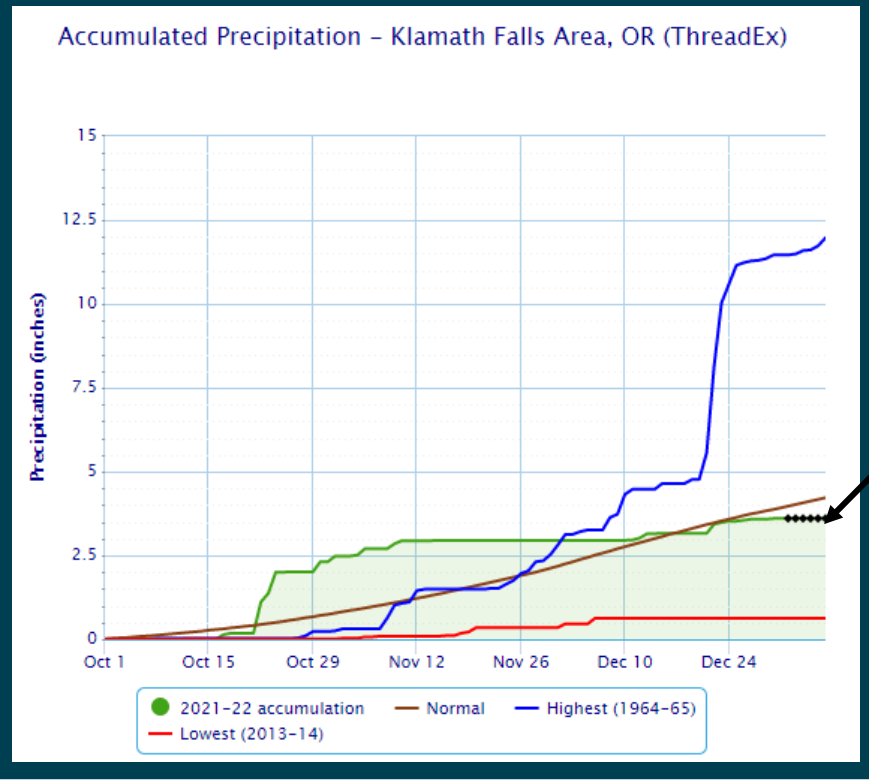
BUREAU OF RECLAMATION

Klamath River Basin Hydrologic Update

January 7, 2022

NWS Klamath Falls Airport Met Station WY 2022



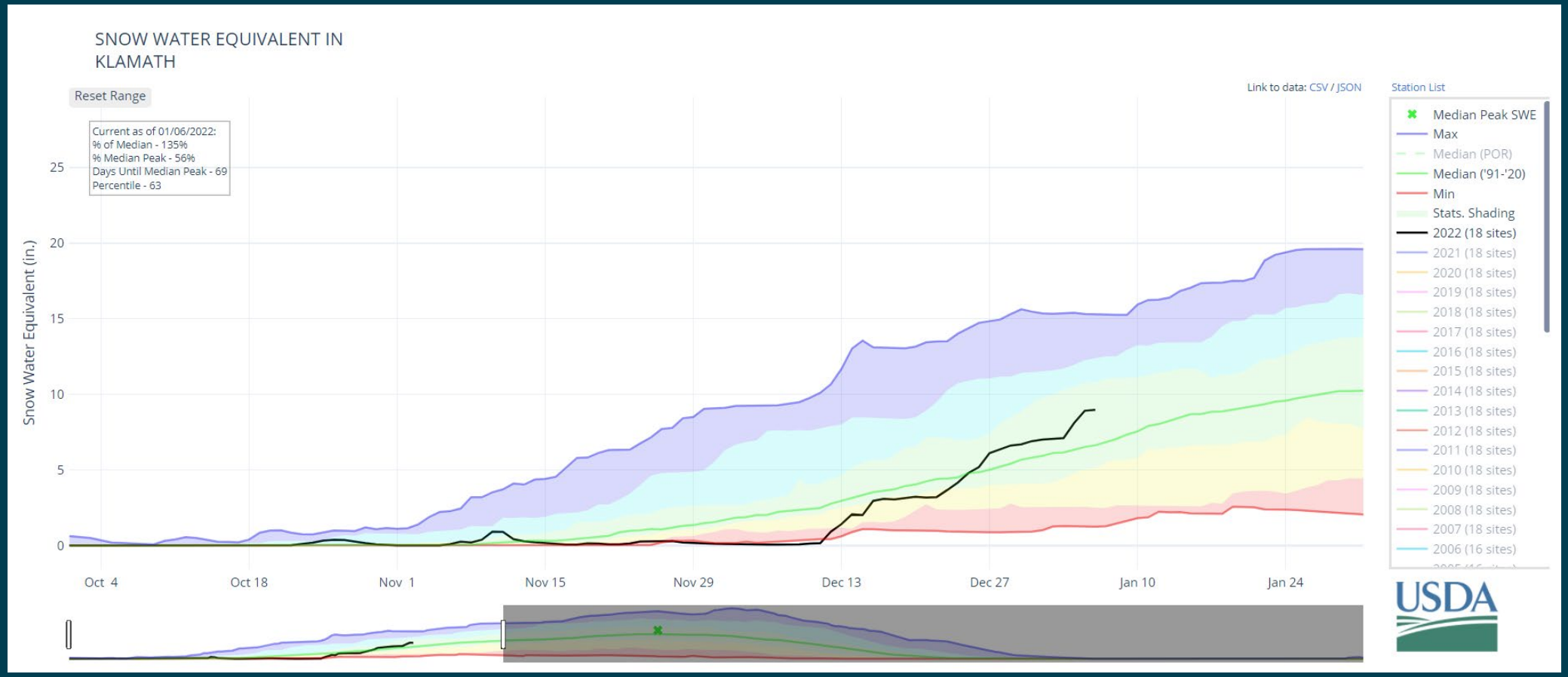
Black diamonds displayed in accumulated precipitation plot indicate missing data

NWS - Klamath Falls International Airport (KLMT)

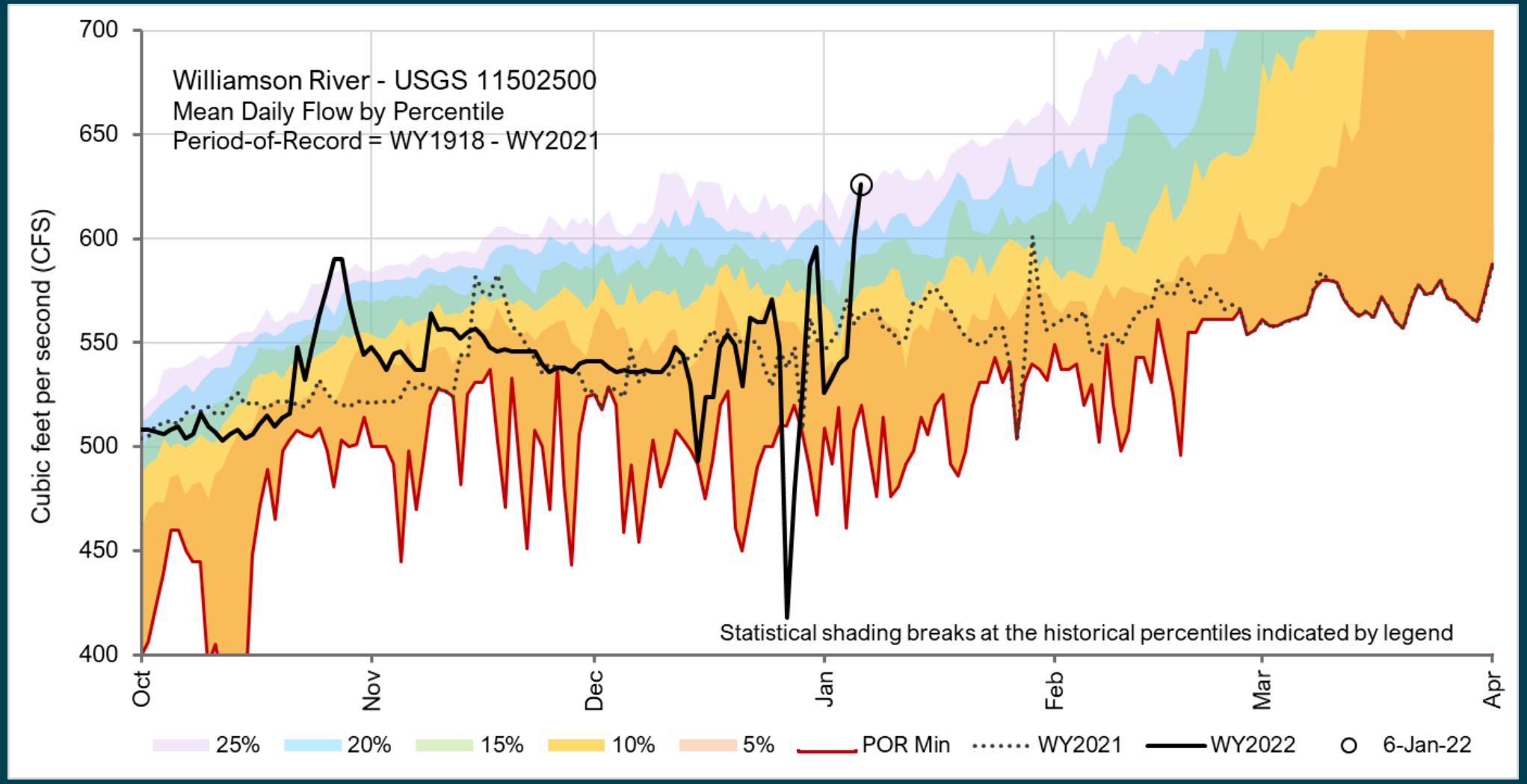
Unit: inch

Water Year	Month	Monthly Total	Monthly Departure	Monthly Normal	% Monthly Normal	WY Total	WY Departure	WY Normal	% WY Normal
2022	Oct	2.31	1.57	0.74	312%	2.31	1.57	0.74	312%
	Nov	0.64	-0.74	1.38	46%	2.95	0.83	2.12	139%
	Dec	0.65	-1.15	1.8	36%	3.60	-0.32	3.92	92%
	as of 7 January	0.24	-0.06	0.3	80%	3.84	-0.38	4.22	91%

Upper Klamath Basin Snow Water Equivalent - NRCS
WY 2022



Williamson River - USGS 11502500



UKL Cumulative Net Inflow
WY 2022 & Period-of-Record (POR)-to-Date

WY	Cumulative UKL Net Inflow (TAF)
2014	216.86
2021	218.771
1991	224.272
1995	227.502
1992	230.852
2022	**242.832**
2019	244.778
2020	247.028
1994	257.146
1993	258.388
1990	264.620
2016	265.993
2012	267.262
2003	267.351
2010	270.117
2005	274.620
2004	274.715
2018	275.018
2008	295.556
2009	304.037
1981	304.190

WY	Cumulative UKL Net Inflow (TAF)
2001	304.269
1989	305.514
2015	307.494
2017	309.712
2013	310.111
1988	316.275
1998	321.991
2011	324.911
2002	326.421
2007	335.540
2000	343.447
1987	355.628
1986	356.322
1996	368.394
1983	402.893
1999	440.100
2006	441.130
1985	491.452
1982	500.935
1984	546.166
1997	593.247

WY2022 % of POR median ≈ 80%

Forecasts

WY 2022 UKL Net Inflow Forecast – NRCS
March – September 2022

USDA NRCS National Water & Climate Center
 * - DATA CURRENT AS OF: January 05, 2022 06:15:19 PM
   - Based on January 01, 2022 forecast values

KLAMATH RIVER BASIN

Forecast Point	period	50% (KAF)	% of med	max (KAF)	30% (KAF)	70% (KAF)	min (KAF)	30-yr med
Gerber Reservoir Inflow (2)	JAN-JUN	54	164	79	64	44	29	33
Sprague R nr Chiloquin	JAN-SEP	345	133	560	425	275	185	260
	MAR-SEP	265	123	445	330	205	129	215
Williamson R bl Sprague R nr Chiloquin	JAN-SEP	545	116	760	630	460	330	470
	MAR-SEP	420	117	580	485	360	265	360
Upper Klamath Lake Inflow (1,2)	JAN-SEP	850	114	1290	990	710	405	745
	MAR-SEP	580	115	880	670	485	280	505

Max (10%), 30%, 50%, 70% and Min (90%) chance that actual volume will exceed forecast.
Medians are for the 1991-2020 period.
All volumes are in thousands of acre-feet.

footnotes:
1) Max and Min are 5% and 95% chance that actual volume will exceed forecast
2) streamflow is adjusted for upstream storage

Forecasts are provisional and subject to revision based on hydrologic conditions
POR = Water Years 1991 - 2020

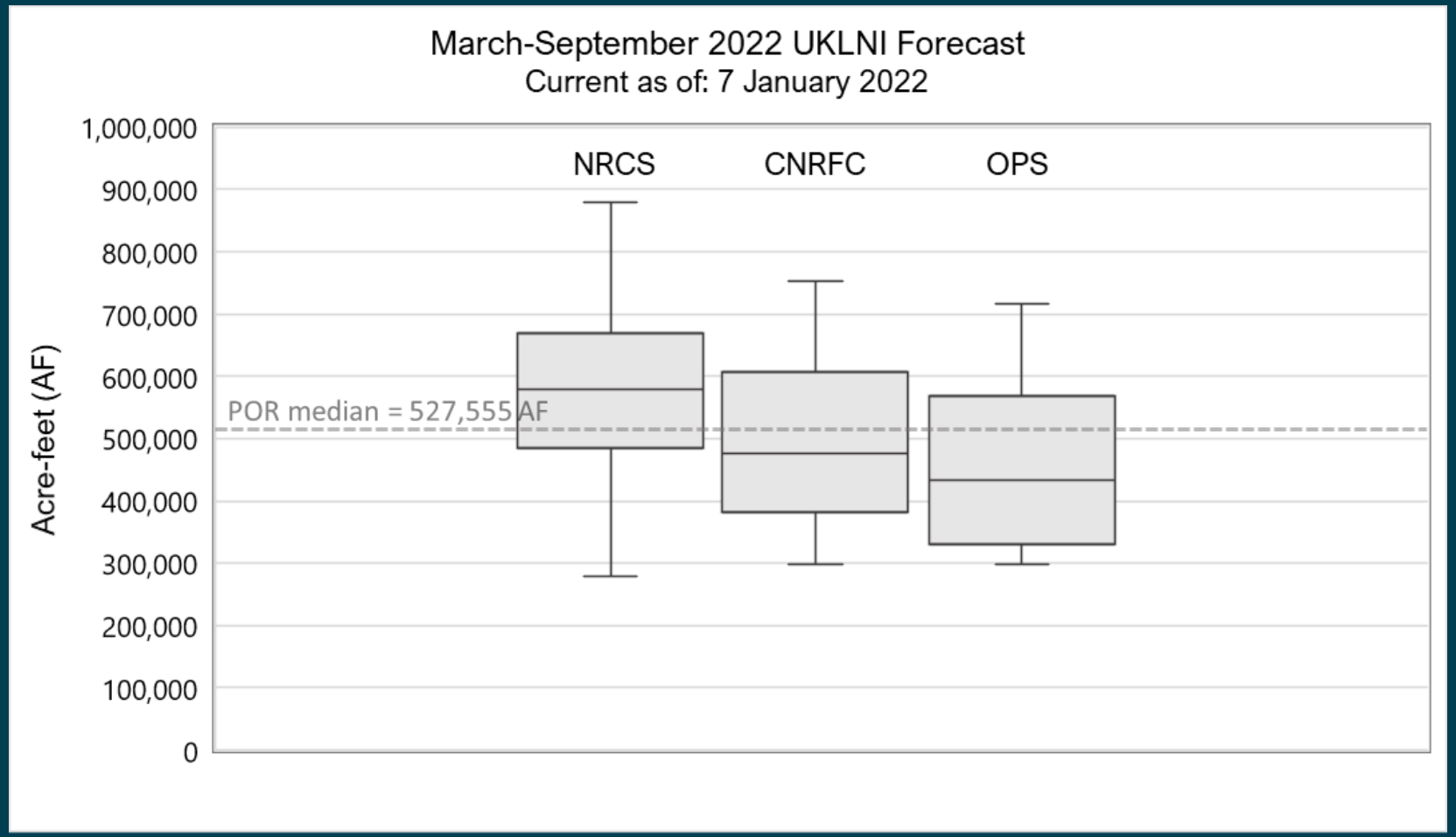
WY 2022 UKL Net Inflow Forecast – CNRFC
March – September 2022

CNRFC - KLAO3 UKL Net Inflow Accumulation		
Forecast issuance date		1/6/2022
Forecast period		Mar-Sep 2022
Probability of Exceedance	Volume (ac-ft)	**% of POR median
90%	298,008	56%
75%	381,669	72%
50%	475,913	90%
25%	606,282	115%
10%	753,514	143%

Forecasts are provisional and subject to revision based on hydrologic conditions

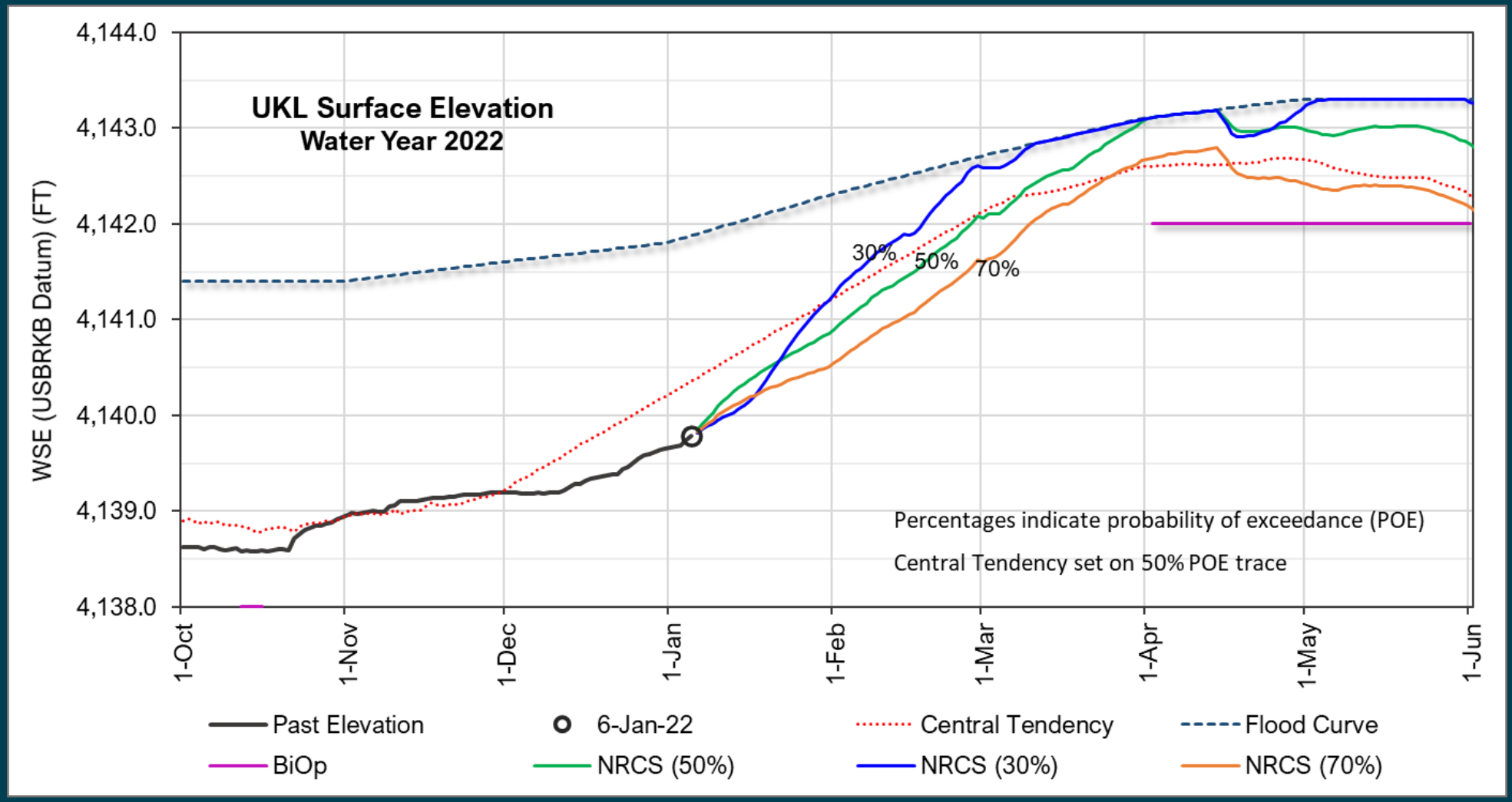
** POR = Water Years 1981-2021

WY 2022 UKL Net Inflow Forecast
March – September 2022



Forecasts are provisional and subject to revision based on hydrologic conditions
POR median relative to water years 1981-2021

Upper Klamath Lake Water Surface Elevation WY2022 - NRCS



Upper Klamath Lake Water Surface Elevation WY2022 - NRCS

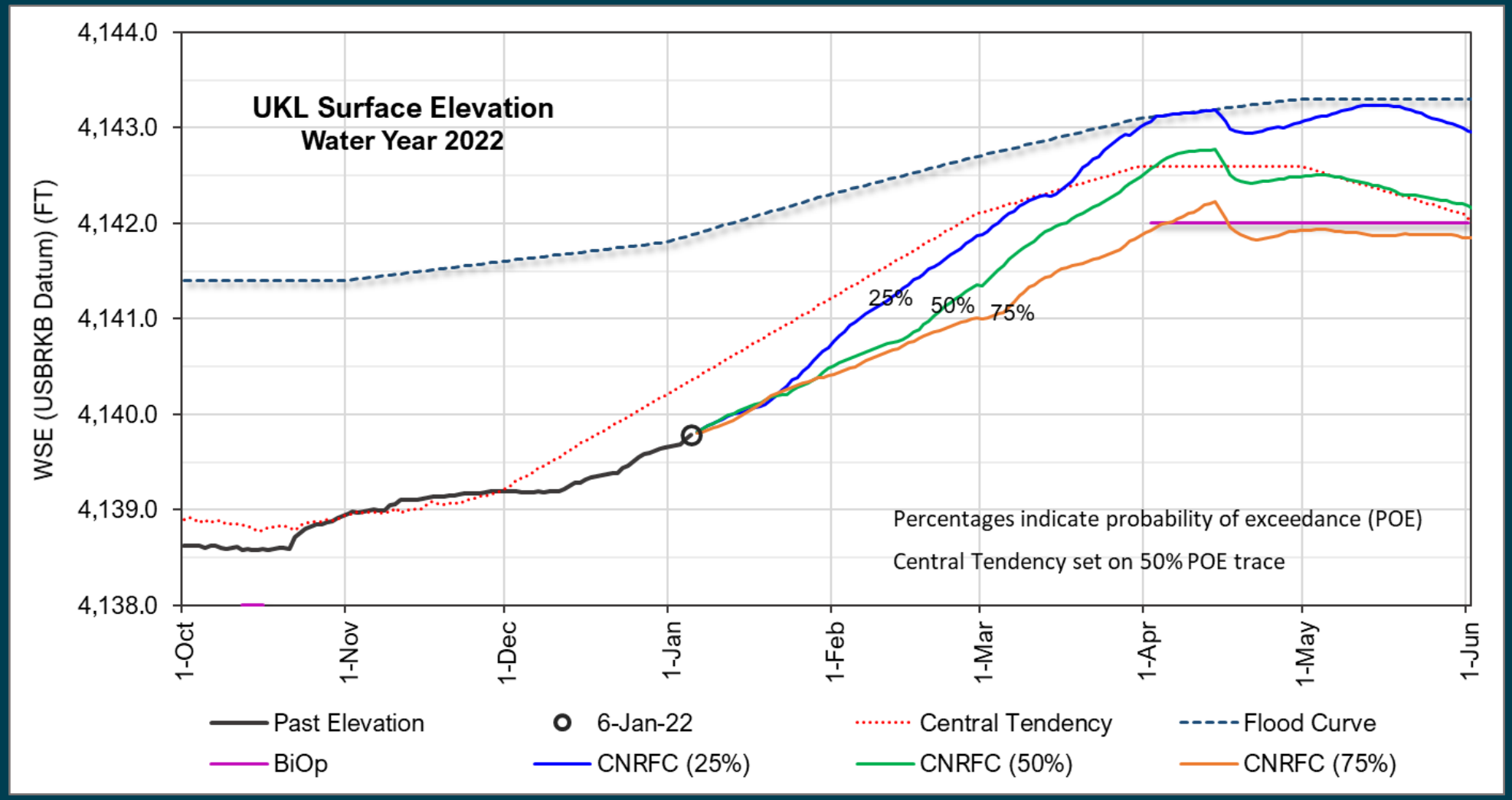
NRCS 30%	
2022 proj EOF elev (FT)	4142.61
2022 proj Prj Supp (TAF)	324
2022 proj EWA (TAF)	631
2022 proj min elev (FT)	4138.66
KDD F/W proj total supp (TAF)	25.587
LKNWR F/W proj total supp (TAF)	4.495

NRCS 50%	
2022 proj EOF elev (FT)	4142.08
2022 proj Prj Supp (TAF)	266
2022 proj EWA (TAF)	522
2022 proj min elev (FT)	4138.63
KDD F/W proj total supp (TAF)	21.310
LKNWR F/W proj total supp (TAF)	2.571

NRCS 70%	
2022 proj EOF elev (FT)	4141.55
2022 proj Prj Supp (TAF)	232
2022 proj EWA (TAF)	421
2022 proj min elev (FT)	4138.15
KDD F/W proj total supp (TAF)	19.483
LKNWR F/W proj total supp (TAF)	1.886

EOF = End-of-February
Prj Supp = Project Supply
EWA = Environmental Water Account
Min elev = Seasonal minimum elevation
F/W = Fall/Winter

Upper Klamath Lake Water Surface Elevation WY2022 - CNRFC



Upper Klamath Lake Water Surface Elevation WY2022 - CNRFC

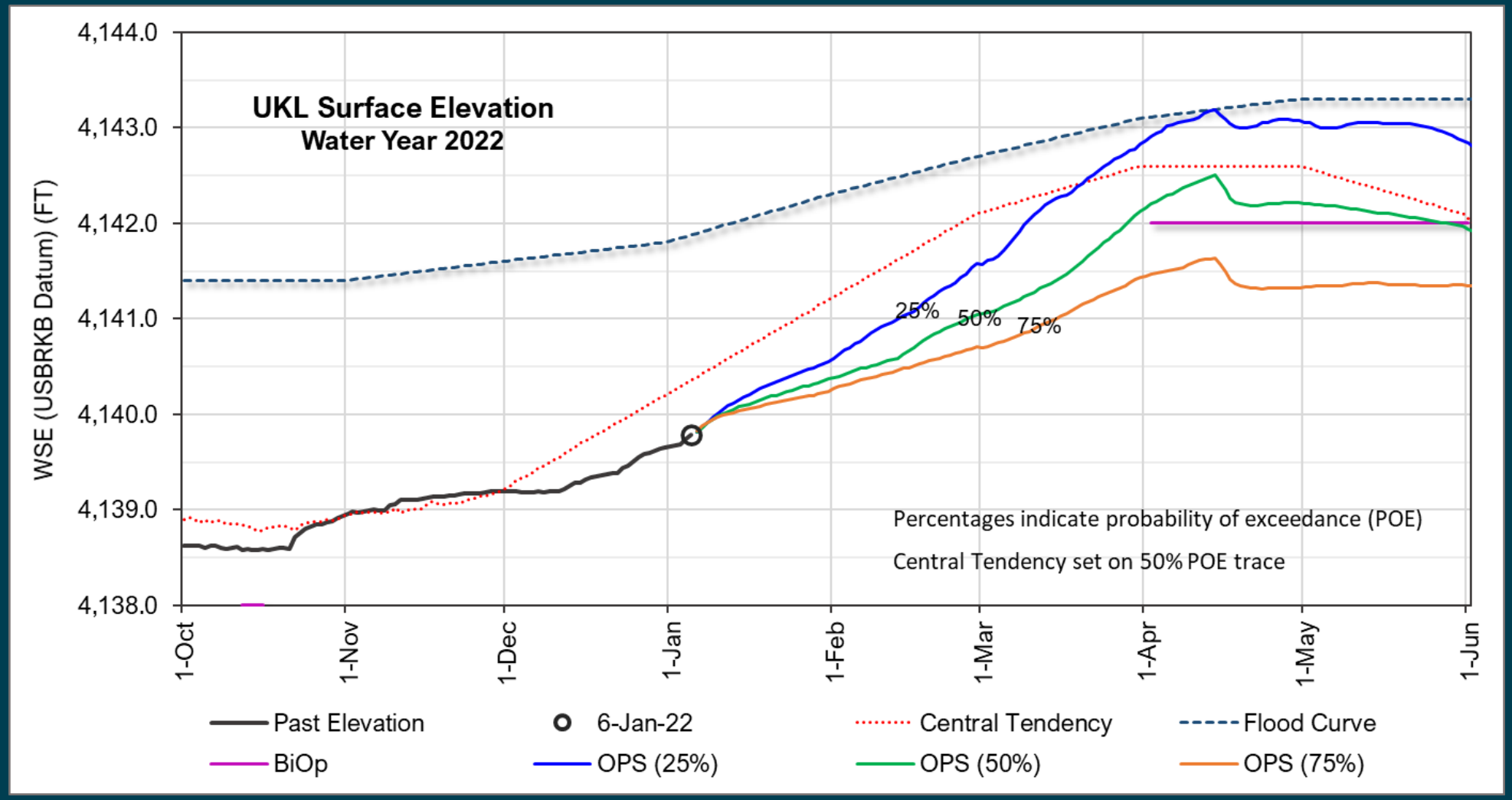
CNRFC 25%	
2022 proj EOF elev (FT)	4141.87
2022 proj Prj Supp (TAF)	265
2022 proj EWA (TAF)	518
2022 proj min elev (FT)	4138.91
KDD F/W proj total supp (TAF)	20.363
LKNWR F/W proj total supp (TAF)	2.174

CNRFC 50%	
2022 proj EOF elev (FT)	4141.28
2022 proj Prj Supp (TAF)	217
2022 proj EWA (TAF)	407
2022 proj min elev (FT)	4138.17
KDD F/W proj total supp (TAF)	19.483
LKNWR F/W proj total supp (TAF)	1.886

CNRFC 75%	
2022 proj EOF elev (FT)	4141.01
2022 proj Prj Supp (TAF)	131
2022 proj EWA (TAF)	407
2022 proj min elev (FT)	4138.20
KDD F/W proj total supp (TAF)	19.483
LKNWR F/W proj total supp (TAF)	1.886

EOF = End-of-February
Prj Supp = Project Supply
EWA = Environmental Water Account
Min elev = Seasonal minimum elevation
F/W = Fall/Winter

Upper Klamath Lake Water Surface Elevation WY2022 - OPS



Upper Klamath Lake Water Surface Elevation WY2022 - OPS

OPS 25%	
2022 proj EOF elev (FT)	4141.58
2022 proj Prj Supp (TAF)	253
2022 proj EWA (TAF)	481
2022 proj min elev (FT)	4138.79
KDD F/W proj total supp (TAF)	19.483
LKNWR F/W proj total supp (TAF)	1.886

OPS 50%	
2022 proj EOF elev (FT)	4141.04
2022 proj Prj Supp (TAF)	168
2022 proj EWA (TAF)	407
2022 proj min elev (FT)	4138.41
KDD F/W proj total supp (TAF)	19.483
LKNWR F/W proj total supp (TAF)	1.886

OPS 75%	
2022 proj EOF elev (FT)	4140.71
2022 proj Prj Supp (TAF)	106
2022 proj EWA (TAF)	407
2022 proj min elev (FT)	4137.86
KDD F/W proj total supp (TAF)	19.483
LKNWR F/W proj total supp (TAF)	1.886

EOF = End-of-February
Prj Supp = Project Supply
EWA = Environmental Water Account
Min elev = Seasonal minimum elevation
F/W = Fall/Winter

Assumptions

- UKL Net Inflow (UKLNI) Projections
- Ensemble traces based on period-of-record (POR) water year (WY) analogs
  - Selected WYs based on:
    - Distribution pattern & volume
    - La Niña/El Niño index forecasts (Oregon Department of Agriculture)
    - Streamflow forecasts (California-Nevada River Forecast Center (CNRFC))
    - Antecedent/current hydrologic conditions
    - In-house observations & analyses
- Traces categorized into 25%/30%, 50%, 70%/75%, probability of exceedance (POE) levels
- Current hydrologic conditions inform short-range (<2 week) UKLNI projection
- Current meteorological forecasts inform short-range UKLNI projection

Assumptions cont.

- <u>Accretions</u>
- *Lost River:* set to 0% contribution to Klamath River → Iron Gate Dam flows
- *Lake Ewauna:* volume & pattern set to historical percentile -or- WY analog; downscaled to account for Lost River
- *F/FF Pumping Plant:* volume & pattern set to historical percentile -or- analog WY
- *Keno-Iron Gate:* volume & pattern set to multi-model forecast through March 2022, then set to historical percentile -or- WY analog through September 2022

Assumptions cont.

- 2022 Spring/Summer (March 2022 – September 2022)
- Project Supply
  - Allocation calculation in accordance with current BiOp policy
  - NRCS UKLNI Mar-Sep 2022 volumetric forecast applied for NRCS ensemble
  - CNRFC KLAO3 UKLNI Mar-Sep 2022 volumetric forecast applied for CNRFC ensemble
  - KBAO Water Ops UKLNI Mar-Sep 2022 volumetric forecast applied for OPS ensemble

Assumptions cont.

- Simulated Project Supply and EWA allocations computed on *March 1 only*
- Simulated end-of-season minimum elevation reflects full utilization of computed Project Supply and EWA (including augmentation when set by allocation logic)
- Surface flushing flows are set and triggered in accordance with current BiOp policy
  - If set, trigger date = April 15
  - Flow rate = 6030 CFS, 3 days continuous, followed by BiOp ramp down rates -OR- maximum Link release capacity, 3 days continuous, followed by BiOp ramp down rates

Assumptions cont.

- 2021-2022 Fall/Winter (Nov 2021 – Feb 2022) Deliveries & Demand
- KDD
  - KDD diversion rates in compliance with/do not exceed Central Tendency (CT)-controlled reductions
  - Daily distribution proportions reflect historical diversion patterns

- LKNWR
  - LKNWR diversion rates in compliance with/do not exceed CT-controlled reductions
  - Daily distribution proportion forced to CT-controlled maxima

Thank You