

# RECLAMATION

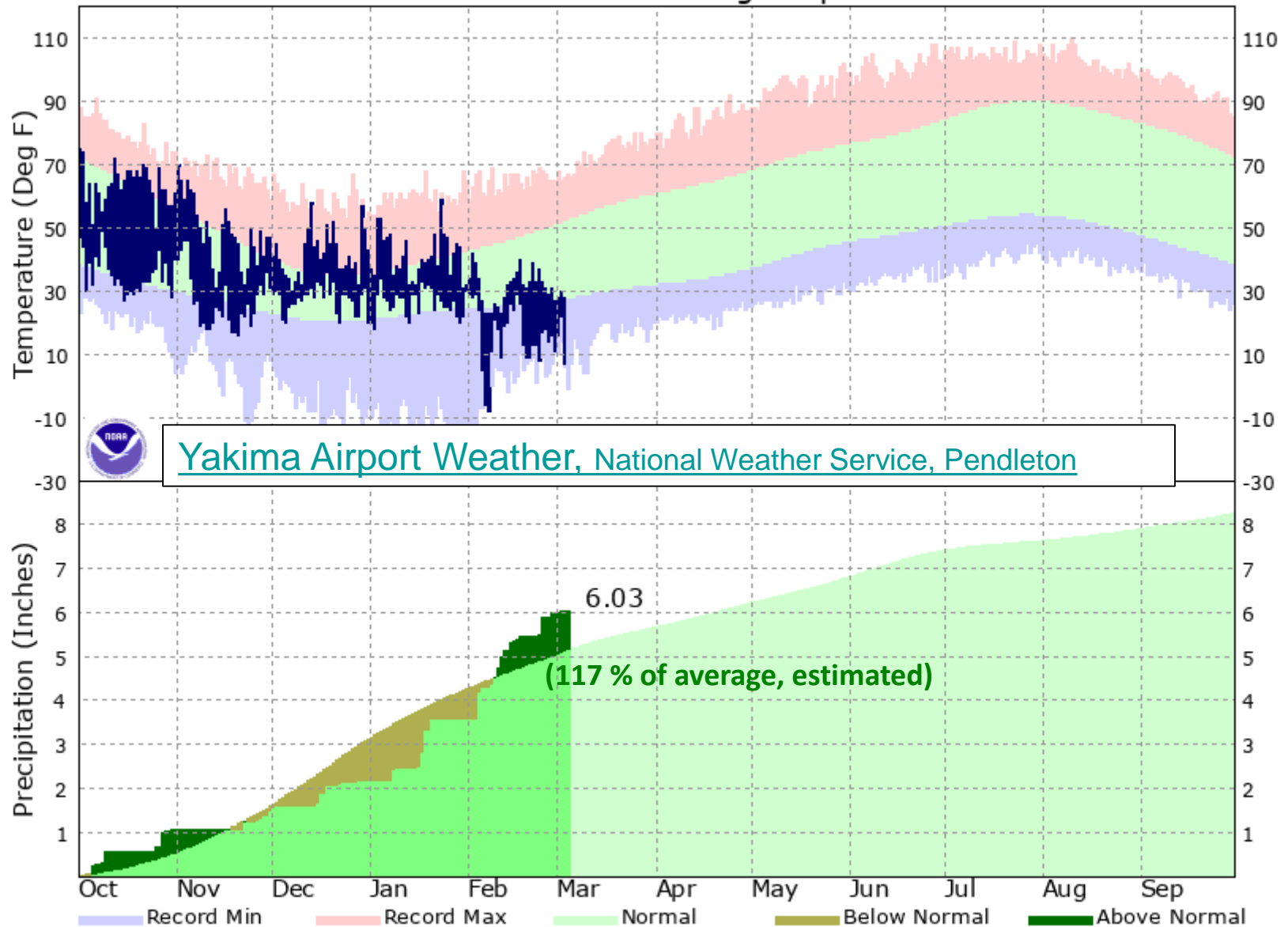
*Managing Water in the West*

## **Yakima Basin WY 2019 TWSA & River Operations Meeting, March 7, 2019**

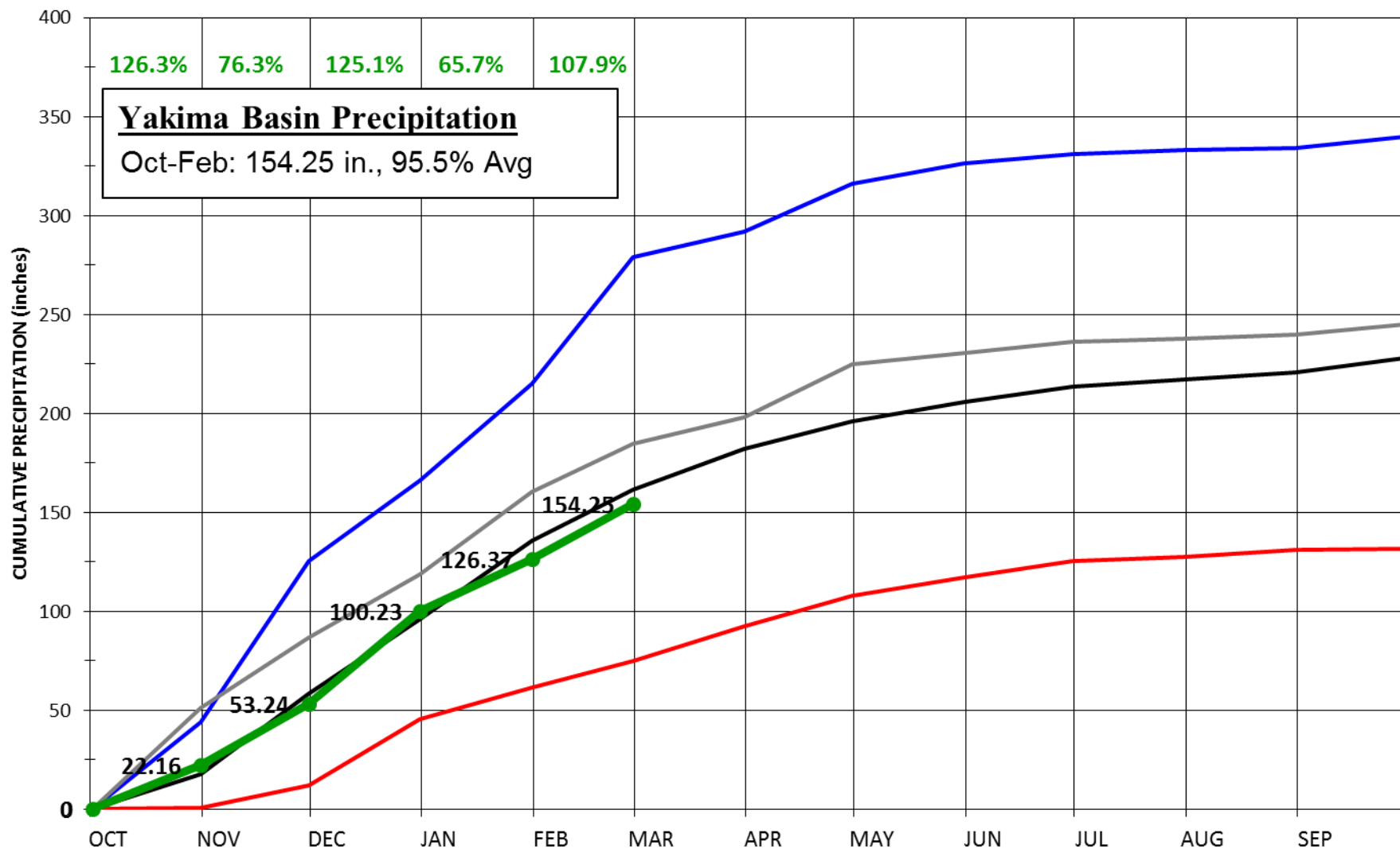


U.S. Department of the Interior  
Bureau of Reclamation

## KYKM - Oct 2018 Through Sep 2019



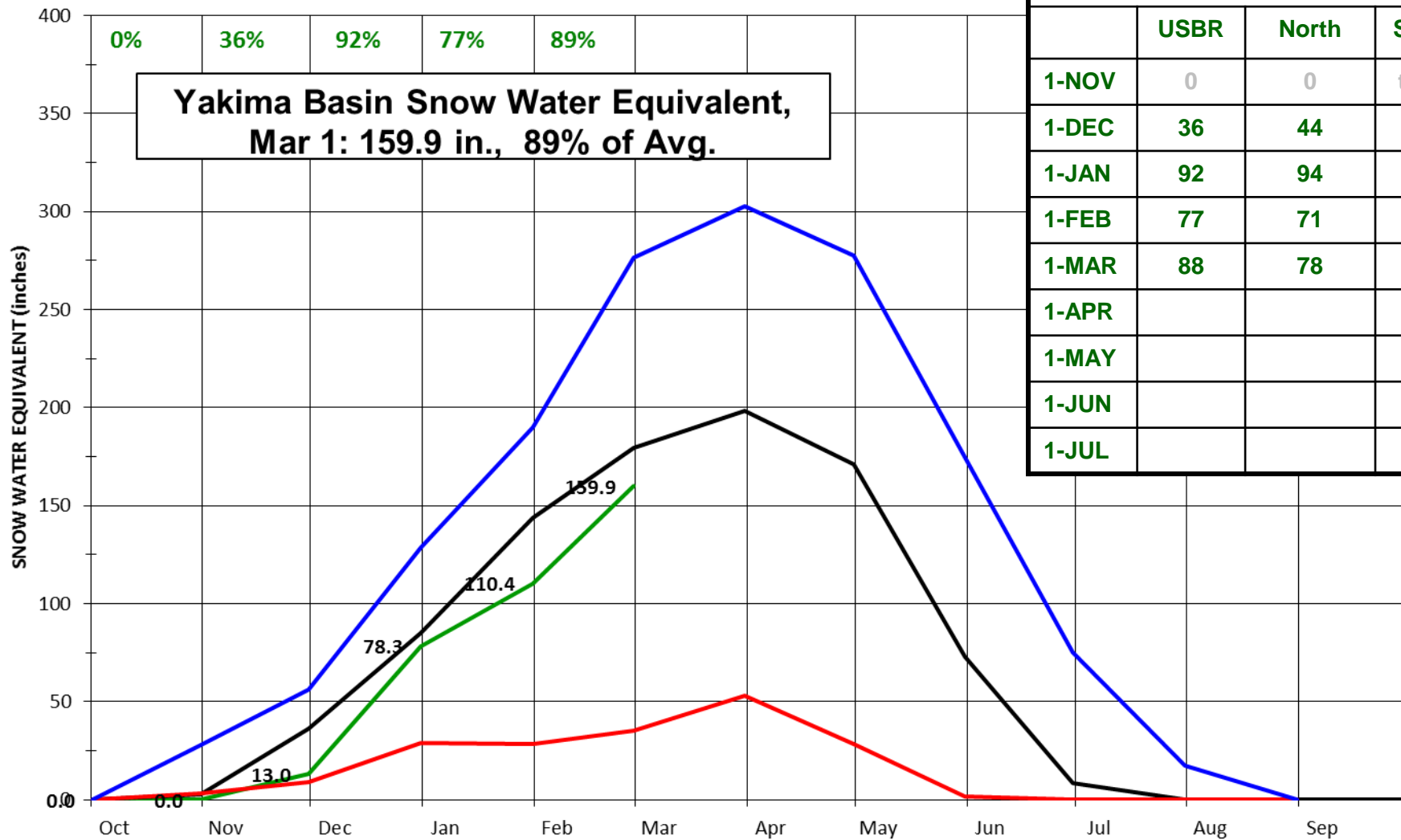
# RECLAMATION



— Maximum  
 — Average  
 — Minimum  
 — WY2018  
 ● WY 2019

**YAKIMA BASIN**  
 Combined Cumulative Precipitation  
 5 Reservoir Sites  
 WATER YEARS 1981-2010

UNITED STATES  
 DEPARTMENT OF THE INTERIOR  
 BUREAU OF RECLAMATION  
 YAKIMA FIELD OFFICE  
 1917 MARSH ROAD  
 YAKIMA, WA 98901



# NRCS SWE % AVG

	USBR	North	South
1-NOV	0	0	trace
1-DEC	36	44	45
1-JAN	92	94	94
1-FEB	77	71	85
1-MAR	88	78	97
1-APR			
1-MAY			
1-JUN			
1-JUL			

- Water Year 2019
- Average
- Low Year (2005)
- High Year (1999)

## YAKIMA BASIN WATER YEAR SNOW WATER EQUIVALENT

Average based on greater of 1971-2000 or POR-1995  
Totals derived from 7 Yakima forecast sites  
Corral, Stampede, Olallie, Fish, Bumping, Domerie, & Tunnel Avenue

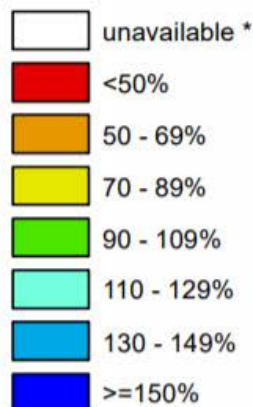
UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF RECLAMATION  
YAKIMA FIELD OFFICE  
1917 MARSH ROAD  
YAKIMA, WA 98901

RECLAMATION

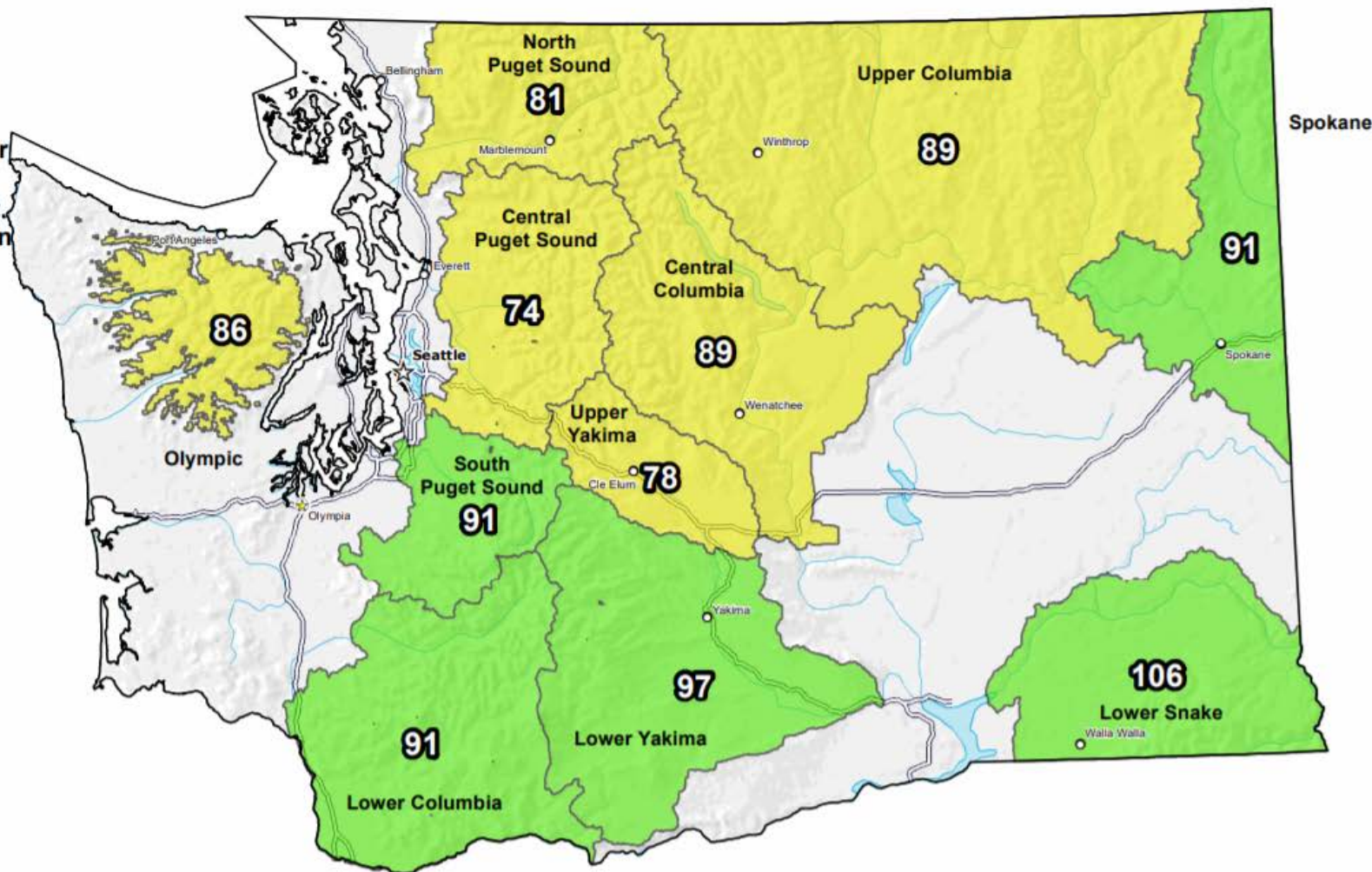
# Washington SNOTEL Current Snow Water Equivalent (SWE) % of Normal

Mar 04, 2019

Current Snow Water Equivalent (SWE) Basin-wide Percent of 1981-2010 Median



\* Data unavailable at time of posting or measurement is not representative at this time of year



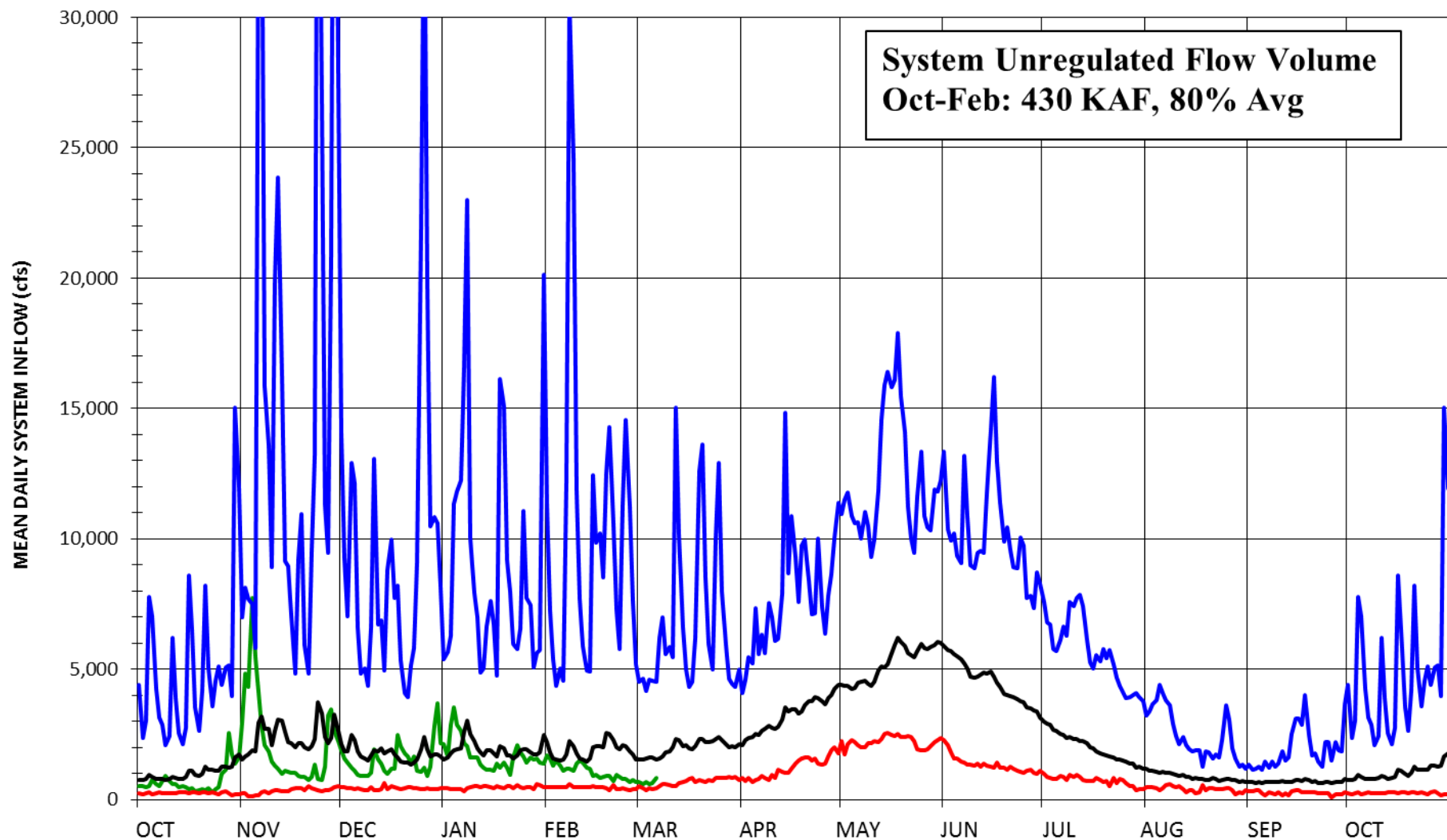
Provisional Data  
Subject to Revision





UPPER YAKIMA		SWE	Avg SWE	SWE %			
Grouse Camp	5390	16.1	N/A	*	20.0	22.4	89
Sasse Ridge	4340	24.9	28.5	87	38.4	43.0	89
Olallie Meadows	4030	33.0	43.9	75	68.5	82.6	83
Stampede Pass	3850	23.6	36.9	64	47.6	60.7	78
Fish Lake	3430	24.3	27.9	87	42.9	46.3	93
Basin Index (%)		77			85		
LOWER YAKIMA							
Green Lake	5920	20.5	19.4	106	24.1	25.4	95
Pigtail Peak	5800	34.6	43.0	80	38.4	54.5	70
Morse Lake	5410	41.3	45.6	91	50.9	56.9	89
Indian Rock	5360	18.0	N/A	*	25.6	N/A	*
Cayuse Pass	5240	39.0	N/A	*	-M	N/A	*
Lost Horse	5120	19.7	17.7	111	-M	24.1	*
Bumping Ridge	4610	21.4	23.7	90	39.6	43.3	91
Potato Hill	4510	30.5	21.7	141	41.9	44.1	95
White Pass E.S.	4440	16.3	20.5	80	27.4	31.5	87
Basin Index (%)		96			87		

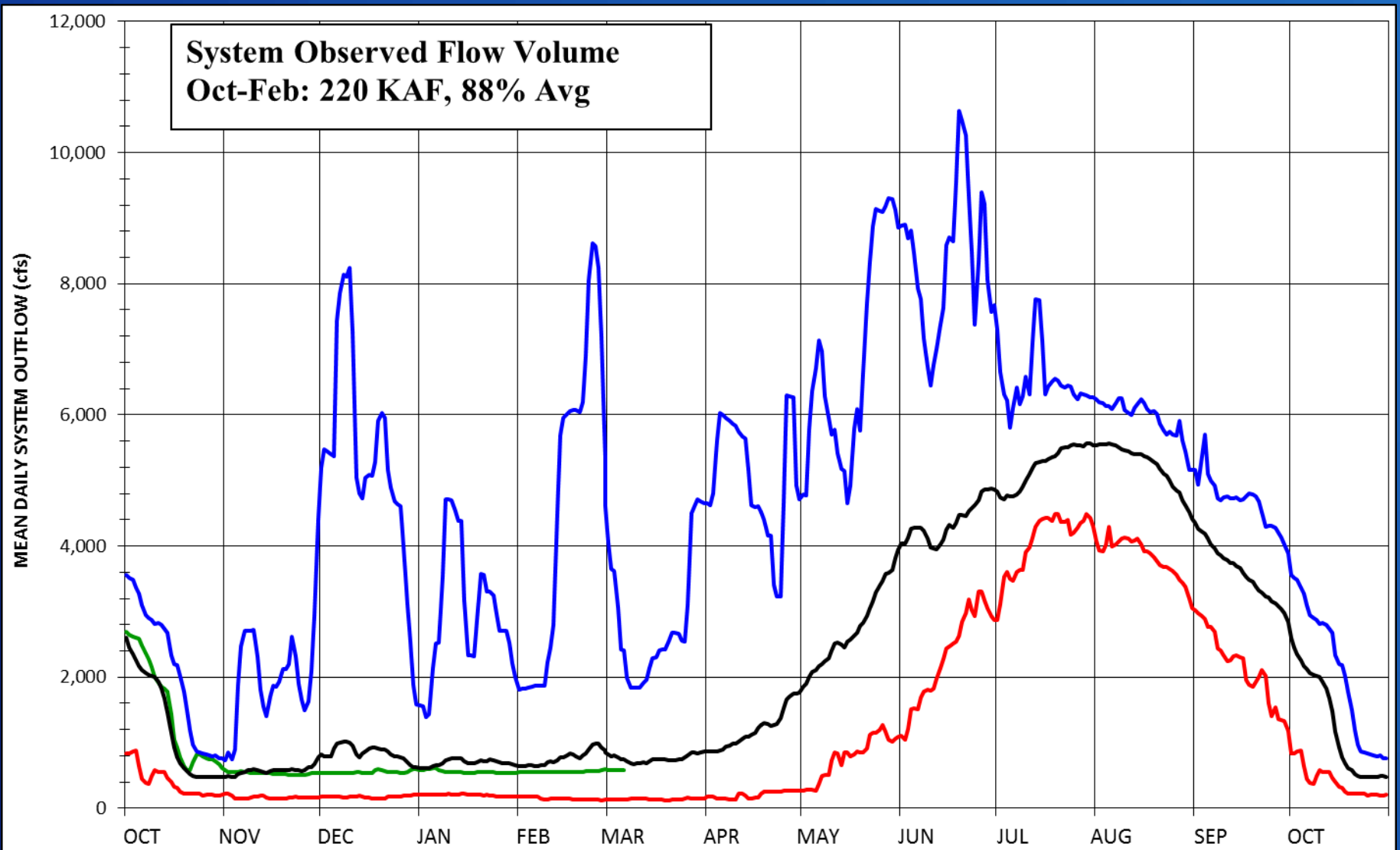
 Regulated     Partly Regulated



— Water Year 2019    — Minimum  
— Average            — Maximum

**YAKIMA PROJECT  
SYSTEM RESERVOIRS  
SUM OF INFLOWS  
SUMMARY HYDROGRAPH  
WATER YEARS 1981-2010**

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF RECLAMATION  
YAKIMA FIELD OFFICE  
1917 MARSH ROAD  
YAKIMA, WA 98901

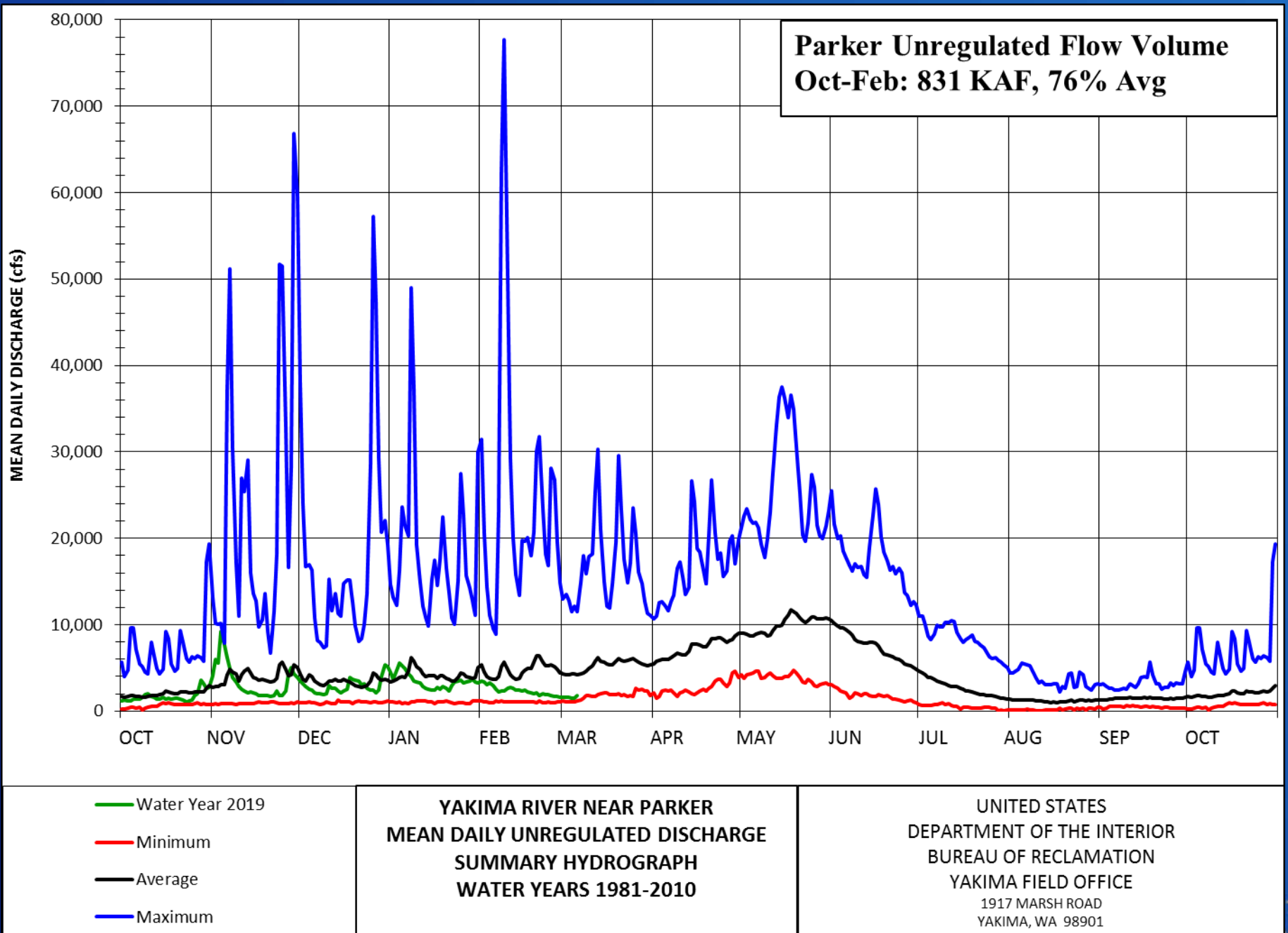


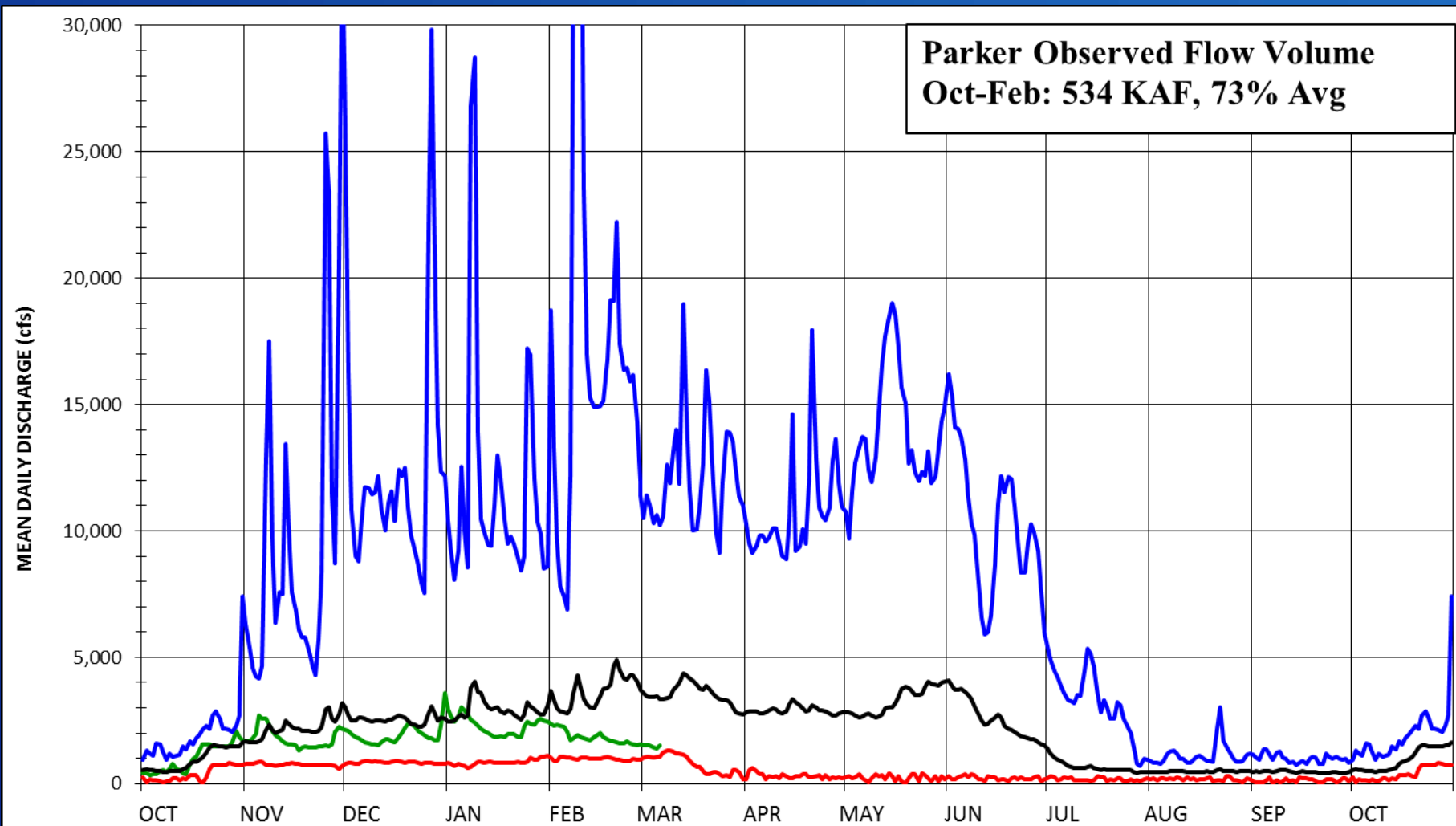
— Water Year 2019  
— Minimum  
— Average  
— Maximum

**SYSTEM RESERVOIRS  
SUM OF OUTFLOWS  
SUMMARY HYDROGRAPH  
WATER YEARS 1981-2010**

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF RECLAMATION  
YAKIMA FIELD OFFICE  
1917 MARSH ROAD  
YAKIMA, WA 98901



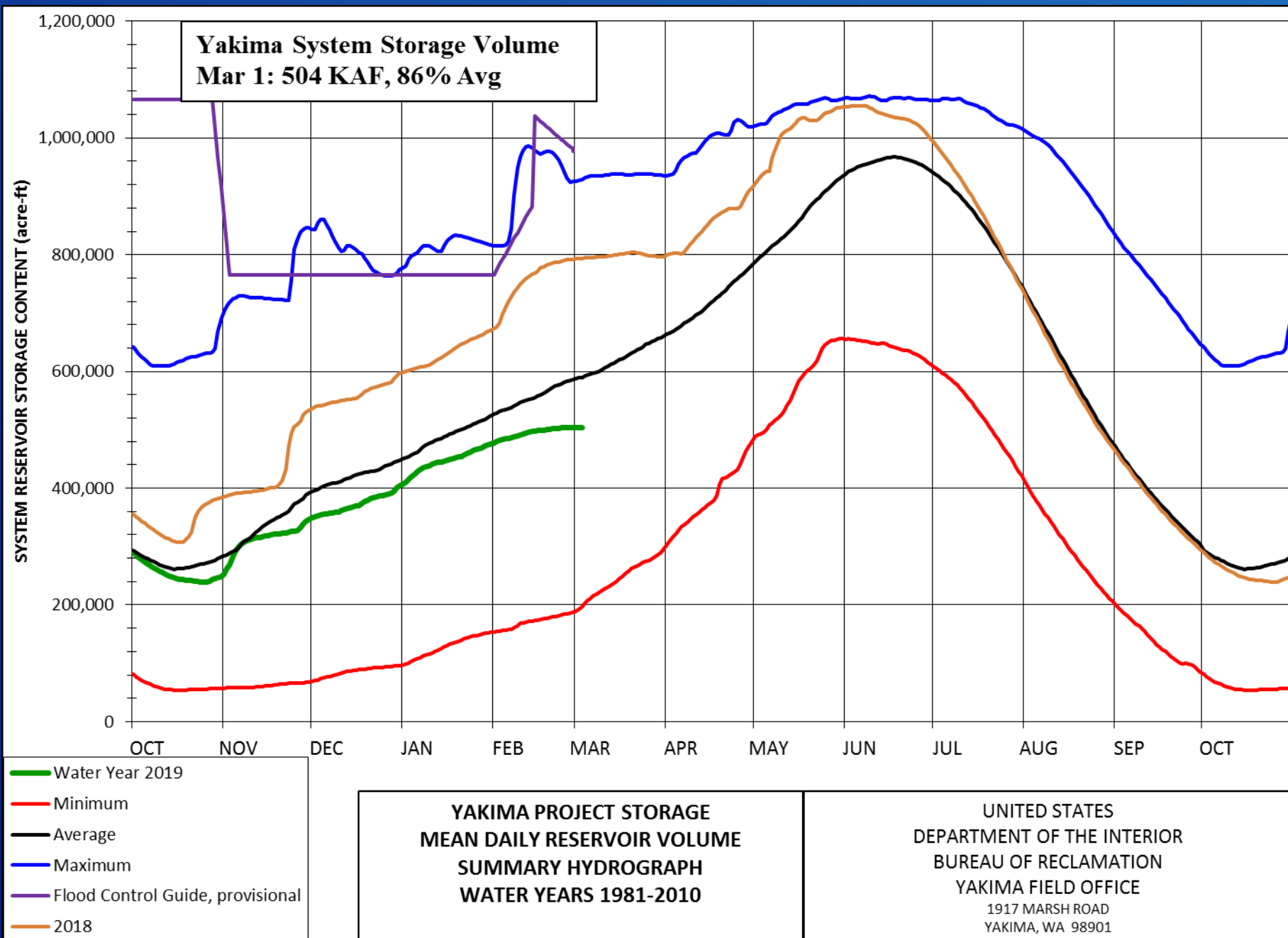




— Water Year 2019  
— Minimum  
— Average  
— Maximum

**YAKIMA RIVER NEAR PARKER  
MEAN DAILY REGULATED DISCHARGE  
SUMMARY HYDROGRAPH  
WATER YEARS 1981-2010**

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF RECLAMATION  
YAKIMA FIELD OFFICE  
1917 MARSH ROAD  
YAKIMA, WA 98901



# Yakima Subbasin forecasts

Runoff, AF and % of Average

March, 2019	Low	Adopted	High	Low	Adopted	High
Parw	1,343,932	1,887,271	2,527,447	0.68	0.95	1.27
kee	83,109	124,635	166,185	0.61	0.92	1.23
kac	76,261	114,315	152,795	0.62	0.93	1.24
cle	299,135	400,814	507,158	0.70	0.93	1.18
bum	89,393	118,151	152,625	0.70	0.93	1.20
rim	155,503	195,910	245,098	0.73	0.92	1.15
Yumw	576,824	783,362	992,453	0.66	0.89	1.13
Nacw	519,331	731,461	972,265	0.65	0.91	1.21

RECLAMATION

# March's April 1, 2019 TWSA ESTIMATE

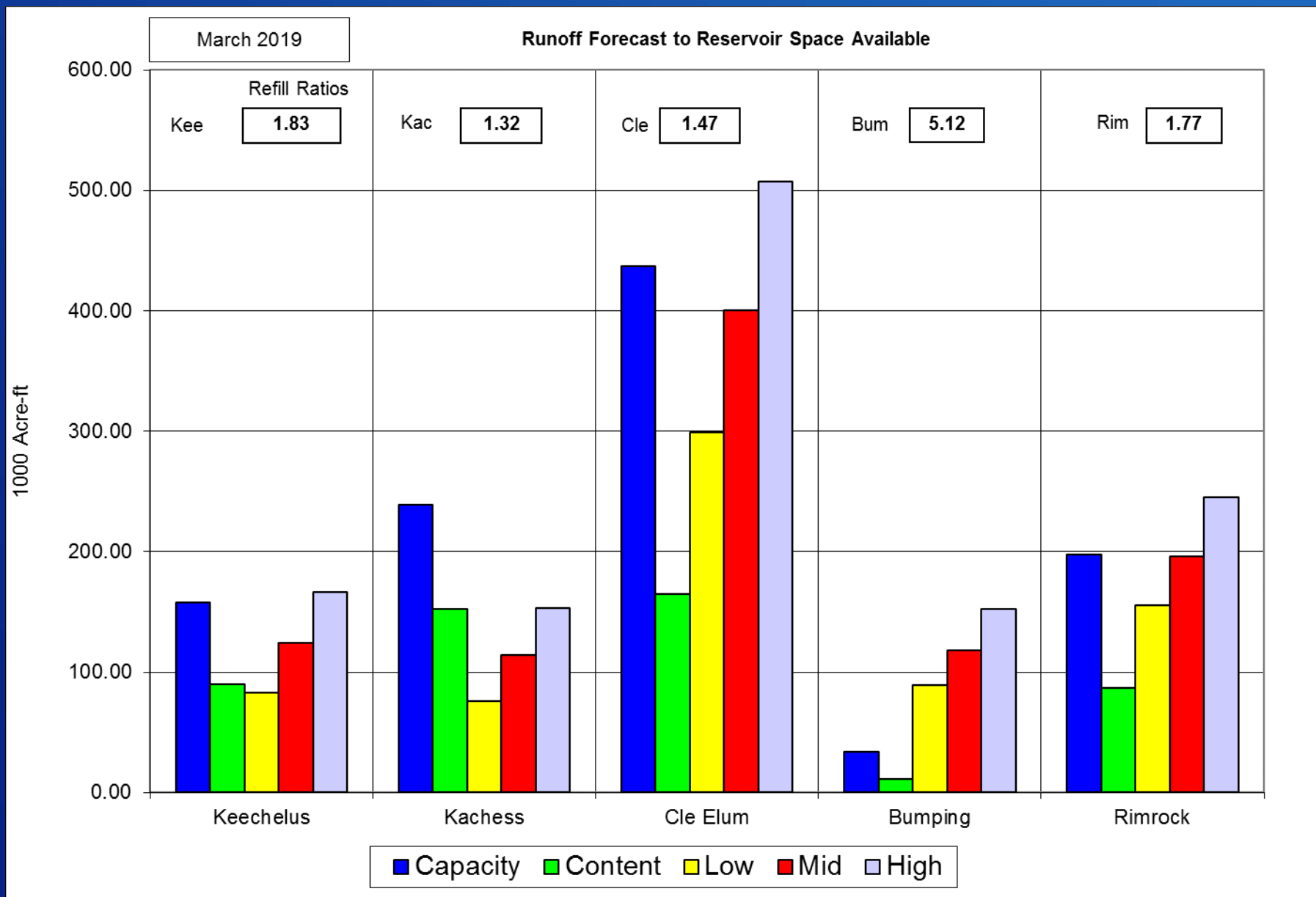
## April 1 - September 30

Parameter*	+/-/=	Low	Adopted	High
Apr 1-Sep 30 Natural Flow at Parker est.	+	1304	1850	2502
Return Flow Estimate, est	+	330	335	350
April 1, Reservoir Content, est	+	554	566	586
TWSA	=	<b>2188</b>	<b>2752</b>	<b>3437</b>
SEP 30 EST RESERVOIR CONTENT	-	76	76	372
FLOW OVER SUNNYSIDE DAM	-	300	486	756
TWSA FOR IRRIGATION	=	<b>1812</b>	<b>2189</b>	<b>2309</b>
NONPRORATABLE ENTITLEMENT	-	1070	1070	1070
REMAINING TWSA	=	<b>742</b>	<b>1119</b>	<b>1239</b>
PRORATABLE ENTITLEMENT		1239	1239	1239
% RATIO= REMAINING TWSA/PRORATABLE ENTITLEMENT		<b>60%</b>	<b>90%</b>	<b>100%</b>
TITLE XII FLOW TARGET, cfs	April	<b>300</b>	<b>400</b>	<b>600</b>
Added flow available, cfs ***		<b>111</b>	<b>121</b>	<b>125</b>
Non-storeable Portion of added flow, cfs		<b>14</b>	<b>14</b>	<b>14</b>
Storable portion of added flow, cfs		<b>98</b>	<b>108</b>	<b>111</b>

\*Values are in 1,000 ac-ft unless otherwise specified.

\*\*\* State & YRBWEP Trust, Acquisition, & Conservation additions to Title XII flow range from 111 to 125 cfs.

# RECLAMATION



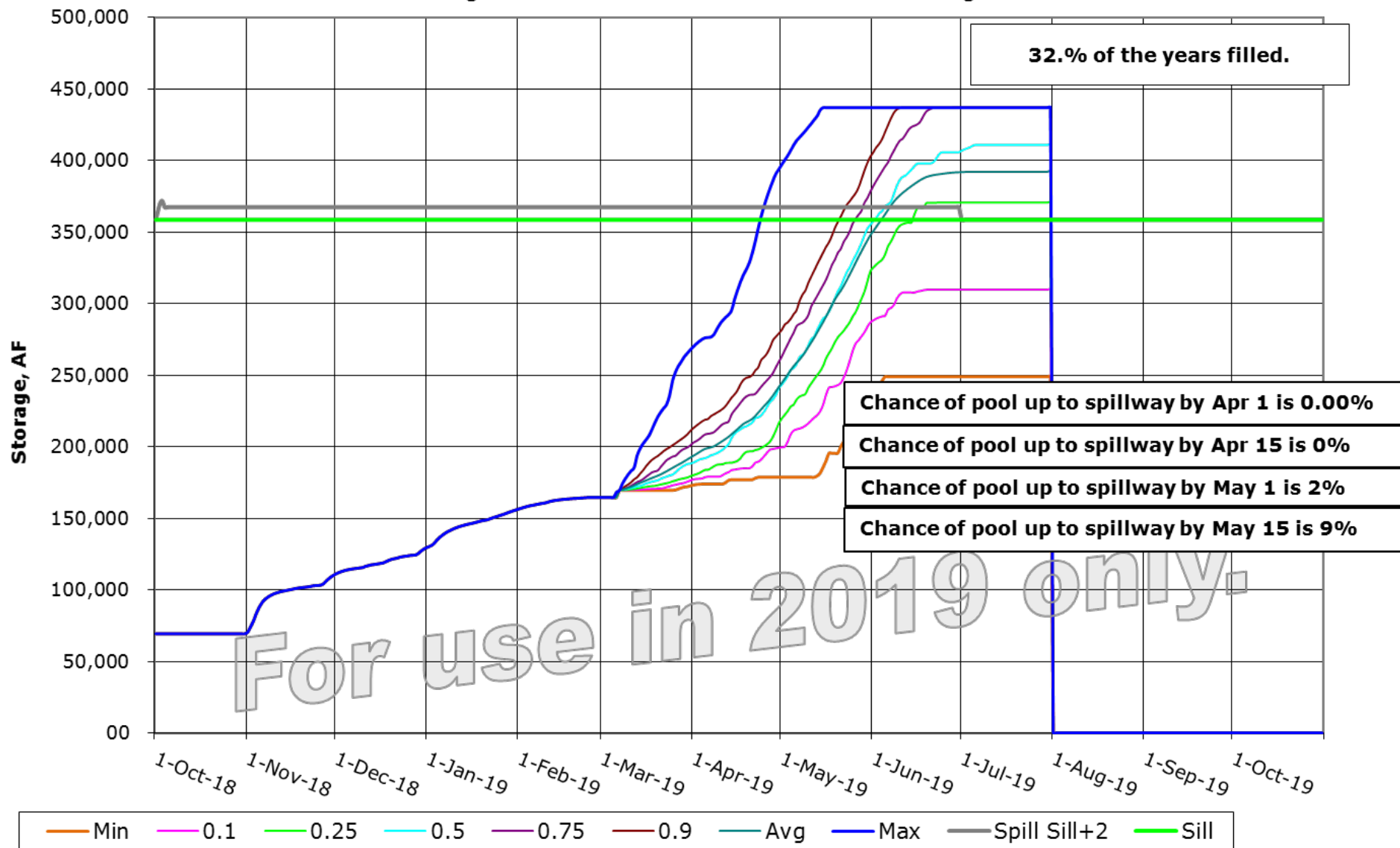
RECLAMATION



# Cle Elum Reservoir, Fill Analysis

ENSO = 1

Forecast Range is 0.67 to 1.17 with a median 0.97 and an average 0.95



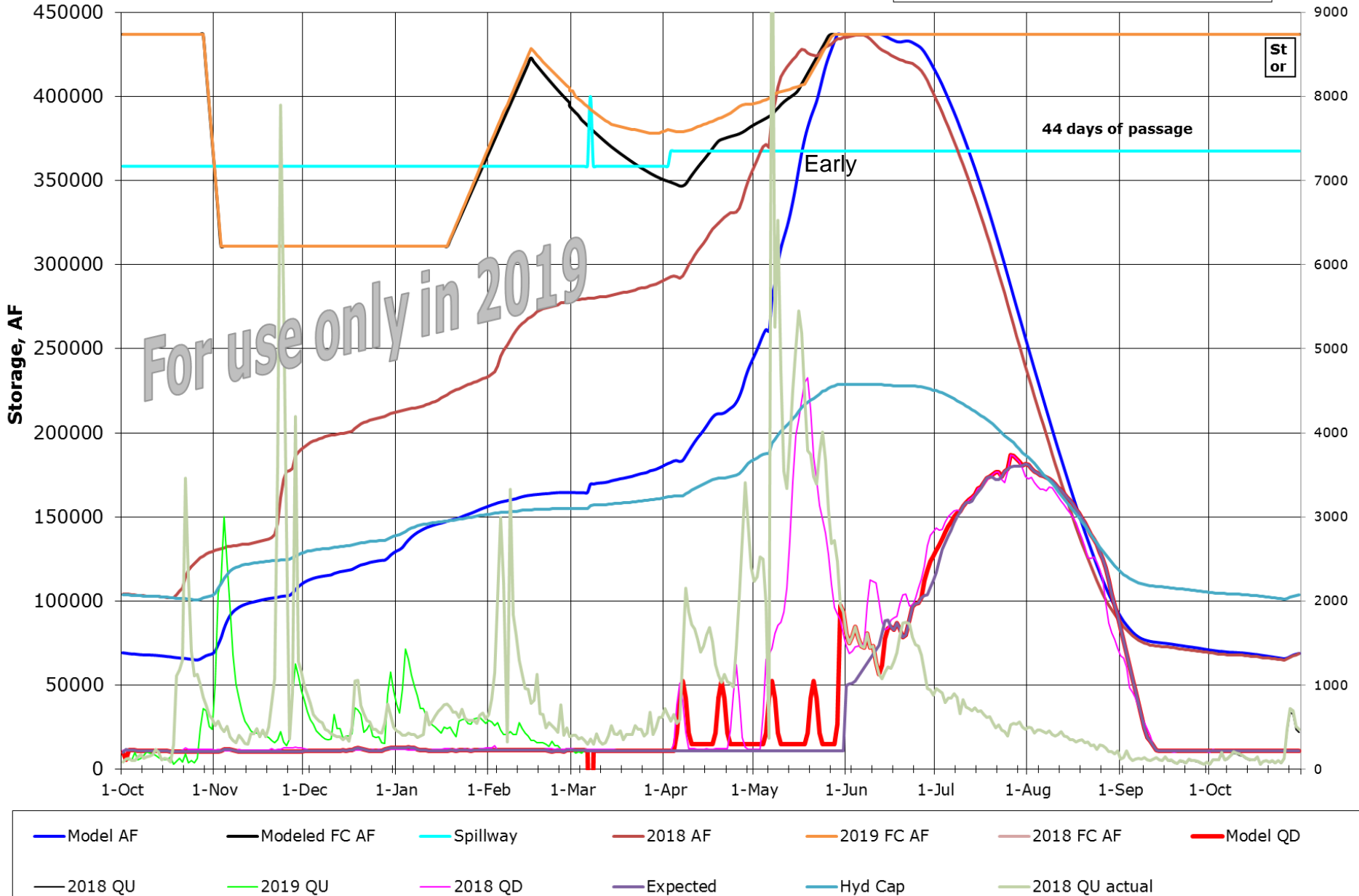
3/7/2019

RECLAMATION

3/7/2019

# Cle modeled reservoir operations with historical inflow

2018 runoff was 107% of Avg.



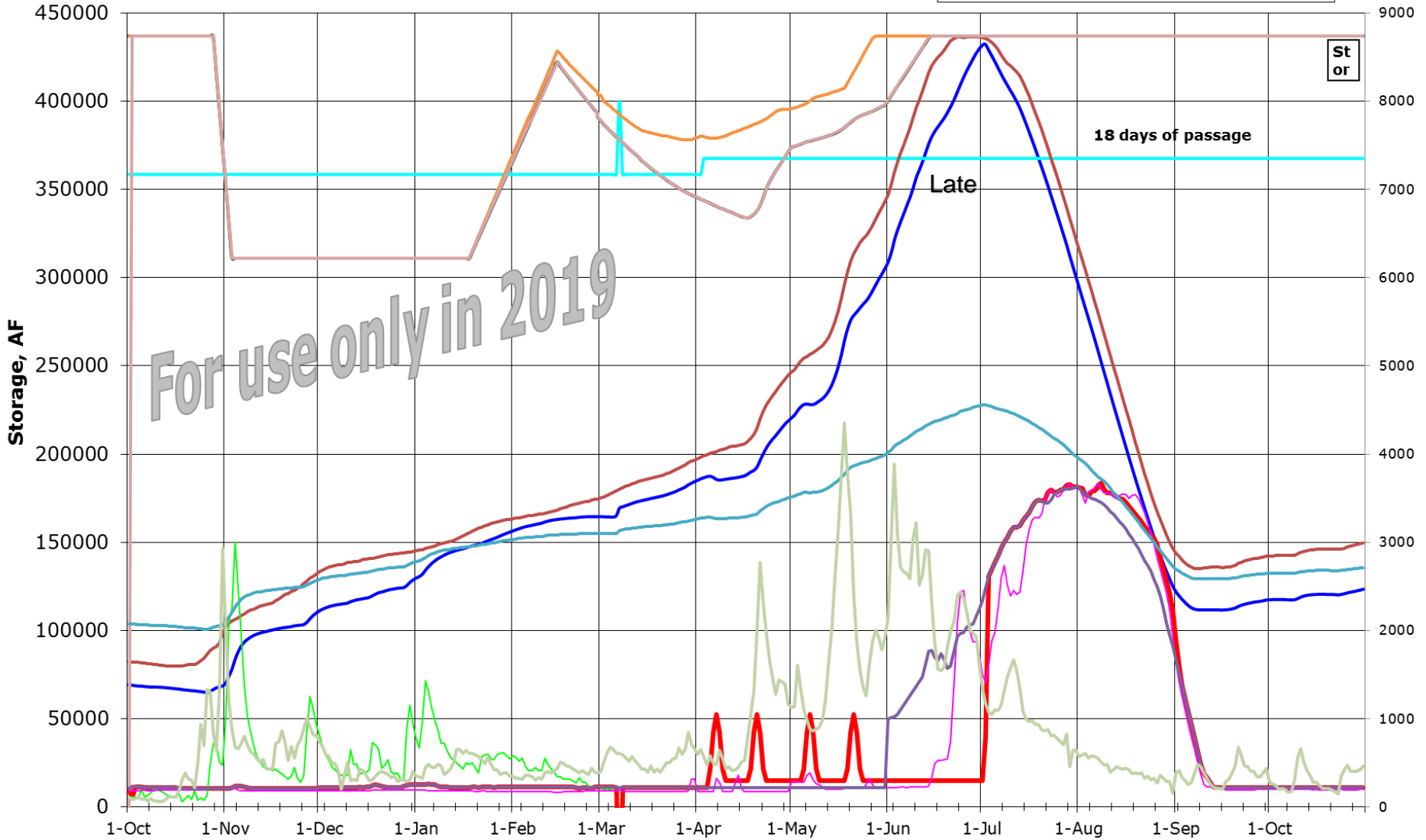
3/7/2019

# Cle modeled reservoir operations with historical inflow

2010 runoff was 96% of Avg.

Storage

Storage, AF



Model AF	Modeled FC AF	Spillway	2010 AF	2019 FC AF	2010 FC AF	Model QD
2010 QU	2019 QU	2010 QD	Expected	Hyd Cap	2010 QU actual	

# Reservoir Refill

% filled, Storage Max, Likely timing of max)

- Reach Cle spillway+2' fish flume in late May.
- Cle: 30% fill, 410 (310 to 437), June
- Kee: 36% fill, 146 (105 to 157), late May or June  
Kac: 39% fill, 230 (178 to 239), June
- Bum: 99% fill, 34 (31to 34), late May or June
- Rim: 67% fill, 198(150 to 198), June

RECLAMATION

# Yakima Basin Flows

- Winter-Spring Minimum Targets, WY 2019

<u>Location</u>	<u>Target Flow (cfs)</u>	
Keechelus (KEE)	100	Increase in Late January
Easton (EASW)	250	Increase in Late January
Cle Elum (CLE)	220	Increase in Late January
Tieton River (TICW)	100	Increase in Late January
Rimrock	75	Increase in Late January
Bumping (BUM)	130	(range: inflow to 130+)
Parw	N/A	
Yrpw	N/A	
Prosser (Yrpw), subord	800 Oct-Nov, 600 Dec-Mar*, 1000 Apr-Jun	
Roza (Rbdw), subord	500 Oct-Mar, 1300 Apr-May, 500 Jun-Oct	

\*In March 2019, held at 800 cfs through March, due to prevailing conditions that kept the incidental flow above 800 cfs all winter until March 4.

RECLAMATION

# Yakima Basin Outmigration Flows

**Table 3-4. Minimum volume of water (acre-feet) that will be available in April and May, each year, to provide outmigration flows as measured at Tieton Dam (RIM), Cle Elum Dam (CLE), and Yakima River at Easton gage (EASW).**

	Monthly Min. acre-feet for Outmigration Flows		
<b>April TWSA (MAF)</b>	<b>&lt; 2.36</b>	<b>2.36 - 3.13</b>	<b>&gt; 3.13</b>
<b>May TWSA (MAF)</b>	<b>&lt; 2.20</b>	<b>2.20 - 261</b>	<b>&gt; 2.61</b>
RIM	4,500	8,400	14,800
CLE	4,200	9,900	18,800
EASW	3,700	4,800	9,900

Easton (EASW) can be met from unregulated local inflow below Kee and Kac.



# River Operations Summary

- El Nino has finally arrived.
- Reservoir Storage is 86% of avg.
- Precip in Feb was 108%
- Snow has improved but is still only 65 to 91% at locations above our reservoirs.
- TWSA is 93% of average.
- Prorationing is 90%. (Forecast low=60%, high=100%)
- Title XII flow is 400 cfs. (set at 300 to 600 cfs from TWSA)
- Pulse flow is in mid-range.

RECLAMATION