3)	0.6 (5)	0.6 (4)	0.59 (4)
Average	0.52	0.52 (-1)	0.52 (-2)	0.51 (-2)	0.51 (-3)	0.51 (-3)	0.51 (-2)	0.52 (-2)	0.52 (-1)	0.52 (-1)	0.53 (0)	0.52 (-1)	0.52 (-1)
	MSE for Threshold: Inflow ≤ 28,600 acre-ft and PDSI ≤ -0.49												
		MSE Score (Percent Change from Baseline)											
D3	0.49	0.47 (-4)	0.47 (-5)	0.47 (-5)	0.46 (-6)	0.47 (-5)	0.47 (-5)	0.46 (-6)	0.47 (-6)	0.47 (-5)	0.48 (-4)	0.48 (-3)	0.48 (-3)
D6	0.42	0.39 (-7)	0.39 (-7)	0.38 (-7)	0.38 (-8)	0.39 (-6)	0.39 (-6)	0.39 (-5)	0.39 (-6)	0.38 (-8)	0.39 (-6)	0.39 (-5)	0.39 (-7)
D12	0.67	0.65 (-3)	0.64 (-4)	0.64 (-4)	0.64 (-5)	0.64 (-4)	0.64 (-4)	0.65 (-3)	0.64 (-4)	0.64 (-4)	0.65 (-2)	0.66 (-2)	0.65 (-2)
D13	0.68	0.67 (-2)	0.66 (-3)	0.66 (-3)	0.66 (-4)	0.66 (-4)	0.66 (-4)	0.66 (-3)	0.66 (-3)	0.66 (-3)	0.67 (-2)	0.68 (-1)	0.67 (-2)
D14	0.70	0.69 (-1)	0.68 (-2)	0.68 (-3)	0.67 (-3)	0.67 (-4)	0.67 (-3)	0.68 (-3)	0.68 (-3)	0.68 (-2)	0.69 (-1)	0.69 (0)	0.69 (-1)
D15	0.71	0.72 (1)	0.72 (1)	0.71 (0)	0.71 (0)	0.71 (-1)	0.71 (-1)	0.71 (-1)	0.71 (0)	0.71 (0)	0.72 (1)	0.72 (2)	0.72 (2)
Average	0.61	0.6 (-2)	0.59 (-3)	0.59 (-3)	0.59 (-4)	0.59 (-4)	0.59 (-4)	0.59 (-3)	0.59 (-3)	0.59 (-3)	0.6 (-2)	0.6 (-1)	0.6 (-2)

Table 43. Probability of Detection and Success Ratio under six drought scenarios when inflow-PDSI Thresholds are met during any month of the year (Baseline) or only during individual months. Months with positive net changes relative to baseline are shaded in green, and months with negative net changes relative to the baseline are not shaded in green.

Drought Scenario	POD / SR for Threshold: Inflow ≤ 58,200 acre-ft and PDSI ≤ -0.12 (Net change in POD and SR)												
	Baseline (Any Month)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
D3	59 / 71	41 / 82 (-8)	37 / 78 (-15)	33 / 72 (-26)	30 / 72 (-28)	36 / 75 (-19)	42 / 78 (-10)	44 / 78 (-8)	47 / 78 (-5)	47 / 77 (-6)	47 / 76 (-8)	44 / 78 (-9)	41 / 79 (-10)
D6	50 / 76	32 / 82 (-12)	30 / 80 (-17)	29 / 79 (-18)	27 / 81 (-18)	31 / 83 (-12)	37 / 87 (-3)	37 / 81 (-9)	38 / 80 (-9)	39 / 79 (-8)	38 / 78 (-11)	35 / 79 (-12)	34 / 81 (-12)
D12	85 / 52	59 / 61 (-17)	55 / 60 (-23)	53 / 59 (-25)	50 / 61 (-27)	60 / 64 (-13)	68 / 65 (-4)	75 / 67 (4)	75 / 64 (1)	75 / 63 (1)	71 / 59 (-8)	67 / 61 (-10)	64 / 62 (-11)
D13	89 / 48	64 / 58 (-15)	60 / 57 (-21)	59 / 56 (-22)	55 / 59 (-24)	65 / 61 (-12)	74 / 62 (-2)	79 / 62 (4)	80 / 59 (2)	81 / 59 (3)	76 / 56 (-5)	72 / 57 (-8)	69 / 59 (-9)
D14	90 / 43	67 / 54 (-12)	62 / 52 (-19)	60 / 51 (-22)	56 / 54 (-23)	66 / 54 (-13)	75 / 56 (-2)	80 / 56 (2)	82 / 54 (2)	85 / 56 (8)	81 / 52 (-1)	76 / 54 (-4)	73 / 55 (-6)
D15	94 / 31	75 / 42 (-8)	70 / 41 (-14)	66 / 39 (-20)	63 / 42 (-20)	66 / 38 (-21)	78 / 40 (-7)	78 / 38 (-8)	83 / 38 (-4)	90 / 41 (6)	86 / 39 (0)	82 / 40 (-3)	80 / 42 (-3)
Average	78 / 54	56 / 63 (-12)	52 / 61 (-18)	50 / 59 (-22)	47 / 61 (-23)	54 / 63 (-15)	62 / 65 (-5)	65 / 64 (-3)	67 / 62 (-2)	70 / 63 (0)	66 / 60 (-5)	62 / 61 (-8)	60 / 63 (-9)
Drought Scenario	POD / SR for Threshold: Inflow ≤ 72,200 acre-ft and PDSI ≤ -1.66 (Net change in POD and SR)												
	Baseline (Any Month)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
D3	40 / 87	29 / 93 (-5)	30 / 93 (-3)	28 / 93 (-6)	26 / 92 (-9)	24 / 92 (-11)	24 / 87 (-15)	28 / 89 (-10)	26 / 89 (-12)	32 / 89 (-6)	34 / 88 (-5)	32 / 89 (-5)	31 / 91 (-5)
D6	33 / 91	22 / 91 (-10)	24 / 92 (-8)	22 / 92 (-10)	21 / 92 (-11)	19 / 93 (-12)	20 / 91 (-13)	23 / 92 (-10)	21 / 91 (-12)	25 / 89 (-10)	28 / 90 (-7)	26 / 90 (-8)	24 / 90 (-9)
D12	63 / 72	48 / 79 (-9)	50 / 78 (-7)	47 / 79 (-9)	44 / 80 (-11)	41 / 82 (-12)	43 / 79 (-12)	46 / 77 (-12)	44 / 77 (-14)	54 / 78 (-3)	56 / 75 (-4)	53 / 76 (-6)	50 / 77 (-8)
D13	68 / 67	52 / 75 (-8)	55 / 76 (-5)	52 / 77 (-6)	49 / 78 (-9)	46 / 79 (-10)	48 / 77 (-10)	51 / 74 (-10)	50 / 76 (-10)	60 / 77 (1)	60 / 70 (-5)	58 / 72 (-6)	55 / 73 (-8)
D14	70 / 61	54 / 69 (-8)	58 / 70 (-3)	55 / 72 (-4)	52 / 73 (-6)	49 / 76 (-6)	52 / 74 (-5)	53 / 68 (-11)	51 / 70 (-10)	63 / 71 (3)	63 / 65 (-4)	60 / 66 (-6)	56 / 67 (-8)
D15	76 / 47	61 / 54 (-8)	67 / 57 (1)	63 / 58 (-2)	60 / 60 (-3)	58 / 62 (-3)	58 / 58 (-6)	58 / 52 (-12)	56 / 54 (-13)	69 / 54 (1)	68 / 49 (-5)	65 / 50 (-7)	63 / 52 (-8)
Average	58 / 71	44 / 77 (-8)	47 / 78 (-4)	44 / 79 (-6)	42 / 79 (-8)	39 / 81 (-9)	41 / 78 (-10)	43 / 75 (-11)	41 / 76 (-12)	51 / 76 (-2)	52 / 73 (-5)	49 / 74 (-6)	47 / 75 (-7)
Drought Scenario	POD / SR for Threshold: Inflow ≤39,700 acre-ft and PDSI ≤ -0.78 (Net change in POD and SR)												
	Baseline (Any Month)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
D3	36 / 81	22 / 85 (-10)	20 / 87 (-10)	18 / 88 (-11)	15 / 88 (-14)	16 / 83 (-18)	19 / 83 (-14)	21 / 81 (-16)	22 / 80 (-15)	23 / 79 (-15)	27 / 83 (-7)	25 / 85 (-7)	24 / 84 (-9)
D6	30 / 84	17 / 84 (-13)	16 / 87 (-11)	14 / 89 (-11)	12 / 91 (-11)	15 / 92 (-7)	16 / 88 (-10)	17 / 84 (-13)	17 / 79 (-18)	18 / 77 (-19)	21 / 80 (-13)	19 / 81 (-13)	19 / 82 (-13)
D12	66 / 75	43 / 86 (-13)	39 / 87 (-16)	35 / 89 (-18)	31 / 95 (-16)	36 / 94 (-12)	39 / 87 (-15)	45 / 91 (-6)	47 / 87 (-8)	50 / 88 (-4)	54 / 86 (-1)	50 / 86 (-6)	47 / 83 (-11)
D13	70 / 69	47 / 83 (-9)	43 / 84 (-12)	39 / 87 (-13)	34 / 92 (-12)	39 / 87 (-13)	42 / 81 (-15)	49 / 87 (-3)	52 / 84 (-2)	53 / 82 (-4)	59 / 81 (1)	54 / 81 (-4)	51 / 79 (-8)
D14	71 / 63	49 / 77 (-7)	45 / 79 (-10)	41 / 82 (-11)	37 / 87 (-10)	39 / 77 (-17)	42 / 73 (-18)	49 / 76 (-8)	53 / 77 (-4)	55 / 75 (-3)	62 / 76 (4)	56 / 76 (-2)	54 / 74 (-6)
D15	81 / 50	62 / 68 (-1)	58 / 70 (-3)	52 / 73 (-5)	48 / 81 (-1)	48 / 67 (-16)	51 / 61 (-19)	55 / 60 (-16)	61 / 61 (-9)	64 / 61 (-6)	75 / 65 (10)	70 / 65 (5)	66 / 63 (-1)
Average	59 / 70	40 / 80 (-9)	37 / 82 (-10)	33 / 85 (-11)	29 / 89 (-11)	32 / 83 (-14)	35 / 79 (-15)	39 / 80 (-10)	42 / 78 (-9)	44 / 77 (-8)	50 / 79 (-1)	46 / 79 (-4)	44 / 78 (-8)
Drought Scenario	POD / SR for Threshold: Inflow ≤ 28,600 acre-ft and PDSI ≤ -0.49 (Net change in POD and SR)												
	Baseline (Any Month)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
D3	21 / 77	11 / 83 (-4)	10 / 84 (-4)	9 / 82 (-7)	8 / 79 (-11)	10 / 78 (-11)	9 / 79 (-10)	9 / 72 (-17)	11 / 69 (-18)	11 / 72 (-15)	13 / 79 (-6)	14 / 82 (-2)	13 / 82 (-3)
D6	18 / 80	9 / 79 (-9)	8 / 82 (-8)	7 / 82 (-8)	6 / 81 (-10)	9 / 88 (-1)	8 / 88 (-2)	9 / 88 (0)	10 / 81 (-7)	9 / 72 (-16)	10 / 76 (-11)	11 / 79 (-7)	9 / 76 (-12)
D12	45 / 84	25 / 97 (-8)	23 / 98 (-9)	20 / 96 (-13)	18 / 94 (-18)	23 / 93 (-14)	23 / 96 (-11)	24 / 97 (-9)	26 / 86 (-18)	25 / 88 (-16)	30 / 93 (-7)	31 / 95 (-4)	29 / 96 (-5)
D13	50 / 81	29 / 97 (-6)	26 / 98 (-7)	23 / 96 (-12)	21 / 94 (-17)	24 / 86 (-21)	24 / 91 (-16)	27 / 93 (-11)	30 / 86 (-16)	29 / 88 (-14)	34 / 93 (-4)	35 / 95 (-1)	33 / 96 (-3)
D14	54 / 78	33 / 97 (-3)	29 / 98 (-5)	26 / 96 (-10)	24 / 94 (-15)	25 / 81 (-26)	26 / 86 (-21)	28 / 87 (-18)	32 / 83 (-17)	33 / 88 (-11)	38 / 93 (-1)	40 / 95 (2)	37 / 96 (0)
D15	65 / 65	45 / 92 (7)	41 / 96 (7)	36 / 92 (-1)	34 / 94 (-2)	34 / 76 (-20)	34 / 79 (-17)	35 / 75 (-20)	41 / 74 (-15)	40 / 75 (-14)	48 / 83 (2)	52 / 87 (10)	49 / 89 (8)
Average	42 / 78	25 / 91 (-4)	23 / 93 (-5)	20 / 91 (-9)	19 / 89 (-12)	21 / 84 (-16)	21 / 86 (-13)	22 / 85 (-13)	25 / 80 (-15)	24 / 81 (-14)	29 / 86 (-5)	30 / 89 (-1)	28 / 89 (-2)

Conclusions

Although initiation of curtailments in a particular month versus any time of the year had little effect on the frequency of overall curtailments, as well as on the number and duration of curtailment events over the period of record, results did show a minor increase in curtailment frequency between July and December. This suggests potential benefits of initiating curtailments in the latter part of the year since as most observed droughts were detected as beginning in the latter part of the year. Despite some minor variations in impacts between triggering curtailments during any Individual Month versus Baseline conditions, overall, when comparing results across *all* inflow-PDSI thresholds and drought scenarios, results showed that constraining thresholds to any particular month would likely *not* have a measurable impact on the accuracy of predicting drought conditions. The overall similarity of predictive performance across timing conditions means that a higher degree of flexibility can be integrated into future curtailment procedures without sacrificing the assumed benefits gained by curtailments. This flexibility should consider the role that water supply risk and uncertainty play in water resources management and incorporate a monitoring and advanced warning process that gives water users sufficient time to plan and prepare ahead of a potential curtailment. Most water users in the basin are farmers, and farmers often make decisions on seed purchase, crop planting, whether or not to apply for crop insurance if applicable, etc.) during the winter prior to the next irrigation season. For this reason, in addition to a **Baseline** timing condition (which would allow curtailments to initiation anytime throughout the year), the month of **September** was selected as the month curtailments could be triggered when inflow, PDSI, and reservoir storage are at or below the thresholds previously identified. Specifically, September was selected because farmers assess conditions and make purchases/decisions well in advance and throughout the irrigation season (typically May through September) and this could be taken into consideration in the development of procedures that involve the curtailment of surface water rights.

Curtailment Types

A final consideration in formulating the range of Stream-Water Management Alternatives was the type of permits that would be curtailed. Two curtailment types were included into the formulation of Stream-Water Management Alternatives, and both carried forward to the water availability analysis as follows:

1. "All Permits": both existing junior stream permits and new[8] junior stream permits would be curtailed.
2. "Only New Permits": only new junior stream permits would be curtailed, meaning existing stream permits would be "grandfathered" into the management framework and exempt from curtailments.

For new stream permits, three scenarios were identified and listed below. Because the purpose of this TM was to describe the formulation of hydrologic thresholds, it was considered beyond the scope of this TM to include a description of the methods and assumptions used to derive the new permit scenario volumes listed below. A thorough description of those methods is provided in Chapter 6.4.4 in the URRBS report.

1. "Low" New Stream Permit Scenario – assumed 2,500 acre-ft/yr of new stream permits would be issued by OWRB in the Tom Steed Reservoir hydrologic basin, and that the full volume of those permits would diverted until the permits are curtailed when one or more of the previously-discussed hydrologic thresholds have been met.
2. "High" New Stream Permit Scenario – assumed 5,000 acre-ft/yr of new stream permits would be issued by OWRB in the Tom Steed Reservoir hydrologic basin, and that the full volume of those permits would diverted

[8] For the purposes of this analysis, "new" stream permits were defined as the cumulative volume of new permits issued by OWRB after the year 2009, which was the most recent existing permit issued by OWRB (Permit No. 20090008). The methods and assumptions used to derive the volume of new stream permits is explained in the URRBS report (Chapter 6.4.4).

until the permits are curtailed when one or more of the previously-discussed hydrologic thresholds have been met.

3. "Full" New Stream Permit Scenario – assumed the Tom Steed Reservoir hydrologic basin would be fully appropriated such that either 35,900 acre-ft/yr or 33,900 acre-ft/yr of new stream permits would be issued by OWRB in the Tom Steed Reservoir hydrologic basin, and that the full volume of those permits would be diverted until the permits are curtailed when one or more of the previously-discussed hydrologic thresholds have been met.

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APPENDIX

Appendix

Table 44. Occurrence (percentiles) and Event Probability of Drought Scenario 3 and Model Period A of combined inflow/PDSI thresholds over the period of record, Model Period A (1926-2016).

Occurrence of Threshold Combinations / EP of Drought Scenario 3, Model Period A			12-month Running Average PDSI Thresholds																			
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.97	0 / 0.93	0 / 0.91	0 / 0.88	0 / 0.85	0 / 0.82	0 / 0.78	0 / 0.75	0 / 0.73	0 / 0.71	0 / 0.69	0 / 0.67	0 / 0.64	0 / 0.61	0 / 0.56	0 / 0.52	0 / 0.47	-	-	-	-
	18,100	5th	0 / 0.96	1 / 0.91	2 / 0.88	3 / 0.85	4 / 0.82	4 / 0.78	4 / 0.73	4 / 0.7	4 / 0.68	5 / 0.66	5 / 0.63	5 / 0.62	5 / 0.59	5 / 0.55	5 / 0.51	5 / 0.46	-	-	-	-	-
	24,600	10th	0 / 0.96	2 / 0.9	4 / 0.87	6 / 0.83	7 / 0.79	8 / 0.75	8 / 0.7	8 / 0.67	9 / 0.65	10 / 0.62	10 / 0.6	10 / 0.58	10 / 0.55	10 / 0.51	10 / 0.47	-	-	-	-	-	-
	28,600	15th	0 / 0.95	3 / 0.89	5 / 0.86	7 / 0.82	9 / 0.78	11 / 0.74	11 / 0.69	12 / 0.65	13 / 0.63	14 / 0.6	14 / 0.58	15 / 0.56	15 / 0.53	15 / 0.49	15 / 0.45	-	-	-	-	-	-
	33,000	20th	0 / 0.95	3 / 0.88	5 / 0.84	8 / 0.81	11 / 0.76	13 / 0.72	14 / 0.66	15 / 0.63	16 / 0.6	18 / 0.58	19 / 0.56	19 / 0.53	19 / 0.51	20 / 0.47	-	-	-	-	-	-	-
	36,300	25th	0 / 0.94	4 / 0.87	7 / 0.83	10 / 0.79	13 / 0.75	15 / 0.7	17 / 0.65	19 / 0.61	20 / 0.59	22 / 0.56	23 / 0.54	23 / 0.52	24 / 0.49	24 / 0.45	-	-	-	-	-	-	-
	39,700	30th	0 / 0.94	4 / 0.86	8 / 0.82	12 / 0.78	14 / 0.73	17 / 0.69	20 / 0.63	21 / 0.59	23 / 0.57	26 / 0.54	27 / 0.52	28 / 0.5	28 / 0.47	-	-	-	-	-	-	-	-
	44,000	35th	0 / 0.94	4 / 0.85	8 / 0.81	12 / 0.76	15 / 0.71	19 / 0.66	21 / 0.61	24 / 0.57	27 / 0.54	29 / 0.52	30 / 0.5	32 / 0.47	32 / 0.45	-	-	-	-	-	-	-	-
	48,500	40th	0 / 0.93	4 / 0.84	8 / 0.79	12 / 0.75	16 / 0.69	19 / 0.64	22 / 0.58	25 / 0.55	27 / 0.52	30 / 0.5	32 / 0.47	34 / 0.45	-	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.92	5 / 0.82	9 / 0.77	13 / 0.72	17 / 0.66	20 / 0.61	24 / 0.55	27 / 0.51	30 / 0.48	32 / 0.46	35 / 0.44	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.91	5 / 0.81	9 / 0.76	14 / 0.7	18 / 0.65	22 / 0.59	26 / 0.53	29 / 0.49	33 / 0.47	36 / 0.44	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.9	5 / 0.79	10 / 0.73	14 / 0.68	19 / 0.62	23 / 0.56	27 / 0.5	31 / 0.46	34 / 0.44	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.9	5 / 0.78	10 / 0.72	15 / 0.66	19 / 0.6	24 / 0.54	28 / 0.48	32 / 0.44	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.89	5 / 0.76	10 / 0.7	15 / 0.64	20 / 0.57	25 / 0.52	29 / 0.45	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.87	5 / 0.73	10 / 0.66	15 / 0.6	20 / 0.54	25 / 0.48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.85	5 / 0.7	10 / 0.63	15 / 0.57	20 / 0.5	25 / 0.44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.82	5 / 0.65	10 / 0.57	15 / 0.51	20 / 0.44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.78	5 / 0.59	10 / 0.51	15 / 0.44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.73	5 / 0.52	10 / 0.44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 45. Occurrence (percentiles) and Event Probability of Drought Scenario 15 and Model Period A of combined inflow/PDSI thresholds over the period of record, Model Period A (1926-2016).

Occurrence of Threshold Combinations / EP of Drought Scenario 15, Model Period A			12-month Running Average PDSI Thresholds																			
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.97	0 / 0.91	0 / 0.87	0 / 0.83	0 / 0.77	0 / 0.71	0 / 0.64	0 / 0.59	0 / 0.55	0 / 0.52	0 / 0.48	0 / 0.46	0 / 0.42	0 / 0.37	0 / 0.31	0 / 0.27	0 / 0.22	0 / 0.16	-	-	-
	18,100	5th	0 / 0.93	1 / 0.8	2 / 0.72	3 / 0.64	4 / 0.56	4 / 0.48	4 / 0.39	4 / 0.34	4 / 0.31	5 / 0.28	5 / 0.26	5 / 0.24	5 / 0.21	5 / 0.18	5 / 0.14	-	-	-	-	-	-
	24,600	10th	0 / 0.88	2 / 0.68	4 / 0.58	6 / 0.49	7 / 0.41	8 / 0.33	8 / 0.26	8 / 0.22	9 / 0.2	10 / 0.18	10 / 0.16	10 / 0.14	10 / 0.13	-	-	-	-	-	-	-	-
	28,600	15th	0 / 0.84	3 / 0.6	5 / 0.49	7 / 0.4	9 / 0.32	11 / 0.26	11 / 0.2	12 / 0.16	13 / 0.15	14 / 0.13	-	-	-	-	-	-	-	-	-	-	-
	33,000	20th	0 / 0.77	3 / 0.5	5 / 0.39	8 / 0.31	11 / 0.24	13 / 0.19	14 / 0.14	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	36,300	25th	0 / 0.72	4 / 0.42	7 / 0.32	10 / 0.25	13 / 0.19	15 / 0.14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	39,700	30th	0 / 0.65	4 / 0.35	8 / 0.26	12 / 0.2	14 / 0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	44,000	35th	0 / 0.56	4 / 0.27	8 / 0.19	12 / 0.14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	48,500	40th	0 / 0.45	4 / 0.19	8 / 0.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 46. Occurrence (percentiles) and Event Probability of Drought Scenario 6 and Model Period D of combined inflow/PDSI thresholds over the period of record, Model Period A (1926-2016).

Occurrence of Threshold Combinations / EP of Drought Scenario 6, Model Period D			12-month Running Average PDSI Thresholds																			
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 1	0 / 1	0 / 0.99	0 / 0.99	0 / 0.98	0 / 0.97	0 / 0.96	0 / 0.95	0 / 0.94	0 / 0.93	0 / 0.92	0 / 0.91	0 / 0.89	0 / 0.87	0 / 0.83	-	-	-	-	-	-
	18,100	5th	0 / 1	1 / 0.99	2 / 0.99	3 / 0.99	4 / 0.98	4 / 0.97	4 / 0.96	4 / 0.95	4 / 0.94	5 / 0.93	5 / 0.91	5 / 0.9	5 / 0.88	5 / 0.86	5 / 0.82	-	-	-	-	-	-
	24,600	10th	0 / 1	2 / 0.99	4 / 0.99	6 / 0.99	7 / 0.98	8 / 0.97	8 / 0.95	8 / 0.94	9 / 0.93	10 / 0.92	10 / 0.91	10 / 0.9	10 / 0.88	10 / 0.85	10 / 0.81	-	-	-	-	-	-
	28,600	15th	0 / 1	3 / 0.99	5 / 0.99	7 / 0.99	9 / 0.98	11 / 0.97	11 / 0.95	12 / 0.94	13 / 0.93	14 / 0.92	14 / 0.91	15 / 0.9	15 / 0.88	15 / 0.85	-	-	-	-	-	-	-
	33,000	20th	0 / 1	3 / 0.99	5 / 0.99	8 / 0.99	11 / 0.98	13 / 0.97	14 / 0.95	15 / 0.94	16 / 0.93	18 / 0.92	19 / 0.9	19 / 0.89	19 / 0.87	20 / 0.84	-	-	-	-	-	-	-
	36,300	25th	0 / 1	4 / 0.99	7 / 0.99	10 / 0.98	13 / 0.98	15 / 0.97	17 / 0.95	19 / 0.94	20 / 0.93	22 / 0.91	23 / 0.9	23 / 0.89	24 / 0.87	24 / 0.84	-	-	-	-	-	-	-
	39,700	30th	0 / 1	4 / 0.99	8 / 0.99	12 / 0.98	14 / 0.98	17 / 0.97	20 / 0.95	21 / 0.94	23 / 0.92	26 / 0.91	27 / 0.9	28 / 0.89	28 / 0.87	28 / 0.83	-	-	-	-	-	-	-
	44,000	35th	0 / 1	4 / 0.99	8 / 0.99	12 / 0.98	15 / 0.98	19 / 0.96	21 / 0.95	24 / 0.93	27 / 0.92	29 / 0.91	30 / 0.9	32 / 0.88	32 / 0.86	33 / 0.83	-	-	-	-	-	-	-
	48,500	40th	0 / 1	4 / 0.99	8 / 0.99	12 / 0.98	16 / 0.97	19 / 0.96	22 / 0.95	25 / 0.93	27 / 0.92	30 / 0.91	32 / 0.89	34 / 0.88	36 / 0.86	37 / 0.82	-	-	-	-	-	-	-
	54,800	45th	0 / 1	5 / 0.99	9 / 0.99	13 / 0.98	17 / 0.97	20 / 0.96	24 / 0.94	27 / 0.93	30 / 0.92	32 / 0.9	35 / 0.89	37 / 0.87	39 / 0.85	41 / 0.82	-	-	-	-	-	-	-
	58,200	50th	0 / 1	5 / 0.99	9 / 0.99	14 / 0.98	18 / 0.97	22 / 0.96	26 / 0.94	29 / 0.93	33 / 0.91	36 / 0.9	39 / 0.88	41 / 0.87	43 / 0.85	45 / 0.81	-	-	-	-	-	-	-
	63,400	55th	0 / 1	5 / 0.99	10 / 0.99	14 / 0.98	19 / 0.97	23 / 0.96	27 / 0.94	31 / 0.92	34 / 0.91	38 / 0.9	41 / 0.88	44 / 0.87	46 / 0.84	-	-	-	-	-	-	-	-
	67,800	60th	0 / 1	5 / 0.99	10 / 0.99	15 / 0.98	19 / 0.97	24 / 0.96	28 / 0.94	32 / 0.92	36 / 0.91	39 / 0.89	43 / 0.88	46 / 0.86	49 / 0.84	-	-	-	-	-	-	-	-
	72,200	65th	0 / 1	5 / 0.99	10 / 0.99	15 / 0.98	20 / 0.97	25 / 0.96	29 / 0.94	33 / 0.92	37 / 0.9	41 / 0.89	45 / 0.87	49 / 0.86	52 / 0.83	-	-	-	-	-	-	-	-
	79,200	70th	0 / 1	5 / 0.99	10 / 0.99	15 / 0.98	20 / 0.97	25 / 0.95	29 / 0.93	33 / 0.91	38 / 0.9	42 / 0.88	46 / 0.87	50 / 0.85	54 / 0.82	-	-	-	-	-	-	-	-
	85,500	75th	0 / 1	5 / 0.99	10 / 0.99	15 / 0.98	20 / 0.97	25 / 0.95	29 / 0.93	34 / 0.91	38 / 0.89	42 / 0.88	47 / 0.86	51 / 0.84	55 / 0.82	-	-	-	-	-	-	-	-
	96,200	80th	0 / 1	5 / 0.99	10 / 0.98	15 / 0.98	20 / 0.96	25 / 0.95	30 / 0.92	34 / 0.9	39 / 0.89	43 / 0.87	48 / 0.85	52 / 0.83	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 1	5 / 0.99	10 / 0.98	15 / 0.97	20 / 0.96	25 / 0.94	30 / 0.92	34 / 0.89	39 / 0.88	44 / 0.86	48 / 0.84	53 / 0.82	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 1	5 / 0.99	10 / 0.98	15 / 0.97	20 / 0.96	25 / 0.94	30 / 0.91	35 / 0.88	40 / 0.86	45 / 0.85	50 / 0.82	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 1	5 / 0.98	10 / 0.97	15 / 0.96	20 / 0.93	25 / 0.91	30 / 0.87	35 / 0.84	40 / 0.81	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	0 / 0.99	5 / 0.95	10 / 0.91	15 / 0.87	20 / 0.82	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 47. Occurrence (percentiles) and Event Probability of Drought Scenario 12 and Model Period D of combined inflow/PDSI thresholds over the period of record, Model Period A (1926-2016).

Occurrence of Threshold Combinations / EP of Drought Scenario 12, Model Period D			12-month Running Average PDSI Thresholds																			
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 1	0 / 1	0 / 0.99	0 / 0.96	0 / 0.91	0 / 0.81	0 / 0.64	0 / 0.49	0 / 0.4	0 / 0.31	0 / 0.24	0 / 0.19	0 / 0.13	-	-	-	-	-	-	-	-
	18,100	5th	0 / 1	1 / 0.98	2 / 0.94	3 / 0.85	4 / 0.68	4 / 0.47	4 / 0.26	4 / 0.17	4 / 0.12	-	-	-	-	-	-	-	-	-	-	-	-
	24,600	10th	0 / 1	2 / 0.95	4 / 0.85	6 / 0.68	7 / 0.45	8 / 0.26	8 / 0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	28,600	15th	0 / 1	3 / 0.91	5 / 0.77	7 / 0.55	9 / 0.32	11 / 0.16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	33,000	20th	0 / 0.99	3 / 0.85	5 / 0.63	8 / 0.39	11 / 0.19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	36,300	25th	0 / 0.99	4 / 0.77	7 / 0.51	10 / 0.28	13 / 0.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	39,700	30th	0 / 0.98	4 / 0.68	8 / 0.4	12 / 0.19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	44,000	35th	0 / 0.97	4 / 0.53	8 / 0.26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	48,500	40th	0 / 0.94	4 / 0.37	8 / 0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.87	5 / 0.19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.81	5 / 0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.66	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.51	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 48. Occurrence (percentiles) and Event Probability of Drought Scenario 13 and Model Period D of combined inflow/PDSI thresholds over the period of record, Model Period A (1926-2016).

Occurrence of Threshold Combinations / EP of Drought Scenario 13, Model Period D			12-month Running Average PDSI Thresholds																			
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 1	0 / 1	0 / 0.99	0 / 0.98	0 / 0.93	0 / 0.82	0 / 0.57	0 / 0.38	0 / 0.27	0 / 0.19	0 / 0.12	-	-	-	-	-	-	-	-	-	-
	18,100	5th	0 / 1	1 / 0.99	2 / 0.96	3 / 0.87	4 / 0.66	4 / 0.39	4 / 0.16	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	24,600	10th	0 / 1	2 / 0.97	4 / 0.89	6 / 0.68	7 / 0.38	8 / 0.16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	28,600	15th	0 / 1	3 / 0.95	5 / 0.79	7 / 0.51	9 / 0.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	33,000	20th	0 / 1	3 / 0.89	5 / 0.63	8 / 0.32	11 / 0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	36,300	25th	0 / 1	4 / 0.82	7 / 0.49	10 / 0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	39,700	30th	0 / 1	4 / 0.71	8 / 0.34	12 / 0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	44,000	35th	0 / 0.99	4 / 0.52	8 / 0.19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	48,500	40th	0 / 0.98	4 / 0.33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.93	5 / 0.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.88	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 49. Occurrence (percentiles) and Event Probability of Drought Scenario 14 and Model Period D of combined inflow/PDSI thresholds over the period of record, Model Period A (1926-2016).

Occurrence of Threshold Combinations / EP of Drought Scenario 14, Model Period D			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 1	0 / 0.99	0 / 0.96	0 / 0.89	0 / 0.77	0 / 0.6	0 / 0.38	0 / 0.26	0 / 0.2	0 / 0.15	0 / 0.11	0 / 0.09	-	-	-	-	-	-	-	-	-
	18,100	5th	0 / 1	1 / 0.94	2 / 0.84	3 / 0.66	4 / 0.44	4 / 0.26	4 / 0.13	4 / 0.08	-	-	-	-	-	-	-	-	-	-	-	-	-
	24,600	10th	0 / 0.99	2 / 0.86	4 / 0.68	6 / 0.45	7 / 0.25	8 / 0.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	28,600	15th	0 / 0.99	3 / 0.79	5 / 0.55	7 / 0.32	9 / 0.16	11 / 0.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	33,000	20th	0 / 0.98	3 / 0.67	5 / 0.4	8 / 0.21	11 / 0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	36,300	25th	0 / 0.97	4 / 0.56	7 / 0.3	10 / 0.14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	39,700	30th	0 / 0.95	4 / 0.45	8 / 0.22	12 / 0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	44,000	35th	0 / 0.92	4 / 0.32	8 / 0.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	48,500	40th	0 / 0.86	4 / 0.2	8 / 0.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.72	5 / 0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 50. Occurrence (percentiles) and Event Probability of Drought Scenario 15 and Model Period D of combined inflow/PDSI thresholds over the period of record, Model Period A (1926-2016).

Occurrence of Threshold Combinations / EP of Drought Scenario 15, Model Period D			12-month Running Average PDSI Thresholds																			
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 1	0 / 1	0 / 1	0 / 0.99	0 / 0.94	0 / 0.72	0 / 0.26	0 / 0.09	0 / 0.04	-	-	-	-	-	-	-	-	-	-	-	-
	18,100	5th	0 / 1	1 / 1	2 / 0.96	3 / 0.74	4 / 0.27	4 / 0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	24,600	10th	0 / 1	2 / 0.97	4 / 0.71	6 / 0.23	7 / 0.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	28,600	15th	0 / 1	3 / 0.88	5 / 0.38	7 / 0.07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	33,000	20th	0 / 1	3 / 0.61	5 / 0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	36,300	25th	0 / 1	4 / 0.33	7 / 0.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	39,700	30th	0 / 1	4 / 0.14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	44,000	35th	0 / 0.98	4 / 0.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	48,500	40th	0 / 0.91	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 51. Occurrence (percentiles) and Event Probability of Drought Scenario 6 and Model Period G of combined inflow/PDSI thresholds over the period of record, Model Period A (1926-2016).

Occurrence of Threshold Combinations / EP of Drought Scenario 6, Model Period G			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.98	0 / 0.96	0 / 0.95	0 / 0.94	0 / 0.92	0 / 0.91	0 / 0.89	0 / 0.88	0 / 0.87	0 / 0.86	0 / 0.85	0 / 0.84	0 / 0.83	0 / 0.81	0 / 0.79	0 / 0.76	0 / 0.74	0 / 0.69	0 / 0.64	-	-
	18,100	5th	0 / 0.97	1 / 0.94	2 / 0.93	3 / 0.91	4 / 0.9	4 / 0.88	4 / 0.86	4 / 0.84	4 / 0.83	5 / 0.82	5 / 0.8	5 / 0.79	5 / 0.78	5 / 0.76	5 / 0.73	5 / 0.7	5 / 0.67	5 / 0.62	-	-	-
	24,600	10th	0 / 0.97	2 / 0.93	4 / 0.92	6 / 0.9	7 / 0.88	8 / 0.86	8 / 0.83	8 / 0.81	9 / 0.8	10 / 0.79	10 / 0.77	10 / 0.76	10 / 0.74	10 / 0.72	10 / 0.69	10 / 0.66	10 / 0.63	-	-	-	-
	28,600	15th	0 / 0.96	3 / 0.93	5 / 0.91	7 / 0.89	9 / 0.86	11 / 0.84	11 / 0.81	12 / 0.79	13 / 0.78	14 / 0.77	14 / 0.75	15 / 0.74	15 / 0.72	15 / 0.7	15 / 0.67	15 / 0.64	15 / 0.6	-	-	-	-
	33,000	20th	0 / 0.96	3 / 0.92	5 / 0.89	8 / 0.87	11 / 0.85	13 / 0.82	14 / 0.79	15 / 0.77	16 / 0.76	18 / 0.74	19 / 0.73	19 / 0.71	19 / 0.69	20 / 0.67	20 / 0.64	20 / 0.61	-	-	-	-	-
	36,300	25th	0 / 0.95	4 / 0.91	7 / 0.89	10 / 0.86	13 / 0.84	15 / 0.81	17 / 0.78	19 / 0.75	20 / 0.74	22 / 0.72	23 / 0.71	23 / 0.69	24 / 0.67	24 / 0.65	24 / 0.61	-	-	-	-	-	-
	39,700	30th	0 / 0.95	4 / 0.9	8 / 0.88	12 / 0.85	14 / 0.82	17 / 0.79	20 / 0.76	21 / 0.74	23 / 0.72	26 / 0.7	27 / 0.69	28 / 0.67	28 / 0.65	28 / 0.62	29 / 0.59	-	-	-	-	-	-
	44,000	35th	0 / 0.94	4 / 0.89	8 / 0.86	12 / 0.83	15 / 0.8	19 / 0.77	21 / 0.74	24 / 0.71	27 / 0.69	29 / 0.68	30 / 0.66	32 / 0.65	32 / 0.62	33 / 0.59	-	-	-	-	-	-	-
	48,500	40th	0 / 0.93	4 / 0.87	8 / 0.84	12 / 0.81	16 / 0.78	19 / 0.75	22 / 0.71	25 / 0.68	27 / 0.67	30 / 0.65	32 / 0.63	34 / 0.61	36 / 0.59	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.92	5 / 0.85	9 / 0.82	13 / 0.79	17 / 0.75	20 / 0.71	24 / 0.67	27 / 0.64	30 / 0.62	32 / 0.6	-	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.92	5 / 0.84	9 / 0.8	14 / 0.77	18 / 0.73	22 / 0.69	26 / 0.65	29 / 0.62	33 / 0.6	-	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.9	5 / 0.82	10 / 0.78	14 / 0.74	19 / 0.7	23 / 0.66	27 / 0.61	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.89	5 / 0.8	10 / 0.76	15 / 0.72	19 / 0.67	24 / 0.63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.88	5 / 0.78	10 / 0.73	15 / 0.69	20 / 0.64	25 / 0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.85	5 / 0.74	10 / 0.69	15 / 0.64	20 / 0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.83	5 / 0.7	10 / 0.65	15 / 0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.78	5 / 0.64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.72	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 52. Occurrence (percentiles) and Event Probability of Drought Scenario 12 and Model Period G of combined inflow/PDSI thresholds over the period of record, Model Period A (1926-2016).

Occurrence of Threshold Combinations / EP of Drought Scenario 12, Model Period G			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.98	0 / 0.97	0 / 0.96	0 / 0.96	0 / 0.95	0 / 0.95	0 / 0.94	0 / 0.93	0 / 0.93	0 / 0.93	0 / 0.92	0 / 0.92	0 / 0.91	0 / 0.91	0 / 0.9	0 / 0.89	0 / 0.88	0 / 0.86	0 / 0.84	0 / 0.81	0 / 0.7
	18,100	5th	0 / 0.95	1 / 0.92	2 / 0.91	3 / 0.89	4 / 0.88	4 / 0.87	4 / 0.85	4 / 0.84	4 / 0.83	5 / 0.82	5 / 0.81	5 / 0.81	5 / 0.8	5 / 0.78	5 / 0.76	5 / 0.75	5 / 0.73	5 / 0.7	5 / 0.66	5 / 0.61	5 / 0.46
	24,600	10th	0 / 0.91	2 / 0.86	4 / 0.84	6 / 0.82	7 / 0.8	8 / 0.78	8 / 0.75	8 / 0.74	9 / 0.72	10 / 0.71	10 / 0.7	10 / 0.69	10 / 0.68	10 / 0.66	10 / 0.64	10 / 0.62	10 / 0.59	10 / 0.56	10 / 0.52	10 / 0.46	-
	28,600	15th	0 / 0.88	3 / 0.81	5 / 0.79	7 / 0.76	9 / 0.73	11 / 0.71	11 / 0.68	12 / 0.66	13 / 0.64	14 / 0.63	14 / 0.62	15 / 0.61	15 / 0.59	15 / 0.57	15 / 0.55	15 / 0.53	15 / 0.5	15 / 0.46	15 / 0.43	-	-
	33,000	20th	0 / 0.83	3 / 0.74	5 / 0.71	8 / 0.68	11 / 0.64	13 / 0.61	14 / 0.58	15 / 0.56	16 / 0.55	18 / 0.53	19 / 0.52	19 / 0.51	19 / 0.49	20 / 0.47	20 / 0.45	20 / 0.42	20 / 0.4	-	-	-	-
	36,300	25th	0 / 0.78	4 / 0.68	7 / 0.64	10 / 0.61	13 / 0.57	15 / 0.54	17 / 0.51	19 / 0.48	20 / 0.47	22 / 0.46	23 / 0.44	23 / 0.43	24 / 0.42	24 / 0.4	24 / 0.37	-	-	-	-	-	-
	39,700	30th	0 / 0.72	4 / 0.61	8 / 0.57	12 / 0.53	14 / 0.49	17 / 0.46	20 / 0.43	21 / 0.41	23 / 0.39	26 / 0.38	27 / 0.37	-	-	-	-	-	-	-	-	-	-
	44,000	35th	0 / 0.63	4 / 0.51	8 / 0.47	12 / 0.43	15 / 0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	48,500	40th	0 / 0.53	4 / 0.41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	58,200	50th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 53. Occurrence (percentiles) and Event Probability of Drought Scenario 13 and Model Period G of combined inflow/PDSI thresholds over the period of record, Model Period A (1926-2016).

Occurrence of Threshold Combinations / EP of Drought Scenario 13, Model Period G			12-month Running Average PDSI Thresholds																			
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.99	0 / 0.98	0 / 0.98	0 / 0.97	0 / 0.96	0 / 0.95	0 / 0.94	0 / 0.93	0 / 0.92	0 / 0.92	0 / 0.91	0 / 0.9	0 / 0.89	0 / 0.87	0 / 0.85	0 / 0.83	0 / 0.8	0 / 0.76	0 / 0.7	0 / 0.6	0 / 0.33
	18,100	5th	0 / 0.98	1 / 0.94	2 / 0.92	3 / 0.9	4 / 0.87	4 / 0.84	4 / 0.81	4 / 0.78	4 / 0.77	5 / 0.75	5 / 0.73	5 / 0.71	5 / 0.69	5 / 0.65	5 / 0.61	5 / 0.57	5 / 0.52	5 / 0.46	5 / 0.39	-	-
	24,600	10th	0 / 0.95	2 / 0.88	4 / 0.84	6 / 0.8	7 / 0.76	8 / 0.71	8 / 0.66	8 / 0.62	9 / 0.6	10 / 0.57	10 / 0.55	10 / 0.53	10 / 0.5	10 / 0.46	10 / 0.42	10 / 0.38	10 / 0.33	-	-	-	-
	28,600	15th	0 / 0.92	3 / 0.82	5 / 0.77	7 / 0.72	9 / 0.66	11 / 0.61	11 / 0.54	12 / 0.51	13 / 0.48	14 / 0.46	14 / 0.43	15 / 0.41	15 / 0.38	15 / 0.35	-	-	-	-	-	-	-
	33,000	20th	0 / 0.87	3 / 0.73	5 / 0.66	8 / 0.6	11 / 0.53	13 / 0.47	14 / 0.41	15 / 0.38	16 / 0.35	18 / 0.33	-	-	-	-	-	-	-	-	-	-	-
	36,300	25th	0 / 0.82	4 / 0.64	7 / 0.57	10 / 0.5	13 / 0.43	15 / 0.38	17 / 0.32	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	39,700	30th	0 / 0.75	4 / 0.55	8 / 0.47	12 / 0.4	14 / 0.34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	44,000	35th	0 / 0.64	4 / 0.42	8 / 0.34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	48,500	40th	0 / 0.51	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	58,200	50th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 54. Occurrence (percentiles) and Event Probability of Drought Scenario 14 and Model Period G of combined inflow/PDSI thresholds over the period of record, Model Period A (1926-2016).

Occurrence of Threshold Combinations / EP of Drought Scenario 14, Model Period G			12-month Running Average PDSI Thresholds																			
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.99	0 / 0.98	0 / 0.98	0 / 0.97	0 / 0.96	0 / 0.95	0 / 0.94	0 / 0.93	0 / 0.93	0 / 0.92	0 / 0.92	0 / 0.91	0 / 0.9	0 / 0.89	0 / 0.87	0 / 0.86	0 / 0.83	0 / 0.8	0 / 0.76	0 / 0.68	0 / 0.45
	18,100	5th	0 / 0.96	1 / 0.92	2 / 0.9	3 / 0.88	4 / 0.85	4 / 0.83	4 / 0.79	4 / 0.77	4 / 0.75	5 / 0.74	5 / 0.72	5 / 0.7	5 / 0.68	5 / 0.65	5 / 0.62	5 / 0.58	5 / 0.54	5 / 0.48	5 / 0.42	5 / 0.33	-
	24,600	10th	0 / 0.92	2 / 0.83	4 / 0.79	6 / 0.75	7 / 0.71	8 / 0.66	8 / 0.61	8 / 0.58	9 / 0.56	10 / 0.54	10 / 0.51	10 / 0.5	10 / 0.47	10 / 0.44	10 / 0.4	10 / 0.37	10 / 0.33	-	-	-	-
	28,600	15th	0 / 0.87	3 / 0.75	5 / 0.69	7 / 0.64	9 / 0.58	11 / 0.53	11 / 0.48	12 / 0.45	13 / 0.42	14 / 0.4	14 / 0.38	15 / 0.37	15 / 0.34	15 / 0.31	-	-	-	-	-	-	-
	33,000	20th	0 / 0.78	3 / 0.62	5 / 0.55	8 / 0.49	11 / 0.44	13 / 0.39	14 / 0.34	15 / 0.31	-	-	-	-	-	-	-	-	-	-	-	-	-
	36,300	25th	0 / 0.7	4 / 0.51	7 / 0.44	10 / 0.39	13 / 0.33	15 / 0.29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	39,700	30th	0 / 0.6	4 / 0.4	8 / 0.34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	44,000	35th	0 / 0.45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	48,500	40th	0 / 0.31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	54,800	45th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	58,200	50th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 55. Occurrence (percentiles) and Event Probability of Drought Scenario 15 and Model Period G of combined inflow/PDSI thresholds over the period of record, Model Period A (1926-2016).

Occurrence of Threshold Combinations / EP of Drought Scenario 15, Model Period G			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.97	0 / 0.96	0 / 0.95	0 / 0.94	0 / 0.93	0 / 0.92	0 / 0.91	0 / 0.9	0 / 0.9	0 / 0.89	0 / 0.89	0 / 0.88	0 / 0.88	0 / 0.87	0 / 0.85	0 / 0.84	0 / 0.83	0 / 0.8	0 / 0.78	0 / 0.73	0 / 0.59
	18,100	5th	0 / 0.87	1 / 0.8	2 / 0.78	3 / 0.75	4 / 0.72	4 / 0.69	4 / 0.66	4 / 0.64	4 / 0.63	5 / 0.61	5 / 0.6	5 / 0.59	5 / 0.57	5 / 0.55	5 / 0.53	5 / 0.5	5 / 0.48	5 / 0.44	5 / 0.4	5 / 0.34	5 / 0.22
	24,600	10th	0 / 0.72	2 / 0.6	4 / 0.56	6 / 0.52	7 / 0.48	8 / 0.45	8 / 0.42	8 / 0.39	9 / 0.38	10 / 0.37	10 / 0.35	10 / 0.34	10 / 0.33	10 / 0.31	10 / 0.29	10 / 0.27	10 / 0.25	10 / 0.22	-	-	-
	28,600	15th	0 / 0.58	3 / 0.45	5 / 0.41	7 / 0.37	9 / 0.34	11 / 0.31	11 / 0.28	12 / 0.26	13 / 0.25	14 / 0.24	14 / 0.23	15 / 0.22	-	-	-	-	-	-	-	-	-
	33,000	20th	0 / 0.41	3 / 0.29	5 / 0.26	8 / 0.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	36,300	25th	0 / 0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	39,700	30th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	44,000	35th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	48,500	40th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	54,800	45th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	58,200	50th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 56. Occurrence (percentiles) and MSE of Drought Scenario 3 of combined inflow/PDSI thresholds over the period of record, Model Period A (1926-2016).

Occurrence of Threshold Combinations / MSE of Drought Scenario 3			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.57	0 / 0.57	0 / 0.57	0 / 0.57	0 / 0.57	0 / 0.57	0 / 0.57	0 / 0.57	0 / 0.57	0 / 0.57	0 / 0.57	0 / 0.57	0 / 0.57	0 / 0.57	0 / 0.57	0 / 0.57	0 / 0.57	0 / 0.57	0 / 0.57	0 / 0.57	0 / 0.57	0 / 0.57
	18,100	5th	0 / 0.57	1 / 0.56	2 / 0.56	3 / 0.56	4 / 0.55	4 / 0.55	4 / 0.55	4 / 0.55	4 / 0.55	5 / 0.54	5 / 0.54	5 / 0.54	5 / 0.54	5 / 0.54	5 / 0.54	5 / 0.54	5 / 0.54	5 / 0.54	5 / 0.54	5 / 0.54	5 / 0.54	5 / 0.54
	24,600	10th	0 / 0.57	2 / 0.55	4 / 0.55	6 / 0.54	7 / 0.53	8 / 0.51	8 / 0.51	8 / 0.51	9 / 0.51	9 / 0.5	10 / 0.49	10 / 0.49	10 / 0.49	10 / 0.49	10 / 0.49	10 / 0.49	10 / 0.49	10 / 0.49	-	-	-
	28,600	15th	0 / 0.57	3 / 0.55	5 / 0.55	7 / 0.53	9 / 0.52	11 / 0.5	11 / 0.5	12 / 0.49	13 / 0.49	14 / 0.47	14 / 0.47	15 / 0.46	15 / 0.46	15 / 0.46	15 / 0.46	15 / 0.46	15 / 0.46	-	-	-	-
	33,000	20th	0 / 0.57	3 / 0.55	5 / 0.54	8 / 0.53	11 / 0.51	13 / 0.49	14 / 0.48	15 / 0.47	16 / 0.46	18 / 0.45	19 / 0.44	19 / 0.44	19 / 0.43	19 / 0.43	20 / 0.43	20 / 0.43	-	-	-	-	-
	36,300	25th	0 / 0.57	4 / 0.55	7 / 0.54	10 / 0.52	13 / 0.51	15 / 0.48	17 / 0.47	19 / 0.46	20 / 0.45	22 / 0.43	23 / 0.42	23 / 0.41	24 / 0.41	24 / 0.41	24 / 0.41	-	-	-	-	-	-
	39,700	30th	0 / 0.57	4 / 0.55	8 / 0.54	12 / 0.52	14 / 0.5	17 / 0.47	20 / 0.46	21 / 0.44	23 / 0.42	26 / 0.4	27 / 0.39	28 / 0.38	28 / 0.38	28 / 0.38	-	-	-	-	-	-	-
	44,000	35th	0 / 0.57	4 / 0.55	8 / 0.54	12 / 0.52	15 / 0.49	19 / 0.47	21 / 0.45	24 / 0.42	27 / 0.4	29 / 0.38	30 / 0.37	32 / 0.36	32 / 0.35	33 / 0.35	-	-	-	-	-	-	-
	48,500	40th	0 / 0.57	4 / 0.55	8 / 0.54	12 / 0.52	16 / 0.49	19 / 0.46	22 / 0.44	25 / 0.42	27 / 0.39	30 / 0.37	32 / 0.36	34 / 0.34	36 / 0.33	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.57	5 / 0.55	9 / 0.53	13 / 0.51	17 / 0.49	20 / 0.46	24 / 0.43	27 / 0.4	30 / 0.38	32 / 0.36	35 / 0.34	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.57	5 / 0.55	9 / 0.53	14 / 0.51	18 / 0.48	22 / 0.44	26 / 0.41	29 / 0.38	33 / 0.36	36 / 0.33	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.57	5 / 0.55	10 / 0.53	14 / 0.51	19 / 0.47	23 / 0.43	27 / 0.4	31 / 0.37	34 / 0.35	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.57	5 / 0.55	10 / 0.53	15 / 0.51	19 / 0.47	24 / 0.43	28 / 0.4	32 / 0.36	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.57	5 / 0.55	10 / 0.53	15 / 0.51	20 / 0.47	25 / 0.43	29 / 0.39	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.57	5 / 0.55	10 / 0.53	15 / 0.51	20 / 0.47	25 / 0.43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.57	5 / 0.55	10 / 0.53	15 / 0.51	20 / 0.47	25 / 0.42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.57	5 / 0.55	10 / 0.53	15 / 0.51	20 / 0.47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.57	5 / 0.55	10 / 0.53	15 / 0.51	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.57	5 / 0.55	10 / 0.53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.57	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 57. Occurrence (percentiles) and MSE of Drought Scenario 6 of combined inflow/PDSI thresholds over the period of record, Model Period A (1926-2016).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46
	18,100	5th	0 / 0.46	1 / 0.45	2 / 0.45	3 / 0.44	4 / 0.44	4 / 0.44	4 / 0.44	4 / 0.44	4 / 0.44	5 / 0.43	5 / 0.43	5 / 0.43	5 / 0.43	5 / 0.43	5 / 0.43	5 / 0.43	5 / 0.43	5 / 0.43	5 / 0.43	5 / 0.43	5 / 0.43	5 / 0.43
	24,600	10th	0 / 0.46	2 / 0.45	4 / 0.45	6 / 0.44	7 / 0.43	8 / 0.43	8 / 0.43	8 / 0.43	9 / 0.42	9 / 0.41	10 / 0.41	10 / 0.41	10 / 0.41	10 / 0.41	10 / 0.41	10 / 0.41	10 / 0.41	10 / 0.41	-	-	-
	28,600	15th	0 / 0.46	3 / 0.45	5 / 0.45	7 / 0.44	9 / 0.43	11 / 0.43	11 / 0.42	12 / 0.41	13 / 0.41	14 / 0.39	14 / 0.39	15 / 0.39	15 / 0.39	15 / 0.38	15 / 0.38	15 / 0.38	15 / 0.38	-	-	-	-
	33,000	20th	0 / 0.46	3 / 0.45	5 / 0.45	8 / 0.44	11 / 0.43	13 / 0.42	14 / 0.42	15 / 0.41	16 / 0.4	18 / 0.39	19 / 0.38	19 / 0.38	19 / 0.38	19 / 0.38	20 / 0.37	20 / 0.37	-	-	-	-	-
	36,300	25th	0 / 0.46	4 / 0.45	7 / 0.45	10 / 0.44	13 / 0.43	15 / 0.42	17 / 0.4	19 / 0.39	20 / 0.38	22 / 0.37	23 / 0.37	23 / 0.36	24 / 0.36	24 / 0.36	24 / 0.36	-	-	-	-	-	-
	39,700	30th	0 / 0.46	4 / 0.45	8 / 0.45	12 / 0.44	14 / 0.42	17 / 0.41	20 / 0.4	21 / 0.38	23 / 0.37	26 / 0.35	27 / 0.35	28 / 0.35	28 / 0.34	28 / 0.34	-	-	-	-	-	-	-
	44,000	35th	0 / 0.46	4 / 0.45	8 / 0.45	12 / 0.44	15 / 0.42	19 / 0.41	21 / 0.39	24 / 0.37	27 / 0.35	29 / 0.34	30 / 0.33	32 / 0.33	32 / 0.32	33 / 0.32	-	-	-	-	-	-	-
	48,500	40th	0 / 0.46	4 / 0.45	8 / 0.45	12 / 0.44	16 / 0.42	19 / 0.41	22 / 0.39	25 / 0.37	27 / 0.35	30 / 0.33	32 / 0.32	34 / 0.32	36 / 0.31	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.46	5 / 0.45	9 / 0.45	13 / 0.43	17 / 0.42	20 / 0.4	24 / 0.38	27 / 0.36	30 / 0.34	32 / 0.32	35 / 0.31	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.46	5 / 0.45	9 / 0.44	14 / 0.43	18 / 0.42	22 / 0.4	26 / 0.38	29 / 0.35	33 / 0.33	36 / 0.31	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.46	5 / 0.45	10 / 0.44	14 / 0.43	19 / 0.41	23 / 0.4	27 / 0.37	31 / 0.35	34 / 0.33	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.46	5 / 0.45	10 / 0.44	15 / 0.43	19 / 0.41	24 / 0.39	28 / 0.37	32 / 0.34	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.46	5 / 0.45	10 / 0.44	15 / 0.43	20 / 0.41	25 / 0.39	29 / 0.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.46	5 / 0.45	10 / 0.44	15 / 0.43	20 / 0.41	25 / 0.39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.46	5 / 0.45	10 / 0.44	15 / 0.43	20 / 0.41	25 / 0.39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.46	5 / 0.45	10 / 0.44	15 / 0.43	20 / 0.41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.46	5 / 0.45	10 / 0.44	15 / 0.43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.46	5 / 0.45	10 / 0.44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 58. Occurrence (percentiles) and MSE of Drought Scenario 12 of combined inflow/PDSI thresholds over the period of record, Model Period A (1926-2016).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.78	0 / 0.78	0 / 0.78	0 / 0.78	0 / 0.78	0 / 0.78	0 / 0.78	0 / 0.78	0 / 0.78	0 / 0.78	0 / 0.78	0 / 0.78	0 / 0.78	0 / 0.78	0 / 0.78	0 / 0.78	0 / 0.78	0 / 0.78	0 / 0.78	0 / 0.78	0 / 0.78	0 / 0.78
	18,100	5th	0 / 0.78	1 / 0.77	2 / 0.76	3 / 0.76	4 / 0.75	4 / 0.75	4 / 0.75	4 / 0.75	4 / 0.75	5 / 0.74	5 / 0.74	5 / 0.74	5 / 0.74	5 / 0.74	5 / 0.74	5 / 0.74	5 / 0.74	5 / 0.74	5 / 0.74	5 / 0.74	5 / 0.74
	24,600	10th	0 / 0.78	2 / 0.76	4 / 0.75	6 / 0.74	7 / 0.73	8 / 0.71	8 / 0.71	8 / 0.71	9 / 0.7	9 / 0.69	10 / 0.69	10 / 0.68	10 / 0.68	10 / 0.68	10 / 0.68	10 / 0.68	10 / 0.68	10 / 0.68	-	-	-
	28,600	15th	0 / 0.78	3 / 0.76	5 / 0.75	7 / 0.73	9 / 0.71	11 / 0.69	11 / 0.68	12 / 0.67	13 / 0.66	14 / 0.64	14 / 0.63	15 / 0.63	15 / 0.62	15 / 0.62	15 / 0.62	15 / 0.62	15 / 0.62	-	-	-	-
	33,000	20th	0 / 0.78	3 / 0.76	5 / 0.75	8 / 0.72	11 / 0.7	13 / 0.67	14 / 0.64	15 / 0.63	16 / 0.62	18 / 0.6	19 / 0.58	19 / 0.57	19 / 0.57	19 / 0.56	20 / 0.56	20 / 0.56	-	-	-	-	-
	36,300	25th	0 / 0.78	4 / 0.76	7 / 0.74	10 / 0.7	13 / 0.68	15 / 0.65	17 / 0.61	19 / 0.59	20 / 0.57	22 / 0.54	23 / 0.53	23 / 0.52	24 / 0.51	24 / 0.5	24 / 0.5	-	-	-	-	-	-
	39,700	30th	0 / 0.78	4 / 0.75	8 / 0.72	12 / 0.68	14 / 0.65	17 / 0.62	20 / 0.57	21 / 0.55	23 / 0.52	26 / 0.49	27 / 0.47	28 / 0.46	28 / 0.45	28 / 0.44	-	-	-	-	-	-	-
	44,000	35th	0 / 0.78	4 / 0.75	8 / 0.72	12 / 0.67	15 / 0.64	19 / 0.6	21 / 0.55	24 / 0.51	27 / 0.47	29 / 0.44	30 / 0.42	32 / 0.4	32 / 0.39	33 / 0.38	-	-	-	-	-	-	-
	48,500	40th	0 / 0.78	4 / 0.75	8 / 0.71	12 / 0.67	16 / 0.63	19 / 0.59	22 / 0.53	25 / 0.5	27 / 0.46	30 / 0.43	32 / 0.4	34 / 0.38	36 / 0.36	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.78	5 / 0.75	9 / 0.7	13 / 0.65	17 / 0.61	20 / 0.57	24 / 0.51	27 / 0.47	30 / 0.43	32 / 0.39	35 / 0.36	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.78	5 / 0.75	9 / 0.69	14 / 0.64	18 / 0.59	22 / 0.54	26 / 0.48	29 / 0.43	33 / 0.39	36 / 0.35	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.78	5 / 0.75	10 / 0.69	14 / 0.63	19 / 0.57	23 / 0.52	27 / 0.46	31 / 0.41	34 / 0.37	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.78	5 / 0.75	10 / 0.69	15 / 0.63	19 / 0.57	24 / 0.51	28 / 0.45	32 / 0.39	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.78	5 / 0.75	10 / 0.69	15 / 0.63	20 / 0.56	25 / 0.5	29 / 0.43	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.78	5 / 0.75	10 / 0.69	15 / 0.62	20 / 0.56	25 / 0.49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.78	5 / 0.75	10 / 0.69	15 / 0.62	20 / 0.56	25 / 0.49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.78	5 / 0.75	10 / 0.69	15 / 0.62	20 / 0.56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.78	5 / 0.75	10 / 0.69	15 / 0.62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.78	5 / 0.75	10 / 0.69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.78	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 59. Occurrence (percentiles) and MSE of Drought Scenario 13 of combined inflow/PDSI thresholds over the period of record, Model Period A (1926-2016).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.81	0 / 0.81	0 / 0.81	0 / 0.81	0 / 0.81	0 / 0.81	0 / 0.81	0 / 0.81	0 / 0.81	0 / 0.81	0 / 0.81	0 / 0.81	0 / 0.81	0 / 0.81	0 / 0.81	0 / 0.81	0 / 0.81	0 / 0.81	0 / 0.81	0 / 0.81	0 / 0.81	0 / 0.81
	18,100	5th	0 / 0.81	1 / 0.8	2 / 0.79	3 / 0.79	4 / 0.78	4 / 0.78	4 / 0.78	4 / 0.78	4 / 0.77	5 / 0.77	5 / 0.76	5 / 0.76	5 / 0.76	5 / 0.76	5 / 0.76	5 / 0.76	5 / 0.76	5 / 0.76	5 / 0.76	5 / 0.76	5 / 0.76
	24,600	10th	0 / 0.81	2 / 0.79	4 / 0.78	6 / 0.77	7 / 0.75	8 / 0.74	8 / 0.73	8 / 0.73	9 / 0.72	9 / 0.71	10 / 0.71	10 / 0.7	10 / 0.7	10 / 0.7	10 / 0.7	10 / 0.7	10 / 0.7	10 / 0.7	-	-	-
	28,600	15th	0 / 0.81	3 / 0.79	5 / 0.78	7 / 0.75	9 / 0.73	11 / 0.71	11 / 0.69	12 / 0.68	13 / 0.68	14 / 0.66	14 / 0.65	15 / 0.64	15 / 0.64	15 / 0.63	15 / 0.63	15 / 0.63	15 / 0.63	-	-	-	-
	33,000	20th	0 / 0.81	3 / 0.79	5 / 0.77	8 / 0.74	11 / 0.71	13 / 0.68	14 / 0.65	15 / 0.64	16 / 0.62	18 / 0.6	19 / 0.58	19 / 0.57	19 / 0.57	19 / 0.56	20 / 0.56	20 / 0.56	-	-	-	-	-
	36,300	25th	0 / 0.81	4 / 0.78	7 / 0.76	10 / 0.72	13 / 0.69	15 / 0.65	17 / 0.61	19 / 0.59	20 / 0.57	22 / 0.55	23 / 0.53	23 / 0.52	24 / 0.51	24 / 0.5	24 / 0.5	-	-	-	-	-	-
	39,700	30th	0 / 0.81	4 / 0.78	8 / 0.74	12 / 0.69	14 / 0.66	17 / 0.62	20 / 0.57	21 / 0.55	23 / 0.52	26 / 0.49	27 / 0.47	28 / 0.45	28 / 0.45	28 / 0.44	-	-	-	-	-	-	-
	44,000	35th	0 / 0.81	4 / 0.77	8 / 0.73	12 / 0.69	15 / 0.64	19 / 0.6	21 / 0.55	24 / 0.51	27 / 0.47	29 / 0.44	30 / 0.42	32 / 0.4	32 / 0.39	33 / 0.38	-	-	-	-	-	-	-
	48,500	40th	0 / 0.81	4 / 0.77	8 / 0.73	12 / 0.68	16 / 0.64	19 / 0.59	22 / 0.53	25 / 0.5	27 / 0.46	30 / 0.43	32 / 0.4	34 / 0.37	36 / 0.35	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.81	5 / 0.77	9 / 0.72	13 / 0.66	17 / 0.61	20 / 0.57	24 / 0.51	27 / 0.47	30 / 0.43	32 / 0.39	35 / 0.36	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.81	5 / 0.77	9 / 0.71	14 / 0.65	18 / 0.6	22 / 0.54	26 / 0.48	29 / 0.43	33 / 0.39	36 / 0.35	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.81	5 / 0.77	10 / 0.71	14 / 0.65	19 / 0.58	23 / 0.52	27 / 0.46	31 / 0.41	34 / 0.37	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.81	5 / 0.77	10 / 0.71	15 / 0.65	19 / 0.58	24 / 0.51	28 / 0.45	32 / 0.39	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.81	5 / 0.77	10 / 0.7	15 / 0.64	20 / 0.57	25 / 0.5	29 / 0.43	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.81	5 / 0.77	10 / 0.7	15 / 0.64	20 / 0.56	25 / 0.49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.81	5 / 0.77	10 / 0.7	15 / 0.64	20 / 0.56	25 / 0.49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.81	5 / 0.77	10 / 0.7	15 / 0.64	20 / 0.56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.81	5 / 0.77	10 / 0.7	15 / 0.64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.81	5 / 0.77	10 / 0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 60. Occurrence (percentiles) and MSE of Drought Scenario 14 of combined inflow/PDSI thresholds over the period of record, Model Period A (1926-2016).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.83	0 / 0.83	0 / 0.83	0 / 0.83	0 / 0.83	0 / 0.83	0 / 0.83	0 / 0.83	0 / 0.83	0 / 0.83	0 / 0.83	0 / 0.83	0 / 0.83	0 / 0.83	0 / 0.83	0 / 0.83	0 / 0.83	0 / 0.83	0 / 0.83	0 / 0.83	0 / 0.83	0 / 0.83
	18,100	5th	0 / 0.83	1 / 0.82	2 / 0.81	3 / 0.81	4 / 0.8	4 / 0.8	4 / 0.8	4 / 0.8	4 / 0.79	5 / 0.79	5 / 0.78	5 / 0.78	5 / 0.78	5 / 0.78	5 / 0.78	5 / 0.78	5 / 0.78	5 / 0.78	5 / 0.78	5 / 0.78	5 / 0.78
	24,600	10th	0 / 0.83	2 / 0.81	4 / 0.8	6 / 0.78	7 / 0.77	8 / 0.75	8 / 0.75	8 / 0.75	9 / 0.74	9 / 0.73	10 / 0.72	10 / 0.72	10 / 0.72	10 / 0.71	10 / 0.71	10 / 0.71	10 / 0.71	10 / 0.71	-	-	-
	28,600	15th	0 / 0.83	3 / 0.81	5 / 0.8	7 / 0.77	9 / 0.74	11 / 0.72	11 / 0.7	12 / 0.7	13 / 0.69	14 / 0.66	14 / 0.66	15 / 0.65	15 / 0.64	15 / 0.64	15 / 0.64	15 / 0.64	15 / 0.64	-	-	-	-
	33,000	20th	0 / 0.83	3 / 0.81	5 / 0.79	8 / 0.76	11 / 0.72	13 / 0.69	14 / 0.66	15 / 0.64	16 / 0.63	18 / 0.6	19 / 0.59	19 / 0.58	19 / 0.57	19 / 0.57	20 / 0.56	20 / 0.56	-	-	-	-	-
	36,300	25th	0 / 0.83	4 / 0.8	7 / 0.77	10 / 0.73	13 / 0.69	15 / 0.65	17 / 0.61	19 / 0.59	20 / 0.57	22 / 0.54	23 / 0.53	23 / 0.51	24 / 0.51	24 / 0.5	24 / 0.5	-	-	-	-	-	-
	39,700	30th	0 / 0.83	4 / 0.79	8 / 0.75	12 / 0.7	14 / 0.66	17 / 0.62	20 / 0.57	21 / 0.55	23 / 0.51	26 / 0.48	27 / 0.46	28 / 0.45	28 / 0.45	28 / 0.44	-	-	-	-	-	-	-
	44,000	35th	0 / 0.83	4 / 0.79	8 / 0.74	12 / 0.69	15 / 0.64	19 / 0.59	21 / 0.54	24 / 0.5	27 / 0.47	29 / 0.44	30 / 0.41	32 / 0.4	32 / 0.39	33 / 0.38	-	-	-	-	-	-	-
	48,500	40th	0 / 0.83	4 / 0.79	8 / 0.74	12 / 0.69	16 / 0.64	19 / 0.58	22 / 0.53	25 / 0.49	27 / 0.45	30 / 0.42	32 / 0.39	34 / 0.37	36 / 0.35	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.83	5 / 0.78	9 / 0.72	13 / 0.67	17 / 0.61	20 / 0.56	24 / 0.51	27 / 0.46	30 / 0.42	32 / 0.39	35 / 0.36	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.83	5 / 0.78	9 / 0.72	14 / 0.66	18 / 0.59	22 / 0.54	26 / 0.48	29 / 0.43	33 / 0.39	36 / 0.35	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.83	5 / 0.78	10 / 0.71	14 / 0.65	19 / 0.58	23 / 0.52	27 / 0.46	31 / 0.41	34 / 0.37	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.83	5 / 0.78	10 / 0.71	15 / 0.65	19 / 0.58	24 / 0.51	28 / 0.44	32 / 0.39	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.83	5 / 0.78	10 / 0.71	15 / 0.64	20 / 0.57	25 / 0.49	29 / 0.43	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.83	5 / 0.78	10 / 0.71	15 / 0.64	20 / 0.56	25 / 0.49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.83	5 / 0.78	10 / 0.71	15 / 0.64	20 / 0.56	25 / 0.49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.83	5 / 0.78	10 / 0.71	15 / 0.64	20 / 0.56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.83	5 / 0.78	10 / 0.71	15 / 0.64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.83	5 / 0.78	10 / 0.71	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.83	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 61. Occurrence (percentiles) and MSE of Drought Scenario 15 of combined inflow/PDSI thresholds over the period of record, Model Period A (1926-2016).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.88	0 / 0.88	0 / 0.88	0 / 0.88	0 / 0.88	0 / 0.88	0 / 0.88	0 / 0.88	0 / 0.88	0 / 0.88	0 / 0.88	0 / 0.88	0 / 0.88	0 / 0.88	0 / 0.88	0 / 0.88	0 / 0.88	0 / 0.88	0 / 0.88	0 / 0.88	0 / 0.88	0 / 0.88
	18,100	5th	0 / 0.88	1 / 0.87	2 / 0.86	3 / 0.85	4 / 0.84	4 / 0.84	4 / 0.84	4 / 0.84	4 / 0.83	5 / 0.83	5 / 0.82	5 / 0.82	5 / 0.82	5 / 0.82	5 / 0.82	5 / 0.82	5 / 0.82	5 / 0.82	5 / 0.82	5 / 0.82	5 / 0.82
	24,600	10th	0 / 0.88	2 / 0.85	4 / 0.84	6 / 0.82	7 / 0.8	8 / 0.78	8 / 0.78	8 / 0.78	9 / 0.77	9 / 0.75	10 / 0.75	10 / 0.74	10 / 0.74	10 / 0.74	10 / 0.74	10 / 0.74	10 / 0.74	10 / 0.74	-	-	-
	28,600	15th	0 / 0.88	3 / 0.85	5 / 0.83	7 / 0.8	9 / 0.77	11 / 0.74	11 / 0.72	12 / 0.71	13 / 0.7	14 / 0.67	14 / 0.67	15 / 0.66	15 / 0.65	15 / 0.65	15 / 0.65	15 / 0.65	15 / 0.65	-	-	-	-
	33,000	20th	0 / 0.88	3 / 0.85	5 / 0.82	8 / 0.78	11 / 0.74	13 / 0.7	14 / 0.67	15 / 0.65	16 / 0.63	18 / 0.6	19 / 0.58	19 / 0.58	19 / 0.57	19 / 0.57	20 / 0.56	20 / 0.56	-	-	-	-	-
	36,300	25th	0 / 0.88	4 / 0.84	7 / 0.79	10 / 0.75	13 / 0.71	15 / 0.66	17 / 0.62	19 / 0.59	20 / 0.57	22 / 0.54	23 / 0.52	23 / 0.51	24 / 0.5	24 / 0.5	24 / 0.49	-	-	-	-	-	-
	39,700	30th	0 / 0.88	4 / 0.83	8 / 0.77	12 / 0.71	14 / 0.67	17 / 0.62	20 / 0.57	21 / 0.54	23 / 0.51	26 / 0.47	27 / 0.45	28 / 0.44	28 / 0.44	28 / 0.43	-	-	-	-	-	-	-
	44,000	35th	0 / 0.88	4 / 0.82	8 / 0.76	12 / 0.7	15 / 0.65	19 / 0.59	21 / 0.54	24 / 0.5	27 / 0.46	29 / 0.43	30 / 0.4	32 / 0.39	32 / 0.38	33 / 0.37	-	-	-	-	-	-	-
	48,500	40th	0 / 0.88	4 / 0.82	8 / 0.76	12 / 0.7	16 / 0.64	19 / 0.59	22 / 0.53	25 / 0.48	27 / 0.44	30 / 0.41	32 / 0.38	34 / 0.36	36 / 0.34	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.88	5 / 0.81	9 / 0.74	13 / 0.67	17 / 0.62	20 / 0.56	24 / 0.5	27 / 0.45	30 / 0.41	32 / 0.38	35 / 0.35	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.88	5 / 0.81	9 / 0.73	14 / 0.66	18 / 0.59	22 / 0.53	26 / 0.47	29 / 0.42	33 / 0.38	36 / 0.34	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.88	5 / 0.81	10 / 0.72	14 / 0.65	19 / 0.58	23 / 0.51	27 / 0.45	31 / 0.4	34 / 0.36	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.88	5 / 0.81	10 / 0.72	15 / 0.65	19 / 0.57	24 / 0.5	28 / 0.43	32 / 0.38	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.88	5 / 0.81	10 / 0.72	15 / 0.64	20 / 0.56	25 / 0.49	29 / 0.42	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.88	5 / 0.81	10 / 0.72	15 / 0.64	20 / 0.56	25 / 0.48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.88	5 / 0.81	10 / 0.72	15 / 0.64	20 / 0.56	25 / 0.48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.88	5 / 0.81	10 / 0.72	15 / 0.64	20 / 0.56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.88	5 / 0.81	10 / 0.72	15 / 0.64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.88	5 / 0.81	10 / 0.72	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.88	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 62. Occurrence (percentiles) and MSE of Drought Scenario 3 of combined inflow/PDSI thresholds over the period of record, Model Period B (1926-1975).

Occurrence of Threshold Combinations / MSE of Drought Scenario 3			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22
	18,100	5th	0 / 0.22	1 / 0.23	2 / 0.23	3 / 0.23	4 / 0.22	4 / 0.22	4 / 0.22	4 / 0.22	4 / 0.22	5 / 0.22	5 / 0.22	5 / 0.22	5 / 0.22	5 / 0.22	5 / 0.22	5 / 0.22	5 / 0.22	5 / 0.22	5 / 0.22	5 / 0.22	5 / 0.22	5 / 0.22
	24,600	10th	0 / 0.22	2 / 0.22	4 / 0.22	6 / 0.22	7 / 0.21	8 / 0.21	8 / 0.21	8 / 0.21	9 / 0.21	9 / 0.21	10 / 0.21	10 / 0.21	10 / 0.21	10 / 0.21	10 / 0.21	10 / 0.21	10 / 0.21	10 / 0.21	-	-	-
	28,600	15th	0 / 0.22	3 / 0.22	5 / 0.22	7 / 0.22	9 / 0.22	11 / 0.21	11 / 0.21	12 / 0.21	13 / 0.21	14 / 0.21	14 / 0.2	15 / 0.2	15 / 0.2	15 / 0.2	15 / 0.2	15 / 0.2	15 / 0.2	-	-	-	-
	33,000	20th	0 / 0.22	3 / 0.22	5 / 0.23	8 / 0.22	11 / 0.22	13 / 0.21	14 / 0.22	15 / 0.21	16 / 0.21	18 / 0.21	19 / 0.2	19 / 0.2	19 / 0.2	19 / 0.2	20 / 0.2	20 / 0.2	-	-	-	-	-
	36,300	25th	0 / 0.22	4 / 0.22	7 / 0.23	10 / 0.22	13 / 0.22	15 / 0.21	17 / 0.21	19 / 0.21	20 / 0.21	22 / 0.2	23 / 0.2	23 / 0.2	24 / 0.2	24 / 0.2	24 / 0.2	-	-	-	-	-	-
	39,700	30th	0 / 0.22	4 / 0.22	8 / 0.23	12 / 0.23	14 / 0.22	17 / 0.21	20 / 0.21	21 / 0.2	23 / 0.2	26 / 0.19	27 / 0.19	28 / 0.19	28 / 0.19	28 / 0.19	-	-	-	-	-	-	-
	44,000	35th	0 / 0.22	4 / 0.22	8 / 0.23	12 / 0.23	15 / 0.22	19 / 0.22	21 / 0.21	24 / 0.2	27 / 0.19	29 / 0.19	30 / 0.18	32 / 0.18	32 / 0.18	33 / 0.18	-	-	-	-	-	-	-
	48,500	40th	0 / 0.22	4 / 0.22	8 / 0.23	12 / 0.23	16 / 0.22	19 / 0.21	22 / 0.21	25 / 0.2	27 / 0.19	30 / 0.19	32 / 0.18	34 / 0.17	36 / 0.17	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.22	5 / 0.23	9 / 0.24	13 / 0.23	17 / 0.22	20 / 0.22	24 / 0.21	27 / 0.2	30 / 0.19	32 / 0.18	35 / 0.17	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.22	5 / 0.23	9 / 0.24	14 / 0.23	18 / 0.22	22 / 0.21	26 / 0.2	29 / 0.19	33 / 0.18	36 / 0.17	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.22	5 / 0.23	10 / 0.24	14 / 0.24	19 / 0.23	23 / 0.21	27 / 0.2	31 / 0.19	34 / 0.18	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.22	5 / 0.23	10 / 0.24	15 / 0.24	19 / 0.22	24 / 0.21	28 / 0.2	32 / 0.18	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.22	5 / 0.23	10 / 0.24	15 / 0.24	20 / 0.22	25 / 0.21	29 / 0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.22	5 / 0.23	10 / 0.24	15 / 0.24	20 / 0.22	25 / 0.21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.22	5 / 0.23	10 / 0.24	15 / 0.24	20 / 0.22	25 / 0.21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.22	5 / 0.23	10 / 0.24	15 / 0.24	20 / 0.22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.22	5 / 0.23	10 / 0.24	15 / 0.24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.22	5 / 0.23	10 / 0.24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 63. Occurrence (percentiles) and MSE of Drought Scenario 6 of combined inflow/PDSI thresholds over the period of record, Model Period B (1926-1975).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21
	18,100	5th	0 / 0.21	1 / 0.21	2 / 0.2	3 / 0.2	4 / 0.2	4 / 0.2	4 / 0.2	4 / 0.2	4 / 0.2	5 / 0.2	5 / 0.19	5 / 0.19	5 / 0.19	5 / 0.19	5 / 0.19	5 / 0.19	5 / 0.19	5 / 0.19	5 / 0.19	5 / 0.19	5 / 0.19
	24,600	10th	0 / 0.21	2 / 0.2	4 / 0.2	6 / 0.2	7 / 0.2	8 / 0.2	8 / 0.2	8 / 0.2	9 / 0.2	9 / 0.19	10 / 0.19	10 / 0.19	10 / 0.19	10 / 0.19	10 / 0.19	10 / 0.19	10 / 0.19	10 / 0.19	-	-	-
	28,600	15th	0 / 0.21	3 / 0.2	5 / 0.21	7 / 0.21	9 / 0.21	11 / 0.2	11 / 0.2	12 / 0.2	13 / 0.19	14 / 0.19	14 / 0.19	15 / 0.18	15 / 0.18	15 / 0.18	15 / 0.18	15 / 0.18	15 / 0.18	-	-	-	-
	33,000	20th	0 / 0.21	3 / 0.2	5 / 0.21	8 / 0.21	11 / 0.21	13 / 0.21	14 / 0.21	15 / 0.2	16 / 0.2	18 / 0.19	19 / 0.19	19 / 0.19	19 / 0.19	19 / 0.19	20 / 0.18	20 / 0.18	-	-	-	-	-
	36,300	25th	0 / 0.21	4 / 0.2	7 / 0.21	10 / 0.21	13 / 0.21	15 / 0.21	17 / 0.2	19 / 0.2	20 / 0.19	22 / 0.19	23 / 0.18	23 / 0.18	24 / 0.18	24 / 0.18	24 / 0.18	-	-	-	-	-	-
	39,700	30th	0 / 0.21	4 / 0.21	8 / 0.21	12 / 0.22	14 / 0.22	17 / 0.21	20 / 0.2	21 / 0.2	23 / 0.19	26 / 0.18	27 / 0.18	28 / 0.18	28 / 0.18	28 / 0.18	-	-	-	-	-	-	-
	44,000	35th	0 / 0.21	4 / 0.21	8 / 0.22	12 / 0.22	15 / 0.22	19 / 0.21	21 / 0.2	24 / 0.19	27 / 0.18	29 / 0.18	30 / 0.17	32 / 0.17	32 / 0.17	33 / 0.17	-	-	-	-	-	-	-
	48,500	40th	0 / 0.21	4 / 0.21	8 / 0.22	12 / 0.22	16 / 0.22	19 / 0.21	22 / 0.2	25 / 0.19	27 / 0.18	30 / 0.18	32 / 0.17	34 / 0.17	36 / 0.16	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.21	5 / 0.21	9 / 0.22	13 / 0.22	17 / 0.22	20 / 0.21	24 / 0.2	27 / 0.19	30 / 0.18	32 / 0.17	35 / 0.17	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.21	5 / 0.21	9 / 0.22	14 / 0.22	18 / 0.22	22 / 0.21	26 / 0.2	29 / 0.19	33 / 0.18	36 / 0.17	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.21	5 / 0.21	10 / 0.22	14 / 0.23	19 / 0.22	23 / 0.21	27 / 0.2	31 / 0.19	34 / 0.18	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.21	5 / 0.21	10 / 0.22	15 / 0.23	19 / 0.22	24 / 0.21	28 / 0.2	32 / 0.18	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.21	5 / 0.21	10 / 0.22	15 / 0.23	20 / 0.22	25 / 0.21	29 / 0.19	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.21	5 / 0.21	10 / 0.22	15 / 0.23	20 / 0.22	25 / 0.21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.21	5 / 0.21	10 / 0.22	15 / 0.23	20 / 0.22	25 / 0.21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.21	5 / 0.21	10 / 0.22	15 / 0.23	20 / 0.22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.21	5 / 0.21	10 / 0.22	15 / 0.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.21	5 / 0.21	10 / 0.22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 64. Occurrence (percentiles) and MSE of Drought Scenario 12 of combined inflow/PDSI thresholds over the period of record, Model Period B (1926-1975).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.4	0 / 0.4	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39
	18,100	5th	0 / 0.4	1 / 0.39	2 / 0.39	3 / 0.39	4 / 0.38	4 / 0.38	4 / 0.38	4 / 0.38	4 / 0.38	5 / 0.38	5 / 0.38	5 / 0.38	5 / 0.38	5 / 0.38	5 / 0.38	5 / 0.38	5 / 0.38	5 / 0.38	5 / 0.38	5 / 0.38	5 / 0.38
	24,600	10th	0 / 0.39	2 / 0.39	4 / 0.38	6 / 0.38	7 / 0.37	8 / 0.36	8 / 0.36	8 / 0.36	9 / 0.36	9 / 0.36	10 / 0.35	10 / 0.35	10 / 0.35	10 / 0.35	10 / 0.35	10 / 0.35	10 / 0.35	10 / 0.35	-	-	-
	28,600	15th	0 / 0.39	3 / 0.39	5 / 0.38	7 / 0.38	9 / 0.37	11 / 0.36	11 / 0.35	12 / 0.35	13 / 0.34	14 / 0.34	14 / 0.33	15 / 0.33	15 / 0.33	15 / 0.32	15 / 0.32	15 / 0.32	15 / 0.32	-	-	-	-
	33,000	20th	0 / 0.39	3 / 0.39	5 / 0.39	8 / 0.38	11 / 0.37	13 / 0.35	14 / 0.33	15 / 0.33	16 / 0.32	18 / 0.31	19 / 0.3	19 / 0.3	19 / 0.3	19 / 0.3	20 / 0.29	20 / 0.29	-	-	-	-	-
	36,300	25th	0 / 0.39	4 / 0.38	7 / 0.38	10 / 0.37	13 / 0.36	15 / 0.34	17 / 0.32	19 / 0.31	20 / 0.3	22 / 0.29	23 / 0.28	23 / 0.27	24 / 0.27	24 / 0.27	24 / 0.26	-	-	-	-	-	-
	39,700	30th	0 / 0.39	4 / 0.38	8 / 0.37	12 / 0.36	14 / 0.34	17 / 0.33	20 / 0.3	21 / 0.29	23 / 0.27	26 / 0.26	27 / 0.25	28 / 0.24	28 / 0.24	28 / 0.23	-	-	-	-	-	-	-
	44,000	35th	0 / 0.39	4 / 0.38	8 / 0.37	12 / 0.35	15 / 0.34	19 / 0.31	21 / 0.29	24 / 0.26	27 / 0.25	29 / 0.23	30 / 0.22	32 / 0.21	32 / 0.21	33 / 0.2	-	-	-	-	-	-	-
	48,500	40th	0 / 0.39	4 / 0.38	8 / 0.37	12 / 0.35	16 / 0.33	19 / 0.31	22 / 0.28	25 / 0.26	27 / 0.24	30 / 0.23	32 / 0.21	34 / 0.2	36 / 0.19	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.39	5 / 0.38	9 / 0.36	13 / 0.34	17 / 0.32	20 / 0.3	24 / 0.26	27 / 0.24	30 / 0.22	32 / 0.21	35 / 0.19	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.39	5 / 0.38	9 / 0.36	14 / 0.33	18 / 0.31	22 / 0.28	26 / 0.25	29 / 0.22	33 / 0.2	36 / 0.19	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.39	5 / 0.38	10 / 0.36	14 / 0.33	19 / 0.3	23 / 0.27	27 / 0.24	31 / 0.21	34 / 0.19	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.39	5 / 0.38	10 / 0.36	15 / 0.33	19 / 0.3	24 / 0.27	28 / 0.24	32 / 0.21	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.39	5 / 0.38	10 / 0.36	15 / 0.33	20 / 0.3	25 / 0.26	29 / 0.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.39	5 / 0.38	10 / 0.36	15 / 0.33	20 / 0.29	25 / 0.26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.39	5 / 0.38	10 / 0.36	15 / 0.33	20 / 0.29	25 / 0.26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.39	5 / 0.38	10 / 0.36	15 / 0.33	20 / 0.29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.39	5 / 0.38	10 / 0.36	15 / 0.32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.39	5 / 0.38	10 / 0.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 65. Occurrence (percentiles) and MSE of Drought Scenario 13 of combined inflow/PDSI thresholds over the period of record, Model Period B (1926-1975).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41
	18,100	5th	0 / 0.41	1 / 0.41	2 / 0.41	3 / 0.4	4 / 0.4	4 / 0.4	4 / 0.4	4 / 0.4	4 / 0.39	5 / 0.39	5 / 0.39	5 / 0.39	5 / 0.39	5 / 0.39	5 / 0.39	5 / 0.39	5 / 0.39	5 / 0.39	5 / 0.39	5 / 0.39	5 / 0.39
	24,600	10th	0 / 0.41	2 / 0.4	4 / 0.4	6 / 0.39	7 / 0.39	8 / 0.38	8 / 0.38	8 / 0.37	9 / 0.37	9 / 0.37	10 / 0.37	10 / 0.37	10 / 0.37	10 / 0.36	10 / 0.36	10 / 0.36	10 / 0.36	10 / 0.36	-	-	-
	28,600	15th	0 / 0.41	3 / 0.4	5 / 0.4	7 / 0.39	9 / 0.38	11 / 0.37	11 / 0.36	12 / 0.36	13 / 0.35	14 / 0.35	14 / 0.34	15 / 0.34	15 / 0.34	15 / 0.33	15 / 0.33	15 / 0.33	15 / 0.33	-	-	-	-
	33,000	20th	0 / 0.41	3 / 0.4	5 / 0.4	8 / 0.39	11 / 0.37	13 / 0.36	14 / 0.34	15 / 0.33	16 / 0.32	18 / 0.31	19 / 0.3	19 / 0.3	19 / 0.3	19 / 0.29	20 / 0.29	20 / 0.29	-	-	-	-	-
	36,300	25th	0 / 0.41	4 / 0.4	7 / 0.39	10 / 0.38	13 / 0.36	15 / 0.34	17 / 0.32	19 / 0.31	20 / 0.3	22 / 0.29	23 / 0.28	23 / 0.27	24 / 0.27	24 / 0.26	24 / 0.26	-	-	-	-	-	-
	39,700	30th	0 / 0.41	4 / 0.4	8 / 0.38	12 / 0.36	14 / 0.35	17 / 0.32	20 / 0.3	21 / 0.28	23 / 0.27	26 / 0.26	27 / 0.25	28 / 0.24	28 / 0.24	28 / 0.23	-	-	-	-	-	-	-
	44,000	35th	0 / 0.41	4 / 0.4	8 / 0.38	12 / 0.36	15 / 0.34	19 / 0.31	21 / 0.28	24 / 0.26	27 / 0.24	29 / 0.23	30 / 0.22	32 / 0.21	32 / 0.21	33 / 0.2	-	-	-	-	-	-	-
	48,500	40th	0 / 0.41	4 / 0.4	8 / 0.38	12 / 0.36	16 / 0.33	19 / 0.31	22 / 0.28	25 / 0.26	27 / 0.24	30 / 0.22	32 / 0.21	34 / 0.2	36 / 0.19	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.41	5 / 0.39	9 / 0.37	13 / 0.34	17 / 0.32	20 / 0.29	24 / 0.26	27 / 0.24	30 / 0.22	32 / 0.2	35 / 0.19	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.41	5 / 0.39	9 / 0.37	14 / 0.34	18 / 0.31	22 / 0.28	26 / 0.25	29 / 0.22	33 / 0.2	36 / 0.18	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.41	5 / 0.39	10 / 0.37	14 / 0.34	19 / 0.3	23 / 0.27	27 / 0.24	31 / 0.21	34 / 0.19	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.41	5 / 0.39	10 / 0.37	15 / 0.34	19 / 0.3	24 / 0.27	28 / 0.23	32 / 0.2	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.41	5 / 0.39	10 / 0.37	15 / 0.33	20 / 0.3	25 / 0.26	29 / 0.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.41	5 / 0.39	10 / 0.37	15 / 0.33	20 / 0.29	25 / 0.26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.41	5 / 0.39	10 / 0.37	15 / 0.33	20 / 0.29	25 / 0.26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.41	5 / 0.39	10 / 0.37	15 / 0.33	20 / 0.29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.41	5 / 0.39	10 / 0.37	15 / 0.33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.41	5 / 0.39	10 / 0.37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 66. Occurrence (percentiles) and MSE of Drought Scenario 14 of combined inflow/PDSI thresholds over the period of record, Model Period B (1926-1975).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.43	0 / 0.43	0 / 0.43	0 / 0.43	0 / 0.43	0 / 0.43	0 / 0.43	0 / 0.43	0 / 0.43	0 / 0.43	0 / 0.43	0 / 0.43	0 / 0.43	0 / 0.43	0 / 0.43	0 / 0.43	0 / 0.43	0 / 0.43	0 / 0.43	0 / 0.43	0 / 0.43	0 / 0.43
	18,100	5th	0 / 0.43	1 / 0.43	2 / 0.42	3 / 0.42	4 / 0.41	4 / 0.41	4 / 0.41	4 / 0.41	4 / 0.41	5 / 0.41	5 / 0.4	5 / 0.4	5 / 0.4	5 / 0.4	5 / 0.4	5 / 0.4	5 / 0.4	5 / 0.4	5 / 0.4	5 / 0.4	5 / 0.4	5 / 0.4
	24,600	10th	0 / 0.43	2 / 0.42	4 / 0.42	6 / 0.41	7 / 0.4	8 / 0.39	8 / 0.39	8 / 0.39	9 / 0.39	9 / 0.38	10 / 0.38	10 / 0.38	10 / 0.38	10 / 0.37	10 / 0.37	10 / 0.37	10 / 0.37	10 / 0.37	-	-	-
	28,600	15th	0 / 0.43	3 / 0.42	5 / 0.41	7 / 0.41	9 / 0.39	11 / 0.38	11 / 0.37	12 / 0.37	13 / 0.36	14 / 0.35	14 / 0.35	15 / 0.34	15 / 0.34	15 / 0.34	15 / 0.34	15 / 0.34	15 / 0.34	-	-	-	-
	33,000	20th	0 / 0.43	3 / 0.42	5 / 0.41	8 / 0.4	11 / 0.38	13 / 0.36	14 / 0.34	15 / 0.34	16 / 0.33	18 / 0.32	19 / 0.31	19 / 0.3	19 / 0.3	19 / 0.3	20 / 0.3	20 / 0.3	-	-	-	-	-
	36,300	25th	0 / 0.43	4 / 0.41	7 / 0.4	10 / 0.38	13 / 0.36	15 / 0.34	17 / 0.32	19 / 0.31	20 / 0.3	22 / 0.29	23 / 0.28	23 / 0.27	24 / 0.27	24 / 0.26	24 / 0.26	-	-	-	-	-	-
	39,700	30th	0 / 0.43	4 / 0.41	8 / 0.39	12 / 0.36	14 / 0.35	17 / 0.32	20 / 0.3	21 / 0.28	23 / 0.27	26 / 0.25	27 / 0.24	28 / 0.24	28 / 0.23	28 / 0.23	-	-	-	-	-	-	-
	44,000	35th	0 / 0.43	4 / 0.41	8 / 0.38	12 / 0.36	15 / 0.33	19 / 0.31	21 / 0.28	24 / 0.26	27 / 0.24	29 / 0.23	30 / 0.22	32 / 0.21	32 / 0.2	33 / 0.2	-	-	-	-	-	-	-
	48,500	40th	0 / 0.43	4 / 0.41	8 / 0.38	12 / 0.36	16 / 0.33	19 / 0.3	22 / 0.27	25 / 0.25	27 / 0.23	30 / 0.22	32 / 0.21	34 / 0.19	36 / 0.19	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.43	5 / 0.4	9 / 0.37	13 / 0.35	17 / 0.32	20 / 0.29	24 / 0.26	27 / 0.24	30 / 0.22	32 / 0.2	35 / 0.19	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.43	5 / 0.4	9 / 0.37	14 / 0.34	18 / 0.31	22 / 0.28	26 / 0.25	29 / 0.22	33 / 0.2	36 / 0.18	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.43	5 / 0.4	10 / 0.37	14 / 0.34	19 / 0.3	23 / 0.27	27 / 0.24	31 / 0.21	34 / 0.19	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.43	5 / 0.4	10 / 0.37	15 / 0.34	19 / 0.3	24 / 0.27	28 / 0.23	32 / 0.2	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.43	5 / 0.4	10 / 0.37	15 / 0.33	20 / 0.29	25 / 0.26	29 / 0.22	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.43	5 / 0.4	10 / 0.37	15 / 0.33	20 / 0.29	25 / 0.26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.43	5 / 0.4	10 / 0.37	15 / 0.33	20 / 0.29	25 / 0.26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.43	5 / 0.4	10 / 0.37	15 / 0.33	20 / 0.29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.43	5 / 0.4	10 / 0.37	15 / 0.33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.43	5 / 0.4	10 / 0.37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 67. Occurrence (percentiles) and MSE of Drought Scenario 15 of combined inflow/PDSI thresholds over the period of record, Model Period B (1926-1975).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.47	0 / 0.47	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46	0 / 0.46
	18,100	5th	0 / 0.47	1 / 0.46	2 / 0.45	3 / 0.45	4 / 0.44	4 / 0.44	4 / 0.44	4 / 0.44	4 / 0.44	5 / 0.43	5 / 0.43	5 / 0.43	5 / 0.43	5 / 0.43	5 / 0.43	5 / 0.43	5 / 0.43	5 / 0.43	5 / 0.43	5 / 0.43	5 / 0.43
	24,600	10th	0 / 0.46	2 / 0.45	4 / 0.44	6 / 0.44	7 / 0.43	8 / 0.42	8 / 0.42	8 / 0.41	9 / 0.41	9 / 0.4	10 / 0.4	10 / 0.4	10 / 0.4	10 / 0.4	10 / 0.4	10 / 0.4	10 / 0.4	10 / 0.4	-	-	-
	28,600	15th	0 / 0.46	3 / 0.45	5 / 0.44	7 / 0.43	9 / 0.41	11 / 0.4	11 / 0.39	12 / 0.38	13 / 0.37	14 / 0.36	14 / 0.36	15 / 0.35	15 / 0.35	15 / 0.35	15 / 0.35	15 / 0.35	15 / 0.35	-	-	-	-
	33,000	20th	0 / 0.46	3 / 0.45	5 / 0.44	8 / 0.42	11 / 0.4	13 / 0.38	14 / 0.36	15 / 0.34	16 / 0.33	18 / 0.32	19 / 0.31	19 / 0.31	19 / 0.3	19 / 0.3	20 / 0.3	20 / 0.3	-	-	-	-	-
	36,300	25th	0 / 0.46	4 / 0.44	7 / 0.42	10 / 0.4	13 / 0.37	15 / 0.35	17 / 0.33	19 / 0.31	20 / 0.3	22 / 0.29	23 / 0.28	23 / 0.27	24 / 0.27	24 / 0.26	24 / 0.26	-	-	-	-	-	-
	39,700	30th	0 / 0.46	4 / 0.44	8 / 0.4	12 / 0.37	14 / 0.35	17 / 0.33	20 / 0.3	21 / 0.28	23 / 0.26	26 / 0.25	27 / 0.24	28 / 0.23	28 / 0.23	28 / 0.23	-	-	-	-	-	-	-
	44,000	35th	0 / 0.46	4 / 0.43	8 / 0.4	12 / 0.37	15 / 0.34	19 / 0.31	21 / 0.28	24 / 0.26	27 / 0.24	29 / 0.22	30 / 0.21	32 / 0.2	32 / 0.2	33 / 0.19	-	-	-	-	-	-	-
	48,500	40th	0 / 0.46	4 / 0.43	8 / 0.4	12 / 0.37	16 / 0.33	19 / 0.31	22 / 0.27	25 / 0.25	27 / 0.23	30 / 0.21	32 / 0.2	34 / 0.19	36 / 0.18	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.46	5 / 0.43	9 / 0.38	13 / 0.35	17 / 0.32	20 / 0.29	24 / 0.26	27 / 0.23	30 / 0.21	32 / 0.19	35 / 0.18	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.46	5 / 0.42	9 / 0.38	14 / 0.34	18 / 0.3	22 / 0.27	26 / 0.24	29 / 0.21	33 / 0.19	36 / 0.17	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.46	5 / 0.42	10 / 0.38	14 / 0.34	19 / 0.3	23 / 0.26	27 / 0.23	31 / 0.2	34 / 0.18	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.46	5 / 0.42	10 / 0.37	15 / 0.34	19 / 0.29	24 / 0.26	28 / 0.22	32 / 0.19	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.46	5 / 0.42	10 / 0.37	15 / 0.33	20 / 0.29	25 / 0.25	29 / 0.22	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.46	5 / 0.42	10 / 0.37	15 / 0.33	20 / 0.29	25 / 0.25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.46	5 / 0.42	10 / 0.37	15 / 0.33	20 / 0.29	25 / 0.25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.46	5 / 0.42	10 / 0.37	15 / 0.33	20 / 0.29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.46	5 / 0.42	10 / 0.37	15 / 0.33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.46	5 / 0.42	10 / 0.37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 68. Occurrence (percentiles) and MSE of Drought Scenario 3 of combined inflow/PDSI thresholds over the period of record, Model Period C (1976-2016).

Occurrence of Threshold Combinations / MSE of Drought Scenario 3			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.34	0 / 0.34	0 / 0.34	0 / 0.34	0 / 0.34	0 / 0.34	0 / 0.34	0 / 0.34	0 / 0.34	0 / 0.34	0 / 0.34	0 / 0.34	0 / 0.34	0 / 0.34	0 / 0.34	0 / 0.34	0 / 0.34	0 / 0.34	0 / 0.34	0 / 0.34	0 / 0.34
	18,100	5th	0 / 0.34	1 / 0.34	2 / 0.33	3 / 0.33	4 / 0.33	4 / 0.33	4 / 0.33	4 / 0.33	4 / 0.32	5 / 0.32	5 / 0.32	5 / 0.32	5 / 0.32	5 / 0.32	5 / 0.32	5 / 0.32	5 / 0.32	5 / 0.32	5 / 0.32	5 / 0.32	5 / 0.32
	24,600	10th	0 / 0.34	2 / 0.33	4 / 0.33	6 / 0.32	7 / 0.32	8 / 0.3	8 / 0.3	8 / 0.3	9 / 0.3	9 / 0.29	10 / 0.29	10 / 0.29	10 / 0.29	10 / 0.28	10 / 0.28	10 / 0.28	10 / 0.28	10 / 0.28	-	-	-
	28,600	15th	0 / 0.34	3 / 0.33	5 / 0.32	7 / 0.31	9 / 0.31	11 / 0.29	11 / 0.29	12 / 0.28	13 / 0.28	14 / 0.27	14 / 0.26	15 / 0.26	15 / 0.26	15 / 0.26	15 / 0.26	15 / 0.26	15 / 0.26	-	-	-	-
	33,000	20th	0 / 0.34	3 / 0.33	5 / 0.32	8 / 0.31	11 / 0.3	13 / 0.28	14 / 0.27	15 / 0.26	16 / 0.26	18 / 0.25	19 / 0.24	19 / 0.23	19 / 0.23	19 / 0.23	20 / 0.23	20 / 0.23	-	-	-	-	-
	36,300	25th	0 / 0.34	4 / 0.33	7 / 0.31	10 / 0.3	13 / 0.29	15 / 0.27	17 / 0.26	19 / 0.25	20 / 0.24	22 / 0.23	23 / 0.22	23 / 0.21	24 / 0.21	24 / 0.21	24 / 0.21	-	-	-	-	-	-
	39,700	30th	0 / 0.34	4 / 0.33	8 / 0.31	12 / 0.29	14 / 0.28	17 / 0.26	20 / 0.24	21 / 0.23	23 / 0.22	26 / 0.21	27 / 0.2	28 / 0.19	28 / 0.19	28 / 0.19	-	-	-	-	-	-	-
	44,000	35th	0 / 0.34	4 / 0.33	8 / 0.3	12 / 0.29	15 / 0.27	19 / 0.25	21 / 0.24	24 / 0.22	27 / 0.21	29 / 0.19	30 / 0.18	32 / 0.18	32 / 0.17	33 / 0.17	-	-	-	-	-	-	-
	48,500	40th	0 / 0.34	4 / 0.33	8 / 0.3	12 / 0.29	16 / 0.27	19 / 0.25	22 / 0.23	25 / 0.22	27 / 0.2	30 / 0.19	32 / 0.18	34 / 0.17	36 / 0.16	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.34	5 / 0.32	9 / 0.3	13 / 0.28	17 / 0.26	20 / 0.24	24 / 0.22	27 / 0.21	30 / 0.19	32 / 0.18	35 / 0.16	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.34	5 / 0.32	9 / 0.3	14 / 0.28	18 / 0.25	22 / 0.23	26 / 0.21	29 / 0.19	33 / 0.18	36 / 0.16	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.34	5 / 0.32	10 / 0.29	14 / 0.27	19 / 0.25	23 / 0.22	27 / 0.2	31 / 0.18	34 / 0.17	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.34	5 / 0.32	10 / 0.29	15 / 0.27	19 / 0.25	24 / 0.22	28 / 0.2	32 / 0.18	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.34	5 / 0.32	10 / 0.29	15 / 0.27	20 / 0.25	25 / 0.22	29 / 0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.34	5 / 0.32	10 / 0.29	15 / 0.27	20 / 0.24	25 / 0.22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.34	5 / 0.32	10 / 0.29	15 / 0.27	20 / 0.24	25 / 0.22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.34	5 / 0.32	10 / 0.29	15 / 0.27	20 / 0.24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.34	5 / 0.32	10 / 0.29	15 / 0.27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.34	5 / 0.32	10 / 0.29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 69. Occurrence (percentiles) and MSE of Drought Scenario 6 of combined inflow/PDSI thresholds over the period of record, Model Period C (1976-2016).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25
	18,100	5th	0 / 0.25	1 / 0.24	2 / 0.25	3 / 0.24	4 / 0.24	4 / 0.24	4 / 0.24	4 / 0.24	4 / 0.24	5 / 0.23	5 / 0.23	5 / 0.23	5 / 0.23	5 / 0.23	5 / 0.23	5 / 0.23	5 / 0.23	5 / 0.23	5 / 0.23	5 / 0.23	5 / 0.23
	24,600	10th	0 / 0.25	2 / 0.25	4 / 0.24	6 / 0.24	7 / 0.23	8 / 0.23	8 / 0.23	8 / 0.23	9 / 0.22	9 / 0.22	10 / 0.22	10 / 0.22	10 / 0.22	10 / 0.22	10 / 0.22	10 / 0.22	10 / 0.22	10 / 0.22	-	-	-
	28,600	15th	0 / 0.25	3 / 0.25	5 / 0.24	7 / 0.23	9 / 0.23	11 / 0.22	11 / 0.22	12 / 0.22	13 / 0.21	14 / 0.21	14 / 0.21	15 / 0.2	15 / 0.2	15 / 0.2	15 / 0.2	15 / 0.2	15 / 0.2	-	-	-	-
	33,000	20th	0 / 0.25	3 / 0.25	5 / 0.24	8 / 0.23	11 / 0.22	13 / 0.21	14 / 0.21	15 / 0.21	16 / 0.2	18 / 0.19	19 / 0.19	19 / 0.19	19 / 0.19	19 / 0.19	20 / 0.19	20 / 0.19	-	-	-	-	-
	36,300	25th	0 / 0.25	4 / 0.25	7 / 0.24	10 / 0.23	13 / 0.22	15 / 0.21	17 / 0.2	19 / 0.2	20 / 0.19	22 / 0.18	23 / 0.18	23 / 0.18	24 / 0.18	24 / 0.18	24 / 0.18	-	-	-	-	-	-
	39,700	30th	0 / 0.25	4 / 0.25	8 / 0.23	12 / 0.22	14 / 0.21	17 / 0.2	20 / 0.19	21 / 0.19	23 / 0.18	26 / 0.17	27 / 0.17	28 / 0.17	28 / 0.17	28 / 0.17	-	-	-	-	-	-	-
	44,000	35th	0 / 0.25	4 / 0.24	8 / 0.23	12 / 0.22	15 / 0.2	19 / 0.2	21 / 0.19	24 / 0.18	27 / 0.17	29 / 0.16	30 / 0.16	32 / 0.16	32 / 0.16	33 / 0.15	-	-	-	-	-	-	-
	48,500	40th	0 / 0.25	4 / 0.24	8 / 0.23	12 / 0.22	16 / 0.2	19 / 0.19	22 / 0.18	25 / 0.17	27 / 0.17	30 / 0.16	32 / 0.15	34 / 0.15	36 / 0.15	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.25	5 / 0.24	9 / 0.23	13 / 0.21	17 / 0.2	20 / 0.19	24 / 0.18	27 / 0.17	30 / 0.16	32 / 0.15	35 / 0.14	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.25	5 / 0.24	9 / 0.22	14 / 0.21	18 / 0.2	22 / 0.19	26 / 0.18	29 / 0.16	33 / 0.15	36 / 0.14	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.25	5 / 0.24	10 / 0.22	14 / 0.21	19 / 0.19	23 / 0.18	27 / 0.17	31 / 0.16	34 / 0.15	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.25	5 / 0.24	10 / 0.22	15 / 0.21	19 / 0.19	24 / 0.18	28 / 0.17	32 / 0.16	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.25	5 / 0.24	10 / 0.22	15 / 0.2	20 / 0.19	25 / 0.18	29 / 0.17	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.25	5 / 0.24	10 / 0.22	15 / 0.2	20 / 0.19	25 / 0.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.25	5 / 0.24	10 / 0.22	15 / 0.2	20 / 0.19	25 / 0.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.25	5 / 0.24	10 / 0.22	15 / 0.2	20 / 0.19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.25	5 / 0.24	10 / 0.22	15 / 0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.25	5 / 0.24	10 / 0.22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 70. Occurrence (percentiles) and MSE of Drought Scenario 12 of combined inflow/PDSI thresholds over the period of record, Model Period C (1976-2016).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.38	0 / 0.38	0 / 0.38	0 / 0.38	0 / 0.38	0 / 0.38	0 / 0.38	0 / 0.38	0 / 0.38	0 / 0.38	0 / 0.38	0 / 0.38	0 / 0.38	0 / 0.38	0 / 0.38	0 / 0.38	0 / 0.38	0 / 0.38	0 / 0.38	0 / 0.38	0 / 0.38	0 / 0.38
	18,100	5th	0 / 0.38	1 / 0.38	2 / 0.37	3 / 0.37	4 / 0.37	4 / 0.37	4 / 0.37	4 / 0.37	4 / 0.37	5 / 0.36	5 / 0.36	5 / 0.36	5 / 0.36	5 / 0.36	5 / 0.36	5 / 0.36	5 / 0.36	5 / 0.36	5 / 0.36	5 / 0.36	5 / 0.36	5 / 0.36
	24,600	10th	0 / 0.38	2 / 0.38	4 / 0.37	6 / 0.36	7 / 0.36	8 / 0.35	8 / 0.35	8 / 0.35	9 / 0.34	9 / 0.34	10 / 0.33	10 / 0.33	10 / 0.33	10 / 0.33	10 / 0.33	10 / 0.33	10 / 0.33	10 / 0.33	-	-	-
	28,600	15th	0 / 0.38	3 / 0.38	5 / 0.37	7 / 0.35	9 / 0.34	11 / 0.33	11 / 0.33	12 / 0.32	13 / 0.32	14 / 0.31	14 / 0.3	15 / 0.3	15 / 0.3	15 / 0.29	15 / 0.29	15 / 0.29	15 / 0.29	-	-	-	-
	33,000	20th	0 / 0.38	3 / 0.38	5 / 0.36	8 / 0.34	11 / 0.33	13 / 0.32	14 / 0.31	15 / 0.3	16 / 0.3	18 / 0.28	19 / 0.27	19 / 0.27	19 / 0.27	19 / 0.27	20 / 0.26	20 / 0.26	-	-	-	-	-
	36,300	25th	0 / 0.38	4 / 0.37	7 / 0.35	10 / 0.33	13 / 0.32	15 / 0.3	17 / 0.29	19 / 0.28	20 / 0.27	22 / 0.26	23 / 0.25	23 / 0.24	24 / 0.24	24 / 0.24	24 / 0.24	-	-	-	-	-	-
	39,700	30th	0 / 0.38	4 / 0.37	8 / 0.35	12 / 0.32	14 / 0.31	17 / 0.29	20 / 0.27	21 / 0.26	23 / 0.25	26 / 0.23	27 / 0.22	28 / 0.21	28 / 0.21	28 / 0.21	-	-	-	-	-	-	-
	44,000	35th	0 / 0.38	4 / 0.37	8 / 0.34	12 / 0.32	15 / 0.3	19 / 0.28	21 / 0.26	24 / 0.24	27 / 0.22	29 / 0.21	30 / 0.2	32 / 0.19	32 / 0.18	33 / 0.18	-	-	-	-	-	-	-
	48,500	40th	0 / 0.38	4 / 0.37	8 / 0.34	12 / 0.32	16 / 0.3	19 / 0.28	22 / 0.26	25 / 0.24	27 / 0.22	30 / 0.2	32 / 0.19	34 / 0.18	36 / 0.17	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.38	5 / 0.37	9 / 0.34	13 / 0.31	17 / 0.29	20 / 0.27	24 / 0.25	27 / 0.23	30 / 0.21	32 / 0.19	35 / 0.17	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.38	5 / 0.36	9 / 0.34	14 / 0.31	18 / 0.28	22 / 0.26	26 / 0.23	29 / 0.21	33 / 0.19	36 / 0.17	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.38	5 / 0.36	10 / 0.33	14 / 0.3	19 / 0.27	23 / 0.25	27 / 0.22	31 / 0.2	34 / 0.18	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.38	5 / 0.36	10 / 0.33	15 / 0.3	19 / 0.27	24 / 0.24	28 / 0.21	32 / 0.19	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.38	5 / 0.36	10 / 0.33	15 / 0.3	20 / 0.27	25 / 0.23	29 / 0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.38	5 / 0.36	10 / 0.33	15 / 0.3	20 / 0.26	25 / 0.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.38	5 / 0.36	10 / 0.33	15 / 0.3	20 / 0.26	25 / 0.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.38	5 / 0.36	10 / 0.33	15 / 0.3	20 / 0.26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.38	5 / 0.36	10 / 0.33	15 / 0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.38	5 / 0.36	10 / 0.33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 71. Occurrence (percentiles) and MSE of Drought Scenario 13 of combined inflow/PDSI thresholds over the period of record, Model Period C (1976-2016).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39	0 / 0.39
	18,100	5th	0 / 0.39	1 / 0.39	2 / 0.39	3 / 0.38	4 / 0.38	4 / 0.38	4 / 0.38	4 / 0.38	4 / 0.38	5 / 0.37	5 / 0.37	5 / 0.37	5 / 0.37	5 / 0.37	5 / 0.37	5 / 0.37	5 / 0.37	5 / 0.37	5 / 0.37	5 / 0.37	5 / 0.37	5 / 0.37
	24,600	10th	0 / 0.39	2 / 0.39	4 / 0.38	6 / 0.37	7 / 0.36	8 / 0.36	8 / 0.36	8 / 0.36	9 / 0.35	9 / 0.34	10 / 0.34	10 / 0.34	10 / 0.34	10 / 0.34	10 / 0.34	10 / 0.34	10 / 0.34	10 / 0.34	-	-	-
	28,600	15th	0 / 0.39	3 / 0.39	5 / 0.38	7 / 0.36	9 / 0.35	11 / 0.34	11 / 0.33	12 / 0.33	13 / 0.32	14 / 0.31	14 / 0.3	15 / 0.3	15 / 0.3	15 / 0.3	15 / 0.3	15 / 0.3	15 / 0.3	-	-	-	-
	33,000	20th	0 / 0.39	3 / 0.39	5 / 0.37	8 / 0.35	11 / 0.34	13 / 0.32	14 / 0.31	15 / 0.31	16 / 0.3	18 / 0.29	19 / 0.28	19 / 0.27	19 / 0.27	19 / 0.27	20 / 0.27	20 / 0.27	-	-	-	-	-
	36,300	25th	0 / 0.39	4 / 0.38	7 / 0.36	10 / 0.34	13 / 0.33	15 / 0.31	17 / 0.29	19 / 0.29	20 / 0.28	22 / 0.26	23 / 0.25	23 / 0.25	24 / 0.24	24 / 0.24	24 / 0.24	-	-	-	-	-	-
	39,700	30th	0 / 0.39	4 / 0.38	8 / 0.36	12 / 0.33	14 / 0.31	17 / 0.3	20 / 0.28	21 / 0.26	23 / 0.25	26 / 0.23	27 / 0.22	28 / 0.22	28 / 0.21	28 / 0.21	-	-	-	-	-	-	-
	44,000	35th	0 / 0.39	4 / 0.38	8 / 0.35	12 / 0.33	15 / 0.31	19 / 0.28	21 / 0.26	24 / 0.25	27 / 0.23	29 / 0.21	30 / 0.2	32 / 0.19	32 / 0.18	33 / 0.18	-	-	-	-	-	-	-
	48,500	40th	0 / 0.39	4 / 0.38	8 / 0.35	12 / 0.33	16 / 0.3	19 / 0.28	22 / 0.26	25 / 0.24	27 / 0.22	30 / 0.2	32 / 0.19	34 / 0.17	36 / 0.17	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.39	5 / 0.38	9 / 0.35	13 / 0.32	17 / 0.3	20 / 0.27	24 / 0.25	27 / 0.23	30 / 0.21	32 / 0.19	35 / 0.17	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.39	5 / 0.37	9 / 0.34	14 / 0.31	18 / 0.29	22 / 0.26	26 / 0.23	29 / 0.21	33 / 0.19	36 / 0.17	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.39	5 / 0.37	10 / 0.34	14 / 0.31	19 / 0.28	23 / 0.25	27 / 0.22	31 / 0.2	34 / 0.18	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.39	5 / 0.37	10 / 0.34	15 / 0.31	19 / 0.28	24 / 0.24	28 / 0.21	32 / 0.19	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.39	5 / 0.37	10 / 0.34	15 / 0.31	20 / 0.27	25 / 0.24	29 / 0.21	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.39	5 / 0.37	10 / 0.34	15 / 0.31	20 / 0.27	25 / 0.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.39	5 / 0.37	10 / 0.34	15 / 0.31	20 / 0.27	25 / 0.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.39	5 / 0.37	10 / 0.34	15 / 0.31	20 / 0.27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.39	5 / 0.37	10 / 0.34	15 / 0.31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.39	5 / 0.37	10 / 0.34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 72. Occurrence (percentiles) and MSE of Drought Scenario 14 of combined inflow/PDSI thresholds over the period of record, Model Period C (1976-2016).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.4	0 / 0.4	0 / 0.4	0 / 0.4	0 / 0.4	0 / 0.4	0 / 0.4	0 / 0.4	0 / 0.4	0 / 0.4	0 / 0.4	0 / 0.4	0 / 0.4	0 / 0.4	0 / 0.4	0 / 0.4	0 / 0.4	0 / 0.4	0 / 0.4	0 / 0.4	0 / 0.4	0 / 0.4
	18,100	5th	0 / 0.4	1 / 0.39	2 / 0.39	3 / 0.39	4 / 0.39	4 / 0.39	4 / 0.39	4 / 0.39	4 / 0.38	5 / 0.38	5 / 0.38	5 / 0.38	5 / 0.38	5 / 0.38	5 / 0.38	5 / 0.38	5 / 0.38	5 / 0.38	5 / 0.38	5 / 0.38	5 / 0.38	5 / 0.38
	24,600	10th	0 / 0.4	2 / 0.39	4 / 0.39	6 / 0.37	7 / 0.37	8 / 0.36	8 / 0.36	8 / 0.36	9 / 0.35	9 / 0.35	10 / 0.34	10 / 0.34	10 / 0.34	10 / 0.34	10 / 0.34	10 / 0.34	10 / 0.34	10 / 0.34	-	-	-
	28,600	15th	0 / 0.4	3 / 0.39	5 / 0.38	7 / 0.36	9 / 0.35	11 / 0.34	11 / 0.33	12 / 0.33	13 / 0.32	14 / 0.31	14 / 0.3	15 / 0.3	15 / 0.3	15 / 0.3	15 / 0.3	15 / 0.3	15 / 0.3	-	-	-	-
	33,000	20th	0 / 0.4	3 / 0.39	5 / 0.38	8 / 0.36	11 / 0.34	13 / 0.32	14 / 0.31	15 / 0.31	16 / 0.3	18 / 0.29	19 / 0.28	19 / 0.27	19 / 0.27	19 / 0.27	20 / 0.27	20 / 0.27	-	-	-	-	-
	36,300	25th	0 / 0.4	4 / 0.39	7 / 0.37	10 / 0.34	13 / 0.33	15 / 0.31	17 / 0.29	19 / 0.28	20 / 0.28	22 / 0.26	23 / 0.25	23 / 0.24	24 / 0.24	24 / 0.24	24 / 0.24	-	-	-	-	-	-
	39,700	30th	0 / 0.4	4 / 0.38	8 / 0.36	12 / 0.33	14 / 0.32	17 / 0.29	20 / 0.28	21 / 0.26	23 / 0.25	26 / 0.23	27 / 0.22	28 / 0.22	28 / 0.21	28 / 0.21	-	-	-	-	-	-	-
	44,000	35th	0 / 0.4	4 / 0.38	8 / 0.36	12 / 0.33	15 / 0.31	19 / 0.28	21 / 0.26	24 / 0.24	27 / 0.23	29 / 0.21	30 / 0.2	32 / 0.19	32 / 0.18	33 / 0.18	-	-	-	-	-	-	-
	48,500	40th	0 / 0.4	4 / 0.38	8 / 0.36	12 / 0.33	16 / 0.31	19 / 0.28	22 / 0.26	25 / 0.24	27 / 0.22	30 / 0.2	32 / 0.19	34 / 0.17	36 / 0.16	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.4	5 / 0.38	9 / 0.35	13 / 0.32	17 / 0.3	20 / 0.27	24 / 0.25	27 / 0.23	30 / 0.21	32 / 0.19	35 / 0.17	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.4	5 / 0.38	9 / 0.35	14 / 0.32	18 / 0.29	22 / 0.26	26 / 0.23	29 / 0.21	33 / 0.19	36 / 0.17	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.4	5 / 0.38	10 / 0.34	14 / 0.31	19 / 0.28	23 / 0.25	27 / 0.22	31 / 0.2	34 / 0.18	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.4	5 / 0.38	10 / 0.34	15 / 0.31	19 / 0.28	24 / 0.24	28 / 0.21	32 / 0.19	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.4	5 / 0.38	10 / 0.34	15 / 0.31	20 / 0.27	25 / 0.23	29 / 0.21	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.4	5 / 0.38	10 / 0.34	15 / 0.31	20 / 0.27	25 / 0.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.4	5 / 0.38	10 / 0.34	15 / 0.31	20 / 0.27	25 / 0.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.4	5 / 0.38	10 / 0.34	15 / 0.31	20 / 0.27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.4	5 / 0.38	10 / 0.34	15 / 0.31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.4	5 / 0.38	10 / 0.34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 73. Occurrence (percentiles) and MSE of Drought Scenario 15 of combined inflow/PDSI thresholds over the period of record, Model Period C (1976-2016).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41	0 / 0.41
	18,100	5th	0 / 0.41	1 / 0.41	2 / 0.4	3 / 0.4	4 / 0.4	4 / 0.4	4 / 0.4	4 / 0.4	4 / 0.39	5 / 0.39	5 / 0.39	5 / 0.39	5 / 0.39	5 / 0.39	5 / 0.39	5 / 0.39	5 / 0.39	5 / 0.39	5 / 0.39	5 / 0.39	5 / 0.39
	24,600	10th	0 / 0.41	2 / 0.4	4 / 0.39	6 / 0.38	7 / 0.37	8 / 0.36	8 / 0.36	8 / 0.36	9 / 0.36	9 / 0.35	10 / 0.35	10 / 0.34	10 / 0.34	10 / 0.34	10 / 0.34	10 / 0.34	10 / 0.34	10 / 0.34	-	-	-
	28,600	15th	0 / 0.41	3 / 0.4	5 / 0.39	7 / 0.37	9 / 0.36	11 / 0.34	11 / 0.34	12 / 0.33	13 / 0.33	14 / 0.31	14 / 0.31	15 / 0.3	15 / 0.3	15 / 0.3	15 / 0.3	15 / 0.3	15 / 0.3	-	-	-	-
	33,000	20th	0 / 0.41	3 / 0.4	5 / 0.38	8 / 0.36	11 / 0.35	13 / 0.33	14 / 0.31	15 / 0.3	16 / 0.3	18 / 0.28	19 / 0.27	19 / 0.27	19 / 0.27	19 / 0.26	20 / 0.26	20 / 0.26	-	-	-	-	-
	36,300	25th	0 / 0.41	4 / 0.39	7 / 0.37	10 / 0.35	13 / 0.33	15 / 0.31	17 / 0.29	19 / 0.28	20 / 0.27	22 / 0.25	23 / 0.25	23 / 0.24	24 / 0.24	24 / 0.23	24 / 0.23	-	-	-	-	-	-
	39,700	30th	0 / 0.41	4 / 0.39	8 / 0.36	12 / 0.34	14 / 0.32	17 / 0.29	20 / 0.27	21 / 0.26	23 / 0.24	26 / 0.23	27 / 0.22	28 / 0.21	28 / 0.21	28 / 0.2	-	-	-	-	-	-	-
	44,000	35th	0 / 0.41	4 / 0.39	8 / 0.36	12 / 0.33	15 / 0.31	19 / 0.28	21 / 0.26	24 / 0.24	27 / 0.22	29 / 0.2	30 / 0.19	32 / 0.18	32 / 0.18	33 / 0.18	-	-	-	-	-	-	-
	48,500	40th	0 / 0.41	4 / 0.39	8 / 0.36	12 / 0.33	16 / 0.31	19 / 0.28	22 / 0.26	25 / 0.24	27 / 0.21	30 / 0.2	32 / 0.18	34 / 0.17	36 / 0.16	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.41	5 / 0.38	9 / 0.35	13 / 0.32	17 / 0.3	20 / 0.27	24 / 0.25	27 / 0.22	30 / 0.2	32 / 0.18	35 / 0.17	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.41	5 / 0.38	9 / 0.35	14 / 0.32	18 / 0.29	22 / 0.26	26 / 0.23	29 / 0.21	33 / 0.18	36 / 0.17	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.41	5 / 0.38	10 / 0.35	14 / 0.31	19 / 0.28	23 / 0.25	27 / 0.22	31 / 0.19	34 / 0.17	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.41	5 / 0.38	10 / 0.35	15 / 0.31	19 / 0.28	24 / 0.24	28 / 0.21	32 / 0.18	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.41	5 / 0.38	10 / 0.35	15 / 0.31	20 / 0.28	25 / 0.23	29 / 0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.41	5 / 0.38	10 / 0.35	15 / 0.31	20 / 0.27	25 / 0.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.41	5 / 0.38	10 / 0.35	15 / 0.31	20 / 0.27	25 / 0.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.41	5 / 0.38	10 / 0.35	15 / 0.31	20 / 0.27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.41	5 / 0.38	10 / 0.35	15 / 0.31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.41	5 / 0.38	10 / 0.35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 74. Occurrence (percentiles) and MSE of Drought Scenario 3 of combined inflow/PDSI thresholds over the period of record, Model Period D (1926-1942).

Occurrence of Threshold Combinations / MSE of Drought Scenario 3			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03
	18,100	5th	0 / 0.03	1 / 0.03	2 / 0.03	3 / 0.03	4 / 0.03	4 / 0.03	4 / 0.03	4 / 0.03	4 / 0.03	5 / 0.03	5 / 0.03	5 / 0.03	5 / 0.03	5 / 0.03	5 / 0.03	5 / 0.03	5 / 0.03	5 / 0.03	5 / 0.03	5 / 0.03	5 / 0.03	5 / 0.03
	24,600	10th	0 / 0.03	2 / 0.03	4 / 0.03	6 / 0.03	7 / 0.03	8 / 0.03	8 / 0.03	8 / 0.03	9 / 0.03	9 / 0.03	10 / 0.03	10 / 0.03	10 / 0.03	10 / 0.03	10 / 0.03	10 / 0.03	10 / 0.03	10 / 0.03	-	-	-
	28,600	15th	0 / 0.03	3 / 0.03	5 / 0.03	7 / 0.03	9 / 0.03	11 / 0.03	11 / 0.04	12 / 0.04	13 / 0.04	14 / 0.04	14 / 0.04	15 / 0.04	15 / 0.04	15 / 0.04	15 / 0.04	15 / 0.04	15 / 0.04	-	-	-	-
	33,000	20th	0 / 0.03	3 / 0.03	5 / 0.03	8 / 0.03	11 / 0.03	13 / 0.03	14 / 0.04	15 / 0.04	16 / 0.04	18 / 0.04	19 / 0.04	19 / 0.04	19 / 0.04	19 / 0.04	20 / 0.04	20 / 0.04	-	-	-	-	-
	36,300	25th	0 / 0.03	4 / 0.03	7 / 0.04	10 / 0.04	13 / 0.04	15 / 0.04	17 / 0.04	19 / 0.04	20 / 0.04	22 / 0.05	23 / 0.05	23 / 0.05	24 / 0.05	24 / 0.05	24 / 0.05	-	-	-	-	-	-
	39,700	30th	0 / 0.03	4 / 0.04	8 / 0.04	12 / 0.04	14 / 0.04	17 / 0.04	20 / 0.05	21 / 0.05	23 / 0.05	26 / 0.05	27 / 0.05	28 / 0.05	28 / 0.05	28 / 0.05	-	-	-	-	-	-	-
	44,000	35th	0 / 0.03	4 / 0.04	8 / 0.04	12 / 0.05	15 / 0.05	19 / 0.05	21 / 0.05	24 / 0.05	27 / 0.05	29 / 0.05	30 / 0.05	32 / 0.05	32 / 0.05	33 / 0.05	-	-	-	-	-	-	-
	48,500	40th	0 / 0.03	4 / 0.04	8 / 0.04	12 / 0.05	16 / 0.05	19 / 0.05	22 / 0.05	25 / 0.05	27 / 0.05	30 / 0.05	32 / 0.05	34 / 0.05	36 / 0.05	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.03	5 / 0.04	9 / 0.04	13 / 0.05	17 / 0.05	20 / 0.05	24 / 0.05	27 / 0.05	30 / 0.05	32 / 0.05	35 / 0.05	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.03	5 / 0.04	9 / 0.04	14 / 0.05	18 / 0.05	22 / 0.05	26 / 0.05	29 / 0.05	33 / 0.05	36 / 0.05	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.03	5 / 0.04	10 / 0.04	14 / 0.05	19 / 0.05	23 / 0.05	27 / 0.05	31 / 0.05	34 / 0.05	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.03	5 / 0.04	10 / 0.04	15 / 0.05	19 / 0.05	24 / 0.05	28 / 0.05	32 / 0.05	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.03	5 / 0.04	10 / 0.04	15 / 0.05	20 / 0.05	25 / 0.05	29 / 0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.03	5 / 0.04	10 / 0.04	15 / 0.05	20 / 0.05	25 / 0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.03	5 / 0.04	10 / 0.04	15 / 0.05	20 / 0.05	25 / 0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.03	5 / 0.04	10 / 0.04	15 / 0.05	20 / 0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.03	5 / 0.04	10 / 0.04	15 / 0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.03	5 / 0.04	10 / 0.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 75. Occurrence (percentiles) and MSE of Drought Scenario 6 of combined inflow/PDSI thresholds over the period of record, Model Period D (1926-1942).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03	0 / 0.03
	18,100	5th	0 / 0.03	1 / 0.03	2 / 0.03	3 / 0.03	4 / 0.03	4 / 0.03	4 / 0.03	4 / 0.03	4 / 0.03	5 / 0.03	5 / 0.03	5 / 0.03	5 / 0.03	5 / 0.03	5 / 0.03	5 / 0.03	5 / 0.03	5 / 0.03	5 / 0.03	5 / 0.03	5 / 0.03	5 / 0.03
	24,600	10th	0 / 0.03	2 / 0.03	4 / 0.03	6 / 0.03	7 / 0.03	8 / 0.03	8 / 0.03	8 / 0.03	9 / 0.03	9 / 0.03	10 / 0.03	10 / 0.03	10 / 0.03	10 / 0.03	10 / 0.03	10 / 0.03	10 / 0.03	10 / 0.03	-	-	-
	28,600	15th	0 / 0.03	3 / 0.03	5 / 0.03	7 / 0.03	9 / 0.03	11 / 0.03	11 / 0.04	12 / 0.04	13 / 0.04	14 / 0.04	14 / 0.04	15 / 0.04	15 / 0.04	15 / 0.04	15 / 0.04	15 / 0.04	15 / 0.04	-	-	-	-
	33,000	20th	0 / 0.03	3 / 0.03	5 / 0.03	8 / 0.03	11 / 0.03	13 / 0.03	14 / 0.04	15 / 0.04	16 / 0.04	18 / 0.04	19 / 0.04	19 / 0.04	19 / 0.04	19 / 0.04	20 / 0.04	20 / 0.04	-	-	-	-	-
	36,300	25th	0 / 0.03	4 / 0.03	7 / 0.04	10 / 0.04	13 / 0.04	15 / 0.04	17 / 0.04	19 / 0.04	20 / 0.04	22 / 0.05	23 / 0.05	23 / 0.05	24 / 0.05	24 / 0.05	24 / 0.05	-	-	-	-	-	-
	39,700	30th	0 / 0.03	4 / 0.04	8 / 0.04	12 / 0.05	14 / 0.05	17 / 0.05	20 / 0.05	21 / 0.05	23 / 0.05	26 / 0.05	27 / 0.05	28 / 0.05	28 / 0.05	28 / 0.05	-	-	-	-	-	-	-
	44,000	35th	0 / 0.03	4 / 0.04	8 / 0.04	12 / 0.05	15 / 0.05	19 / 0.05	21 / 0.05	24 / 0.06	27 / 0.05	29 / 0.05	30 / 0.05	32 / 0.05	32 / 0.05	33 / 0.05	-	-	-	-	-	-	-
	48,500	40th	0 / 0.03	4 / 0.04	8 / 0.04	12 / 0.05	16 / 0.05	19 / 0.05	22 / 0.06	25 / 0.06	27 / 0.06	30 / 0.05	32 / 0.05	34 / 0.05	36 / 0.05	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.03	5 / 0.04	9 / 0.04	13 / 0.05	17 / 0.05	20 / 0.05	24 / 0.06	27 / 0.06	30 / 0.06	32 / 0.06	35 / 0.05	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.03	5 / 0.04	9 / 0.04	14 / 0.05	18 / 0.05	22 / 0.05	26 / 0.06	29 / 0.06	33 / 0.06	36 / 0.06	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.03	5 / 0.04	10 / 0.04	14 / 0.05	19 / 0.06	23 / 0.06	27 / 0.06	31 / 0.06	34 / 0.06	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.03	5 / 0.04	10 / 0.04	15 / 0.05	19 / 0.06	24 / 0.06	28 / 0.06	32 / 0.06	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.03	5 / 0.04	10 / 0.04	15 / 0.05	20 / 0.06	25 / 0.06	29 / 0.06	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.03	5 / 0.04	10 / 0.04	15 / 0.05	20 / 0.06	25 / 0.06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.03	5 / 0.04	10 / 0.04	15 / 0.05	20 / 0.06	25 / 0.06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.03	5 / 0.04	10 / 0.04	15 / 0.05	20 / 0.06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.03	5 / 0.04	10 / 0.04	15 / 0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.03	5 / 0.04	10 / 0.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 76. Occurrence (percentiles) and MSE of Drought Scenario 12 of combined inflow/PDSI thresholds over the period of record, Model Period D (1926-1942).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16
	18,100	5th	0 / 0.16	1 / 0.15	2 / 0.15	3 / 0.15	4 / 0.15	4 / 0.15	4 / 0.15	4 / 0.15	4 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14
	24,600	10th	0 / 0.16	2 / 0.15	4 / 0.15	6 / 0.14	7 / 0.14	8 / 0.13	8 / 0.13	8 / 0.13	9 / 0.13	9 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	-	-	-
	28,600	15th	0 / 0.16	3 / 0.15	5 / 0.14	7 / 0.14	9 / 0.13	11 / 0.13	11 / 0.12	12 / 0.12	13 / 0.12	14 / 0.12	14 / 0.12	15 / 0.11	15 / 0.11	15 / 0.11	15 / 0.11	15 / 0.11	15 / 0.11	-	-	-	-
	33,000	20th	0 / 0.16	3 / 0.15	5 / 0.14	8 / 0.14	11 / 0.13	13 / 0.12	14 / 0.11	15 / 0.11	16 / 0.11	18 / 0.1	19 / 0.1	19 / 0.1	19 / 0.1	19 / 0.1	20 / 0.1	20 / 0.1	-	-	-	-	-
	36,300	25th	0 / 0.16	4 / 0.15	7 / 0.14	10 / 0.13	13 / 0.13	15 / 0.12	17 / 0.11	19 / 0.1	20 / 0.1	22 / 0.09	23 / 0.09	23 / 0.09	24 / 0.09	24 / 0.08	24 / 0.08	-	-	-	-	-	-
	39,700	30th	0 / 0.16	4 / 0.15	8 / 0.14	12 / 0.13	14 / 0.12	17 / 0.11	20 / 0.1	21 / 0.09	23 / 0.09	26 / 0.08	27 / 0.08	28 / 0.07	28 / 0.07	28 / 0.07	-	-	-	-	-	-	-
	44,000	35th	0 / 0.16	4 / 0.15	8 / 0.14	12 / 0.12	15 / 0.12	19 / 0.1	21 / 0.09	24 / 0.08	27 / 0.08	29 / 0.07	30 / 0.07	32 / 0.06	32 / 0.06	33 / 0.06	-	-	-	-	-	-	-
	48,500	40th	0 / 0.16	4 / 0.15	8 / 0.14	12 / 0.12	16 / 0.11	19 / 0.1	22 / 0.09	25 / 0.08	27 / 0.08	30 / 0.07	32 / 0.07	34 / 0.06	36 / 0.06	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.16	5 / 0.15	9 / 0.13	13 / 0.12	17 / 0.11	20 / 0.1	24 / 0.09	27 / 0.08	30 / 0.07	32 / 0.06	35 / 0.06	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.16	5 / 0.15	9 / 0.13	14 / 0.12	18 / 0.1	22 / 0.09	26 / 0.08	29 / 0.07	33 / 0.06	36 / 0.06	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.16	5 / 0.15	10 / 0.13	14 / 0.11	19 / 0.1	23 / 0.09	27 / 0.08	31 / 0.07	34 / 0.06	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.16	5 / 0.15	10 / 0.13	15 / 0.11	19 / 0.1	24 / 0.09	28 / 0.07	32 / 0.06	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.16	5 / 0.15	10 / 0.13	15 / 0.11	20 / 0.1	25 / 0.08	29 / 0.07	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.16	5 / 0.15	10 / 0.13	15 / 0.11	20 / 0.1	25 / 0.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.16	5 / 0.15	10 / 0.13	15 / 0.11	20 / 0.1	25 / 0.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.16	5 / 0.15	10 / 0.13	15 / 0.11	20 / 0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.16	5 / 0.15	10 / 0.13	15 / 0.11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.16	5 / 0.15	10 / 0.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 77. Occurrence (percentiles) and MSE of Drought Scenario 13 of combined inflow/PDSI thresholds over the period of record, Model Period D (1926-1942).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16	0 / 0.16
	18,100	5th	0 / 0.16	1 / 0.16	2 / 0.15	3 / 0.15	4 / 0.15	4 / 0.15	4 / 0.15	4 / 0.15	4 / 0.15	5 / 0.15	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14
	24,600	10th	0 / 0.16	2 / 0.15	4 / 0.15	6 / 0.14	7 / 0.14	8 / 0.14	8 / 0.13	8 / 0.13	9 / 0.13	9 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	-	-	-
	28,600	15th	0 / 0.16	3 / 0.15	5 / 0.15	7 / 0.14	9 / 0.13	11 / 0.13	11 / 0.12	12 / 0.12	13 / 0.12	14 / 0.12	14 / 0.12	15 / 0.11	15 / 0.11	15 / 0.11	15 / 0.11	15 / 0.11	15 / 0.11	-	-	-	-
	33,000	20th	0 / 0.16	3 / 0.15	5 / 0.14	8 / 0.14	11 / 0.13	13 / 0.12	14 / 0.11	15 / 0.11	16 / 0.11	18 / 0.1	19 / 0.1	19 / 0.1	19 / 0.1	19 / 0.1	20 / 0.1	20 / 0.1	-	-	-	-	-
	36,300	25th	0 / 0.16	4 / 0.15	7 / 0.14	10 / 0.14	13 / 0.13	15 / 0.12	17 / 0.11	19 / 0.1	20 / 0.1	22 / 0.09	23 / 0.09	23 / 0.09	24 / 0.09	24 / 0.08	24 / 0.08	-	-	-	-	-	-
	39,700	30th	0 / 0.16	4 / 0.15	8 / 0.14	12 / 0.13	14 / 0.12	17 / 0.11	20 / 0.1	21 / 0.09	23 / 0.09	26 / 0.08	27 / 0.08	28 / 0.07	28 / 0.07	28 / 0.07	-	-	-	-	-	-	-
	44,000	35th	0 / 0.16	4 / 0.15	8 / 0.14	12 / 0.13	15 / 0.12	19 / 0.1	21 / 0.09	24 / 0.08	27 / 0.08	29 / 0.07	30 / 0.07	32 / 0.06	32 / 0.06	33 / 0.06	-	-	-	-	-	-	-
	48,500	40th	0 / 0.16	4 / 0.15	8 / 0.14	12 / 0.13	16 / 0.11	19 / 0.1	22 / 0.09	25 / 0.08	27 / 0.07	30 / 0.07	32 / 0.06	34 / 0.06	36 / 0.06	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.16	5 / 0.15	9 / 0.13	13 / 0.12	17 / 0.11	20 / 0.1	24 / 0.08	27 / 0.08	30 / 0.07	32 / 0.06	35 / 0.06	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.16	5 / 0.15	9 / 0.13	14 / 0.12	18 / 0.1	22 / 0.09	26 / 0.08	29 / 0.07	33 / 0.06	36 / 0.05	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.16	5 / 0.15	10 / 0.13	14 / 0.12	19 / 0.1	23 / 0.09	27 / 0.07	31 / 0.06	34 / 0.06	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.16	5 / 0.15	10 / 0.13	15 / 0.12	19 / 0.1	24 / 0.09	28 / 0.07	32 / 0.06	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.16	5 / 0.15	10 / 0.13	15 / 0.11	20 / 0.1	25 / 0.08	29 / 0.07	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.16	5 / 0.15	10 / 0.13	15 / 0.11	20 / 0.1	25 / 0.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.16	5 / 0.15	10 / 0.13	15 / 0.11	20 / 0.1	25 / 0.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.16	5 / 0.15	10 / 0.13	15 / 0.11	20 / 0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.16	5 / 0.15	10 / 0.13	15 / 0.11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.16	5 / 0.15	10 / 0.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 78. Occurrence (percentiles) and MSE of Drought Scenario 14 of combined inflow/PDSI thresholds over the period of record, Model Period D (1926-1942).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17
	18,100	5th	0 / 0.17	1 / 0.16	2 / 0.16	3 / 0.16	4 / 0.15	4 / 0.15	4 / 0.15	4 / 0.15	4 / 0.15	5 / 0.15	5 / 0.15	5 / 0.15	5 / 0.15	5 / 0.15	5 / 0.15	5 / 0.15	5 / 0.15	5 / 0.15	5 / 0.15	5 / 0.15	5 / 0.15	5 / 0.15
	24,600	10th	0 / 0.17	2 / 0.16	4 / 0.15	6 / 0.15	7 / 0.14	8 / 0.14	8 / 0.14	8 / 0.14	9 / 0.14	9 / 0.14	10 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	-	-	-
	28,600	15th	0 / 0.17	3 / 0.16	5 / 0.15	7 / 0.14	9 / 0.14	11 / 0.13	11 / 0.13	12 / 0.12	13 / 0.12	14 / 0.12	14 / 0.12	15 / 0.12	15 / 0.12	15 / 0.11	15 / 0.11	15 / 0.11	15 / 0.11	-	-	-	-
	33,000	20th	0 / 0.17	3 / 0.16	5 / 0.15	8 / 0.14	11 / 0.13	13 / 0.13	14 / 0.12	15 / 0.11	16 / 0.11	18 / 0.11	19 / 0.1	19 / 0.1	19 / 0.1	19 / 0.1	20 / 0.1	20 / 0.1	-	-	-	-	-
	36,300	25th	0 / 0.17	4 / 0.16	7 / 0.15	10 / 0.14	13 / 0.13	15 / 0.12	17 / 0.11	19 / 0.1	20 / 0.1	22 / 0.09	23 / 0.09	23 / 0.09	24 / 0.09	24 / 0.08	24 / 0.08	-	-	-	-	-	-
	39,700	30th	0 / 0.17	4 / 0.15	8 / 0.14	12 / 0.13	14 / 0.12	17 / 0.11	20 / 0.1	21 / 0.09	23 / 0.08	26 / 0.08	27 / 0.08	28 / 0.07	28 / 0.07	28 / 0.07	-	-	-	-	-	-	-
	44,000	35th	0 / 0.17	4 / 0.15	8 / 0.14	12 / 0.12	15 / 0.11	19 / 0.1	21 / 0.09	24 / 0.08	27 / 0.07	29 / 0.07	30 / 0.07	32 / 0.06	32 / 0.06	33 / 0.06	-	-	-	-	-	-	-
	48,500	40th	0 / 0.17	4 / 0.15	8 / 0.14	12 / 0.12	16 / 0.11	19 / 0.1	22 / 0.09	25 / 0.08	27 / 0.07	30 / 0.07	32 / 0.06	34 / 0.06	36 / 0.06	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.17	5 / 0.15	9 / 0.13	13 / 0.12	17 / 0.11	20 / 0.09	24 / 0.08	27 / 0.07	30 / 0.07	32 / 0.06	35 / 0.06	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.17	5 / 0.15	9 / 0.13	14 / 0.12	18 / 0.1	22 / 0.09	26 / 0.08	29 / 0.07	33 / 0.06	36 / 0.05	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.17	5 / 0.15	10 / 0.13	14 / 0.11	19 / 0.1	23 / 0.08	27 / 0.07	31 / 0.06	34 / 0.06	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.17	5 / 0.15	10 / 0.13	15 / 0.11	19 / 0.09	24 / 0.08	28 / 0.07	32 / 0.06	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.17	5 / 0.15	10 / 0.13	15 / 0.11	20 / 0.09	25 / 0.08	29 / 0.07	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.17	5 / 0.15	10 / 0.13	15 / 0.11	20 / 0.09	25 / 0.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.17	5 / 0.15	10 / 0.13	15 / 0.11	20 / 0.09	25 / 0.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.17	5 / 0.15	10 / 0.13	15 / 0.11	20 / 0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.17	5 / 0.15	10 / 0.13	15 / 0.11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.17	5 / 0.15	10 / 0.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 79. Occurrence (percentiles) and MSE of Drought Scenario 15 of combined inflow/PDSI thresholds over the period of record, Model Period D (1926-1942).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17
	18,100	5th	0 / 0.17	1 / 0.17	2 / 0.16	3 / 0.16	4 / 0.16	4 / 0.16	4 / 0.16	4 / 0.16	4 / 0.16	5 / 0.16	5 / 0.16	5 / 0.16	5 / 0.16	5 / 0.16	5 / 0.16	5 / 0.16	5 / 0.16	5 / 0.16	5 / 0.16	5 / 0.16	5 / 0.16	5 / 0.16
	24,600	10th	0 / 0.17	2 / 0.16	4 / 0.16	6 / 0.16	7 / 0.15	8 / 0.15	8 / 0.15	8 / 0.14	9 / 0.14	9 / 0.14	10 / 0.14	10 / 0.14	10 / 0.14	10 / 0.14	10 / 0.14	10 / 0.14	10 / 0.14	10 / 0.14	-	-	-
	28,600	15th	0 / 0.17	3 / 0.16	5 / 0.16	7 / 0.15	9 / 0.14	11 / 0.14	11 / 0.13	12 / 0.13	13 / 0.13	14 / 0.12	14 / 0.12	15 / 0.12	15 / 0.12	15 / 0.12	15 / 0.12	15 / 0.12	15 / 0.12	-	-	-	-
	33,000	20th	0 / 0.17	3 / 0.16	5 / 0.15	8 / 0.15	11 / 0.14	13 / 0.13	14 / 0.12	15 / 0.12	16 / 0.11	18 / 0.11	19 / 0.1	19 / 0.1	19 / 0.1	19 / 0.1	20 / 0.1	20 / 0.1	-	-	-	-	-
	36,300	25th	0 / 0.17	4 / 0.16	7 / 0.15	10 / 0.14	13 / 0.13	15 / 0.12	17 / 0.11	19 / 0.1	20 / 0.1	22 / 0.09	23 / 0.09	23 / 0.09	24 / 0.09	24 / 0.08	24 / 0.08	-	-	-	-	-	-
	39,700	30th	0 / 0.17	4 / 0.16	8 / 0.14	12 / 0.13	14 / 0.11	17 / 0.11	20 / 0.09	21 / 0.09	23 / 0.08	26 / 0.08	27 / 0.07	28 / 0.07	28 / 0.07	28 / 0.07	-	-	-	-	-	-	-
	44,000	35th	0 / 0.17	4 / 0.16	8 / 0.14	12 / 0.12	15 / 0.11	19 / 0.1	21 / 0.09	24 / 0.08	27 / 0.07	29 / 0.07	30 / 0.06	32 / 0.06	32 / 0.06	33 / 0.06	-	-	-	-	-	-	-
	48,500	40th	0 / 0.17	4 / 0.16	8 / 0.14	12 / 0.12	16 / 0.11	19 / 0.1	22 / 0.08	25 / 0.08	27 / 0.07	30 / 0.06	32 / 0.06	34 / 0.06	36 / 0.05	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.17	5 / 0.16	9 / 0.13	13 / 0.12	17 / 0.1	20 / 0.09	24 / 0.08	27 / 0.07	30 / 0.06	32 / 0.06	35 / 0.05	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.17	5 / 0.16	9 / 0.13	14 / 0.11	18 / 0.1	22 / 0.09	26 / 0.07	29 / 0.06	33 / 0.06	36 / 0.05	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.17	5 / 0.16	10 / 0.13	14 / 0.11	19 / 0.09	23 / 0.08	27 / 0.07	31 / 0.06	34 / 0.05	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.17	5 / 0.16	10 / 0.13	15 / 0.11	19 / 0.09	24 / 0.08	28 / 0.07	32 / 0.06	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.17	5 / 0.16	10 / 0.13	15 / 0.11	20 / 0.09	25 / 0.08	29 / 0.07	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.17	5 / 0.16	10 / 0.13	15 / 0.11	20 / 0.09	25 / 0.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.17	5 / 0.16	10 / 0.13	15 / 0.11	20 / 0.09	25 / 0.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.17	5 / 0.16	10 / 0.13	15 / 0.11	20 / 0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.17	5 / 0.16	10 / 0.13	15 / 0.11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.17	5 / 0.16	10 / 0.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 80. Occurrence (percentiles) and MSE of Drought Scenario 3 of combined inflow/PDSI thresholds over the period of record, Model Period E (1942-1960).

Occurrence of Threshold Combinations / MSE of Drought Scenario 3			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.1	0 / 0.1	0 / 0.1	0 / 0.1	0 / 0.1	0 / 0.1	0 / 0.1	0 / 0.1	0 / 0.1	0 / 0.1	0 / 0.1	0 / 0.1	0 / 0.1	0 / 0.1	0 / 0.1	0 / 0.1	0 / 0.1	0 / 0.1	0 / 0.1	0 / 0.1	0 / 0.1	0 / 0.1
	18,100	5th	0 / 0.1	1 / 0.1	2 / 0.1	3 / 0.1	4 / 0.1	4 / 0.1	4 / 0.1	4 / 0.1	4 / 0.1	5 / 0.1	5 / 0.1	5 / 0.1	5 / 0.1	5 / 0.1	5 / 0.1	5 / 0.1	5 / 0.1	5 / 0.1	5 / 0.1	5 / 0.1	5 / 0.1	5 / 0.1
	24,600	10th	0 / 0.1	2 / 0.1	4 / 0.1	6 / 0.1	7 / 0.09	8 / 0.09	8 / 0.09	8 / 0.09	9 / 0.09	9 / 0.09	10 / 0.09	10 / 0.09	10 / 0.09	10 / 0.09	10 / 0.09	10 / 0.09	10 / 0.09	10 / 0.09	-	-	-
	28,600	15th	0 / 0.1	3 / 0.1	5 / 0.1	7 / 0.1	9 / 0.1	11 / 0.09	11 / 0.09	12 / 0.09	13 / 0.09	14 / 0.09	14 / 0.09	15 / 0.09	15 / 0.09	15 / 0.09	15 / 0.09	15 / 0.09	15 / 0.09	-	-	-	-
	33,000	20th	0 / 0.1	3 / 0.1	5 / 0.1	8 / 0.1	11 / 0.1	13 / 0.1	14 / 0.1	15 / 0.09	16 / 0.09	18 / 0.09	19 / 0.09	19 / 0.09	19 / 0.09	19 / 0.09	20 / 0.09	20 / 0.09	-	-	-	-	-
	36,300	25th	0 / 0.1	4 / 0.1	7 / 0.1	10 / 0.1	13 / 0.09	15 / 0.09	17 / 0.09	19 / 0.09	20 / 0.09	22 / 0.09	23 / 0.09	23 / 0.09	24 / 0.09	24 / 0.08	24 / 0.08	-	-	-	-	-	-
	39,700	30th	0 / 0.1	4 / 0.1	8 / 0.1	12 / 0.1	14 / 0.09	17 / 0.09	20 / 0.09	21 / 0.09	23 / 0.08	26 / 0.08	27 / 0.08	28 / 0.08	28 / 0.08	28 / 0.08	-	-	-	-	-	-	-
	44,000	35th	0 / 0.1	4 / 0.1	8 / 0.1	12 / 0.1	15 / 0.09	19 / 0.09	21 / 0.09	24 / 0.08	27 / 0.08	29 / 0.07	30 / 0.07	32 / 0.07	32 / 0.07	33 / 0.07	-	-	-	-	-	-	-
	48,500	40th	0 / 0.1	4 / 0.1	8 / 0.1	12 / 0.1	16 / 0.09	19 / 0.09	22 / 0.09	25 / 0.08	27 / 0.08	30 / 0.07	32 / 0.07	34 / 0.07	36 / 0.07	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.1	5 / 0.1	9 / 0.1	13 / 0.1	17 / 0.1	20 / 0.09	24 / 0.09	27 / 0.08	30 / 0.07	32 / 0.07	35 / 0.07	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.1	5 / 0.1	9 / 0.1	14 / 0.1	18 / 0.09	22 / 0.09	26 / 0.08	29 / 0.08	33 / 0.07	36 / 0.07	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.1	5 / 0.1	10 / 0.1	14 / 0.1	19 / 0.09	23 / 0.09	27 / 0.08	31 / 0.07	34 / 0.07	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.1	5 / 0.1	10 / 0.1	15 / 0.1	19 / 0.09	24 / 0.09	28 / 0.08	32 / 0.07	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.1	5 / 0.1	10 / 0.1	15 / 0.1	20 / 0.09	25 / 0.09	29 / 0.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.1	5 / 0.1	10 / 0.1	15 / 0.1	20 / 0.09	25 / 0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.1	5 / 0.1	10 / 0.1	15 / 0.1	20 / 0.09	25 / 0.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.1	5 / 0.1	10 / 0.1	15 / 0.1	20 / 0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.1	5 / 0.1	10 / 0.1	15 / 0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.1	5 / 0.1	10 / 0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 81. Occurrence (percentiles) and MSE of Drought Scenario 6 of combined inflow/PDSI thresholds over the period of record, Model Period E (1942-1960).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15
	18,100	5th	0 / 0.15	1 / 0.15	2 / 0.14	3 / 0.14	4 / 0.14	4 / 0.14	4 / 0.14	4 / 0.14	4 / 0.14	5 / 0.13	5 / 0.13	5 / 0.13	5 / 0.13	5 / 0.13	5 / 0.13	5 / 0.13	5 / 0.13	5 / 0.13	5 / 0.13	5 / 0.13	5 / 0.13
	24,600	10th	0 / 0.15	2 / 0.14	4 / 0.14	6 / 0.13	7 / 0.13	8 / 0.13	8 / 0.12	8 / 0.12	9 / 0.12	9 / 0.12	10 / 0.12	10 / 0.12	10 / 0.12	10 / 0.11	10 / 0.11	10 / 0.11	10 / 0.11	10 / 0.11	-	-	-
	28,600	15th	0 / 0.15	3 / 0.14	5 / 0.14	7 / 0.14	9 / 0.13	11 / 0.12	11 / 0.12	12 / 0.12	13 / 0.11	14 / 0.11	14 / 0.11	15 / 0.1	15 / 0.1	15 / 0.1	15 / 0.1	15 / 0.1	15 / 0.1	-	-	-	-
	33,000	20th	0 / 0.15	3 / 0.14	5 / 0.14	8 / 0.14	11 / 0.13	13 / 0.13	14 / 0.12	15 / 0.12	16 / 0.11	18 / 0.11	19 / 0.1	19 / 0.1	19 / 0.1	19 / 0.1	20 / 0.1	20 / 0.1	-	-	-	-	-
	36,300	25th	0 / 0.15	4 / 0.14	7 / 0.14	10 / 0.13	13 / 0.13	15 / 0.12	17 / 0.11	19 / 0.11	20 / 0.1	22 / 0.09	23 / 0.09	23 / 0.09	24 / 0.09	24 / 0.09	24 / 0.09	-	-	-	-	-	-
	39,700	30th	0 / 0.15	4 / 0.14	8 / 0.14	12 / 0.13	14 / 0.12	17 / 0.12	20 / 0.11	21 / 0.1	23 / 0.09	26 / 0.09	27 / 0.08	28 / 0.08	28 / 0.08	28 / 0.08	-	-	-	-	-	-	-
	44,000	35th	0 / 0.15	4 / 0.14	8 / 0.14	12 / 0.13	15 / 0.12	19 / 0.11	21 / 0.1	24 / 0.09	27 / 0.09	29 / 0.08	30 / 0.08	32 / 0.07	32 / 0.07	33 / 0.07	-	-	-	-	-	-	-
	48,500	40th	0 / 0.15	4 / 0.14	8 / 0.14	12 / 0.13	16 / 0.12	19 / 0.11	22 / 0.1	25 / 0.09	27 / 0.08	30 / 0.08	32 / 0.07	34 / 0.07	36 / 0.07	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.15	5 / 0.14	9 / 0.14	13 / 0.13	17 / 0.12	20 / 0.11	24 / 0.1	27 / 0.09	30 / 0.08	32 / 0.07	35 / 0.07	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.15	5 / 0.14	9 / 0.14	14 / 0.13	18 / 0.12	22 / 0.11	26 / 0.1	29 / 0.09	33 / 0.08	36 / 0.07	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.15	5 / 0.14	10 / 0.13	14 / 0.13	19 / 0.12	23 / 0.1	27 / 0.09	31 / 0.08	34 / 0.08	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.15	5 / 0.14	10 / 0.13	15 / 0.13	19 / 0.12	24 / 0.1	28 / 0.09	32 / 0.08	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.15	5 / 0.14	10 / 0.14	15 / 0.13	20 / 0.12	25 / 0.1	29 / 0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.15	5 / 0.14	10 / 0.14	15 / 0.13	20 / 0.12	25 / 0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.15	5 / 0.14	10 / 0.14	15 / 0.13	20 / 0.12	25 / 0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.15	5 / 0.14	10 / 0.14	15 / 0.13	20 / 0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.15	5 / 0.14	10 / 0.14	15 / 0.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.15	5 / 0.14	10 / 0.14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 82. Occurrence (percentiles) and MSE of Drought Scenario 12 of combined inflow/PDSI thresholds over the period of record, Model Period E (1942-1960).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17	0 / 0.17
	18,100	5th	0 / 0.17	1 / 0.17	2 / 0.17	3 / 0.16	4 / 0.16	4 / 0.16	4 / 0.16	4 / 0.16	4 / 0.16	5 / 0.16	5 / 0.16	5 / 0.16	5 / 0.16	5 / 0.16	5 / 0.16	5 / 0.16	5 / 0.16	5 / 0.16	5 / 0.16	5 / 0.16	5 / 0.16	5 / 0.16
	24,600	10th	0 / 0.17	2 / 0.17	4 / 0.16	6 / 0.16	7 / 0.15	8 / 0.15	8 / 0.15	8 / 0.15	9 / 0.15	9 / 0.15	10 / 0.15	10 / 0.15	10 / 0.15	10 / 0.15	10 / 0.15	10 / 0.15	10 / 0.15	10 / 0.15	-	-	-
	28,600	15th	0 / 0.17	3 / 0.17	5 / 0.16	7 / 0.16	9 / 0.15	11 / 0.15	11 / 0.14	12 / 0.14	13 / 0.14	14 / 0.14	14 / 0.14	15 / 0.14	15 / 0.14	15 / 0.14	15 / 0.14	15 / 0.14	15 / 0.14	-	-	-	-
	33,000	20th	0 / 0.17	3 / 0.16	5 / 0.17	8 / 0.16	11 / 0.15	13 / 0.14	14 / 0.14	15 / 0.14	16 / 0.13	18 / 0.13	19 / 0.13	19 / 0.13	19 / 0.13	19 / 0.13	20 / 0.12	20 / 0.12	-	-	-	-	-
	36,300	25th	0 / 0.17	4 / 0.16	7 / 0.16	10 / 0.15	13 / 0.15	15 / 0.14	17 / 0.13	19 / 0.12	20 / 0.12	22 / 0.12	23 / 0.11	23 / 0.11	24 / 0.11	24 / 0.11	24 / 0.11	-	-	-	-	-	-
	39,700	30th	0 / 0.17	4 / 0.16	8 / 0.16	12 / 0.15	14 / 0.14	17 / 0.13	20 / 0.12	21 / 0.12	23 / 0.11	26 / 0.11	27 / 0.1	28 / 0.1	28 / 0.1	28 / 0.1	-	-	-	-	-	-	-
	44,000	35th	0 / 0.17	4 / 0.16	8 / 0.16	12 / 0.15	15 / 0.14	19 / 0.13	21 / 0.12	24 / 0.11	27 / 0.1	29 / 0.1	30 / 0.09	32 / 0.09	32 / 0.09	33 / 0.08	-	-	-	-	-	-	-
	48,500	40th	0 / 0.17	4 / 0.16	8 / 0.16	12 / 0.15	16 / 0.14	19 / 0.13	22 / 0.11	25 / 0.1	27 / 0.1	30 / 0.09	32 / 0.09	34 / 0.08	36 / 0.08	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.17	5 / 0.16	9 / 0.15	13 / 0.14	17 / 0.13	20 / 0.12	24 / 0.1	27 / 0.09	30 / 0.09	32 / 0.08	35 / 0.08	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.17	5 / 0.16	9 / 0.15	14 / 0.14	18 / 0.13	22 / 0.11	26 / 0.1	29 / 0.09	33 / 0.08	36 / 0.07	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.17	5 / 0.16	10 / 0.15	14 / 0.14	19 / 0.12	23 / 0.11	27 / 0.09	31 / 0.08	34 / 0.07	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.17	5 / 0.16	10 / 0.15	15 / 0.14	19 / 0.12	24 / 0.11	28 / 0.09	32 / 0.08	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.17	5 / 0.16	10 / 0.15	15 / 0.13	20 / 0.12	25 / 0.1	29 / 0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.17	5 / 0.16	10 / 0.15	15 / 0.13	20 / 0.12	25 / 0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.17	5 / 0.16	10 / 0.15	15 / 0.13	20 / 0.12	25 / 0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.17	5 / 0.16	10 / 0.15	15 / 0.13	20 / 0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.17	5 / 0.16	10 / 0.15	15 / 0.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.17	5 / 0.16	10 / 0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 83. Occurrence (percentiles) and MSE of Drought Scenario 13 of combined inflow/PDSI thresholds over the period of record, Model Period E (1942-1960).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18
	18,100	5th	0 / 0.18	1 / 0.17	2 / 0.17	3 / 0.17	4 / 0.17	4 / 0.17	4 / 0.17	4 / 0.17	4 / 0.17	5 / 0.17	5 / 0.17	5 / 0.17	5 / 0.17	5 / 0.17	5 / 0.17	5 / 0.17	5 / 0.17	5 / 0.17	5 / 0.17	5 / 0.17	5 / 0.17	5 / 0.17
	24,600	10th	0 / 0.18	2 / 0.17	4 / 0.17	6 / 0.16	7 / 0.16	8 / 0.15	8 / 0.15	8 / 0.15	9 / 0.15	9 / 0.15	10 / 0.15	10 / 0.15	10 / 0.15	10 / 0.15	10 / 0.15	10 / 0.15	10 / 0.15	10 / 0.15	-	-	-
	28,600	15th	0 / 0.18	3 / 0.17	5 / 0.17	7 / 0.16	9 / 0.16	11 / 0.15	11 / 0.15	12 / 0.15	13 / 0.15	14 / 0.15	14 / 0.14	15 / 0.14	15 / 0.14	15 / 0.14	15 / 0.14	15 / 0.14	15 / 0.14	-	-	-	-
	33,000	20th	0 / 0.18	3 / 0.17	5 / 0.17	8 / 0.17	11 / 0.16	13 / 0.15	14 / 0.14	15 / 0.14	16 / 0.14	18 / 0.13	19 / 0.13	19 / 0.13	19 / 0.13	19 / 0.13	20 / 0.12	20 / 0.12	-	-	-	-	-
	36,300	25th	0 / 0.18	4 / 0.17	7 / 0.17	10 / 0.16	13 / 0.15	15 / 0.14	17 / 0.13	19 / 0.13	20 / 0.12	22 / 0.12	23 / 0.11	23 / 0.11	24 / 0.11	24 / 0.11	24 / 0.11	-	-	-	-	-	-
	39,700	30th	0 / 0.18	4 / 0.17	8 / 0.16	12 / 0.15	14 / 0.14	17 / 0.13	20 / 0.12	21 / 0.12	23 / 0.11	26 / 0.11	27 / 0.1	28 / 0.1	28 / 0.1	28 / 0.1	-	-	-	-	-	-	-
	44,000	35th	0 / 0.18	4 / 0.17	8 / 0.16	12 / 0.15	15 / 0.14	19 / 0.13	21 / 0.12	24 / 0.11	27 / 0.1	29 / 0.1	30 / 0.09	32 / 0.09	32 / 0.08	33 / 0.08	-	-	-	-	-	-	-
	48,500	40th	0 / 0.18	4 / 0.17	8 / 0.16	12 / 0.15	16 / 0.14	19 / 0.13	22 / 0.11	25 / 0.1	27 / 0.1	30 / 0.09	32 / 0.09	34 / 0.08	36 / 0.08	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.18	5 / 0.16	9 / 0.15	13 / 0.14	17 / 0.13	20 / 0.12	24 / 0.1	27 / 0.09	30 / 0.09	32 / 0.08	35 / 0.08	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.18	5 / 0.16	9 / 0.15	14 / 0.14	18 / 0.13	22 / 0.11	26 / 0.1	29 / 0.09	33 / 0.08	36 / 0.07	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.18	5 / 0.16	10 / 0.15	14 / 0.14	19 / 0.12	23 / 0.11	27 / 0.09	31 / 0.08	34 / 0.07	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.18	5 / 0.16	10 / 0.15	15 / 0.14	19 / 0.12	24 / 0.11	28 / 0.09	32 / 0.08	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.18	5 / 0.16	10 / 0.15	15 / 0.13	20 / 0.12	25 / 0.1	29 / 0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.18	5 / 0.16	10 / 0.15	15 / 0.13	20 / 0.12	25 / 0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.18	5 / 0.16	10 / 0.15	15 / 0.13	20 / 0.12	25 / 0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.18	5 / 0.16	10 / 0.15	15 / 0.13	20 / 0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.18	5 / 0.16	10 / 0.15	15 / 0.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.18	5 / 0.16	10 / 0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 84. Occurrence (percentiles) and MSE of Drought Scenario 14 of combined inflow/PDSI thresholds over the period of record, Model Period E (1942-1960).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18	0 / 0.18
	18,100	5th	0 / 0.18	1 / 0.18	2 / 0.18	3 / 0.18	4 / 0.17	4 / 0.17	4 / 0.17	4 / 0.17	4 / 0.17	5 / 0.17	5 / 0.17	5 / 0.17	5 / 0.17	5 / 0.17	5 / 0.17	5 / 0.17	5 / 0.17	5 / 0.17	5 / 0.17	5 / 0.17	5 / 0.17	5 / 0.17
	24,600	10th	0 / 0.18	2 / 0.18	4 / 0.17	6 / 0.17	7 / 0.16	8 / 0.16	8 / 0.16	8 / 0.16	9 / 0.16	9 / 0.15	10 / 0.15	10 / 0.15	10 / 0.15	10 / 0.15	10 / 0.15	10 / 0.15	10 / 0.15	10 / 0.15	-	-	-
	28,600	15th	0 / 0.18	3 / 0.18	5 / 0.17	7 / 0.17	9 / 0.16	11 / 0.16	11 / 0.15	12 / 0.15	13 / 0.15	14 / 0.15	14 / 0.15	15 / 0.14	15 / 0.14	15 / 0.14	15 / 0.14	15 / 0.14	15 / 0.14	-	-	-	-
	33,000	20th	0 / 0.18	3 / 0.18	5 / 0.18	8 / 0.17	11 / 0.16	13 / 0.15	14 / 0.14	15 / 0.14	16 / 0.14	18 / 0.13	19 / 0.13	19 / 0.13	19 / 0.13	19 / 0.12	20 / 0.12	20 / 0.12	-	-	-	-	-
	36,300	25th	0 / 0.18	4 / 0.17	7 / 0.17	10 / 0.16	13 / 0.15	15 / 0.14	17 / 0.13	19 / 0.13	20 / 0.12	22 / 0.12	23 / 0.11	23 / 0.11	24 / 0.11	24 / 0.11	24 / 0.11	-	-	-	-	-	-
	39,700	30th	0 / 0.18	4 / 0.17	8 / 0.17	12 / 0.16	14 / 0.15	17 / 0.13	20 / 0.12	21 / 0.12	23 / 0.11	26 / 0.1	27 / 0.1	28 / 0.1	28 / 0.1	28 / 0.09	-	-	-	-	-	-	-
	44,000	35th	0 / 0.18	4 / 0.17	8 / 0.16	12 / 0.15	15 / 0.14	19 / 0.13	21 / 0.11	24 / 0.11	27 / 0.1	29 / 0.09	30 / 0.09	32 / 0.08	32 / 0.08	33 / 0.08	-	-	-	-	-	-	-
	48,500	40th	0 / 0.18	4 / 0.17	8 / 0.16	12 / 0.15	16 / 0.14	19 / 0.13	22 / 0.11	25 / 0.1	27 / 0.1	30 / 0.09	32 / 0.08	34 / 0.08	36 / 0.08	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.18	5 / 0.17	9 / 0.16	13 / 0.14	17 / 0.13	20 / 0.12	24 / 0.1	27 / 0.09	30 / 0.09	32 / 0.08	35 / 0.07	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.18	5 / 0.17	9 / 0.15	14 / 0.14	18 / 0.13	22 / 0.11	26 / 0.1	29 / 0.08	33 / 0.08	36 / 0.07	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.18	5 / 0.17	10 / 0.15	14 / 0.14	19 / 0.12	23 / 0.11	27 / 0.09	31 / 0.08	34 / 0.07	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.18	5 / 0.17	10 / 0.15	15 / 0.14	19 / 0.12	24 / 0.11	28 / 0.09	32 / 0.08	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.18	5 / 0.17	10 / 0.15	15 / 0.14	20 / 0.12	25 / 0.1	29 / 0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.18	5 / 0.17	10 / 0.15	15 / 0.14	20 / 0.12	25 / 0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.18	5 / 0.17	10 / 0.15	15 / 0.14	20 / 0.12	25 / 0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.18	5 / 0.17	10 / 0.15	15 / 0.14	20 / 0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.18	5 / 0.17	10 / 0.15	15 / 0.14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.18	5 / 0.17	10 / 0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 85. Occurrence (percentiles) and MSE of Drought Scenario 15 of combined inflow/PDSI thresholds over the period of record, Model Period E (1942-1960).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.2	0 / 0.2	0 / 0.19	0 / 0.19	0 / 0.19	0 / 0.19	0 / 0.19	0 / 0.19	0 / 0.19	0 / 0.19	0 / 0.19	0 / 0.19	0 / 0.19	0 / 0.19	0 / 0.19	0 / 0.19	0 / 0.19	0 / 0.19	0 / 0.19	0 / 0.19	0 / 0.19
	18,100	5th	0 / 0.2	1 / 0.19	2 / 0.19	3 / 0.18	4 / 0.18	4 / 0.18	4 / 0.18	4 / 0.18	4 / 0.18	5 / 0.18	5 / 0.18	5 / 0.18	5 / 0.18	5 / 0.18	5 / 0.18	5 / 0.18	5 / 0.18	5 / 0.18	5 / 0.18	5 / 0.18	5 / 0.18
	24,600	10th	0 / 0.19	2 / 0.19	4 / 0.18	6 / 0.17	7 / 0.17	8 / 0.17	8 / 0.16	8 / 0.16	9 / 0.16	9 / 0.16	10 / 0.16	10 / 0.16	10 / 0.16	10 / 0.16	10 / 0.16	10 / 0.16	10 / 0.16	10 / 0.16	-	-	-
	28,600	15th	0 / 0.19	3 / 0.19	5 / 0.18	7 / 0.17	9 / 0.16	11 / 0.16	11 / 0.15	12 / 0.15	13 / 0.15	14 / 0.14	14 / 0.14	15 / 0.14	15 / 0.14	15 / 0.13	15 / 0.13	15 / 0.13	15 / 0.13	-	-	-	-
	33,000	20th	0 / 0.19	3 / 0.19	5 / 0.18	8 / 0.17	11 / 0.16	13 / 0.15	14 / 0.14	15 / 0.14	16 / 0.13	18 / 0.13	19 / 0.12	19 / 0.12	19 / 0.12	19 / 0.12	20 / 0.12	20 / 0.12	-	-	-	-	-
	36,300	25th	0 / 0.19	4 / 0.18	7 / 0.18	10 / 0.16	13 / 0.15	15 / 0.14	17 / 0.13	19 / 0.12	20 / 0.12	22 / 0.11	23 / 0.11	23 / 0.11	24 / 0.1	24 / 0.1	24 / 0.1	-	-	-	-	-	-
	39,700	30th	0 / 0.19	4 / 0.18	8 / 0.17	12 / 0.16	14 / 0.15	17 / 0.13	20 / 0.12	21 / 0.11	23 / 0.1	26 / 0.1	27 / 0.09	28 / 0.09	28 / 0.09	28 / 0.09	-	-	-	-	-	-	-
	44,000	35th	0 / 0.19	4 / 0.18	8 / 0.17	12 / 0.15	15 / 0.14	19 / 0.13	21 / 0.11	24 / 0.1	27 / 0.09	29 / 0.09	30 / 0.08	32 / 0.08	32 / 0.08	33 / 0.08	-	-	-	-	-	-	-
	48,500	40th	0 / 0.19	4 / 0.18	8 / 0.17	12 / 0.15	16 / 0.14	19 / 0.12	22 / 0.11	25 / 0.1	27 / 0.09	30 / 0.08	32 / 0.08	34 / 0.07	36 / 0.07	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.19	5 / 0.18	9 / 0.16	13 / 0.14	17 / 0.13	20 / 0.12	24 / 0.1	27 / 0.09	30 / 0.08	32 / 0.07	35 / 0.07	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.19	5 / 0.17	9 / 0.16	14 / 0.14	18 / 0.13	22 / 0.11	26 / 0.09	29 / 0.08	33 / 0.07	36 / 0.07	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.19	5 / 0.17	10 / 0.16	14 / 0.14	19 / 0.12	23 / 0.11	27 / 0.09	31 / 0.08	34 / 0.07	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.19	5 / 0.17	10 / 0.16	15 / 0.14	19 / 0.12	24 / 0.11	28 / 0.09	32 / 0.07	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.19	5 / 0.17	10 / 0.16	15 / 0.14	20 / 0.12	25 / 0.1	29 / 0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.19	5 / 0.17	10 / 0.16	15 / 0.14	20 / 0.12	25 / 0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.19	5 / 0.17	10 / 0.16	15 / 0.14	20 / 0.12	25 / 0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.19	5 / 0.17	10 / 0.16	15 / 0.14	20 / 0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.19	5 / 0.17	10 / 0.16	15 / 0.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.19	5 / 0.17	10 / 0.16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 86. Occurrence (percentiles) and MSE of Drought Scenario 3 of combined inflow/PDSI thresholds over the period of record, Model Period F (1960-1987).

Occurrence of Threshold Combinations / MSE of Drought Scenario 3			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21	0 / 0.21
	18,100	5th	0 / 0.21	1 / 0.21	2 / 0.21	3 / 0.21	4 / 0.21	4 / 0.21	4 / 0.21	4 / 0.21	4 / 0.21	5 / 0.2	5 / 0.2	5 / 0.2	5 / 0.2	5 / 0.2	5 / 0.2	5 / 0.2	5 / 0.2	5 / 0.2	5 / 0.2	5 / 0.2	5 / 0.2	5 / 0.2
	24,600	10th	0 / 0.21	2 / 0.21	4 / 0.2	6 / 0.2	7 / 0.19	8 / 0.19	8 / 0.19	8 / 0.19	9 / 0.19	9 / 0.18	10 / 0.18	10 / 0.18	10 / 0.18	10 / 0.18	10 / 0.18	10 / 0.18	10 / 0.18	10 / 0.18	-	-	-
	28,600	15th	0 / 0.21	3 / 0.21	5 / 0.2	7 / 0.19	9 / 0.19	11 / 0.19	11 / 0.18	12 / 0.18	13 / 0.18	14 / 0.17	14 / 0.17	15 / 0.17	15 / 0.17	15 / 0.17	15 / 0.17	15 / 0.17	15 / 0.17	-	-	-	-
	33,000	20th	0 / 0.21	3 / 0.21	5 / 0.2	8 / 0.19	11 / 0.18	13 / 0.18	14 / 0.17	15 / 0.17	16 / 0.17	18 / 0.16	19 / 0.15	19 / 0.15	19 / 0.15	19 / 0.15	20 / 0.15	20 / 0.15	-	-	-	-	-
	36,300	25th	0 / 0.21	4 / 0.2	7 / 0.2	10 / 0.19	13 / 0.18	15 / 0.17	17 / 0.17	19 / 0.16	20 / 0.16	22 / 0.15	23 / 0.14	23 / 0.14	24 / 0.14	24 / 0.14	24 / 0.14	-	-	-	-	-	-
	39,700	30th	0 / 0.21	4 / 0.2	8 / 0.19	12 / 0.18	14 / 0.17	17 / 0.16	20 / 0.16	21 / 0.15	23 / 0.14	26 / 0.14	27 / 0.13	28 / 0.13	28 / 0.13	28 / 0.13	-	-	-	-	-	-	-
	44,000	35th	0 / 0.21	4 / 0.2	8 / 0.19	12 / 0.18	15 / 0.17	19 / 0.16	21 / 0.15	24 / 0.14	27 / 0.14	29 / 0.13	30 / 0.12	32 / 0.12	32 / 0.12	33 / 0.11	-	-	-	-	-	-	-
	48,500	40th	0 / 0.21	4 / 0.2	8 / 0.19	12 / 0.18	16 / 0.17	19 / 0.16	22 / 0.15	25 / 0.14	27 / 0.13	30 / 0.13	32 / 0.12	34 / 0.11	36 / 0.11	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.21	5 / 0.2	9 / 0.19	13 / 0.18	17 / 0.16	20 / 0.16	24 / 0.14	27 / 0.14	30 / 0.13	32 / 0.12	35 / 0.11	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.21	5 / 0.2	9 / 0.19	14 / 0.18	18 / 0.16	22 / 0.15	26 / 0.14	29 / 0.13	33 / 0.12	36 / 0.11	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.21	5 / 0.2	10 / 0.19	14 / 0.18	19 / 0.16	23 / 0.15	27 / 0.14	31 / 0.12	34 / 0.11	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.21	5 / 0.2	10 / 0.19	15 / 0.18	19 / 0.16	24 / 0.15	28 / 0.14	32 / 0.12	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.21	5 / 0.2	10 / 0.19	15 / 0.18	20 / 0.16	25 / 0.15	29 / 0.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.21	5 / 0.2	10 / 0.19	15 / 0.18	20 / 0.16	25 / 0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.21	5 / 0.2	10 / 0.19	15 / 0.18	20 / 0.16	25 / 0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.21	5 / 0.2	10 / 0.19	15 / 0.18	20 / 0.16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.21	5 / 0.2	10 / 0.19	15 / 0.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.21	5 / 0.2	10 / 0.19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 87. Occurrence (percentiles) and MSE of Drought Scenario 6 of combined inflow/PDSI thresholds over the period of record, Model Period F (1960-1987).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08
	18,100	5th	0 / 0.08	1 / 0.08	2 / 0.08	3 / 0.08	4 / 0.08	4 / 0.09	4 / 0.09	4 / 0.09	4 / 0.08	5 / 0.08	5 / 0.08	5 / 0.08	5 / 0.08	5 / 0.08	5 / 0.08	5 / 0.08	5 / 0.08	5 / 0.08	5 / 0.08	5 / 0.08	5 / 0.08	5 / 0.08
	24,600	10th	0 / 0.08	2 / 0.08	4 / 0.09	6 / 0.09	7 / 0.09	8 / 0.09	8 / 0.09	8 / 0.09	9 / 0.09	9 / 0.09	10 / 0.09	10 / 0.09	10 / 0.09	10 / 0.09	10 / 0.09	10 / 0.09	10 / 0.09	10 / 0.09	-	-	-
	28,600	15th	0 / 0.08	3 / 0.08	5 / 0.09	7 / 0.09	9 / 0.09	11 / 0.09	11 / 0.09	12 / 0.09	13 / 0.09	14 / 0.09	14 / 0.09	15 / 0.09	15 / 0.09	15 / 0.09	15 / 0.09	15 / 0.09	15 / 0.09	-	-	-	-
	33,000	20th	0 / 0.08	3 / 0.08	5 / 0.09	8 / 0.09	11 / 0.09	13 / 0.09	14 / 0.09	15 / 0.09	16 / 0.09	18 / 0.09	19 / 0.09	19 / 0.09	19 / 0.09	19 / 0.09	20 / 0.09	20 / 0.09	-	-	-	-	-
	36,300	25th	0 / 0.08	4 / 0.08	7 / 0.09	10 / 0.09	13 / 0.09	15 / 0.09	17 / 0.09	19 / 0.09	20 / 0.09	22 / 0.09	23 / 0.09	23 / 0.09	24 / 0.09	24 / 0.09	24 / 0.09	-	-	-	-	-	-
	39,700	30th	0 / 0.08	4 / 0.08	8 / 0.08	12 / 0.09	14 / 0.09	17 / 0.09	20 / 0.09	21 / 0.09	23 / 0.09	26 / 0.08	27 / 0.09	28 / 0.09	28 / 0.09	28 / 0.09	-	-	-	-	-	-	-
	44,000	35th	0 / 0.08	4 / 0.08	8 / 0.08	12 / 0.09	15 / 0.09	19 / 0.09	21 / 0.09	24 / 0.09	27 / 0.08	29 / 0.08	30 / 0.08	32 / 0.09	32 / 0.09	33 / 0.08	-	-	-	-	-	-	-
	48,500	40th	0 / 0.08	4 / 0.08	8 / 0.08	12 / 0.09	16 / 0.09	19 / 0.09	22 / 0.09	25 / 0.09	27 / 0.08	30 / 0.08	32 / 0.08	34 / 0.08	36 / 0.08	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.08	5 / 0.08	9 / 0.09	13 / 0.09	17 / 0.09	20 / 0.09	24 / 0.09	27 / 0.09	30 / 0.08	32 / 0.08	35 / 0.08	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.08	5 / 0.08	9 / 0.09	14 / 0.09	18 / 0.09	22 / 0.09	26 / 0.09	29 / 0.09	33 / 0.08	36 / 0.08	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.08	5 / 0.08	10 / 0.09	14 / 0.09	19 / 0.09	23 / 0.09	27 / 0.09	31 / 0.09	34 / 0.09	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.08	5 / 0.08	10 / 0.09	15 / 0.09	19 / 0.09	24 / 0.1	28 / 0.09	32 / 0.09	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.08	5 / 0.08	10 / 0.09	15 / 0.09	20 / 0.09	25 / 0.1	29 / 0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.08	5 / 0.08	10 / 0.09	15 / 0.09	20 / 0.09	25 / 0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.08	5 / 0.08	10 / 0.09	15 / 0.09	20 / 0.09	25 / 0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.08	5 / 0.08	10 / 0.09	15 / 0.09	20 / 0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.08	5 / 0.08	10 / 0.09	15 / 0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.08	5 / 0.08	10 / 0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 88. Occurrence (percentiles) and MSE of Drought Scenario 12 of combined inflow/PDSI thresholds over the period of record, Model Period F (1960-1987).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22	0 / 0.22
	18,100	5th	0 / 0.22	1 / 0.22	2 / 0.22	3 / 0.22	4 / 0.21	4 / 0.21	4 / 0.21	4 / 0.21	4 / 0.21	5 / 0.21	5 / 0.21	5 / 0.21	5 / 0.21	5 / 0.21	5 / 0.21	5 / 0.21	5 / 0.21	5 / 0.21	5 / 0.21	5 / 0.21	5 / 0.21	5 / 0.21
	24,600	10th	0 / 0.22	2 / 0.22	4 / 0.22	6 / 0.22	7 / 0.21	8 / 0.21	8 / 0.21	8 / 0.21	9 / 0.21	9 / 0.2	10 / 0.2	10 / 0.2	10 / 0.2	10 / 0.2	10 / 0.2	10 / 0.2	10 / 0.2	10 / 0.2	-	-	-
	28,600	15th	0 / 0.22	3 / 0.22	5 / 0.22	7 / 0.21	9 / 0.21	11 / 0.2	11 / 0.2	12 / 0.2	13 / 0.2	14 / 0.19	14 / 0.19	15 / 0.18	15 / 0.18	15 / 0.18	15 / 0.18	15 / 0.18	15 / 0.18	-	-	-	-
	33,000	20th	0 / 0.22	3 / 0.22	5 / 0.21	8 / 0.21	11 / 0.2	13 / 0.2	14 / 0.2	15 / 0.19	16 / 0.19	18 / 0.18	19 / 0.18	19 / 0.17	19 / 0.17	19 / 0.17	20 / 0.17	20 / 0.17	-	-	-	-	-
	36,300	25th	0 / 0.22	4 / 0.21	7 / 0.21	10 / 0.21	13 / 0.2	15 / 0.19	17 / 0.19	19 / 0.18	20 / 0.18	22 / 0.17	23 / 0.16	23 / 0.16	24 / 0.16	24 / 0.16	24 / 0.16	-	-	-	-	-	-
	39,700	30th	0 / 0.22	4 / 0.21	8 / 0.21	12 / 0.2	14 / 0.19	17 / 0.19	20 / 0.18	21 / 0.17	23 / 0.16	26 / 0.15	27 / 0.15	28 / 0.14	28 / 0.14	28 / 0.14	-	-	-	-	-	-	-
	44,000	35th	0 / 0.22	4 / 0.21	8 / 0.2	12 / 0.2	15 / 0.19	19 / 0.18	21 / 0.17	24 / 0.16	27 / 0.15	29 / 0.14	30 / 0.13	32 / 0.13	32 / 0.12	33 / 0.12	-	-	-	-	-	-	-
	48,500	40th	0 / 0.22	4 / 0.21	8 / 0.2	12 / 0.2	16 / 0.19	19 / 0.18	22 / 0.17	25 / 0.16	27 / 0.15	30 / 0.14	32 / 0.13	34 / 0.12	36 / 0.11	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.22	5 / 0.21	9 / 0.2	13 / 0.19	17 / 0.18	20 / 0.18	24 / 0.16	27 / 0.15	30 / 0.14	32 / 0.13	35 / 0.12	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.22	5 / 0.21	9 / 0.2	14 / 0.19	18 / 0.18	22 / 0.17	26 / 0.15	29 / 0.14	33 / 0.13	36 / 0.12	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.22	5 / 0.21	10 / 0.2	14 / 0.19	19 / 0.18	23 / 0.16	27 / 0.15	31 / 0.14	34 / 0.12	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.22	5 / 0.21	10 / 0.2	15 / 0.19	19 / 0.18	24 / 0.16	28 / 0.14	32 / 0.13	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.22	5 / 0.21	10 / 0.2	15 / 0.19	20 / 0.17	25 / 0.16	29 / 0.14	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.22	5 / 0.21	10 / 0.2	15 / 0.19	20 / 0.17	25 / 0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.22	5 / 0.21	10 / 0.2	15 / 0.19	20 / 0.17	25 / 0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.22	5 / 0.21	10 / 0.2	15 / 0.19	20 / 0.17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.22	5 / 0.21	10 / 0.2	15 / 0.19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.22	5 / 0.21	10 / 0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 89. Occurrence (percentiles) and MSE of Drought Scenario 13 of combined inflow/PDSI thresholds over the period of record, Model Period F (1960-1987).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.23	0 / 0.23	0 / 0.23	0 / 0.23	0 / 0.23	0 / 0.23	0 / 0.23	0 / 0.23	0 / 0.23	0 / 0.23	0 / 0.23	0 / 0.23	0 / 0.23	0 / 0.23	0 / 0.23	0 / 0.23	0 / 0.23	0 / 0.23	0 / 0.23	0 / 0.23	0 / 0.23	0 / 0.23
	18,100	5th	0 / 0.23	1 / 0.23	2 / 0.23	3 / 0.23	4 / 0.22	4 / 0.22	4 / 0.22	4 / 0.22	4 / 0.22	5 / 0.22	5 / 0.22	5 / 0.22	5 / 0.22	5 / 0.22	5 / 0.22	5 / 0.22	5 / 0.22	5 / 0.22	5 / 0.22	5 / 0.22	5 / 0.22	5 / 0.22
	24,600	10th	0 / 0.23	2 / 0.23	4 / 0.23	6 / 0.22	7 / 0.22	8 / 0.22	8 / 0.22	8 / 0.22	9 / 0.22	9 / 0.21	10 / 0.21	10 / 0.21	10 / 0.21	10 / 0.21	10 / 0.21	10 / 0.21	10 / 0.21	10 / 0.21	-	-	-
	28,600	15th	0 / 0.23	3 / 0.23	5 / 0.22	7 / 0.22	9 / 0.21	11 / 0.21	11 / 0.21	12 / 0.2	13 / 0.2	14 / 0.2	14 / 0.19	15 / 0.19	15 / 0.19	15 / 0.19	15 / 0.19	15 / 0.19	15 / 0.19	-	-	-	-
	33,000	20th	0 / 0.23	3 / 0.23	5 / 0.22	8 / 0.22	11 / 0.21	13 / 0.2	14 / 0.19	15 / 0.19	16 / 0.19	18 / 0.18	19 / 0.17	19 / 0.17	19 / 0.17	19 / 0.17	20 / 0.17	20 / 0.17	-	-	-	-	-
	36,300	25th	0 / 0.23	4 / 0.22	7 / 0.22	10 / 0.21	13 / 0.2	15 / 0.19	17 / 0.19	19 / 0.18	20 / 0.17	22 / 0.17	23 / 0.16	23 / 0.16	24 / 0.16	24 / 0.15	24 / 0.15	-	-	-	-	-	-
	39,700	30th	0 / 0.23	4 / 0.22	8 / 0.21	12 / 0.2	14 / 0.19	17 / 0.18	20 / 0.18	21 / 0.17	23 / 0.16	26 / 0.15	27 / 0.15	28 / 0.14	28 / 0.14	28 / 0.14	-	-	-	-	-	-	-
	44,000	35th	0 / 0.23	4 / 0.22	8 / 0.21	12 / 0.2	15 / 0.19	19 / 0.18	21 / 0.17	24 / 0.16	27 / 0.15	29 / 0.14	30 / 0.13	32 / 0.12	32 / 0.12	33 / 0.12	-	-	-	-	-	-	-
	48,500	40th	0 / 0.23	4 / 0.22	8 / 0.21	12 / 0.2	16 / 0.19	19 / 0.18	22 / 0.17	25 / 0.15	27 / 0.14	30 / 0.13	32 / 0.12	34 / 0.12	36 / 0.11	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.23	5 / 0.22	9 / 0.21	13 / 0.2	17 / 0.18	20 / 0.17	24 / 0.16	27 / 0.15	30 / 0.14	32 / 0.13	35 / 0.12	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.23	5 / 0.22	9 / 0.21	14 / 0.2	18 / 0.18	22 / 0.17	26 / 0.15	29 / 0.14	33 / 0.13	36 / 0.12	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.23	5 / 0.22	10 / 0.21	14 / 0.2	19 / 0.18	23 / 0.16	27 / 0.15	31 / 0.13	34 / 0.12	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.23	5 / 0.22	10 / 0.21	15 / 0.2	19 / 0.18	24 / 0.16	28 / 0.14	32 / 0.13	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.23	5 / 0.22	10 / 0.21	15 / 0.19	20 / 0.17	25 / 0.15	29 / 0.14	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.23	5 / 0.22	10 / 0.21	15 / 0.19	20 / 0.17	25 / 0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.23	5 / 0.22	10 / 0.21	15 / 0.19	20 / 0.17	25 / 0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.23	5 / 0.22	10 / 0.21	15 / 0.19	20 / 0.17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.23	5 / 0.22	10 / 0.21	15 / 0.19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.23	5 / 0.22	10 / 0.21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 90. Occurrence (percentiles) and MSE of Drought Scenario 14 of combined inflow/PDSI thresholds over the period of record, Model Period F (1960-1987).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.24	0 / 0.24	0 / 0.24	0 / 0.24	0 / 0.24	0 / 0.24	0 / 0.24	0 / 0.24	0 / 0.24	0 / 0.24	0 / 0.24	0 / 0.24	0 / 0.24	0 / 0.24	0 / 0.24	0 / 0.24	0 / 0.24	0 / 0.24	0 / 0.24	0 / 0.24	0 / 0.24	0 / 0.24
	18,100	5th	0 / 0.24	1 / 0.23	2 / 0.23	3 / 0.23	4 / 0.23	4 / 0.23	4 / 0.23	4 / 0.23	4 / 0.23	5 / 0.23	5 / 0.22	5 / 0.22	5 / 0.22	5 / 0.22	5 / 0.22	5 / 0.22	5 / 0.22	5 / 0.22	5 / 0.22	5 / 0.22	5 / 0.22
	24,600	10th	0 / 0.24	2 / 0.23	4 / 0.23	6 / 0.23	7 / 0.23	8 / 0.22	8 / 0.22	8 / 0.22	9 / 0.22	9 / 0.22	10 / 0.21	10 / 0.21	10 / 0.21	10 / 0.21	10 / 0.21	10 / 0.21	10 / 0.21	10 / 0.21	-	-	-
	28,600	15th	0 / 0.24	3 / 0.23	5 / 0.23	7 / 0.23	9 / 0.22	11 / 0.21	11 / 0.21	12 / 0.21	13 / 0.21	14 / 0.2	14 / 0.2	15 / 0.19	15 / 0.19	15 / 0.19	15 / 0.19	15 / 0.19	15 / 0.19	-	-	-	-
	33,000	20th	0 / 0.24	3 / 0.23	5 / 0.23	8 / 0.22	11 / 0.21	13 / 0.2	14 / 0.2	15 / 0.19	16 / 0.19	18 / 0.18	19 / 0.17	19 / 0.17	19 / 0.17	19 / 0.17	20 / 0.17	20 / 0.17	-	-	-	-	-
	36,300	25th	0 / 0.24	4 / 0.23	7 / 0.22	10 / 0.21	13 / 0.2	15 / 0.19	17 / 0.19	19 / 0.18	20 / 0.18	22 / 0.17	23 / 0.16	23 / 0.16	24 / 0.16	24 / 0.15	24 / 0.15	-	-	-	-	-	-
	39,700	30th	0 / 0.24	4 / 0.22	8 / 0.21	12 / 0.2	14 / 0.19	17 / 0.18	20 / 0.18	21 / 0.17	23 / 0.16	26 / 0.15	27 / 0.15	28 / 0.14	28 / 0.14	28 / 0.14	-	-	-	-	-	-	-
	44,000	35th	0 / 0.24	4 / 0.22	8 / 0.21	12 / 0.2	15 / 0.19	19 / 0.18	21 / 0.17	24 / 0.16	27 / 0.15	29 / 0.14	30 / 0.13	32 / 0.13	32 / 0.12	33 / 0.12	-	-	-	-	-	-	-
	48,500	40th	0 / 0.24	4 / 0.22	8 / 0.21	12 / 0.2	16 / 0.19	19 / 0.18	22 / 0.17	25 / 0.16	27 / 0.14	30 / 0.14	32 / 0.12	34 / 0.12	36 / 0.11	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.24	5 / 0.22	9 / 0.21	13 / 0.2	17 / 0.19	20 / 0.17	24 / 0.16	27 / 0.15	30 / 0.14	32 / 0.13	35 / 0.12	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.24	5 / 0.23	9 / 0.21	14 / 0.2	18 / 0.18	22 / 0.17	26 / 0.15	29 / 0.14	33 / 0.13	36 / 0.11	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.24	5 / 0.23	10 / 0.21	14 / 0.2	19 / 0.18	23 / 0.16	27 / 0.15	31 / 0.13	34 / 0.12	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.24	5 / 0.23	10 / 0.21	15 / 0.2	19 / 0.18	24 / 0.16	28 / 0.14	32 / 0.13	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.24	5 / 0.23	10 / 0.21	15 / 0.2	20 / 0.17	25 / 0.15	29 / 0.14	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.24	5 / 0.23	10 / 0.21	15 / 0.2	20 / 0.17	25 / 0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.24	5 / 0.23	10 / 0.21	15 / 0.2	20 / 0.17	25 / 0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.24	5 / 0.23	10 / 0.21	15 / 0.2	20 / 0.17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.24	5 / 0.23	10 / 0.21	15 / 0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.24	5 / 0.23	10 / 0.21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 91. Occurrence (percentiles) and MSE of Drought Scenario 15 of combined inflow/PDSI thresholds over the period of record, Model Period F (1960-1987).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25	0 / 0.25
	18,100	5th	0 / 0.25	1 / 0.25	2 / 0.25	3 / 0.25	4 / 0.24	4 / 0.24	4 / 0.24	4 / 0.24	4 / 0.24	5 / 0.24	5 / 0.24	5 / 0.24	5 / 0.24	5 / 0.24	5 / 0.24	5 / 0.24	5 / 0.24	5 / 0.24	5 / 0.24	5 / 0.24	5 / 0.24	5 / 0.24
	24,600	10th	0 / 0.25	2 / 0.25	4 / 0.25	6 / 0.25	7 / 0.24	8 / 0.24	8 / 0.24	8 / 0.24	9 / 0.23	9 / 0.23	10 / 0.23	10 / 0.22	10 / 0.22	10 / 0.22	10 / 0.22	10 / 0.22	10 / 0.22	10 / 0.22	-	-	-
	28,600	15th	0 / 0.25	3 / 0.25	5 / 0.24	7 / 0.24	9 / 0.23	11 / 0.23	11 / 0.22	12 / 0.22	13 / 0.22	14 / 0.21	14 / 0.2	15 / 0.2	15 / 0.2	15 / 0.2	15 / 0.2	15 / 0.2	15 / 0.2	-	-	-	-
	33,000	20th	0 / 0.25	3 / 0.25	5 / 0.24	8 / 0.23	11 / 0.22	13 / 0.21	14 / 0.2	15 / 0.2	16 / 0.2	18 / 0.19	19 / 0.18	19 / 0.18	19 / 0.18	19 / 0.18	20 / 0.18	20 / 0.18	-	-	-	-	-
	36,300	25th	0 / 0.25	4 / 0.24	7 / 0.23	10 / 0.22	13 / 0.21	15 / 0.2	17 / 0.19	19 / 0.19	20 / 0.18	22 / 0.17	23 / 0.17	23 / 0.16	24 / 0.16	24 / 0.16	24 / 0.16	-	-	-	-	-	-
	39,700	30th	0 / 0.25	4 / 0.24	8 / 0.22	12 / 0.21	14 / 0.2	17 / 0.19	20 / 0.18	21 / 0.17	23 / 0.17	26 / 0.16	27 / 0.15	28 / 0.15	28 / 0.14	28 / 0.14	-	-	-	-	-	-	-
	44,000	35th	0 / 0.25	4 / 0.24	8 / 0.22	12 / 0.21	15 / 0.2	19 / 0.19	21 / 0.17	24 / 0.16	27 / 0.15	29 / 0.14	30 / 0.13	32 / 0.13	32 / 0.13	33 / 0.12	-	-	-	-	-	-	-
	48,500	40th	0 / 0.25	4 / 0.24	8 / 0.22	12 / 0.21	16 / 0.2	19 / 0.19	22 / 0.17	25 / 0.16	27 / 0.15	30 / 0.14	32 / 0.13	34 / 0.12	36 / 0.11	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.25	5 / 0.24	9 / 0.22	13 / 0.21	17 / 0.19	20 / 0.18	24 / 0.16	27 / 0.15	30 / 0.14	32 / 0.13	35 / 0.12	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.25	5 / 0.23	9 / 0.21	14 / 0.2	18 / 0.18	22 / 0.17	26 / 0.15	29 / 0.14	33 / 0.13	36 / 0.11	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.25	5 / 0.23	10 / 0.21	14 / 0.2	19 / 0.18	23 / 0.16	27 / 0.15	31 / 0.13	34 / 0.12	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.25	5 / 0.23	10 / 0.21	15 / 0.2	19 / 0.18	24 / 0.16	28 / 0.14	32 / 0.12	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.25	5 / 0.23	10 / 0.21	15 / 0.2	20 / 0.17	25 / 0.15	29 / 0.14	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.25	5 / 0.23	10 / 0.21	15 / 0.2	20 / 0.17	25 / 0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.25	5 / 0.23	10 / 0.21	15 / 0.2	20 / 0.17	25 / 0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.25	5 / 0.23	10 / 0.21	15 / 0.2	20 / 0.17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.25	5 / 0.23	10 / 0.21	15 / 0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.25	5 / 0.23	10 / 0.21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 92. Occurrence (percentiles) and MSE of Drought Scenario 3 of combined inflow/PDSI thresholds over the period of record, Model Period G (2000-2016).

Occurrence of Threshold Combinations / MSE of Drought Scenario 3			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.11	0 / 0.11	0 / 0.11	0 / 0.11	0 / 0.11	0 / 0.11	0 / 0.11	0 / 0.11	0 / 0.11	0 / 0.11	0 / 0.11	0 / 0.11	0 / 0.11	0 / 0.11	0 / 0.11	0 / 0.11	0 / 0.11	0 / 0.11	0 / 0.11	0 / 0.11	0 / 0.11	0 / 0.11
	18,100	5th	0 / 0.11	1 / 0.11	2 / 0.11	3 / 0.11	4 / 0.11	4 / 0.11	4 / 0.11	4 / 0.11	4 / 0.11	5 / 0.11	5 / 0.11	5 / 0.11	5 / 0.11	5 / 0.11	5 / 0.11	5 / 0.11	5 / 0.11	5 / 0.11	5 / 0.11	5 / 0.11	5 / 0.11	5 / 0.11
	24,600	10th	0 / 0.11	2 / 0.11	4 / 0.11	6 / 0.11	7 / 0.11	8 / 0.11	8 / 0.1	8 / 0.1	9 / 0.1	9 / 0.1	10 / 0.1	10 / 0.1	10 / 0.1	10 / 0.1	10 / 0.1	10 / 0.1	10 / 0.1	10 / 0.1	-	-	-
	28,600	15th	0 / 0.11	3 / 0.11	5 / 0.11	7 / 0.11	9 / 0.11	11 / 0.1	11 / 0.1	12 / 0.1	13 / 0.1	14 / 0.1	14 / 0.1	15 / 0.1	15 / 0.09	15 / 0.09	15 / 0.09	15 / 0.09	15 / 0.09	-	-	-	-
	33,000	20th	0 / 0.11	3 / 0.11	5 / 0.11	8 / 0.11	11 / 0.11	13 / 0.1	14 / 0.09	15 / 0.09	16 / 0.09	18 / 0.09	19 / 0.09	19 / 0.09	19 / 0.09	19 / 0.08	20 / 0.08	20 / 0.08	-	-	-	-	-
	36,300	25th	0 / 0.11	4 / 0.11	7 / 0.11	10 / 0.11	13 / 0.11	15 / 0.1	17 / 0.09	19 / 0.09	20 / 0.09	22 / 0.09	23 / 0.08	23 / 0.08	24 / 0.08	24 / 0.08	24 / 0.08	-	-	-	-	-	-
	39,700	30th	0 / 0.11	4 / 0.11	8 / 0.11	12 / 0.11	14 / 0.11	17 / 0.09	20 / 0.09	21 / 0.08	23 / 0.08	26 / 0.08	27 / 0.08	28 / 0.07	28 / 0.07	28 / 0.07	-	-	-	-	-	-	-
	44,000	35th	0 / 0.11	4 / 0.11	8 / 0.11	12 / 0.11	15 / 0.1	19 / 0.09	21 / 0.09	24 / 0.08	27 / 0.08	29 / 0.07	30 / 0.07	32 / 0.07	32 / 0.07	33 / 0.07	-	-	-	-	-	-	-
	48,500	40th	0 / 0.11	4 / 0.11	8 / 0.11	12 / 0.11	16 / 0.1	19 / 0.09	22 / 0.09	25 / 0.08	27 / 0.07	30 / 0.07	32 / 0.07	34 / 0.07	36 / 0.06	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.11	5 / 0.11	9 / 0.11	13 / 0.1	17 / 0.1	20 / 0.09	24 / 0.08	27 / 0.08	30 / 0.07	32 / 0.07	35 / 0.06	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.11	5 / 0.11	9 / 0.1	14 / 0.1	18 / 0.1	22 / 0.09	26 / 0.08	29 / 0.07	33 / 0.06	36 / 0.06	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.11	5 / 0.11	10 / 0.1	14 / 0.1	19 / 0.09	23 / 0.08	27 / 0.07	31 / 0.07	34 / 0.06	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.11	5 / 0.11	10 / 0.1	15 / 0.1	19 / 0.09	24 / 0.08	28 / 0.07	32 / 0.06	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.11	5 / 0.11	10 / 0.1	15 / 0.1	20 / 0.09	25 / 0.08	29 / 0.07	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.11	5 / 0.11	10 / 0.1	15 / 0.1	20 / 0.09	25 / 0.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.11	5 / 0.11	10 / 0.1	15 / 0.1	20 / 0.09	25 / 0.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.11	5 / 0.11	10 / 0.1	15 / 0.1	20 / 0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.11	5 / 0.11	10 / 0.1	15 / 0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.11	5 / 0.11	10 / 0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 93. Occurrence (percentiles) and MSE of Drought Scenario 6 of combined inflow/PDSI thresholds over the period of record, Model Period G (2000-2016).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08	0 / 0.08
	18,100	5th	0 / 0.08	1 / 0.08	2 / 0.08	3 / 0.08	4 / 0.08	4 / 0.08	4 / 0.08	4 / 0.08	4 / 0.08	5 / 0.08	5 / 0.08	5 / 0.08	5 / 0.08	5 / 0.08	5 / 0.08	5 / 0.08	5 / 0.08	5 / 0.08	5 / 0.08	5 / 0.08	5 / 0.08	5 / 0.08
	24,600	10th	0 / 0.08	2 / 0.09	4 / 0.09	6 / 0.09	7 / 0.08	8 / 0.08	8 / 0.08	8 / 0.08	9 / 0.08	9 / 0.08	10 / 0.08	10 / 0.08	10 / 0.08	10 / 0.08	10 / 0.08	10 / 0.08	10 / 0.08	10 / 0.08	-	-	-
	28,600	15th	0 / 0.08	3 / 0.09	5 / 0.09	7 / 0.09	9 / 0.08	11 / 0.08	11 / 0.08	12 / 0.08	13 / 0.08	14 / 0.08	14 / 0.08	15 / 0.08	15 / 0.08	15 / 0.08	15 / 0.08	15 / 0.08	15 / 0.08	-	-	-	-
	33,000	20th	0 / 0.08	3 / 0.09	5 / 0.09	8 / 0.08	11 / 0.08	13 / 0.08	14 / 0.08	15 / 0.08	16 / 0.08	18 / 0.08	19 / 0.08	19 / 0.08	19 / 0.08	19 / 0.08	20 / 0.08	20 / 0.08	-	-	-	-	-
	36,300	25th	0 / 0.08	4 / 0.09	7 / 0.09	10 / 0.09	13 / 0.08	15 / 0.08	17 / 0.08	19 / 0.08	20 / 0.08	22 / 0.08	23 / 0.08	23 / 0.07	24 / 0.07	24 / 0.07	24 / 0.07	-	-	-	-	-	-
	39,700	30th	0 / 0.08	4 / 0.09	8 / 0.09	12 / 0.09	14 / 0.08	17 / 0.08	20 / 0.08	21 / 0.08	23 / 0.07	26 / 0.07	27 / 0.07	28 / 0.07	28 / 0.07	28 / 0.07	-	-	-	-	-	-	-
	44,000	35th	0 / 0.08	4 / 0.09	8 / 0.09	12 / 0.08	15 / 0.08	19 / 0.08	21 / 0.07	24 / 0.07	27 / 0.07	29 / 0.07	30 / 0.07	32 / 0.07	32 / 0.07	33 / 0.06	-	-	-	-	-	-	-
	48,500	40th	0 / 0.08	4 / 0.09	8 / 0.09	12 / 0.08	16 / 0.08	19 / 0.08	22 / 0.07	25 / 0.07	27 / 0.07	30 / 0.07	32 / 0.07	34 / 0.06	36 / 0.06	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.08	5 / 0.09	9 / 0.09	13 / 0.08	17 / 0.08	20 / 0.08	24 / 0.07	27 / 0.07	30 / 0.07	32 / 0.06	35 / 0.06	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.08	5 / 0.09	9 / 0.08	14 / 0.08	18 / 0.08	22 / 0.07	26 / 0.07	29 / 0.07	33 / 0.06	36 / 0.06	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.08	5 / 0.09	10 / 0.08	14 / 0.08	19 / 0.08	23 / 0.07	27 / 0.07	31 / 0.07	34 / 0.06	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.08	5 / 0.09	10 / 0.08	15 / 0.08	19 / 0.07	24 / 0.07	28 / 0.07	32 / 0.06	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.08	5 / 0.09	10 / 0.08	15 / 0.08	20 / 0.07	25 / 0.07	29 / 0.07	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.08	5 / 0.09	10 / 0.08	15 / 0.08	20 / 0.07	25 / 0.07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.08	5 / 0.09	10 / 0.08	15 / 0.08	20 / 0.07	25 / 0.07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.08	5 / 0.09	10 / 0.08	15 / 0.08	20 / 0.07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.08	5 / 0.09	10 / 0.08	15 / 0.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.08	5 / 0.09	10 / 0.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 94. Occurrence (percentiles) and MSE of Drought Scenario 12 of combined inflow/PDSI thresholds over the period of record, Model Period G (2000-2016).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.12	0 / 0.12	0 / 0.12	0 / 0.12	0 / 0.12	0 / 0.12	0 / 0.12	0 / 0.12	0 / 0.12	0 / 0.12	0 / 0.12	0 / 0.12	0 / 0.12	0 / 0.12	0 / 0.12	0 / 0.12	0 / 0.12	0 / 0.12	0 / 0.12	0 / 0.12	0 / 0.12	0 / 0.12
	18,100	5th	0 / 0.12	1 / 0.12	2 / 0.12	3 / 0.13	4 / 0.13	4 / 0.13	4 / 0.13	4 / 0.13	4 / 0.13	5 / 0.13	5 / 0.13	5 / 0.13	5 / 0.13	5 / 0.13	5 / 0.13	5 / 0.13	5 / 0.13	5 / 0.13	5 / 0.13	5 / 0.13	5 / 0.13	5 / 0.13
	24,600	10th	0 / 0.12	2 / 0.13	4 / 0.13	6 / 0.13	7 / 0.13	8 / 0.13	8 / 0.13	8 / 0.13	9 / 0.13	9 / 0.13	10 / 0.12	10 / 0.12	10 / 0.12	10 / 0.12	10 / 0.12	10 / 0.12	10 / 0.12	10 / 0.12	-	-	-
	28,600	15th	0 / 0.12	3 / 0.13	5 / 0.13	7 / 0.12	9 / 0.12	11 / 0.12	11 / 0.12	12 / 0.12	13 / 0.12	14 / 0.12	14 / 0.12	15 / 0.11	15 / 0.11	15 / 0.11	15 / 0.11	15 / 0.11	15 / 0.11	-	-	-	-
	33,000	20th	0 / 0.12	3 / 0.13	5 / 0.12	8 / 0.12	11 / 0.12	13 / 0.12	14 / 0.12	15 / 0.11	16 / 0.11	18 / 0.11	19 / 0.11	19 / 0.11	19 / 0.11	19 / 0.1	20 / 0.1	20 / 0.1	-	-	-	-	-
	36,300	25th	0 / 0.12	4 / 0.13	7 / 0.13	10 / 0.12	13 / 0.12	15 / 0.12	17 / 0.11	19 / 0.11	20 / 0.11	22 / 0.1	23 / 0.1	23 / 0.1	24 / 0.1	24 / 0.09	24 / 0.09	-	-	-	-	-	-
	39,700	30th	0 / 0.12	4 / 0.13	8 / 0.12	12 / 0.12	14 / 0.11	17 / 0.11	20 / 0.1	21 / 0.1	23 / 0.09	26 / 0.09	27 / 0.09	28 / 0.08	28 / 0.08	28 / 0.08	-	-	-	-	-	-	-
	44,000	35th	0 / 0.12	4 / 0.13	8 / 0.12	12 / 0.12	15 / 0.11	19 / 0.11	21 / 0.1	24 / 0.09	27 / 0.08	29 / 0.08	30 / 0.08	32 / 0.07	32 / 0.07	33 / 0.07	-	-	-	-	-	-	-
	48,500	40th	0 / 0.12	4 / 0.13	8 / 0.12	12 / 0.12	16 / 0.11	19 / 0.1	22 / 0.1	25 / 0.09	27 / 0.08	30 / 0.08	32 / 0.07	34 / 0.07	36 / 0.07	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.12	5 / 0.13	9 / 0.12	13 / 0.11	17 / 0.11	20 / 0.1	24 / 0.09	27 / 0.09	30 / 0.08	32 / 0.07	35 / 0.07	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.12	5 / 0.13	9 / 0.12	14 / 0.11	18 / 0.1	22 / 0.1	26 / 0.09	29 / 0.08	33 / 0.07	36 / 0.07	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.12	5 / 0.13	10 / 0.12	14 / 0.11	19 / 0.1	23 / 0.09	27 / 0.08	31 / 0.07	34 / 0.07	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.12	5 / 0.13	10 / 0.12	15 / 0.11	19 / 0.1	24 / 0.09	28 / 0.08	32 / 0.07	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.12	5 / 0.13	10 / 0.12	15 / 0.11	20 / 0.1	25 / 0.09	29 / 0.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.12	5 / 0.13	10 / 0.12	15 / 0.11	20 / 0.1	25 / 0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.12	5 / 0.13	10 / 0.12	15 / 0.11	20 / 0.1	25 / 0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.12	5 / 0.13	10 / 0.12	15 / 0.11	20 / 0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.12	5 / 0.13	10 / 0.12	15 / 0.11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.12	5 / 0.13	10 / 0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 95. Occurrence (percentiles) and MSE of Drought Scenario 13 of combined inflow/PDSI thresholds over the period of record, Model Period G (2000-2016).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13
	18,100	5th	0 / 0.13	1 / 0.13	2 / 0.13	3 / 0.14	4 / 0.14	4 / 0.14	4 / 0.14	4 / 0.14	4 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14
	24,600	10th	0 / 0.13	2 / 0.13	4 / 0.14	6 / 0.14	7 / 0.14	8 / 0.13	8 / 0.13	8 / 0.13	9 / 0.13	9 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	-	-	-
	28,600	15th	0 / 0.13	3 / 0.14	5 / 0.13	7 / 0.13	9 / 0.13	11 / 0.13	11 / 0.13	12 / 0.12	13 / 0.12	14 / 0.12	14 / 0.12	15 / 0.12	15 / 0.12	15 / 0.12	15 / 0.12	15 / 0.12	15 / 0.12	-	-	-	-
	33,000	20th	0 / 0.13	3 / 0.13	5 / 0.13	8 / 0.13	11 / 0.13	13 / 0.12	14 / 0.12	15 / 0.12	16 / 0.12	18 / 0.11	19 / 0.11	19 / 0.11	19 / 0.11	19 / 0.11	20 / 0.11	20 / 0.11	-	-	-	-	-
	36,300	25th	0 / 0.13	4 / 0.14	7 / 0.13	10 / 0.13	13 / 0.13	15 / 0.12	17 / 0.11	19 / 0.11	20 / 0.11	22 / 0.11	23 / 0.1	23 / 0.1	24 / 0.1	24 / 0.1	24 / 0.1	-	-	-	-	-	-
	39,700	30th	0 / 0.13	4 / 0.14	8 / 0.13	12 / 0.12	14 / 0.12	17 / 0.11	20 / 0.11	21 / 0.1	23 / 0.1	26 / 0.09	27 / 0.09	28 / 0.09	28 / 0.09	28 / 0.08	-	-	-	-	-	-	-
	44,000	35th	0 / 0.13	4 / 0.14	8 / 0.13	12 / 0.12	15 / 0.12	19 / 0.11	21 / 0.1	24 / 0.09	27 / 0.09	29 / 0.08	30 / 0.08	32 / 0.08	32 / 0.07	33 / 0.07	-	-	-	-	-	-	-
	48,500	40th	0 / 0.13	4 / 0.14	8 / 0.13	12 / 0.12	16 / 0.12	19 / 0.11	22 / 0.1	25 / 0.09	27 / 0.09	30 / 0.08	32 / 0.07	34 / 0.07	36 / 0.07	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.13	5 / 0.14	9 / 0.13	13 / 0.12	17 / 0.11	20 / 0.11	24 / 0.1	27 / 0.09	30 / 0.08	32 / 0.08	35 / 0.07	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.13	5 / 0.13	9 / 0.13	14 / 0.12	18 / 0.11	22 / 0.1	26 / 0.09	29 / 0.08	33 / 0.07	36 / 0.07	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.13	5 / 0.13	10 / 0.13	14 / 0.12	19 / 0.11	23 / 0.1	27 / 0.09	31 / 0.08	34 / 0.07	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.13	5 / 0.13	10 / 0.13	15 / 0.12	19 / 0.11	24 / 0.1	28 / 0.08	32 / 0.07	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.13	5 / 0.13	10 / 0.13	15 / 0.12	20 / 0.11	25 / 0.09	29 / 0.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.13	5 / 0.13	10 / 0.13	15 / 0.12	20 / 0.11	25 / 0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.13	5 / 0.13	10 / 0.13	15 / 0.12	20 / 0.11	25 / 0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.13	5 / 0.13	10 / 0.13	15 / 0.12	20 / 0.11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.13	5 / 0.13	10 / 0.13	15 / 0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.13	5 / 0.13	10 / 0.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 96. Occurrence (percentiles) and MSE of Drought Scenario 14 of combined inflow/PDSI thresholds over the period of record, Model Period G (2000-2016).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13	0 / 0.13
	18,100	5th	0 / 0.13	1 / 0.13	2 / 0.14	3 / 0.14	4 / 0.14	4 / 0.14	4 / 0.14	4 / 0.14	4 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14	5 / 0.14
	24,600	10th	0 / 0.13	2 / 0.14	4 / 0.14	6 / 0.14	7 / 0.14	8 / 0.14	8 / 0.13	8 / 0.13	9 / 0.13	9 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	-	-	-
	28,600	15th	0 / 0.13	3 / 0.14	5 / 0.14	7 / 0.14	9 / 0.13	11 / 0.13	11 / 0.13	12 / 0.12	13 / 0.12	14 / 0.12	14 / 0.12	15 / 0.12	15 / 0.12	15 / 0.12	15 / 0.12	15 / 0.12	15 / 0.12	-	-	-	-
	33,000	20th	0 / 0.13	3 / 0.14	5 / 0.14	8 / 0.13	11 / 0.13	13 / 0.12	14 / 0.12	15 / 0.12	16 / 0.12	18 / 0.12	19 / 0.11	19 / 0.11	19 / 0.11	19 / 0.11	20 / 0.11	20 / 0.11	-	-	-	-	-
	36,300	25th	0 / 0.13	4 / 0.14	7 / 0.14	10 / 0.13	13 / 0.13	15 / 0.12	17 / 0.11	19 / 0.11	20 / 0.11	22 / 0.1	23 / 0.1	23 / 0.1	24 / 0.1	24 / 0.1	24 / 0.1	-	-	-	-	-	-
	39,700	30th	0 / 0.13	4 / 0.14	8 / 0.13	12 / 0.13	14 / 0.12	17 / 0.11	20 / 0.11	21 / 0.1	23 / 0.1	26 / 0.09	27 / 0.09	28 / 0.09	28 / 0.09	28 / 0.08	-	-	-	-	-	-	-
	44,000	35th	0 / 0.13	4 / 0.14	8 / 0.13	12 / 0.12	15 / 0.12	19 / 0.11	21 / 0.1	24 / 0.09	27 / 0.09	29 / 0.08	30 / 0.08	32 / 0.08	32 / 0.07	33 / 0.07	-	-	-	-	-	-	-
	48,500	40th	0 / 0.13	4 / 0.14	8 / 0.13	12 / 0.12	16 / 0.12	19 / 0.11	22 / 0.1	25 / 0.09	27 / 0.09	30 / 0.08	32 / 0.07	34 / 0.07	36 / 0.07	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.13	5 / 0.14	9 / 0.13	13 / 0.12	17 / 0.11	20 / 0.11	24 / 0.1	27 / 0.09	30 / 0.08	32 / 0.08	35 / 0.07	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.13	5 / 0.14	9 / 0.13	14 / 0.12	18 / 0.11	22 / 0.1	26 / 0.09	29 / 0.08	33 / 0.07	36 / 0.07	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.13	5 / 0.14	10 / 0.13	14 / 0.12	19 / 0.11	23 / 0.1	27 / 0.09	31 / 0.08	34 / 0.07	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.13	5 / 0.14	10 / 0.13	15 / 0.12	19 / 0.11	24 / 0.09	28 / 0.08	32 / 0.07	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.13	5 / 0.14	10 / 0.13	15 / 0.12	20 / 0.11	25 / 0.09	29 / 0.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.13	5 / 0.14	10 / 0.13	15 / 0.12	20 / 0.11	25 / 0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.13	5 / 0.14	10 / 0.13	15 / 0.12	20 / 0.11	25 / 0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.13	5 / 0.14	10 / 0.13	15 / 0.12	20 / 0.11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.13	5 / 0.14	10 / 0.13	15 / 0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.13	5 / 0.14	10 / 0.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 97. Occurrence (percentiles) and MSE of Drought Scenario 15 of combined inflow/PDSI thresholds over the period of record, Model Period G (2000-2016).

Occurrence of Threshold Combinations / MSE			12-month Running Average PDSI Thresholds																				
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15	0 / 0.15
	18,100	5th	0 / 0.15	1 / 0.15	2 / 0.15	3 / 0.15	4 / 0.15	4 / 0.15	4 / 0.15	4 / 0.15	4 / 0.15	5 / 0.15	5 / 0.15	5 / 0.15	5 / 0.15	5 / 0.15	5 / 0.15	5 / 0.15	5 / 0.15	5 / 0.15	5 / 0.15	5 / 0.15	5 / 0.15	5 / 0.15
	24,600	10th	0 / 0.15	2 / 0.15	4 / 0.15	6 / 0.14	7 / 0.14	8 / 0.14	8 / 0.14	8 / 0.14	9 / 0.14	9 / 0.14	10 / 0.14	10 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	10 / 0.13	-	-	-
	28,600	15th	0 / 0.15	3 / 0.15	5 / 0.15	7 / 0.14	9 / 0.14	11 / 0.13	11 / 0.13	12 / 0.13	13 / 0.13	14 / 0.12	14 / 0.12	15 / 0.12	15 / 0.12	15 / 0.12	15 / 0.12	15 / 0.12	15 / 0.12	-	-	-	-
	33,000	20th	0 / 0.15	3 / 0.15	5 / 0.14	8 / 0.14	11 / 0.14	13 / 0.13	14 / 0.12	15 / 0.12	16 / 0.11	18 / 0.11	19 / 0.11	19 / 0.11	19 / 0.11	19 / 0.1	20 / 0.1	20 / 0.1	-	-	-	-	-
	36,300	25th	0 / 0.15	4 / 0.15	7 / 0.14	10 / 0.13	13 / 0.13	15 / 0.12	17 / 0.11	19 / 0.11	20 / 0.1	22 / 0.1	23 / 0.1	23 / 0.1	24 / 0.09	24 / 0.09	24 / 0.09	-	-	-	-	-	-
	39,700	30th	0 / 0.15	4 / 0.14	8 / 0.14	12 / 0.13	14 / 0.12	17 / 0.11	20 / 0.1	21 / 0.1	23 / 0.09	26 / 0.09	27 / 0.08	28 / 0.08	28 / 0.08	28 / 0.08	-	-	-	-	-	-	-
	44,000	35th	0 / 0.15	4 / 0.14	8 / 0.14	12 / 0.13	15 / 0.12	19 / 0.11	21 / 0.1	24 / 0.09	27 / 0.08	29 / 0.08	30 / 0.07	32 / 0.07	32 / 0.07	33 / 0.07	-	-	-	-	-	-	-
	48,500	40th	0 / 0.15	4 / 0.14	8 / 0.13	12 / 0.13	16 / 0.12	19 / 0.11	22 / 0.1	25 / 0.09	27 / 0.08	30 / 0.08	32 / 0.07	34 / 0.06	36 / 0.06	-	-	-	-	-	-	-	-
	54,800	45th	0 / 0.15	5 / 0.14	9 / 0.13	13 / 0.12	17 / 0.12	20 / 0.1	24 / 0.09	27 / 0.09	30 / 0.08	32 / 0.07	35 / 0.06	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 0.15	5 / 0.14	9 / 0.13	14 / 0.12	18 / 0.11	22 / 0.1	26 / 0.09	29 / 0.08	33 / 0.07	36 / 0.06	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 0.15	5 / 0.14	10 / 0.13	14 / 0.12	19 / 0.11	23 / 0.1	27 / 0.08	31 / 0.07	34 / 0.07	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 0.15	5 / 0.14	10 / 0.13	15 / 0.12	19 / 0.11	24 / 0.09	28 / 0.08	32 / 0.07	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 0.15	5 / 0.14	10 / 0.13	15 / 0.12	20 / 0.11	25 / 0.09	29 / 0.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 0.15	5 / 0.14	10 / 0.13	15 / 0.12	20 / 0.11	25 / 0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 0.15	5 / 0.14	10 / 0.13	15 / 0.12	20 / 0.11	25 / 0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 0.15	5 / 0.14	10 / 0.13	15 / 0.12	20 / 0.11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 0.15	5 / 0.14	10 / 0.13	15 / 0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 0.15	5 / 0.14	10 / 0.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 98. Probability of Detection and Success Ratio of Drought Scenario 3 of combined inflow/PDSI thresholds over the period of record, Model Period A (1926-2016).

POD / SR of Drought Scenario 3			12-month Running Average PDSI Thresholds																			
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0	0 / 0	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100
	18,100	5th	0 / 0	3 / 87	5 / 88	7 / 91	8 / 87	9 / 87	9 / 87	9 / 87	9 / 83	9 / 85	10 / 83	10 / 82	10 / 82	10 / 82	10 / 82	10 / 82	10 / 82	10 / 82	10 / 82	10 / 82	10 / 82
	24,600	10th	0 / 100	4 / 81	7 / 81	10 / 80	12 / 77	13 / 72	13 / 72	13 / 71	14 / 70	15 / 69	15 / 68	15 / 67	15 / 67	15 / 66	15 / 66	15 / 66	15 / 66	15 / 66	-	-	-
	28,600	15th	0 / 100	5 / 82	9 / 84	14 / 84	18 / 83	19 / 78	21 / 79	21 / 76	22 / 74	23 / 71	23 / 70	23 / 69	24 / 69	24 / 69	24 / 69	24 / 69	24 / 69	-	-	-	-
	33,000	20th	0 / 100	5 / 83	10 / 86	16 / 85	20 / 82	23 / 78	26 / 78	27 / 76	28 / 75	29 / 73	30 / 71	31 / 70	31 / 70	31 / 70	31 / 69	32 / 69	-	-	-	-	-
	36,300	25th	0 / 100	7 / 87	14 / 89	20 / 88	25 / 85	28 / 80	32 / 81	33 / 78	35 / 77	37 / 75	38 / 73	39 / 73	40 / 73	40 / 72	40 / 72	-	-	-	-	-	-
	39,700	30th	0 / 100	8 / 89	16 / 90	24 / 89	28 / 85	32 / 81	36 / 80	38 / 77	41 / 75	43 / 73	45 / 72	46 / 72	46 / 72	47 / 71	-	-	-	-	-	-	-
	44,000	35th	0 / 100	9 / 89	17 / 91	25 / 89	31 / 86	35 / 82	40 / 81	43 / 77	46 / 75	48 / 73	51 / 72	52 / 71	53 / 71	54 / 71	-	-	-	-	-	-	-
	48,500	40th	0 / 100	9 / 89	17 / 91	25 / 89	31 / 86	36 / 82	41 / 81	44 / 77	47 / 75	50 / 73	53 / 72	56 / 71	58 / 71	-	-	-	-	-	-	-	-
	54,800	45th	0 / 100	10 / 90	19 / 92	28 / 90	34 / 87	39 / 83	44 / 81	48 / 77	51 / 75	54 / 73	58 / 72	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 100	10 / 91	20 / 92	29 / 91	36 / 86	41 / 81	46 / 78	51 / 75	55 / 73	59 / 71	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 100	11 / 91	21 / 93	30 / 91	38 / 86	43 / 81	49 / 78	54 / 75	58 / 73	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 100	11 / 91	21 / 93	31 / 91	38 / 87	45 / 81	51 / 79	56 / 75	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 100	11 / 91	22 / 93	31 / 91	40 / 87	46 / 81	52 / 79	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 100	11 / 91	22 / 93	32 / 91	40 / 87	46 / 81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 100	11 / 91	22 / 93	32 / 91	40 / 87	46 / 81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 100	11 / 91	22 / 93	32 / 91	40 / 87	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 100	11 / 91	22 / 93	32 / 91	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 100	11 / 91	22 / 93	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 99. Probability of Detection and Success Ratio of Drought Scenario 6 of combined inflow/PDSI thresholds over the period of record, Model Period A (1926-2016).

POD / SR of Drought Scenario 6			12-month Running Average PDSI Thresholds																			
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0	0 / 0	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100
	18,100	5th	0 / 0	2 / 80	4 / 81	4 / 76	6 / 76	6 / 76	6 / 76	6 / 76	6 / 73	6 / 67	6 / 67	6 / 65	6 / 65	6 / 65	6 / 65	6 / 65	6 / 65	6 / 65	6 / 65	6 / 65	6 / 65
	24,600	10th	0 / 100	4 / 85	6 / 86	9 / 83	10 / 80	12 / 79	12 / 78	12 / 78	12 / 75	12 / 72	13 / 72	13 / 72	13 / 72	13 / 71	13 / 71	13 / 71	13 / 71	13 / 71	-	-	-
	28,600	15th	0 / 100	4 / 86	7 / 88	11 / 87	14 / 84	16 / 84	17 / 83	18 / 79	18 / 76	18 / 72	19 / 72	19 / 71	19 / 71	19 / 70	19 / 70	19 / 70	19 / 70	-	-	-	-
	33,000	20th	0 / 100	4 / 86	9 / 89	13 / 88	16 / 84	20 / 84	22 / 84	23 / 82	24 / 80	24 / 76	26 / 76	26 / 75	27 / 75	27 / 75	27 / 75	27 / 74	-	-	-	-	-
	36,300	25th	0 / 100	6 / 89	11 / 92	16 / 90	20 / 87	24 / 85	26 / 83	28 / 81	29 / 79	30 / 76	32 / 76	32 / 76	33 / 76	33 / 75	34 / 75	-	-	-	-	-	-
	39,700	30th	0 / 100	7 / 91	13 / 93	19 / 91	23 / 88	27 / 87	30 / 84	32 / 81	34 / 79	36 / 76	38 / 77	39 / 76	39 / 76	40 / 76	-	-	-	-	-	-	-
	44,000	35th	0 / 100	7 / 91	14 / 93	20 / 92	25 / 89	30 / 88	33 / 84	36 / 81	38 / 78	40 / 75	42 / 75	44 / 75	45 / 75	46 / 75	-	-	-	-	-	-	-
	48,500	40th	0 / 100	7 / 91	14 / 93	21 / 92	26 / 89	31 / 88	34 / 85	37 / 81	39 / 78	41 / 75	45 / 76	47 / 76	49 / 76	-	-	-	-	-	-	-	-
	54,800	45th	0 / 100	8 / 92	15 / 93	22 / 92	28 / 90	33 / 88	37 / 84	40 / 81	43 / 78	45 / 75	48 / 75	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 100	8 / 92	16 / 93	23 / 92	30 / 90	35 / 88	40 / 85	44 / 82	47 / 79	50 / 76	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 100	9 / 93	17 / 93	24 / 92	31 / 90	38 / 89	43 / 86	47 / 83	51 / 80	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 100	9 / 93	17 / 94	25 / 92	32 / 90	39 / 89	44 / 86	49 / 83	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 100	9 / 93	17 / 94	25 / 93	33 / 91	40 / 89	46 / 86	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 100	9 / 93	17 / 94	26 / 93	33 / 91	40 / 89	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 100	9 / 93	17 / 94	26 / 93	33 / 91	40 / 89	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 100	9 / 93	17 / 94	26 / 93	33 / 91	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 100	9 / 93	17 / 94	26 / 92	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 100	9 / 93	17 / 94	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 100. Probability of Detection and Success Ratio of Drought Scenario 12 of combined inflow/PDSI thresholds over the period of record, Model Period A (1926-2016).

POD / SR of Drought Scenario 12			12-month Running Average PDSI Thresholds																			
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0	0 / 0	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100
	18,100	5th	0 / 0	6 / 100	11 / 100	14 / 100	18 / 98	19 / 98	19 / 98	19 / 98	19 / 94	20 / 94	21 / 93	21 / 91	21 / 91	21 / 91	21 / 91	21 / 91	21 / 91	21 / 91	21 / 91	21 / 91	21 / 91
	24,600	10th	0 / 100	11 / 100	18 / 100	24 / 97	29 / 93	33 / 91	33 / 89	33 / 88	33 / 86	35 / 84	36 / 82	36 / 81	36 / 81	36 / 80	36 / 80	36 / 80	36 / 80	36 / 80	-	-	-
	28,600	15th	0 / 100	12 / 100	20 / 100	31 / 96	38 / 93	44 / 91	44 / 86	46 / 85	47 / 83	49 / 79	50 / 78	50 / 76	50 / 75	50 / 74	50 / 74	50 / 74	50 / 74	-	-	-	-
	33,000	20th	0 / 100	12 / 100	24 / 100	35 / 97	45 / 94	52 / 91	53 / 83	56 / 82	59 / 80	61 / 77	61 / 74	62 / 72	62 / 71	62 / 70	62 / 70	62 / 69	-	-	-	-	-
	36,300	25th	0 / 100	16 / 100	30 / 100	43 / 94	52 / 92	60 / 88	63 / 81	65 / 79	69 / 77	71 / 73	72 / 70	72 / 69	72 / 68	72 / 67	72 / 66	-	-	-	-	-	-
	39,700	30th	0 / 100	18 / 100	33 / 94	46 / 88	56 / 86	65 / 84	67 / 75	70 / 72	73 / 69	76 / 66	78 / 64	78 / 63	78 / 62	78 / 61	-	-	-	-	-	-	-
	44,000	35th	0 / 100	20 / 100	34 / 92	47 / 87	58 / 84	67 / 81	70 / 72	73 / 67	76 / 64	79 / 61	81 / 59	82 / 57	82 / 56	82 / 55	-	-	-	-	-	-	-
	48,500	40th	0 / 100	20 / 100	34 / 92	48 / 86	59 / 83	68 / 80	71 / 71	74 / 66	78 / 63	80 / 60	83 / 58	85 / 55	86 / 54	-	-	-	-	-	-	-	-
	54,800	45th	0 / 100	20 / 98	35 / 86	49 / 81	60 / 79	69 / 76	73 / 68	75 / 63	80 / 60	83 / 56	86 / 54	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 100	22 / 98	36 / 85	50 / 80	61 / 75	70 / 72	74 / 64	78 / 59	82 / 56	85 / 52	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 100	23 / 98	38 / 85	52 / 79	63 / 74	72 / 69	76 / 62	80 / 57	84 / 54	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 100	23 / 98	38 / 85	52 / 80	63 / 73	73 / 68	76 / 60	80 / 55	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 100	23 / 98	38 / 84	52 / 78	63 / 71	73 / 66	76 / 59	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 100	23 / 98	38 / 84	52 / 77	63 / 71	73 / 65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 100	23 / 98	38 / 84	52 / 77	63 / 71	73 / 65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 100	23 / 98	38 / 84	52 / 77	63 / 71	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 100	23 / 98	38 / 84	52 / 77	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 100	23 / 98	38 / 84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 101. Probability of Detection and Success Ratio of Drought Scenario 13 of combined inflow/PDSI thresholds over the period of record, Model Period A (1926-2016).

POD / SR of Drought Scenario 3			12-month Running Average PDSI Thresholds																			
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0	0 / 0	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100	0 / 100
	18,100	5th	0 / 0	7 / 100	12 / 100	16 / 100	21 / 98	21 / 98	21 / 98	21 / 98	21 / 94	23 / 94	23 / 91	23 / 89	23 / 89	23 / 89	23 / 89	23 / 89	23 / 89	23 / 89	23 / 89	23 / 89	23 / 89
	24,600	10th	0 / 100	12 / 100	20 / 100	28 / 97	33 / 93	37 / 90	37 / 88	37 / 87	38 / 85	40 / 83	40 / 80	40 / 79	40 / 79	40 / 79	40 / 79	40 / 79	40 / 79	40 / 79	-	-	-
	28,600	15th	0 / 100	13 / 100	23 / 100	35 / 96	43 / 92	48 / 87	49 / 83	50 / 82	52 / 80	54 / 77	54 / 75	54 / 72	54 / 72	54 / 70	54 / 70	54 / 70	54 / 70	-	-	-	-
	33,000	20th	0 / 100	14 / 100	27 / 100	40 / 94	49 / 89	54 / 83	56 / 76	59 / 76	62 / 74	64 / 71	64 / 68	64 / 66	64 / 65	64 / 64	64 / 64	64 / 63	-	-	-	-	-
	36,300	25th	0 / 100	18 / 97	33 / 97	47 / 91	56 / 87	63 / 81	66 / 74	69 / 73	72 / 71	75 / 68	75 / 65	75 / 63	75 / 62	75 / 61	75 / 60	-	-	-	-	-	-
	39,700	30th	0 / 100	20 / 95	36 / 90	50 / 84	60 / 81	68 / 77	70 / 69	73 / 67	77 / 64	80 / 61	81 / 59	81 / 57	81 / 56	81 / 56	-	-	-	-	-	-	-
	44,000	35th	0 / 100	21 / 96	37 / 89	51 / 83	62 / 79	70 / 74	73 / 66	76 / 62	80 / 59	83 / 56	84 / 54	85 / 52	85 / 51	85 / 50	-	-	-	-	-	-	-
	48,500	40th	0 / 100	21 / 96	38 / 89	52 / 83	63 / 78	71 / 73	74 / 65	77 / 61	81 / 57	84 / 55	85 / 52	86 / 49	87 / 47	-	-	-	-	-	-	-	-
	54,800	45th	0 / 100	22 / 94	39 / 83	53 / 78	64 / 74	72 / 69	76 / 62	79 / 58	83 / 54	86 / 52	88 / 48	-	-	-	-	-	-	-	-	-	-
	58,200	50th	0 / 100	24 / 94	40 / 82	55 / 77	66 / 71	74 / 66	77 / 59	81 / 54	86 / 51	89 / 48	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	0 / 100	25 / 95	42 / 82	57 / 76	68 / 69	76 / 64	80 / 57	84 / 53	88 / 50	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	0 / 100	25 / 95	42 / 82	57 / 76	68 / 69	76 / 62	80 / 55	84 / 51	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	0 / 100	25 / 95	42 / 82	57 / 75	68 / 67	76 / 60	80 / 54	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	0 / 100	25 / 95	42 / 82	57 / 74	68 / 67	76 / 60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	0 / 100	25 / 95	42 / 82	57 / 74	68 / 67	76 / 60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	0 / 100	25 / 95	42 / 82	57 / 74	68 / 67	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	0 / 100	25 / 95	42 / 82	57 / 74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	0 / 100	25 / 95	42 / 82	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	0 / 100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 102. Probability of Detection and Success Ratio of Drought Scenario 14 of combined inflow/PDSI thresholds over the period of record, Model Period A (1926-2016).

POD / SR of Drought Scenario 14			12-month Running Average PDSI Thresholds																			
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0	0 / 0	1 / 100	1 / 100	1 / 100	1 / 100	1 / 100	1 / 100	1 / 100	1 / 100	1 / 100	1 / 100	1 / 100	1 / 100	1 / 100	1 / 100	1 / 100	1 / 100	1 / 100	1 / 100	1 / 100
	18,100	5th	0 / 0	8 / 100	14 / 100	18 / 100	24 / 98	24 / 98	24 / 98	24 / 98	24 / 94	25 / 90	25 / 87	25 / 85	25 / 85	25 / 85	25 / 85	25 / 85	25 / 85	25 / 85	25 / 85	25 / 85	25 / 85
	24,600	10th	1 / 100	14 / 100	23 / 100	31 / 95	37 / 92	40 / 87	40 / 85	40 / 84	41 / 83	43 / 79	43 / 76	43 / 75	43 / 75	43 / 75	43 / 75	43 / 75	43 / 75	43 / 75	-	-	-
	28,600	15th	1 / 100	15 / 100	26 / 100	39 / 95	48 / 90	52 / 84	53 / 80	55 / 78	56 / 77	58 / 72	58 / 71	58 / 68	58 / 68	58 / 67	58 / 67	58 / 67	58 / 67	-	-	-	-
	33,000	20th	1 / 100	16 / 100	30 / 98	44 / 92	53 / 86	58 / 78	59 / 72	63 / 71	66 / 70	68 / 66	68 / 63	68 / 61	68 / 61	68 / 60	68 / 59	68 / 59	-	-	-	-	-
	36,300	25th	1 / 100	19 / 95	35 / 90	49 / 84	59 / 80	65 / 74	68 / 68	72 / 67	75 / 65	77 / 62	77 / 59	77 / 57	77 / 56	77 / 55	77 / 55	-	-	-	-	-	-
	39,700	30th	1 / 100	21 / 89	37 / 82	52 / 77	62 / 74	69 / 69	72 / 63	75 / 61	80 / 58	82 / 55	83 / 53	83 / 52	83 / 51	83 / 50	-	-	-	-	-	-	-
	44,000	35th	1 / 100	22 / 87	38 / 80	53 / 75	63 / 71	70 / 66	74 / 59	77 / 56	82 / 53	84 / 50	85 / 48	86 / 47	86 / 46	86 / 45	-	-	-	-	-	-	-
	48,500	40th	1 / 100	22 / 87	38 / 80	53 / 75	64 / 70	72 / 65	75 / 58	78 / 55	83 / 52	85 / 49	87 / 46	87 / 44	88 / 42	-	-	-	-	-	-	-	-
	54,800	45th	1 / 100	23 / 86	39 / 74	55 / 71	66 / 67	73 / 62	77 / 56	81 / 52	85 / 49	88 / 46	89 / 44	-	-	-	-	-	-	-	-	-	-
	58,200	50th	1 / 100	25 / 87	41 / 75	56 / 70	67 / 64	75 / 59	78 / 53	83 / 49	88 / 46	90 / 43	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	1 / 100	26 / 87	43 / 75	59 / 70	69 / 63	77 / 57	81 / 52	86 / 48	90 / 45	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	1 / 100	26 / 87	44 / 75	59 / 70	70 / 63	77 / 56	82 / 50	87 / 46	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	1 / 100	26 / 87	44 / 74	59 / 68	70 / 61	77 / 54	82 / 49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	1 / 100	26 / 87	44 / 74	59 / 68	70 / 60	77 / 54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	1 / 100	26 / 87	44 / 74	59 / 68	70 / 60	77 / 54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	1 / 100	26 / 87	44 / 74	59 / 68	70 / 60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	1 / 100	26 / 87	44 / 74	59 / 67	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	1 / 100	26 / 87	44 / 74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	1 / 100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 103. Probability of Detection and Success Ratio of Drought Scenario 15 of combined inflow/PDSI thresholds over the period of record, Model Period A (1926-2016).

POD / SR of Drought Scenario 15			12-month Running Average PDSI Thresholds																			
			-4.90	-3.20	-2.60	-2.10	-1.70	-1.20	-0.80	-0.50	-0.30	-0.10	0.10	0.20	0.40	0.70	1.00	1.30	1.70	2.20	2.70	3.50	5.50
			0th	5th	10th	15th	20th	25th	30th	35th	40th	45th	50th	55th	60th	65th	70th	75th	80th	85th	90th	95th	100th
12-month Running Average Inflow Threshold (acre-ft)	7,300	0th	0 / 0	0 / 0	1 / 100	1 / 100	1 / 100	1 / 100	1 / 100	1 / 100	1 / 100	1 / 100	1 / 100	1 / 100	1 / 100	1 / 100	1 / 100	1 / 100	1 / 100	1 / 100	1 / 100	1 / 100	1 / 100
	18,100	5th	0 / 0	12 / 100	18 / 88	24 / 91	32 / 91	32 / 91	32 / 91	32 / 91	32 / 88	33 / 83	33 / 80	33 / 78	33 / 78	33 / 78	33 / 78	33 / 78	33 / 78	33 / 78	33 / 78	33 / 78	33 / 78
	24,600	10th	1 / 100	17 / 85	27 / 83	38 / 83	48 / 83	52 / 78	52 / 76	52 / 75	53 / 74	55 / 70	55 / 68	55 / 67	55 / 67	55 / 66	55 / 66	55 / 66	55 / 66	55 / 66	-	-	-
	28,600	15th	1 / 100	18 / 86	32 / 84	48 / 81	59 / 78	65 / 72	65 / 68	65 / 65	66 / 63	68 / 59	68 / 58	68 / 56	68 / 55	68 / 54	68 / 54	68 / 54	68 / 54	-	-	-	-
	33,000	20th	1 / 100	18 / 83	35 / 81	52 / 77	65 / 74	70 / 66	70 / 59	71 / 56	73 / 54	75 / 51	75 / 49	75 / 47	75 / 47	75 / 46	75 / 46	75 / 46	-	-	-	-	-
	36,300	25th	1 / 100	23 / 79	40 / 72	58 / 69	70 / 67	78 / 62	79 / 55	80 / 52	83 / 50	85 / 47	85 / 45	85 / 44	85 / 44	85 / 43	85 / 42	-	-	-	-	-	-
	39,700	30th	1 / 100	24 / 70	41 / 64	58 / 61	72 / 60	79 / 56	81 / 50	82 / 46	85 / 44	88 / 42	89 / 40	89 / 39	89 / 38	89 / 38	-	-	-	-	-	-	-
	44,000	35th	1 / 100	25 / 70	42 / 63	60 / 60	73 / 57	81 / 53	83 / 47	84 / 42	88 / 40	91 / 38	92 / 36	92 / 35	92 / 34	92 / 33	-	-	-	-	-	-	-
	48,500	40th	1 / 100	25 / 70	42 / 62	60 / 59	73 / 56	82 / 52	84 / 46	85 / 41	88 / 39	92 / 37	92 / 35	92 / 33	92 / 31	-	-	-	-	-	-	-	-
	54,800	45th	1 / 100	25 / 66	42 / 56	61 / 55	74 / 52	82 / 49	85 / 43	86 / 39	90 / 36	93 / 34	95 / 32	-	-	-	-	-	-	-	-	-	-
	58,200	50th	1 / 100	25 / 62	42 / 54	61 / 53	74 / 49	82 / 45	85 / 40	87 / 36	91 / 34	94 / 31	-	-	-	-	-	-	-	-	-	-	-
	63,400	55th	1 / 100	27 / 64	45 / 54	63 / 53	76 / 48	85 / 44	88 / 39	89 / 35	93 / 33	-	-	-	-	-	-	-	-	-	-	-	-
	67,800	60th	1 / 100	27 / 64	45 / 54	63 / 52	76 / 48	85 / 43	88 / 38	89 / 33	-	-	-	-	-	-	-	-	-	-	-	-	-
	72,200	65th	1 / 100	27 / 64	45 / 53	63 / 51	76 / 46	85 / 42	88 / 37	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	79,200	70th	1 / 100	27 / 64	45 / 53	63 / 51	76 / 46	85 / 41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	85,500	75th	1 / 100	27 / 64	45 / 53	63 / 51	76 / 46	85 / 41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	96,200	80th	1 / 100	27 / 64	45 / 53	63 / 51	76 / 46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	107,800	85th	1 / 100	27 / 64	45 / 53	63 / 50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	120,800	90th	1 / 100	27 / 64	45 / 53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	171,000	95th	1 / 100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	317,000	100th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix

Table 104. Percent of months curtailments would occur throughout the year when initiating a curtailment event in one particular month versus any month for the threshold, Inflow ≤ 58,200 and PDSI ≤ -0.12.

Curtailment Initiation	Inflow ≤ 58,200 & PDSI ≤ -0.12																							
	Percent of Months Curtailed																							
	% of all Jans	% of all Febs	% of all Mars	% of all Aprs	% of all Mays	% of all Juns	% of all Juls	% of all Augs	% of all Seps	% of all Octs	% of all Novs	% of all Decs	% of all Jans	% of all Febs	% of all Mars	% of all Aprs	% of all Mays	% of all Juns	% of all Juls	% of all Augs	% of all Seps	% of all Octs	% of all Novs	% of all Months
Any Month	40	38	37	33	31	30	34	36	36	40	38	40	-	-	-	-	-	-	-	-	-	-	-	36
Jan Only	40	37	32	29	21	16	16	14	13	13	13	13	-	-	-	-	-	-	-	-	-	-	-	21
Feb Only	→	38	33	30	22	17	17	16	14	14	14	14	14	-	-	-	-	-	-	-	-	-	-	20
Mar Only	→	→	37	33	26	19	19	18	16	16	16	15	16	13	-	-	-	-	-	-	-	-	-	20
Apr Only	→	→	→	33	26	19	19	18	16	16	16	15	16	13	12	-	-	-	-	-	-	-	-	18
May Only	→	→	→	→	31	24	24	22	20	20	20	20	19	17	16	16	-	-	-	-	-	-	-	21
Jun Only	→	→	→	→	→	30	30	27	24	24	24	24	23	21	19	19	12	-	-	-	-	-	-	23
Jul Only	→	→	→	→	→	→	34	30	28	28	28	27	27	24	22	22	14	10	-	-	-	-	-	25
Aug Only	→	→	→	→	→	→	→	36	32	32	32	32	31	29	27	23	16	11	11	-	-	-	-	26
Sep Only	→	→	→	→	→	→	→	→	36	36	36	35	34	32	29	26	18	12	12	12	-	-	-	26
Oct Only	→	→	→	→	→	→	→	→	→	40	38	37	37	34	31	28	20	14	14	13	12	-	-	27
Nov Only	→	→	→	→	→	→	→	→	→	→	38	37	37	34	31	28	20	14	14	13	12	12	-	24
Dec Only	→	→	→	→	→	→	→	→	→	→	→	40	39	36	31	28	20	14	14	13	12	12	12	23

Appendix

Table 105. Percent of months curtailments would occur throughout the year when initiating a curtailment event in one particular month versus any month for the threshold, Inflow ≤ 72,200 and PDSI ≤ -1.66.

Curtailment Initiation	Inflow ≤ 72,200 & PDSI ≤ -1.66																							
	Percent of Months Curtailed																							
	% of all Jans	% of all Febs	% of all Mars	% of all Aprs	% of all Mays	% of all Juns	% of all Juls	% of all Augs	% of all Seps	% of all Octs	% of all Novs	% of all Decs	% of all Jans	% of all Febs	% of all Mars	% of all Aprs	% of all Mays	% of all Juns	% of all Juls	% of all Augs	% of all Seps	% of all Octs	% of all Novs	% of all Months
Any Month	19	21	19	18	17	18	19	18	20	23	22	22	-	-	-	-	-	-	-	-	-	-	-	20
Jan Only	19	19	17	16	14	13	13	12	10	10	9	9	-	-	-	-	-	-	-	-	-	-	-	13
Feb Only	→	21	19	18	17	16	14	13	11	11	10	10	9	-	-	-	-	-	-	-	-	-	-	14
Mar Only	→	→	19	18	17	16	14	13	11	11	10	10	9	9	-	-	-	-	-	-	-	-	-	13
Apr Only	→	→	→	18	17	16	14	13	11	11	10	10	9	9	8	-	-	-	-	-	-	-	-	12
May Only	→	→	→	→	17	16	14	13	11	11	10	10	9	9	8	7	-	-	-	-	-	-	-	11
Jun Only	→	→	→	→	→	18	17	16	13	13	12	12	10	10	9	8	8	-	-	-	-	-	-	12
Jul Only	→	→	→	→	→	→	19	18	16	16	14	14	12	12	11	10	10	9	-	-	-	-	-	13
Aug Only	→	→	→	→	→	→	→	18	16	16	14	14	12	12	11	10	10	9	9	-	-	-	-	13
Sep Only	→	→	→	→	→	→	→	→	20	20	19	19	17	17	14	13	12	11	11	11	-	-	-	15
Oct Only	→	→	→	→	→	→	→	→	→	23	22	22	19	19	17	16	14	13	13	12	10	-	-	17
Nov Only	→	→	→	→	→	→	→	→	→	→	22	22	19	19	17	16	14	13	13	12	10	10	-	16
Dec Only	→	→	→	→	→	→	→	→	→	→	→	22	19	19	17	16	14	13	13	12	10	10	9	15

Appendix

Table 106. Percent of months curtailments would occur throughout the year when initiating a curtailment event in one particular month versus any month for the threshold, Inflow ≤ 39,700 and PDSI ≤ -0.78.

Curtailment Initiation	Inflow ≤ 39,700 & PDSI ≤ -0.78																							
	Percent of Months Curtailed																							
	% of all Jans	% of all Febs	% of all Mars	% of all Aprs	% of all Mays	% of all Juns	% of all Juls	% of all Augs	% of all Seps	% of all Octs	% of all Novs	% of all Decs	% of all Jans	% of all Febs	% of all Mars	% of all Aprs	% of all Mays	% of all Juns	% of all Juls	% of all Augs	% of all Seps	% of all Octs	% of all Novs	% of all Months
Any Month	23	21	21	16	14	14	17	20	20	22	22	23	-	-	-	-	-	-	-	-	-	-	-	20
Jan Only	23	20	19	14	10	8	8	8	7	6	6	5	-	-	-	-	-	-	-	-	-	-	-	11
Feb Only	→	21	20	16	10	8	8	8	7	6	6	5	6	-	-	-	-	-	-	-	-	-	-	10
Mar Only	→	→	21	16	10	8	8	8	7	6	6	5	6	4	-	-	-	-	-	-	-	-	-	9
Apr Only	→	→	→	16	10	8	8	8	7	6	6	5	6	4	4	-	-	-	-	-	-	-	-	7
May Only	→	→	→	→	14	11	11	11	10	8	8	7	7	6	6	6	-	-	-	-	-	-	-	9
Jun Only	→	→	→	→	→	14	14	14	12	10	10	9	9	8	8	7	4	-	-	-	-	-	-	10
Jul Only	→	→	→	→	→	→	17	17	14	12	12	11	11	10	10	8	6	4	-	-	-	-	-	11
Aug Only	→	→	→	→	→	→	→	20	17	14	14	13	13	12	12	9	7	6	6	-	-	-	-	12
Sep Only	→	→	→	→	→	→	→	→	20	18	18	15	16	14	13	10	8	7	7	7	-	-	-	13
Oct Only	→	→	→	→	→	→	→	→	→	22	21	19	19	18	17	13	9	8	8	8	7	-	-	14
Nov Only	→	→	→	→	→	→	→	→	→	→	22	20	20	18	17	13	9	8	8	8	7	6	-	13
Dec Only	→	→	→	→	→	→	→	→	→	→	→	23	23	20	19	14	10	8	8	8	7	6	6	13

Appendix

Table 107. Percent of months curtailments would occur throughout the year when initiating a curtailment event in one particular month versus any month for the threshold, Inflow ≤ 28,600 and PDSI ≤ -0.49.

Curtailment Initiation	Inflow ≤ 28,600 & PDSI ≤ -0.49																							
	Percent of Months Curtailed																							
	% of all Jans	% of all Febs	% of all Mars	% of all Aprs	% of all Mays	% of all Juns	% of all Juls	% of all Augs	% of all Seps	% of all Octs	% of all Novs	% of all Decs	% of all Jans	% of all Febs	% of all Mars	% of all Aprs	% of all Mays	% of all Juns	% of all Juls	% of all Augs	% of all Seps	% of all Octs	% of all Novs	% of all Months
Any Month	12	11	11	11	9	9	11	14	14	13	13	13	-	-	-	-	-	-	-	-	-	-	-	12
Jan Only	12	11	9	7	4	4	4	4	3	3	3	3	-	-	-	-	-	-	-	-	-	-	-	6
Feb Only	→	11	9	7	4	4	4	4	3	3	3	3	3	-	-	-	-	-	-	-	-	-	-	5
Mar Only	→	→	11	8	4	4	4	4	3	3	3	3	3	3	-	-	-	-	-	-	-	-	-	5
Apr Only	→	→	→	11	4	4	4	4	3	3	3	3	3	3	3	-	-	-	-	-	-	-	-	4
May Only	→	→	→	→	9	8	8	8	7	4	4	3	3	3	3	3	-	-	-	-	-	-	-	5
Jun Only	→	→	→	→	→	9	9	9	8	6	4	3	3	3	3	3	1	-	-	-	-	-	-	5
Jul Only	→	→	→	→	→	→	11	11	9	7	6	4	4	4	4	3	1	1	-	-	-	-	-	6
Aug Only	→	→	→	→	→	→	→	14	12	9	8	7	7	7	6	4	2	2	2	-	-	-	-	7
Sep Only	→	→	→	→	→	→	→	→	14	10	9	8	8	8	7	4	2	2	2	2	-	-	-	6
Oct Only	→	→	→	→	→	→	→	→	→	13	12	10	10	10	8	6	3	3	3	3	2	-	-	7
Nov Only	→	→	→	→	→	→	→	→	→	→	13	11	11	11	9	7	4	4	4	4	3	3	-	7
Dec Only	→	→	→	→	→	→	→	→	→	→	→	13	12	11	9	7	4	4	4	4	3	3	3	7