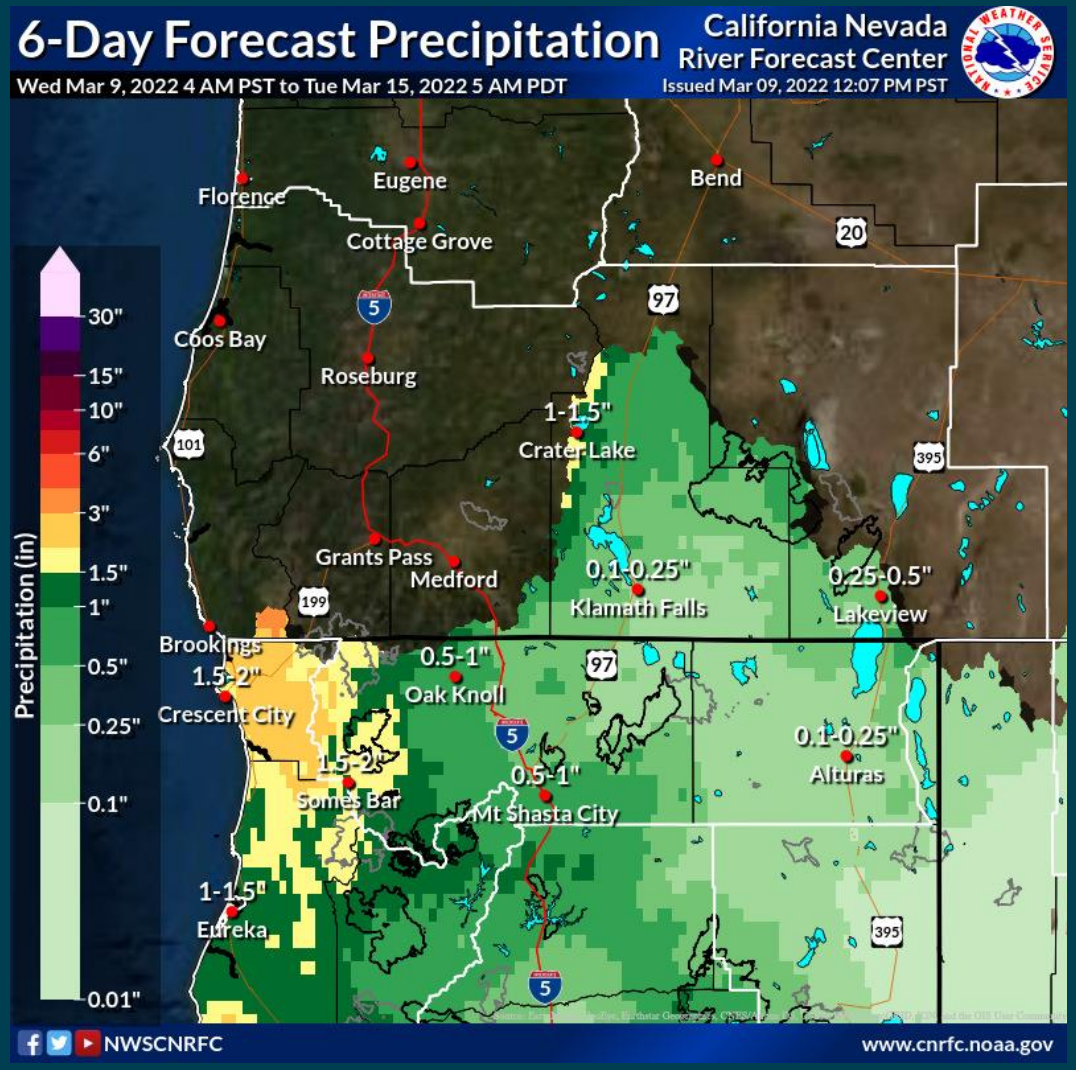
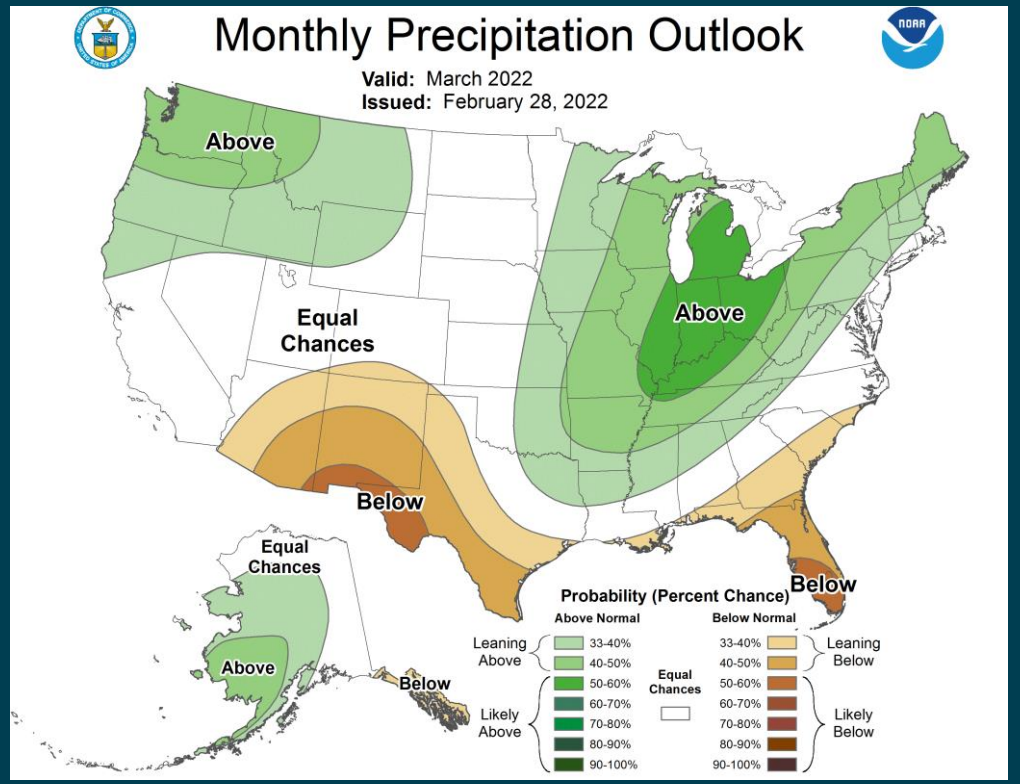
BUREAU OF RECLAMATION

Klamath River Basin Hydrologic Update

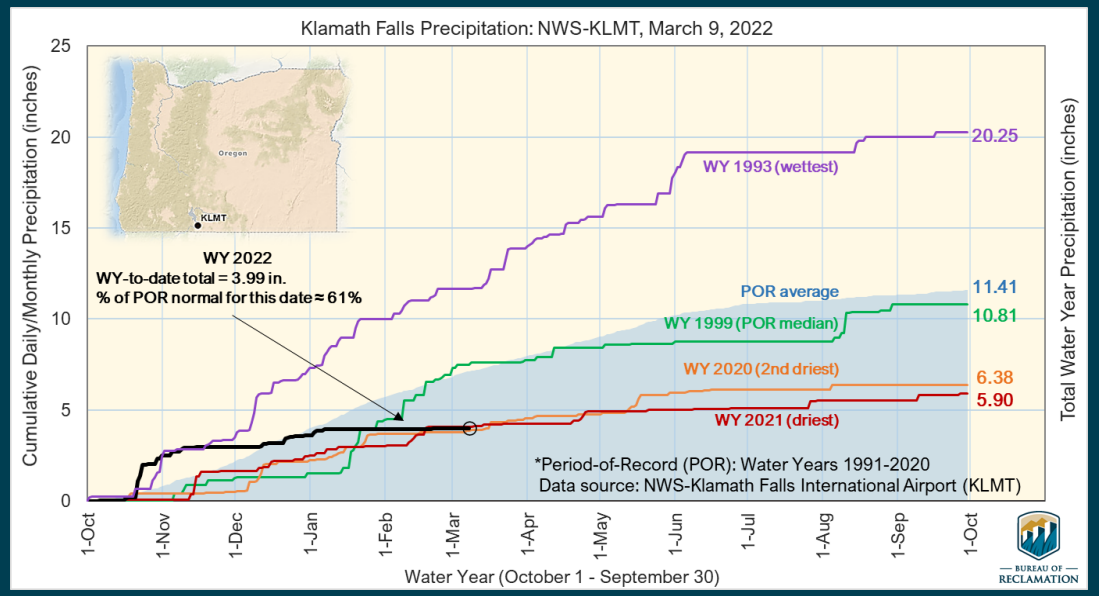
March 10, 2022

Current Conditions





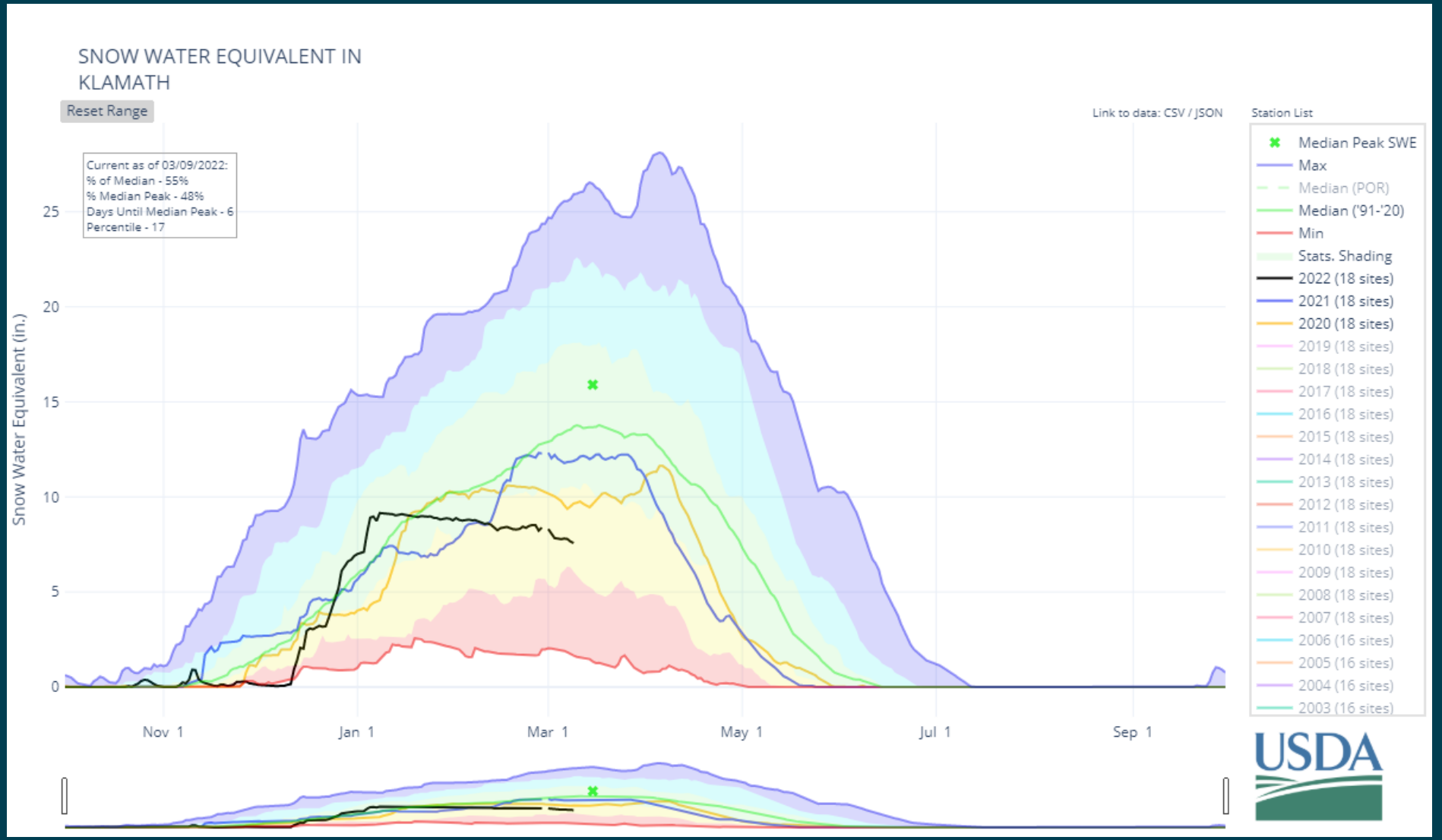
NWS Klamath Falls Airport Met Station WY 2022



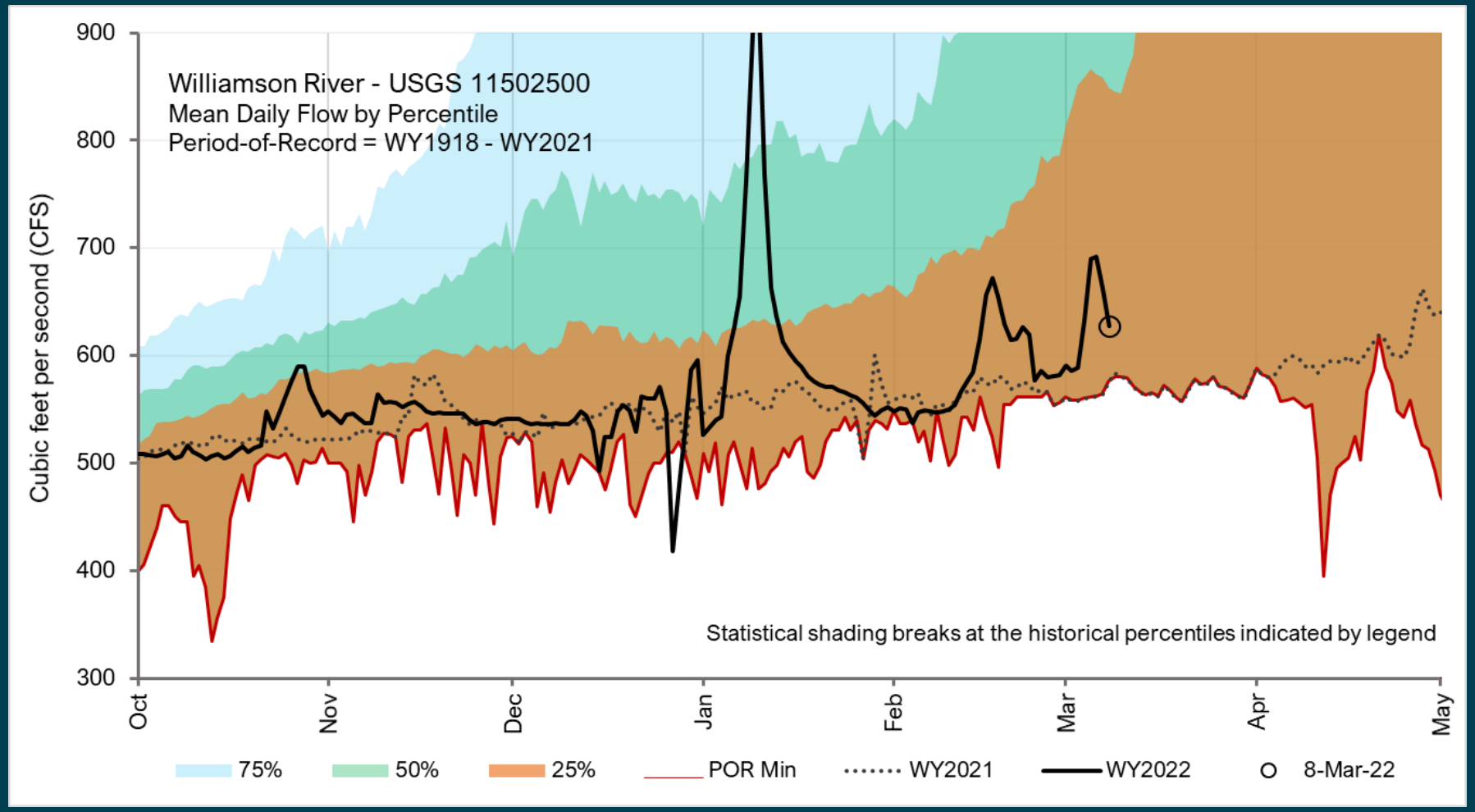
Water Year: 2022, Unit: Inches

Month	Monthly Total	Monthly Departure	Monthly Normal	% Monthly Normal	WY Total	WY Departure	WY Normal	% Water Year Normal
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%
Jan	0.34	-1.17	1.51	23%	3.94	-1.49	5.43	73%
Feb	0.05	-0.8	0.85	6%	3.99	-2.29	6.28	64%
As of 9 March	0	-0.29	0.23	0%	3.99	-2.58	6.57	61%

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)
2021	378.245
2022	379.765
1992	392.967
1994	425.479
1991	430.179
2020	432.436
2014	440.883
2005	446.384
2018	450.647
1993	451.66
2019	466.749
2010	471.719
2012	484.916
2013	502.148
2001	502.754
2008	505.958
1990	515.969
2003	518.219
2009	519.38
1989	526.7
1995	532.213

WY	Cumulative UKL Net Inflow (TAF)
2015	533.586
2004	536.167
1981	543.428
2016	4545.108
2007	581.73
2002	583.544
2011	591.689
1988	598.546
1987	622.941
2017	678.744
2000	726.338
1998	733.562
1985	755.453
1999	797.011
1983	821.452
2006	850.262
1984	884.984
1986	894.59
1996	917.094
1982	1024.639
1997	1091.713

WY 2022 % of POR median ≈ 71%

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

USDA NRCS National Water & Climate Center

- - DATA CURRENT AS OF: March 02, 2022 09:00:27 PM
- - Based on March 03, 2022 forecast values

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.

KLAMATH RIVER BASIN

Forecast Point	Period	50% (KAF)	% of Med	Max (KAF)	30% (KAF)	70% (KAF)	Min (KAF)	30-Year Med
Gerber Reservoir Inflow (2)	MAR-JUN	16.4	92	33	23	9.5	-0.53	17.8
Sprague R nr Chiloquin	MAR-SEP	150	70	225	179	123	89	215
Sprague R nr Chiloquin	APR-SEP	117	74	184	142	94	64	159
Williamson R bl Sprague R nr Chiloquin	MAR-SEP	295	82	395	335	255	198	360
Williamson R bl Sprague R nr Chiloquin	APR-SEP	235	82	325	270	200	147	285
Upper Klamath Lake Inflow (2)	MAR-SEP	405	78	580	455	355	260	520
Upper Klamath Lake Inflow (2)	APR-SEP	290	79	445	335	250	168	365
Clear Lake Inflow (2)	MAR-JUN	5.5	43	42	20	-9.4	-31	12.8

Footnotes:

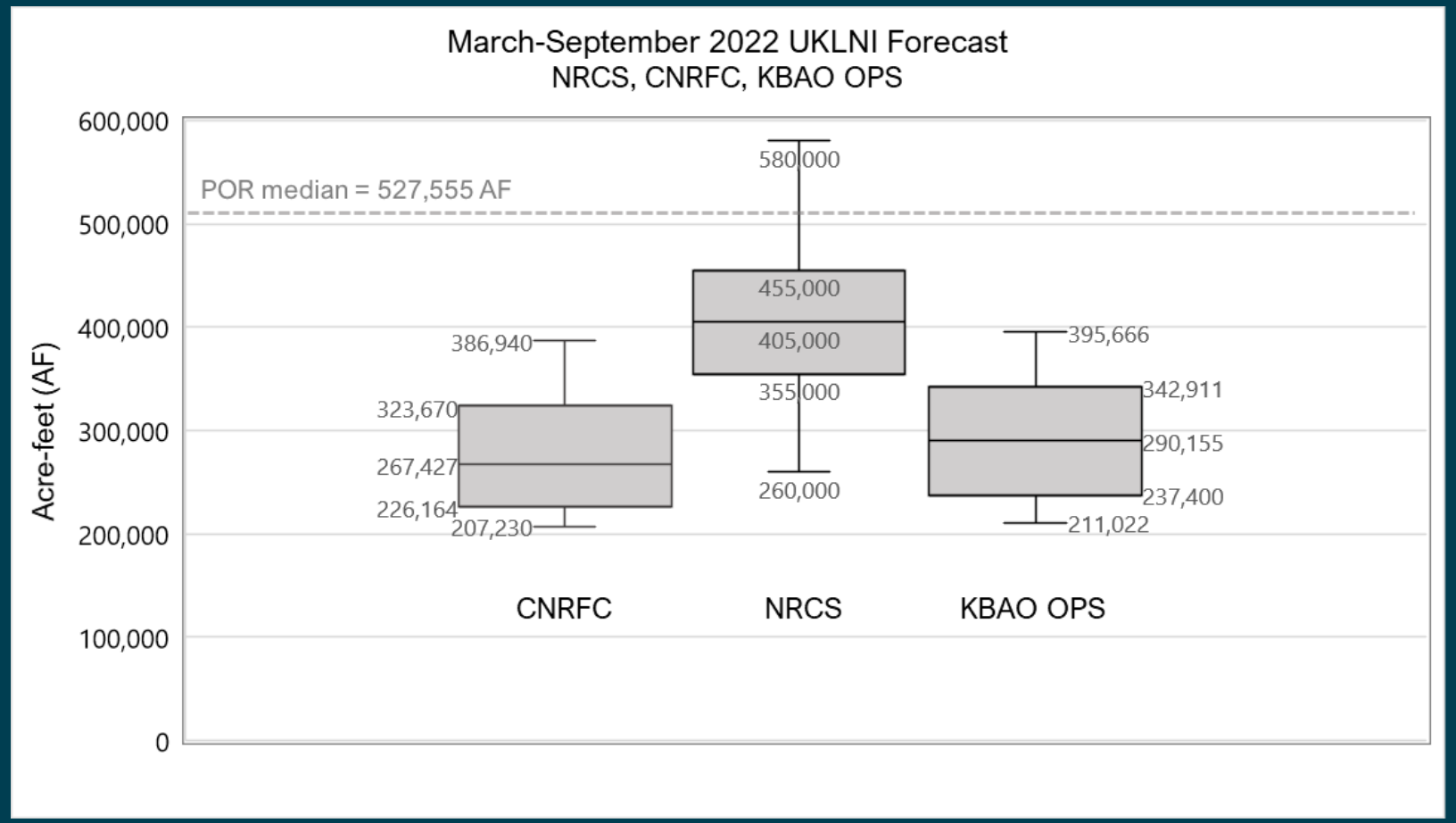
1) Max and Min are 5% and 95% chance that actual volume will exceed forecast

2) Streamflow is adjusted for upstream storage

Forecasts are provisional and subject to revision based on hydrologic conditions

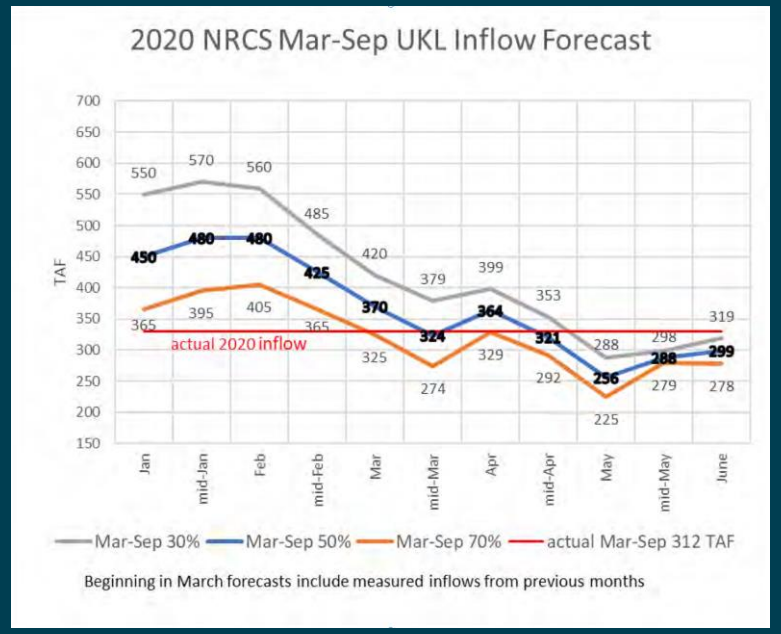
POR = Water Years 1991 -2020

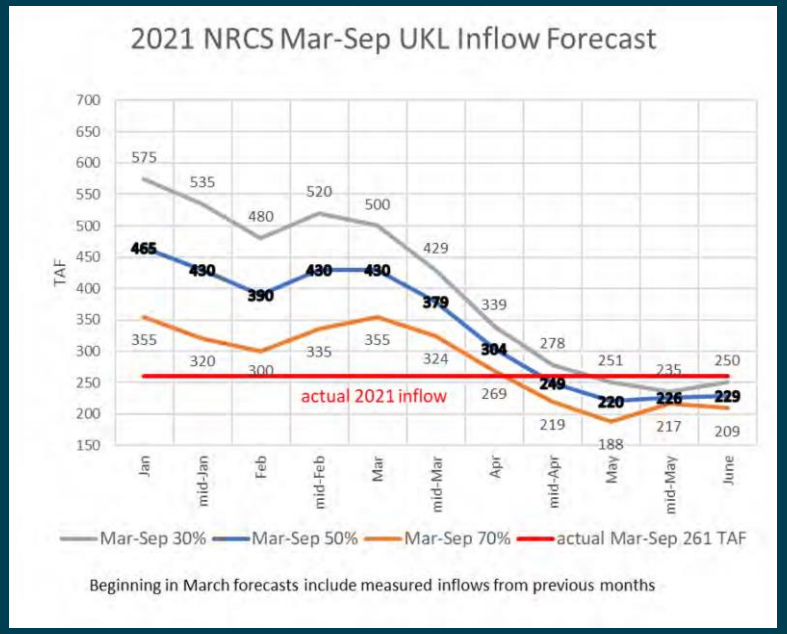
WY 2022 UKL Net Inflow Forecast March – September 2022

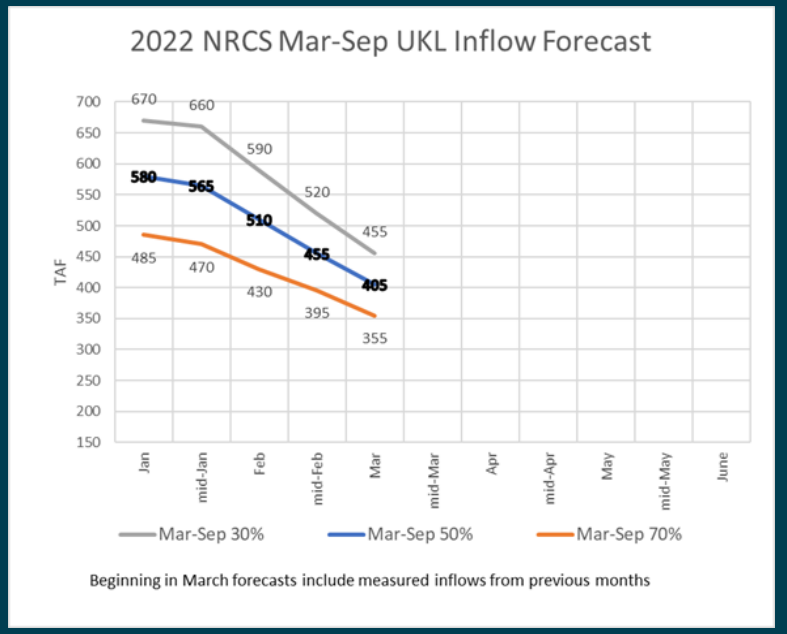


Forecasts are provisional and subject to revision based on hydrologic conditions POR median relative to water years 1981-2021

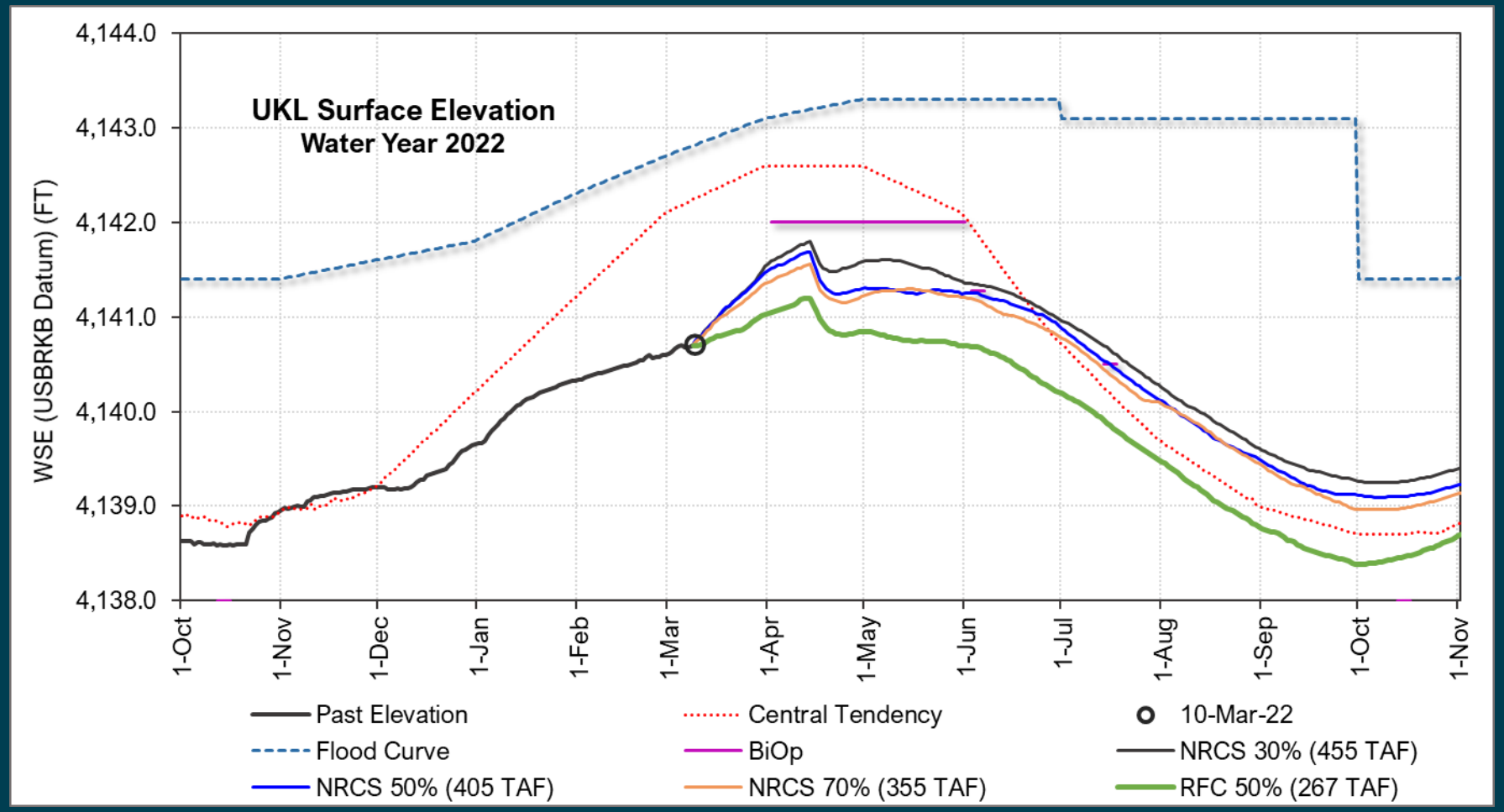
NRCS UKL Net Inflow Projections (2020-2022)







Upper Klamath Lake Water Surface Elevation WY2022 - Flushing flow and project supply



Upper Klamath Lake Water Surface Elevation WY2022 - Flushing flow and project supply

NRC 30%	Amount
2022 proj EOF elev (FT)	4140.6
2022 proj UKL Supp (TAF)	581
2022 proj Prj Supp (TAF)	144
2022 proj EWA (TAF)	407
EWA Augmentation (TAF)	40
2022 proj min elev (FT)	4139.25
Flushing flow peak (CFS)	5,700

NRC 50%	Amount
2022 proj EOF elev (FT)	4140.60
2022 proj UKL Supp (TAF)	533
2022 proj Prj Supp (TAF)	119
2022 proj EWA (TAF)	407
EWA Augmentation (TAF)	0
2022 proj min elev (FT)	4139.09
Flushing flow peak (CFS)	5,150

CNRFC 50%	Amount
2022 proj EOF elev (FT)	4140.60
2022 proj UKL Supp (TAF)	403
2022 proj Prj Supp (TAF)	50
2022 proj EWA (TAF)	407
EWA Augmentation (TAF)	0
2022 proj min elev (FT)	4138.39
Flushing flow peak (CFS)	4,700

NRC 70%	Amount
2022 proj EOF elev (FT)	4140.60
2022 proj UKL Supp (TAF)	486
2022 proj Prj Supp (TAF)	72
2022 proj EWA (TAF)	407
EWA Augmentation (TAF)	0
2022 proj min elev (FT)	4138.96
Flushing flow peak (CFS)	5,000

EOF = End-of-February

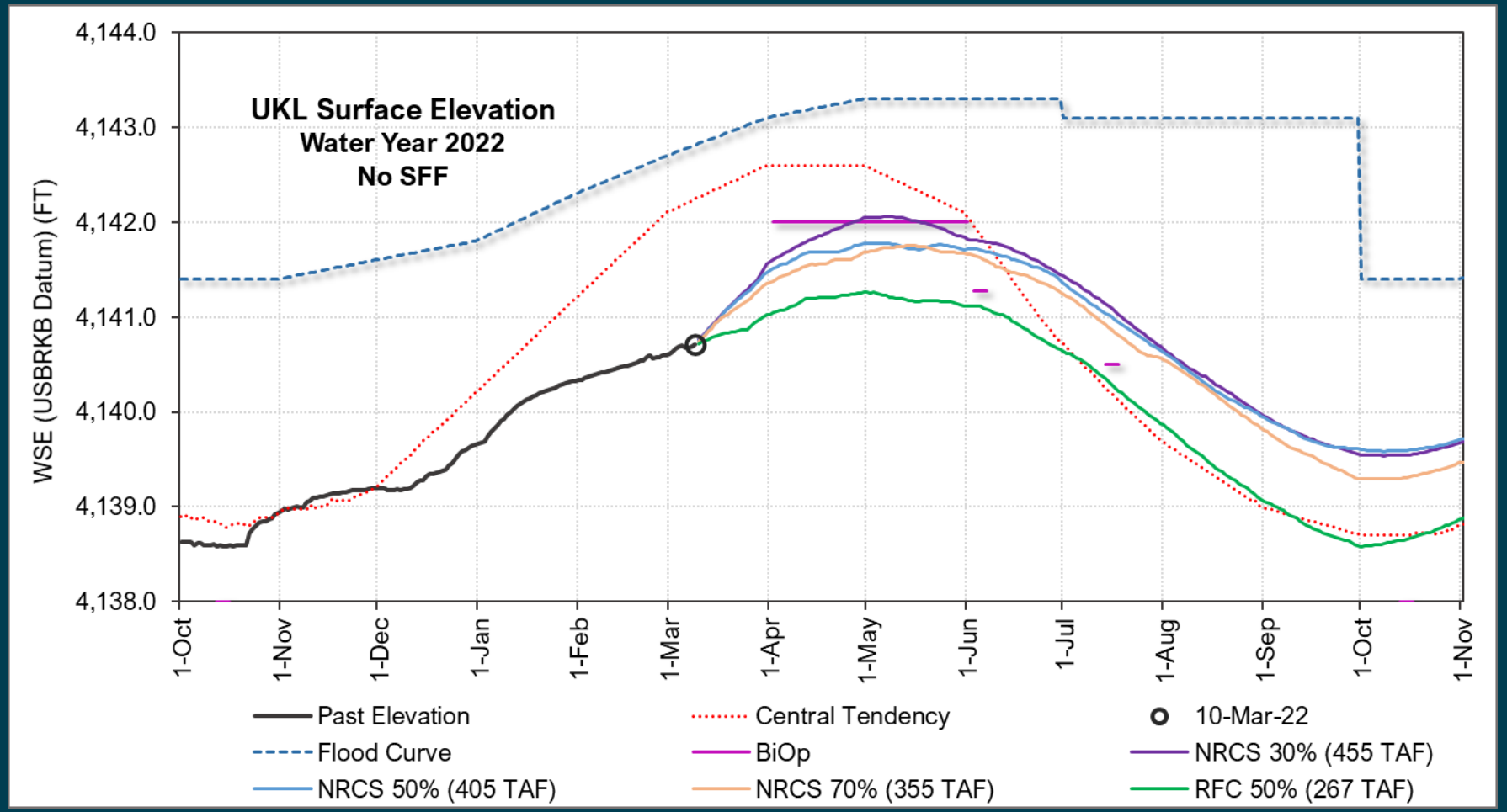
Prj Supp = Project Supply

EWA = Environmental Water Account

Min elev = Seasonal minimum elevation

F/W = Fall/Winter

Upper Klamath Lake Water Surface Elevation WY2022 - Project supply but no flushing flow



Upper Klamath Lake Water Surface Elevation WY2022 - Project supply but no flushing flow

NRC 30%	Amount
2022 proj EOF elev (FT)	4140.6
2022 proj UKL Supp (TAF)	581
2022 proj Prj Supp (TAF)	144
2022 proj EWA (TAF)	407
EWA Augmentation (TAF)	40
2022 proj min elev (FT)	4139.53
Flushing flow peak (CFS)	0

NRC 50%	Amount
2022 proj EOF elev (FT)	4140.60
2022 proj UKL Supp (TAF)	533
2022 proj Prj Supp (TAF)	119
2022 proj EWA (TAF)	407
EWA Augmentation (TAF)	0
2022 proj min elev (FT)	4139.58
Flushing flow peak (CFS)	0

NRC 70%	Amount
2022 proj EOF elev (FT)	4140.60
2022 proj UKL Supp (TAF)	486
2022 proj Prj Supp (TAF)	72
2022 proj EWA (TAF)	407
EWA Augmentation (TAF)	0
2022 proj min elev (FT)	4139.29
Flushing flow peak (CFS)	0

CNRFC 50%	Amount
2022 proj EOF elev (FT)	4140.60
2022 proj UKL Supp (TAF)	403
2022 proj Prj Supp (TAF)	50
2022 proj EWA (TAF)	407
EWA Augmentation (TAF)	0
2022 proj min elev (FT)	4138.58
Flushing flow peak (CFS)	0

EOF = End-of-February

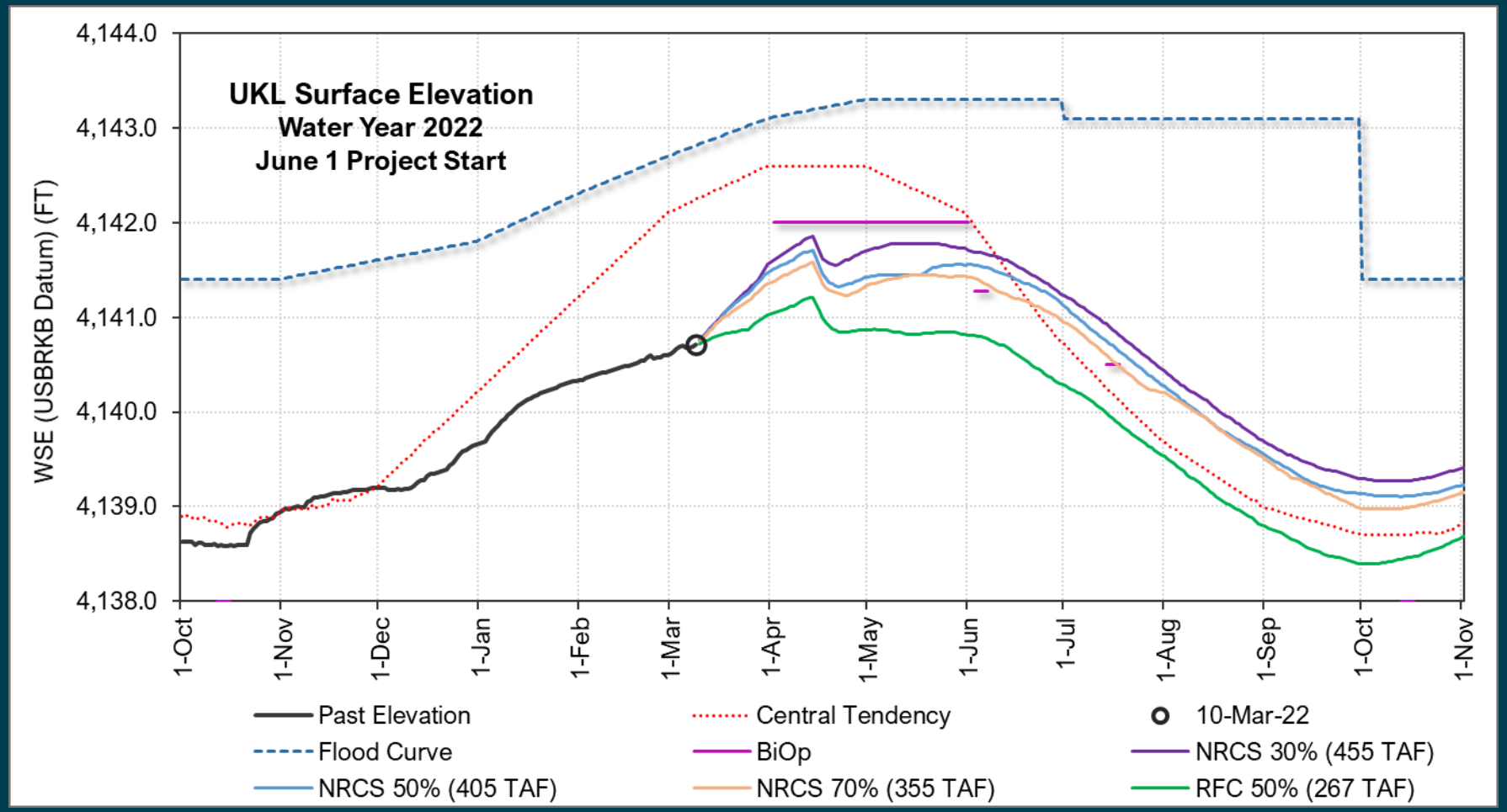
Prj Supp = Project Supply

EWA = Environmental Water Account

Min elev = Seasonal minimum elevation

F/W = Fall/Winter

Upper Klamath Lake Water Surface Elevation WY2022 - Flushing flow and delayed project



Upper Klamath Lake Water Surface Elevation WY2022 - Flushing flow and delayed project

NRC 30%	Amount
2022 proj EOF elev (FT)	4140.6
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2022 proj Prj Supp (TAF)	119
2022 proj EWA (TAF)	407
EWA Augmentation (TAF)	0
2022 proj min elev (FT)	4139.10
Flushing flow peak (CFS)	5,150

CNRFC 50%	Amount
2022 proj EOF elev (FT)	4140.60
2022 proj UKL Supp (TAF)	403
2022 proj Prj Supp (TAF)	50
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EWA Augmentation (TAF)	0
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NRC 70%	Amount
2022 proj EOF elev (FT)	4140.60
2022 proj UKL Supp (TAF)	486
2022 proj Prj Supp (TAF)	72
2022 proj EWA (TAF)	407
EWA Augmentation (TAF)	0
2022 proj min elev (FT)	4138.98
Flushing flow peak (CFS)	5,000

EOF = End-of-February

Prj Supp = Project Supply

EWA = Environmental Water Account

Min elev = Seasonal minimum elevation

F/W = Fall/Winter

Assumptions (page 1 of 5)

- Scenarios not fully finalized
  - Example: Project diversion total set, but daily volumes may vary
- 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 (page 2 of 5)

- Accretions
  - *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 (page 3 of 5)

- 2022 Spring/Summer (March 2022–September 2022)
  - Flushing flow and project supply varied as stated on slides
  - Flow augmentation triggers
    - 40 TAF when UKL supply 550 TAF or greater
    - Up to 20 TAF additional when UKL supply 625 TAF or greater
  - Surface flushing flows are set and triggered in accordance with current BiOp policy
    - If set, trigger date = April 15
    - Flow rate = maximum Link release capacity, 3 days continuous, followed by BiOp ramp down rates

Assumptions (page 4 of 5)

- Simulated Project Supply and EWA allocations computed on March 9 only
- Simulated end-of-season minimum elevation reflects full utilization of computed Project Supply and EWA (including augmentation when set by allocation logic)

Assumptions (page 5 of 5)

- 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