BUREAU OF RECLAMATION

Sacramento River Temperature Task Group Meeting Packet

May 30, 2024

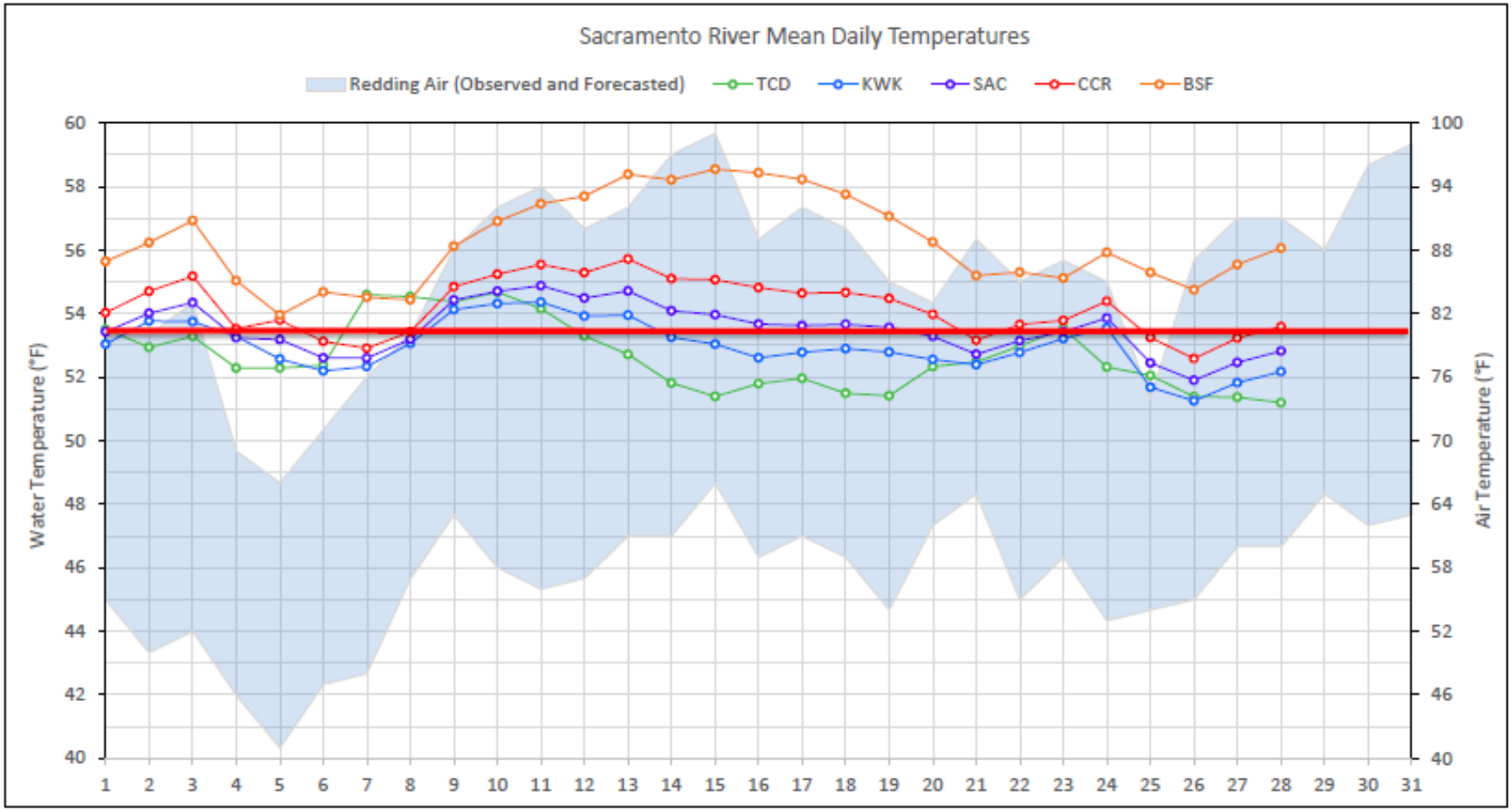
Sacramento River Station Temperature Summary Report

Date	MDWT TCD[1]	MDWT SHD	MDWT SPP[1]	MDWT KWK	MDWT SAC[2]	MDWT CCR	MDWT BSF	MDWT BND	MDWT RBD	MDWT IGO	MDWT LWS	MDWT DGC[3]	MDWT NFH	MDR Shasta Genera-tion	MDR Spring Creek PP	MDR Keswick Total	MDAT RDD	MDAT BSF	MDAT RDB
Apr	51.7	50.5	48.0	51.4	51.8	52.4	53.9	55.0	56.0	52.0	51.2	49.9	50.7	7319	76	7221	62.2	58.4	59.9
05/01	53.5	52.2	48.1	53.0	53.4	54.0	55.6	56.8	57.9	52.4	C	48.1	C	5956	44	6045	67.5	62.4	64.6
05/02	52.9	52.4 A	48.1	53.8	54.0	54.7	56.2	57.4	58.5	52.4	C	48.5	C	6282	44	6107	65.0	60.4	64.8
05/03	53.3	52.3 A	48.2	53.7	54.3	55.2	56.9	57.9	59.1	53.0	C	48.6	C	6069	44	6122	67.5	61.8	65.2
05/04	52.3	50.6	48.1	53.3	53.2	53.5	55.0	56.7	58.1	51.7	C	48.1	C	6058	44	6203	57.5	52.1	53.4
05/05	52.3	51.2	48.1	52.6	53.2	53.8	54.0	53.9	54.7	51.4	C	47.6	C	5539	44	6104	53.5	51.0	52.4
05/06	52.4	51.5 A	48.2	52.2	52.6	53.1	54.7	55.7	56.8	51.7	C	47.4	C	5538	44	5939	59.0	56.3	57.8
05/07	54.6	51.9	48.3	52.3	52.6	52.9	54.5	55.6	56.9	52.5	C	48.0	C	8521	44	10944	62.0	58.5	61.1
05/08	54.5	52.7	48.4	53.1	53.2	53.4	54.4	55.2	56.3	52.8	C	48.4	C	10748	44	10991	68.5	65.3	66.7
05/09	54.4	53.0	48.4	54.1	54.4	54.8	56.1 A	56.7	57.5	53.6 A	C	48.9	C	11415	44	11009	75.5	70.0	70.0
05/10	54.7	53.3	49.9	54.3	54.7	55.2 A	56.9	57.9	59.2	54.1	C	49.5	C	11643	105	10848	86.0	70.7	73.2
05/11	54.2	52.7	50.5	54.4	54.9	55.5	57.5	58.6	60.0	54.4	C	49.6	C	10419	210	9485	87.5	70.9	73.6
05/12	53.3	51.6	48.8	53.9	54.5	55.3	57.7	59.3	61.1	54.7	C	49.8	C	8774	44	8351	73.5	71.3	72.7
05/13	52.7	50.7	48.6	53.9 A	54.7	55.7	58.4	60.2	61.9	54.8	C	50.0	C	7832	44	7174	76.5	73.2	74.0
05/14	51.8	50.8 A	48.6	53.3 A	54.1	55.1	58.2	60.6	62.7	54.8	C	50.1	C	6484	44	6304	79.0	74.0	75.3
05/15	51.4	51.0 A	51.1	53.0	54.0	55.1	58.5	61.0	62.9	55.0	C	50.3	C	5466	730	6152	82.5	75.6	76.8
05/16	51.8	51.0 A	50.9	52.6	53.7	54.8	58.4	61.1	63.1	54.5	C	50.6	C	5524	328	6193	74.0	70.5	71.2
05/17	52.0	51.1 A	50.4	52.8 A	53.6	54.6	58.2	61.0	63.1	53.5	C	50.5	C	6236	130	6219	76.5	73.4	73.5
05/18	51.5	50.2 A	48.8	52.9	53.7	54.7	57.8	60.4	62.8	52.4	C	50.7	C	4919	44	6397	74.5	71.4	73.1
05/19	51.4	50.3 A	50.9	52.8	53.6	54.5	57.1	59.4	61.7	52.1	C	50.1	C	5093	269	6385	69.5	67.8	70.3
05/20	52.3	50.9 A	49.3	52.6	53.3	54.0	56.3	58.2	60.0	52.1	C	50.2	C	6970	49	6425	72.5	68.8	70.4
05/21	52.5	51.4	48.9	52.4	52.7	53.2	55.2	57.1	59.0	52.7	C	50.2	C	11873	44	12017	77.0	69.3	72.7
05/22	53.0	51.6	51.1	52.8	53.1	53.7	55.3	56.4	57.8	53.5	C	50.1	C	12851	245	12185	71.5	68.7	72.4
05/23	53.5	52.2	51.0	53.2	53.4	53.8	55.1	56.2	57.7	53.6	48.2	50.1	C	12566	187	11876	73.0	69.9	70.0

Date	MDWT TCD[1]	MDWT SHD	MDWT SPP[1]	MDWT KWK	MDWT SAC[2]	MDWT CCR	MDWT BSF	MDWT BND	MDWT RBD	MDWT IGO	MDWT LWS	MDWT DGC[3]	MDWT NFH	MDR Shasta Genera-tion	MDR Spring Creek PP	MDR Keswick Total	MDAT RDD	MDAT BSF	MDAT RDB
05/24	52.3	50.9	49.3	53.6	53.9	54.4	55.9	56.9	58.2	53.9	48.0	50.4	C	11893	47	11976	69.0	65.2	65.9
05/25	52.0	49.8 A	51.8	51.7	52.4	53.2	55.3	56.6	58.2	53.5	48.0	50.3	C	8672	253	10316	64.0	61.7	60.8
05/26	51.4	50.3	51.4	51.3	51.9	52.6	54.8	56.3	58.0	54.3	48.2	50.7	C	8925	320	8887	71.0	67.6	68.4
05/27	51.4	50.5 A	51.7	51.8	52.5	53.2	55.5	57.3	59.2	54.8	48.2	51.0	C	9457	551	8640	75.5	70.8	71.6
05/28	51.2	50.3 A	52.1	52.2	52.8	53.6	56.1	58.1	60.1	55.0	48.0	50.9	C	8198	813	8716	75.5	72.3	73.1
May	52.7	51.4	49.6	53.0	53.5	54.2	56.3	57.8	59.4	53.4	48.1	49.6	N/A	8211	173	8358	71.6	66.8	68.4
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Total CFS	229921	4853	234010	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Total AF	456039	9626	464149	N/A	N/A	N/A

Legend
A = 1-9 hours of data missing (Average includes estimations)
B = 10 or more hours of data missing (Average not calculated)
C = Station out of service
D = Record high air temperature
E = Record low air temperature
MDWT = Mean Daily Water Temperature (Fahrenheit)
MDR = Mean Daily Release (CFS)
MDAT = Mean Daily Air Temperatures (Fahrenheit)

Notes
1 Temperatures are weighted averages based on individual penstock flow and temperature
X Highlighted cells in the TCD column indicate a TCD change was made on that day
2 Current Sacramento River control point (see page 4 for more details)
3 Data is currently being collected locally and periodically downloaded.
Once downloaded and certified by USGS, missing data will be added.



Sacramento River Mean Daily Temperatures

This figure shows mean Sacramento River daily temperatures in degrees Fahrenheit at Shasta Power Plant and various stations 0.8, 4.8, 9.7, and 25 miles downstream of Keswick Dam for the past 28 days. It also includes a shaded area depicting observed and forecasted air temperatures in degrees Fahrenheit in Redding California.

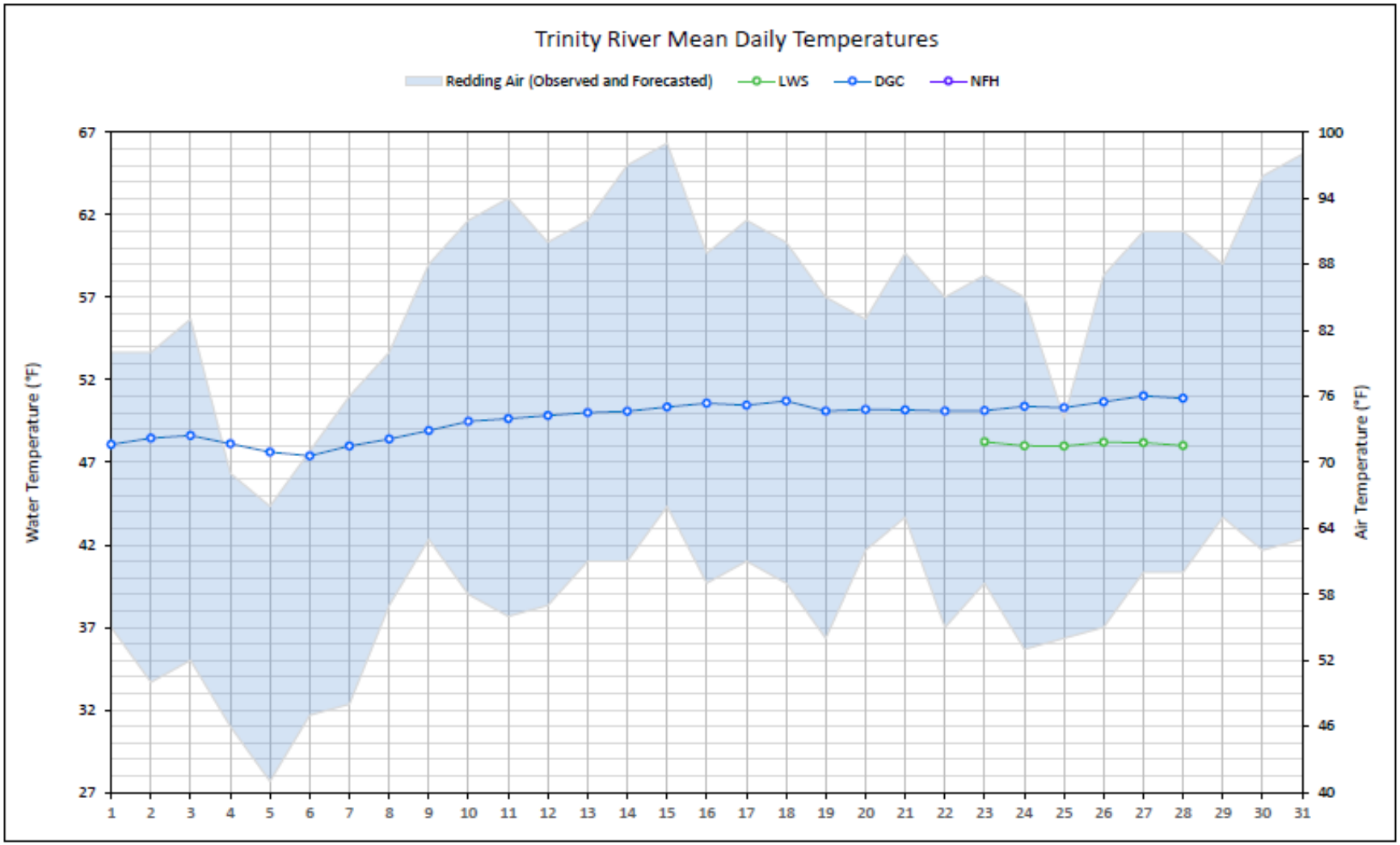
Station Details

Code	Body of Water	Location[1]
TCD	N/A	Shasta Power Plant
SHD	Sacramento River	0.3 miles downstream of Shasta Power Plant
SPP	N/A	Spring Creek Power Plant
KWK	Sacramento River	0.8 miles downstream of Keswick Dam
SAC	Sacramento River	4.8 miles downstream of Keswick Dam
CCR	Sacramento River	9.7 miles downstream of Keswick Dam
BSF	Sacramento River	25 miles downstream of Keswick Dam
JLF	Sacramento River	34 miles downstream of Keswick Dam
BND	Sacramento River	41 miles downstream of Keswick Dam
RDB	Sacramento River	58 miles downstream of Keswick Dam
IGO	Clear Creek	7.3 miles downstream of Whiskeytown Dam

Water Right Temperature Control Points

River	Point	Temp (˚F)	Begin Date	End Date
Sacramento	CCR	53.5	05/14/2023	TBD

Notes: [1] Distances are approximate



Trinity River Mean Daily Temperatures

This figure shows the mean Trinity River daily temperatures in degrees Fahrenheit at stations 1.1, 19, and 38 miles downstream of Lewiston Dam for the past 28 days. It also includes a shaded area depicting observed and forecasted air temperatures in degrees Fahrenheit in Redding California.

Station Details

Code	Body of Water	Location[1]
LWS	Trinity River	1.1 miles downstream of Lewiston Dam
DGC	Trinity River	19 miles downstream of Lewiston Dam
NFH	Trinity River	38 miles downstream of Lewiston Dam

Water Right Temperature Control Points

River	Point	Temp (˚F)	Begin Date	End Date
N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A

Notes: [1] Distances are approximate

Description of SWFSC Temperature-dependent Mortality Modeling Scenarios – May 28, 2024

Total number of scenarios simulated: 4 Model Start Date: May 8, 2024

1. Modeling framework used: "Full" models:

Shasta: CE-QUAL-W2
Keswick: CE-QUAL-W2
Upper Sacramento River: RAFT

Temperature-dependent mortality: Stage independent (Martin et al, 2017)

2. Keswick Release Scenario Assumptions:

Label	Description	Jun	Jul	Aug	Sept	Oct	Nov
Run 1	No pulse	10500	13900	10500	8000	5500	4000
Run 2	Pulse 53.5F at CCR	10500	13900	10500	8000	5500	4000
Run 3	Pulse 56F at BSF	10500	13900	10500	8000	5500	4000
Run 4	Pulse 50% exceedance	9500	12000	10000	8000	6000	4500

3. Hydrology:

All simulations are run with forecasted inflows from the California Nevada River Forecast Center at a 90% (Runs 1—3) or 50% (Run 4) exceedance hydrology.

4. Meteorology:

All simulations are run with the meteorological time series taken from the historical record for year 2016.

5. Inflow temperature:

All simulations are run with the inflow tributary temperatures to Shasta Reservoir from the historical record for year 2016.

6. Initial Shasta conditions:

Variable	Value/Description
Temperature profile date	5/8/2024
Initial storage (TAF)	4388

Variable	Value/Description
Initial storage date	5/8/2024
Initial elevation (ft)	1061
Initial elevation date	7/20/2022

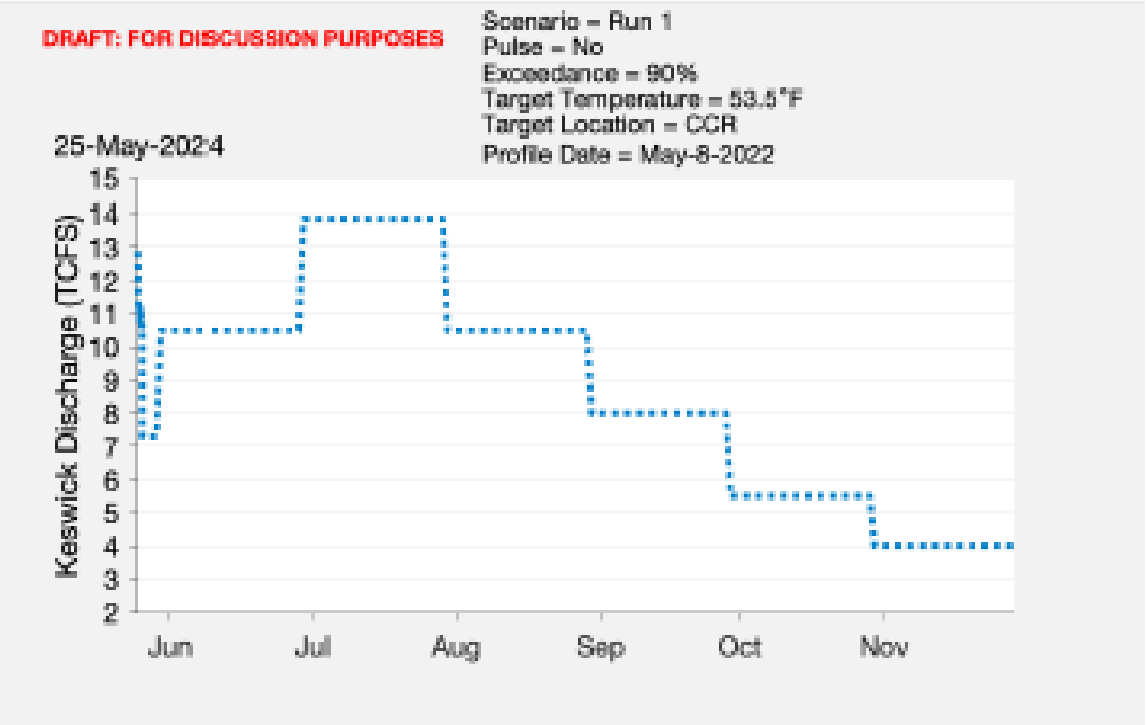
7. Temperature Target (Pattern/shaping) Parameters:

Model runs use all combinations of values given in the table below, along with the 4 release scenarios described in Section 2.

Variable	Value(s)
Target location	CCR and BSF
Target temperature (°C and °F)	(°C) 11.9 & 13.3 (°F) 53.5 & 56
Shoulder temperature (°C and °F)	(°C) NA (°F) 58
Window length (weeks)	NA
Center date	NA
Redd year distribution	aggregate 2016-2022

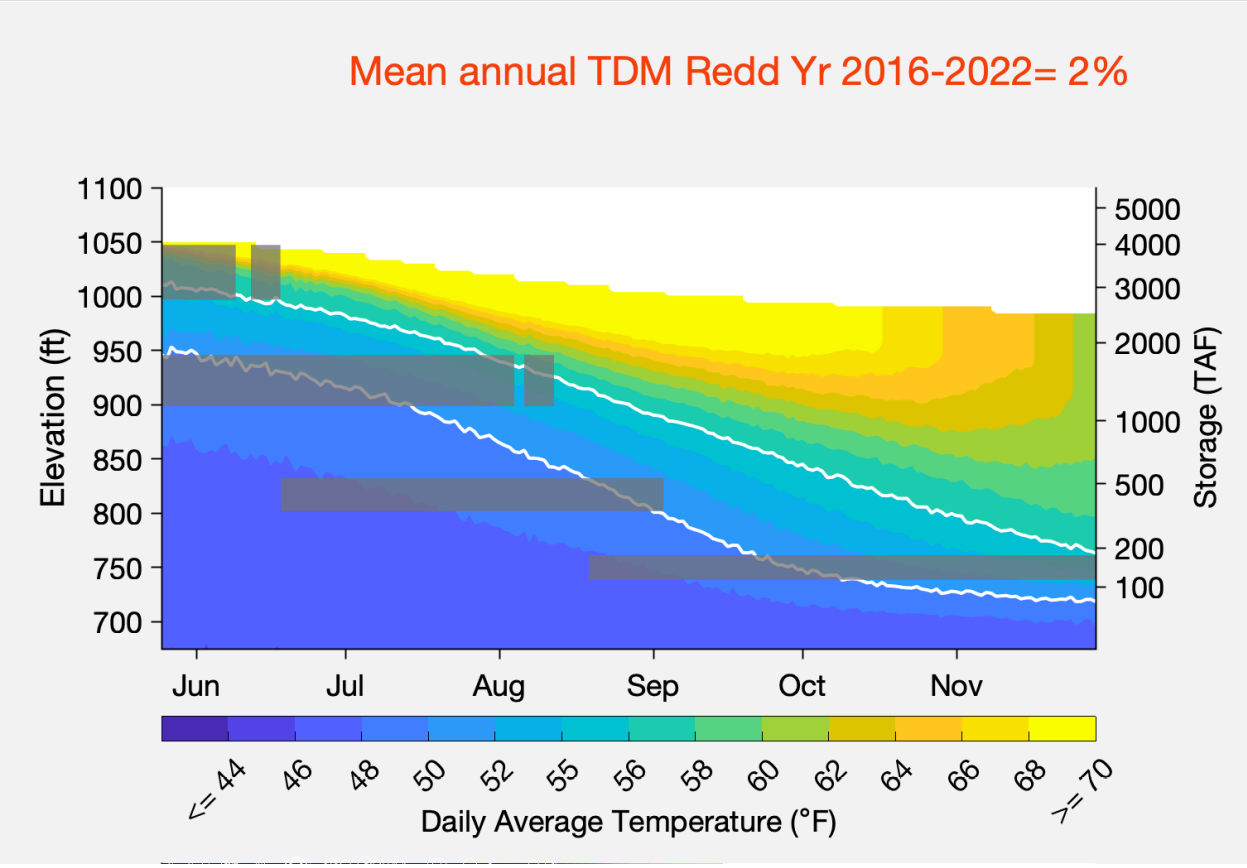
8. Figures:

Run 1: No Pulse



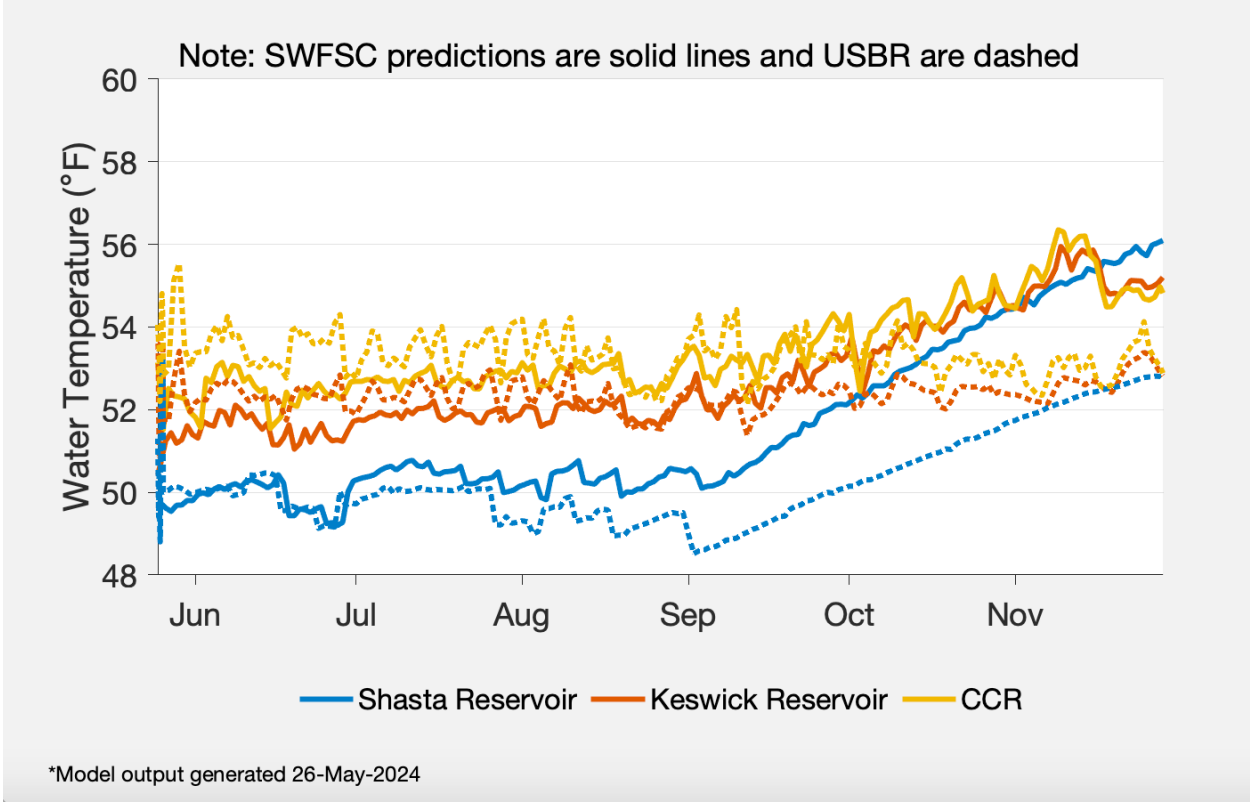
Simulated Timeseries of Keswick Discharge

The figure shows a line graph of simulated Keswick discharge measured in thousands of cfs between the months of June and November.



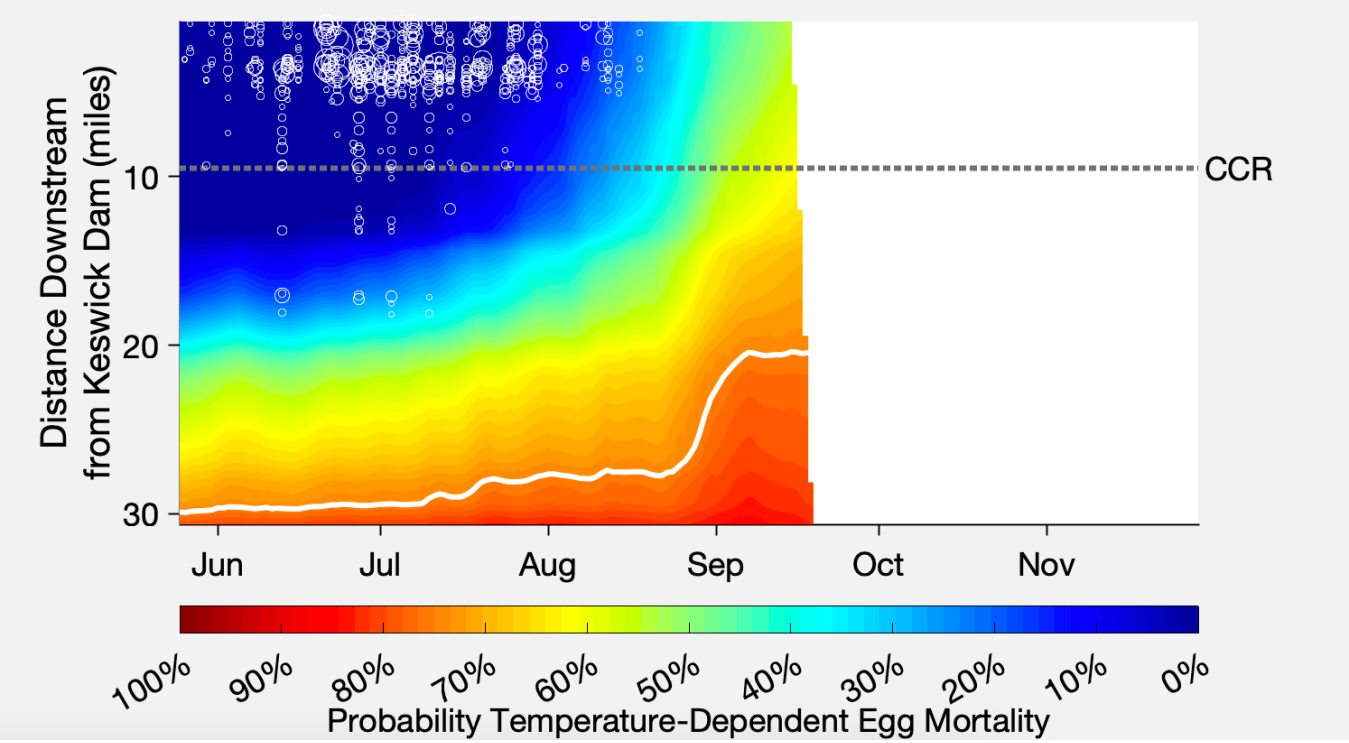
Simulated Shasta Reservoir Water Temperature Profile

This figure shows the simulated Shasta Reservoir water temperature profile and storage levels between June and November. Gray boxes indicate the opening of temperature control device gates. The mean annual Temperature-dependent mortality for redds 2016 – 2022 is 2%.



Simulated Water Temperatures at Shasta Reservoir, Keswick, and CCR

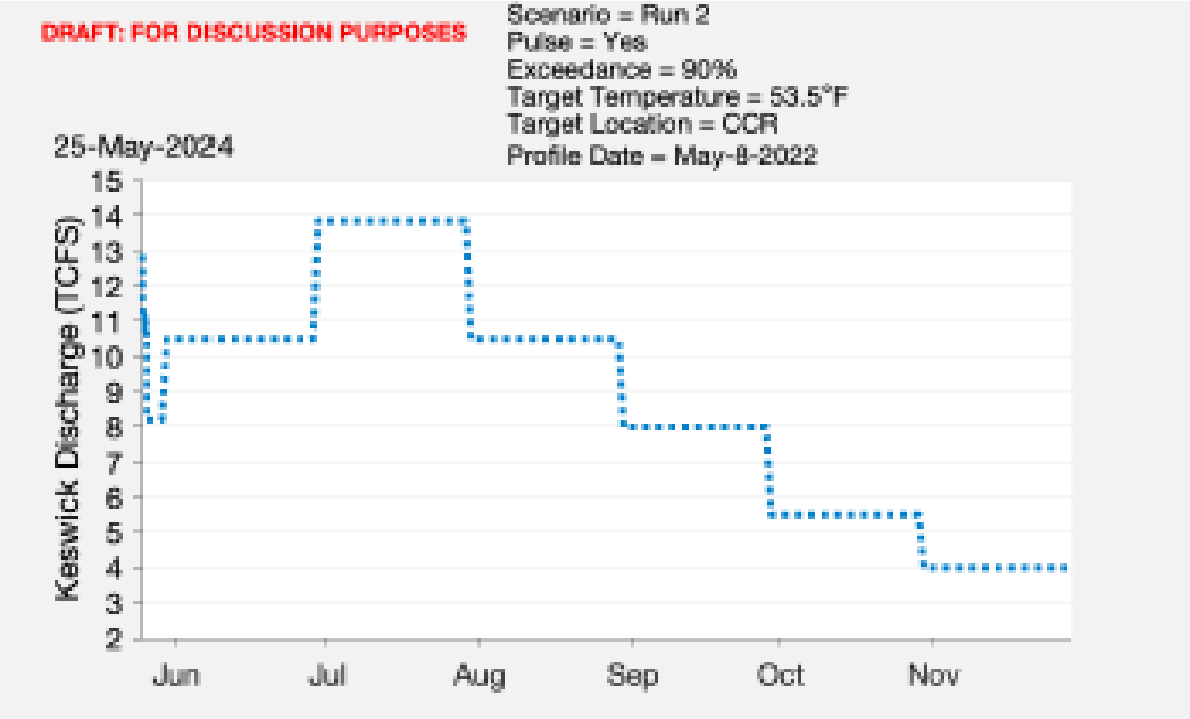
The figure shows simulated water temperatures at Shasta Reservoir, Keswick, and CCR from June to November. Solid lines depict Southwest Fisheries Science Center model predictions and dashed lines depict predictions made from Reclamation's HEC5Q models.



Estimated temperature-dependent egg mortality

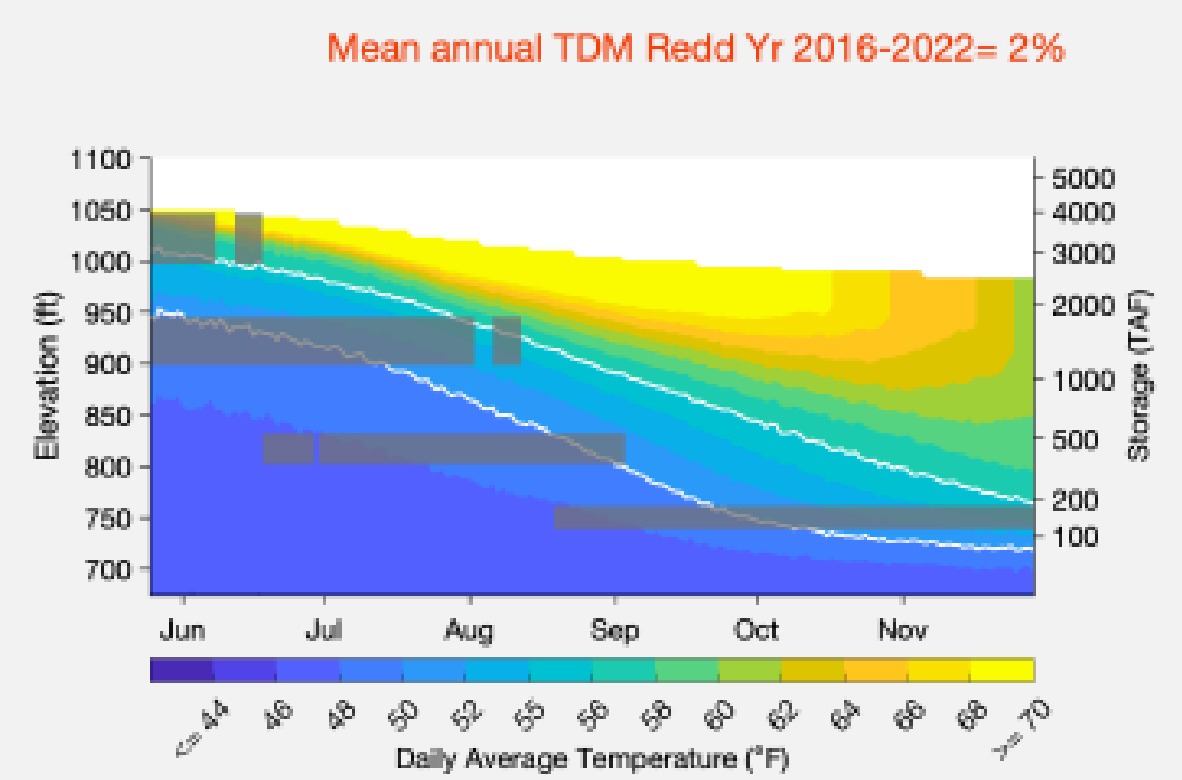
The figure shows probability of temperature-dependent egg mortality probability as it varies across downstream distance from Keswick Dam between 0 and 30 miles and through the months of June to September.

Run 2: Pulse 53.5F at CCR



Simulated Timeseries of Keswick Discharge

The figure shows a line graph of simulated Keswick discharge measured in thousands of cfs between the months of June and November.



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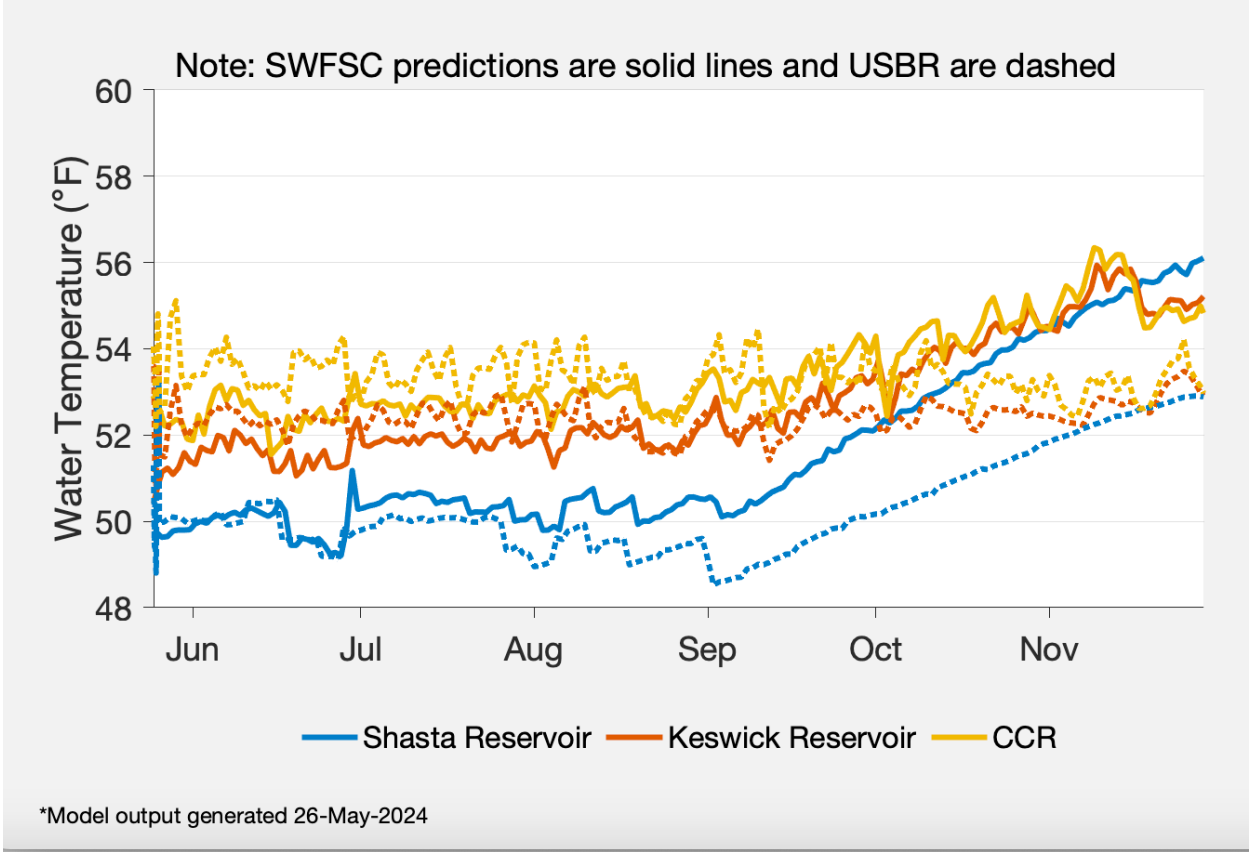

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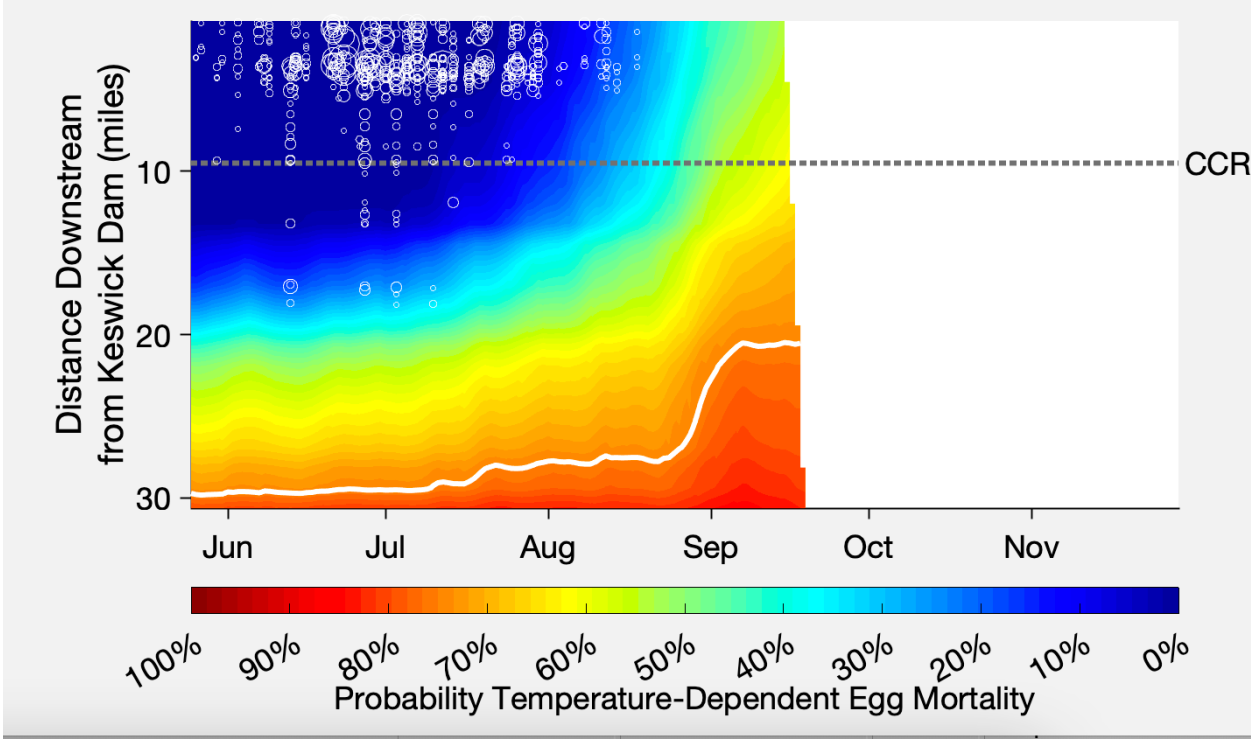

Estimated temperature-dependent egg mortality

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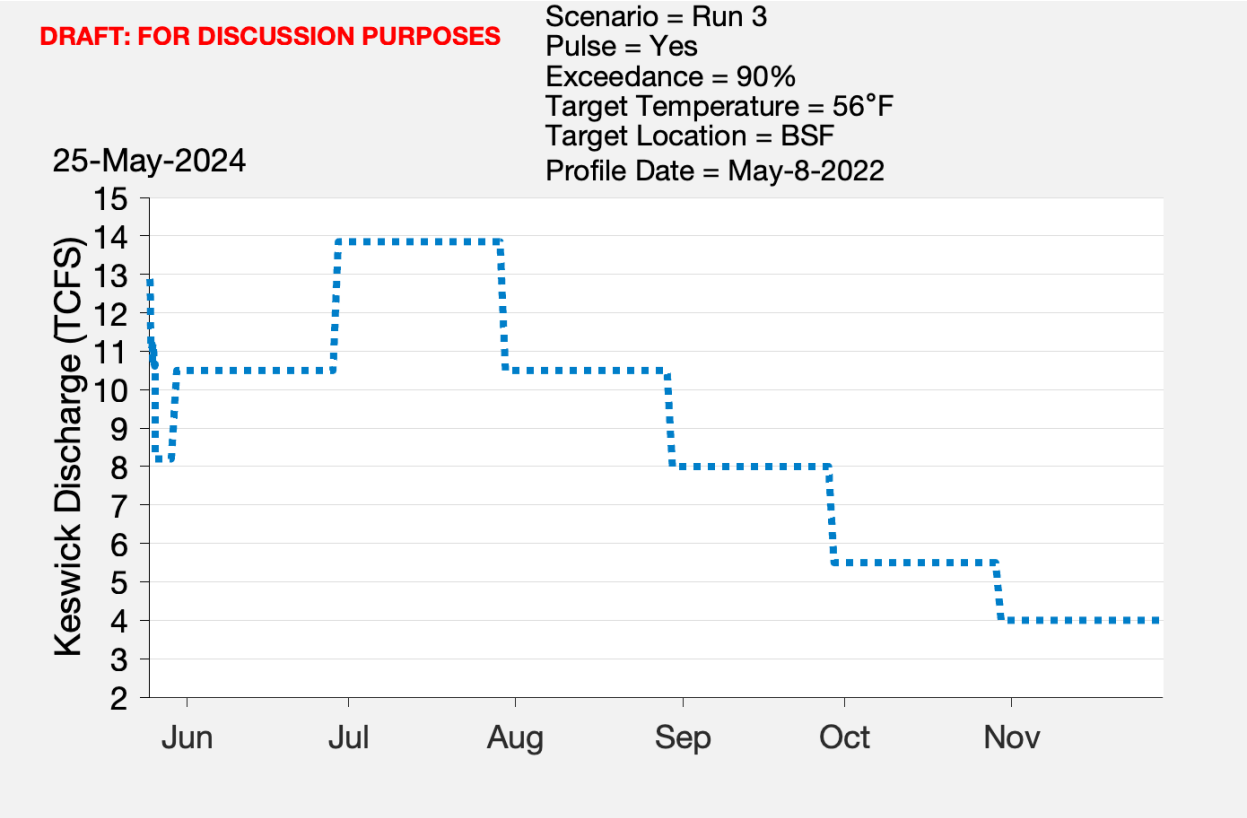
Run 3: Pulse 56F at BSF



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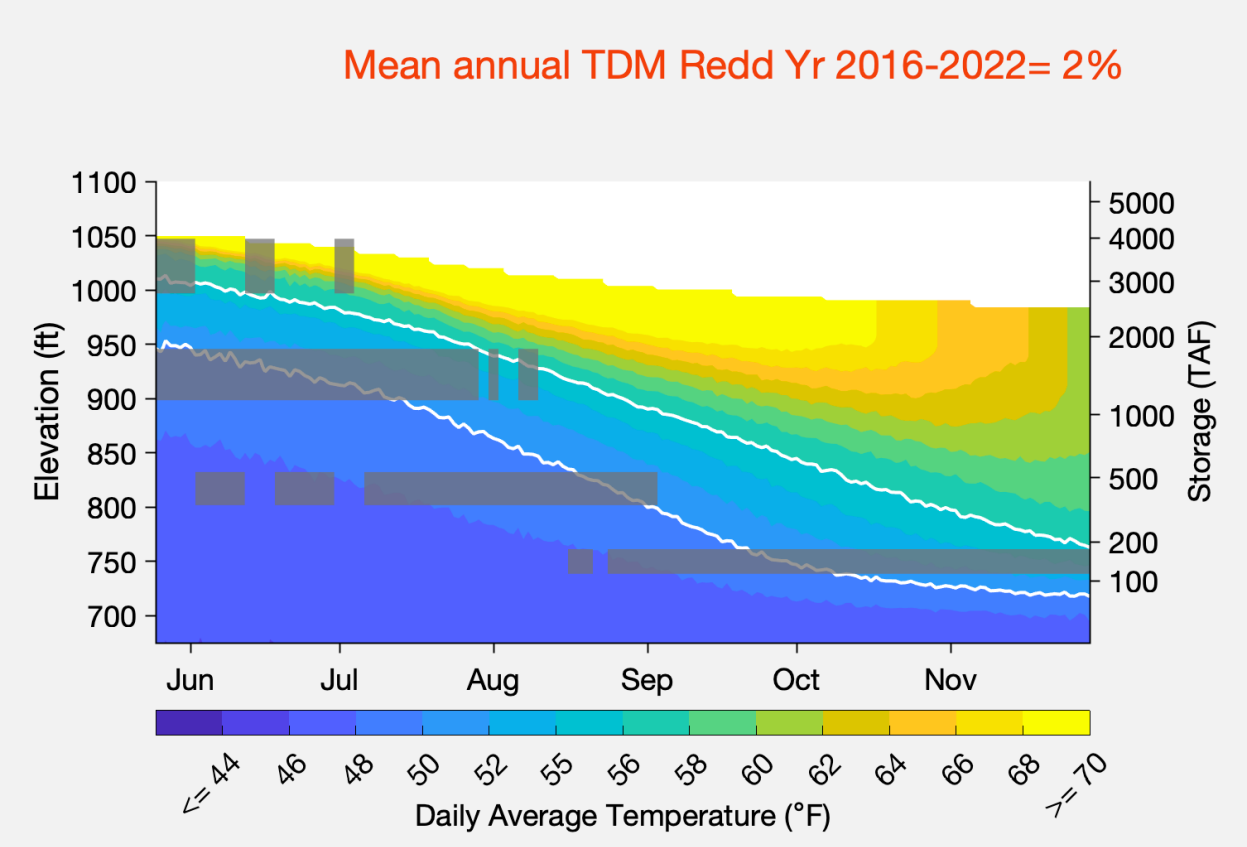

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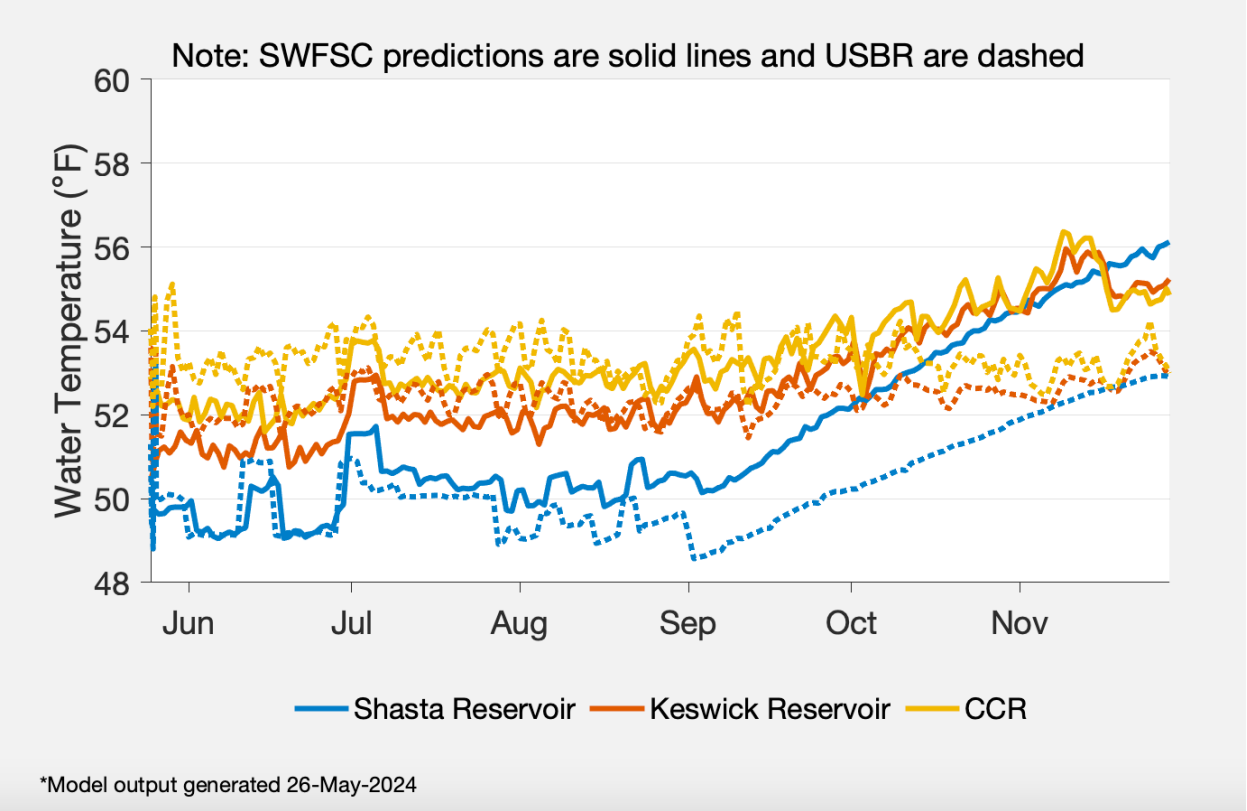

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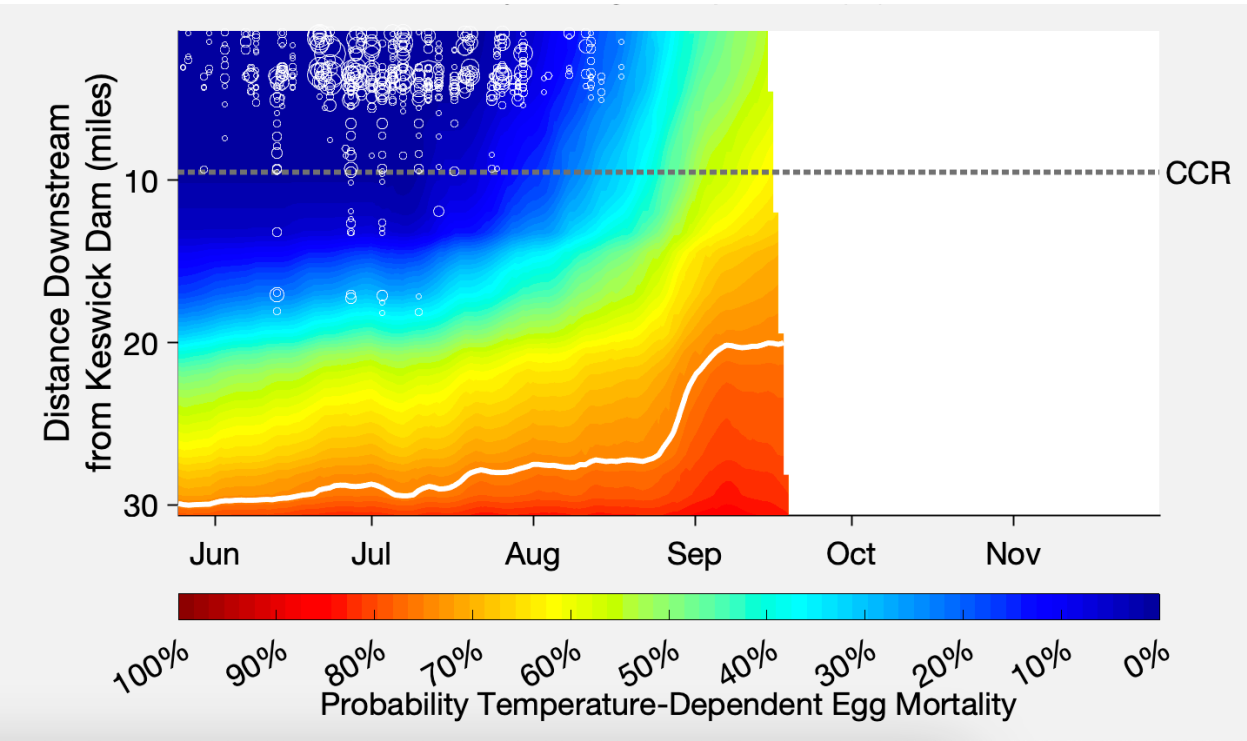

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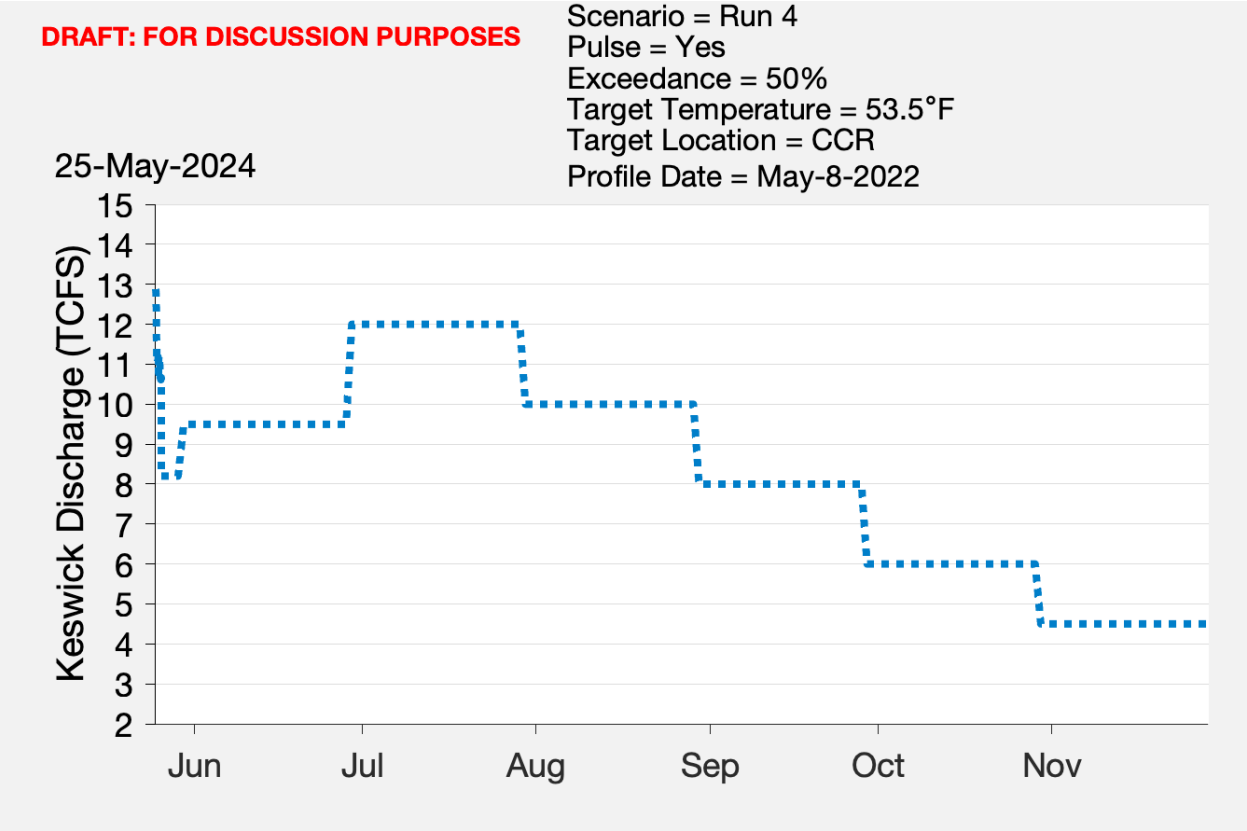
Run 4: Pulse 50% exceedance



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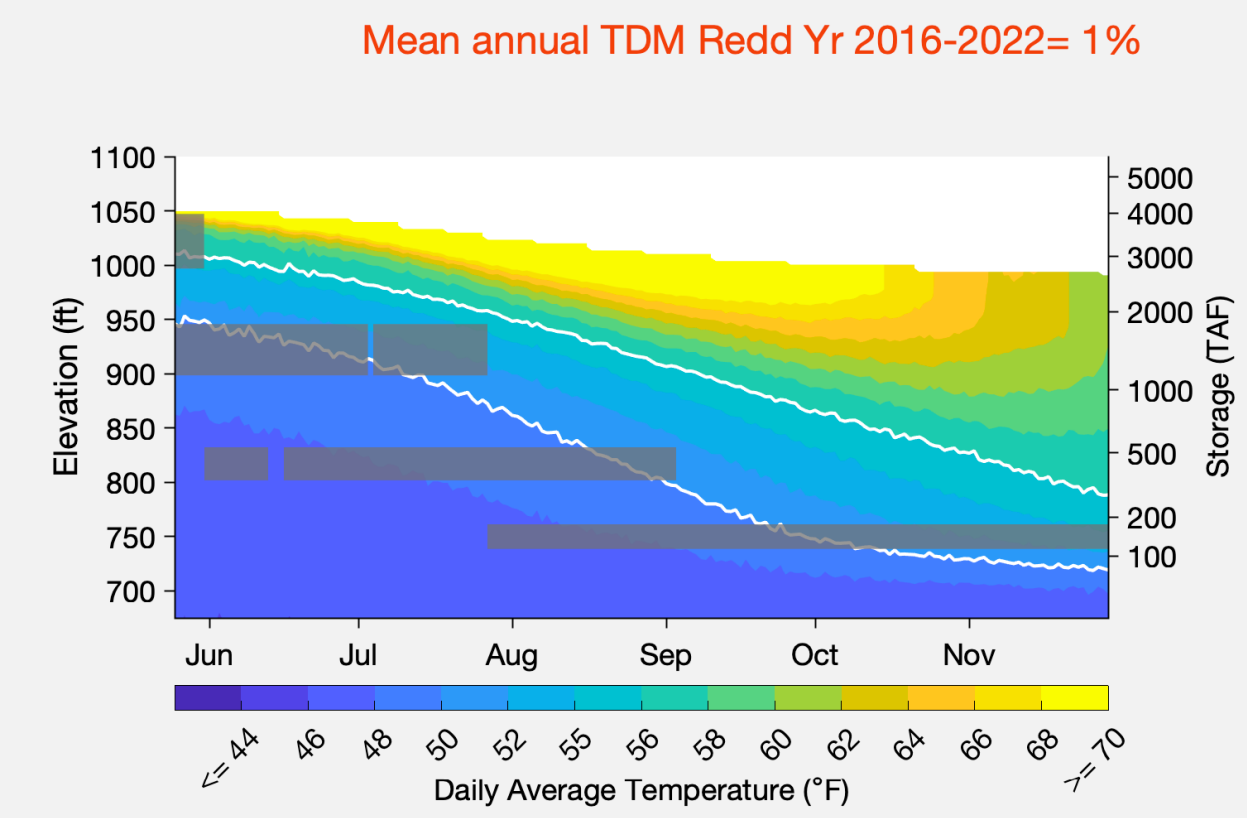

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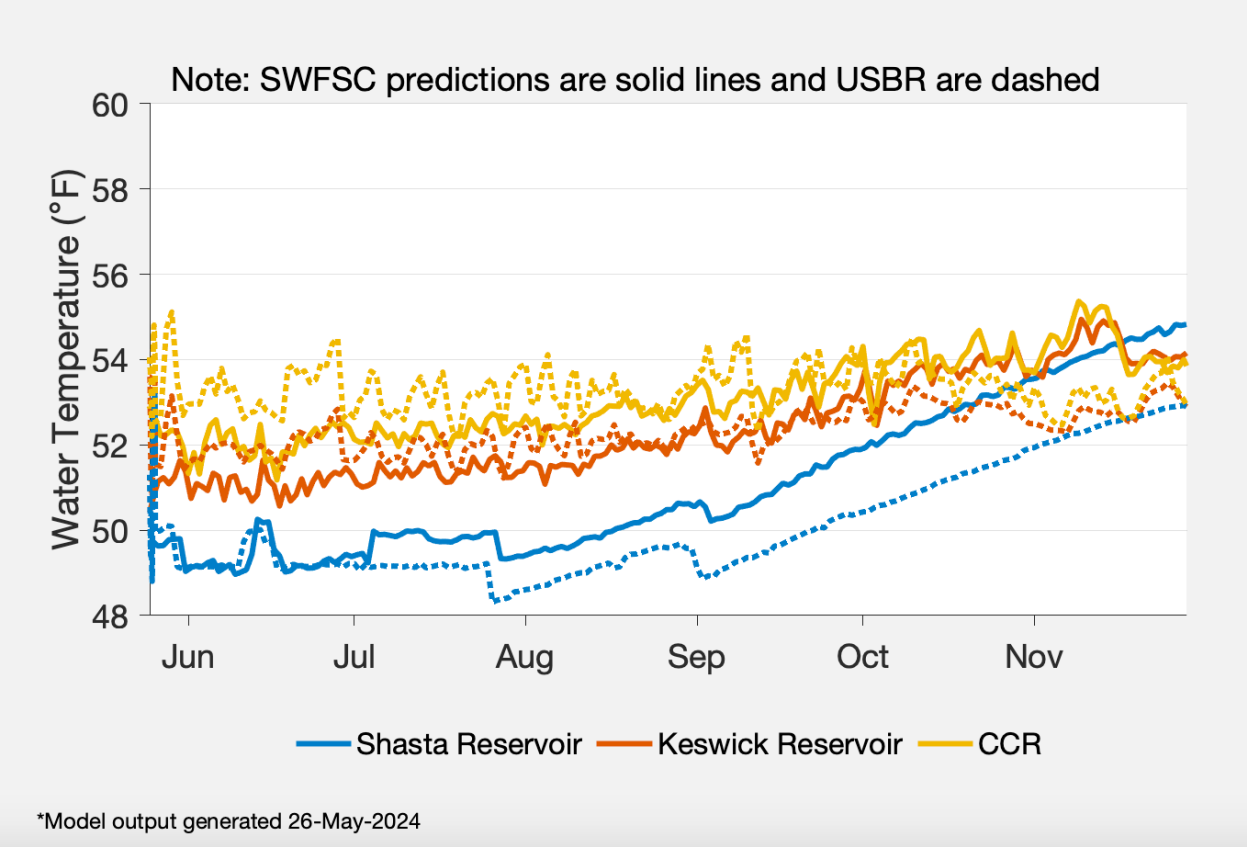

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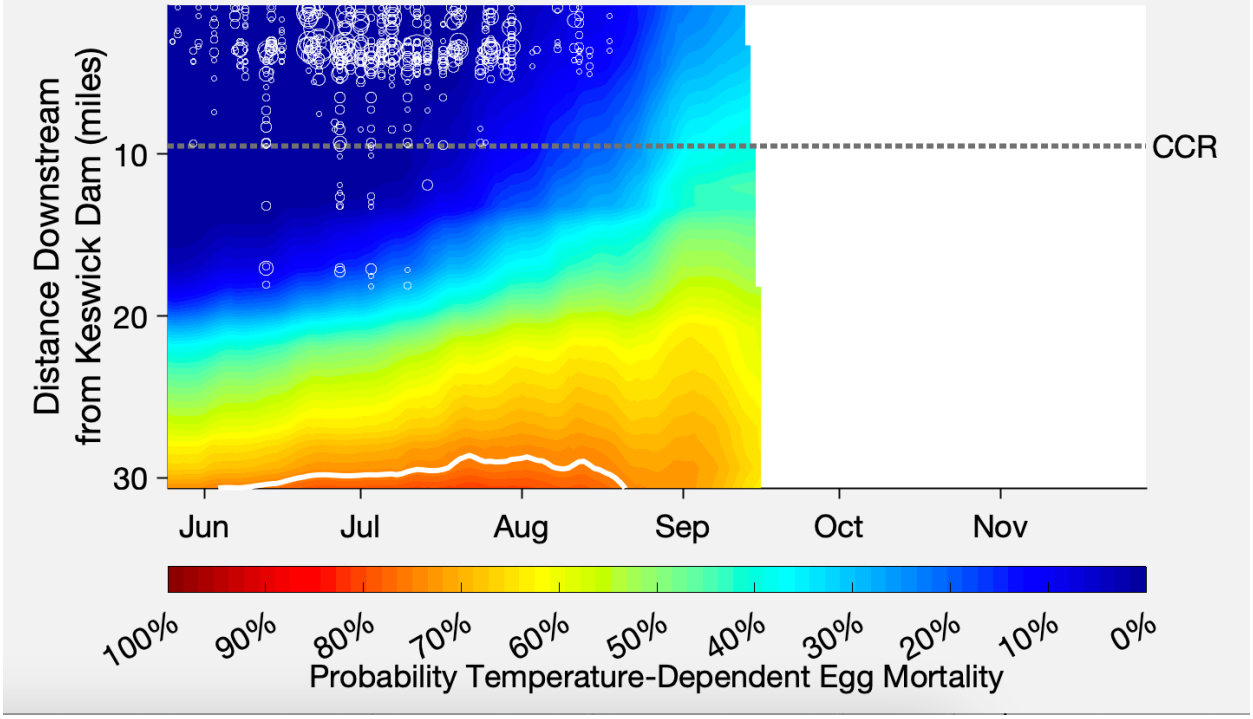

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