RECLAMATION

Managing Water in the West

Temperature Control Device Update

U.S. Department of the Interior
Bureau of Reclamation

LTEMP Conservation Measure

Reclamation would explore the efficacy of a temperature control device at the dam to respond to potential extremes in hydrological conditions due to climate conditions that could result in nonnative fish establishment. **Evaluations would be ongoing for all current and evolving technological advances t**hat could provide for warming and cooling the river in both high- and low-flow discharge scenarios, and high and low reservoir levels. These studies should include evaluating and pursuing new technologies, **an analysis of the feasibility, and a risk assessment and cost analysis for any potential solutions.**

Current Status

- TSD will have a summary report **of *all current and evolving technological advances*** completed by the end of 2018.
- The report will inform the anticipated Prize Competition to solicit new and innovative technologies.
- Conduct ***an analysis of the feasibility, and a risk assessment and cost analysis for any potential solutions***.

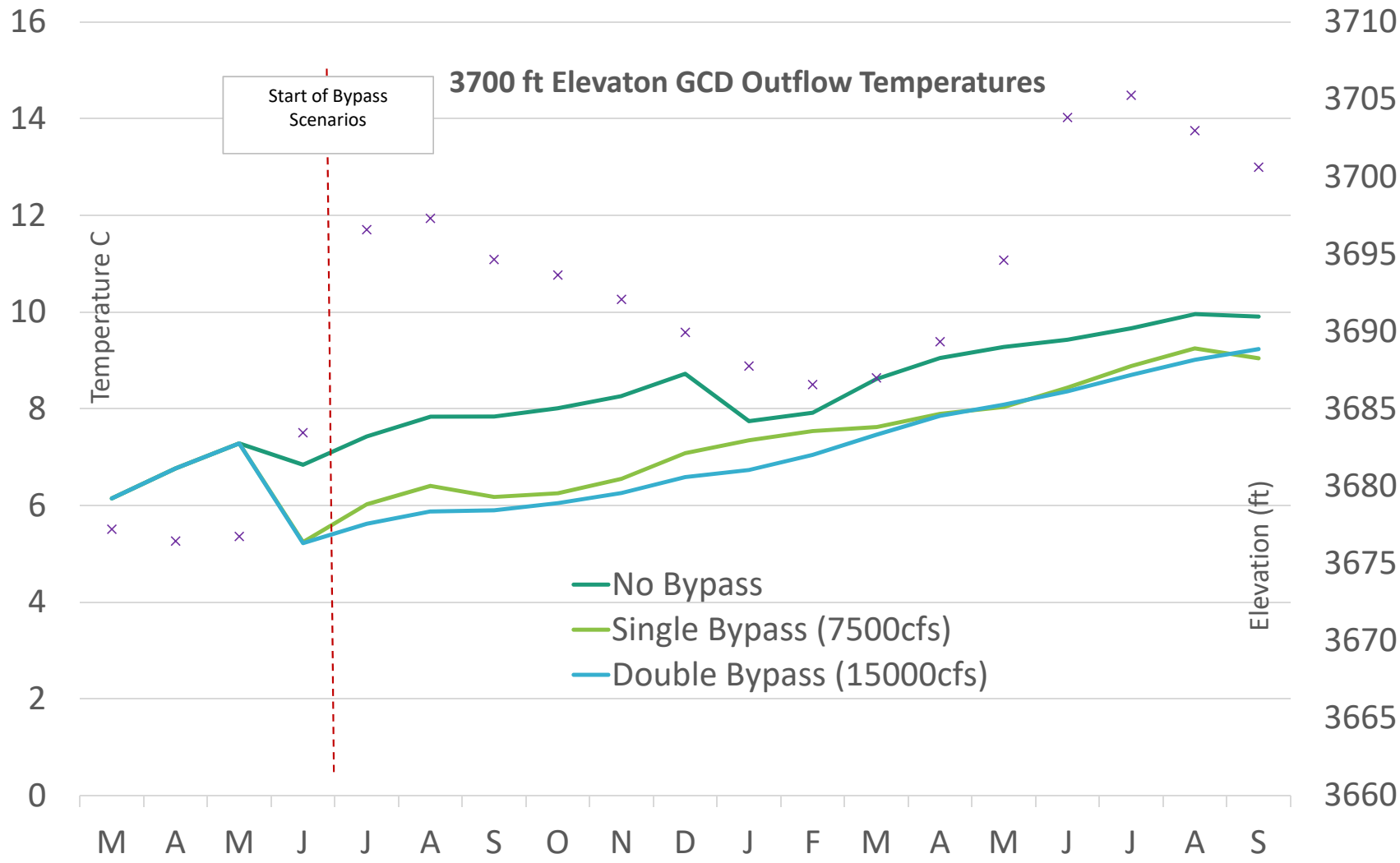
Temperature modeling was conducted to determine the release temperature using half, full bypass and without bypass at three reservoir elevation.

- ≈3700 ft - 2004
- ≈3600 ft - 2018, 2012 and 2016
- ≈3550 ft – 2007, 2009

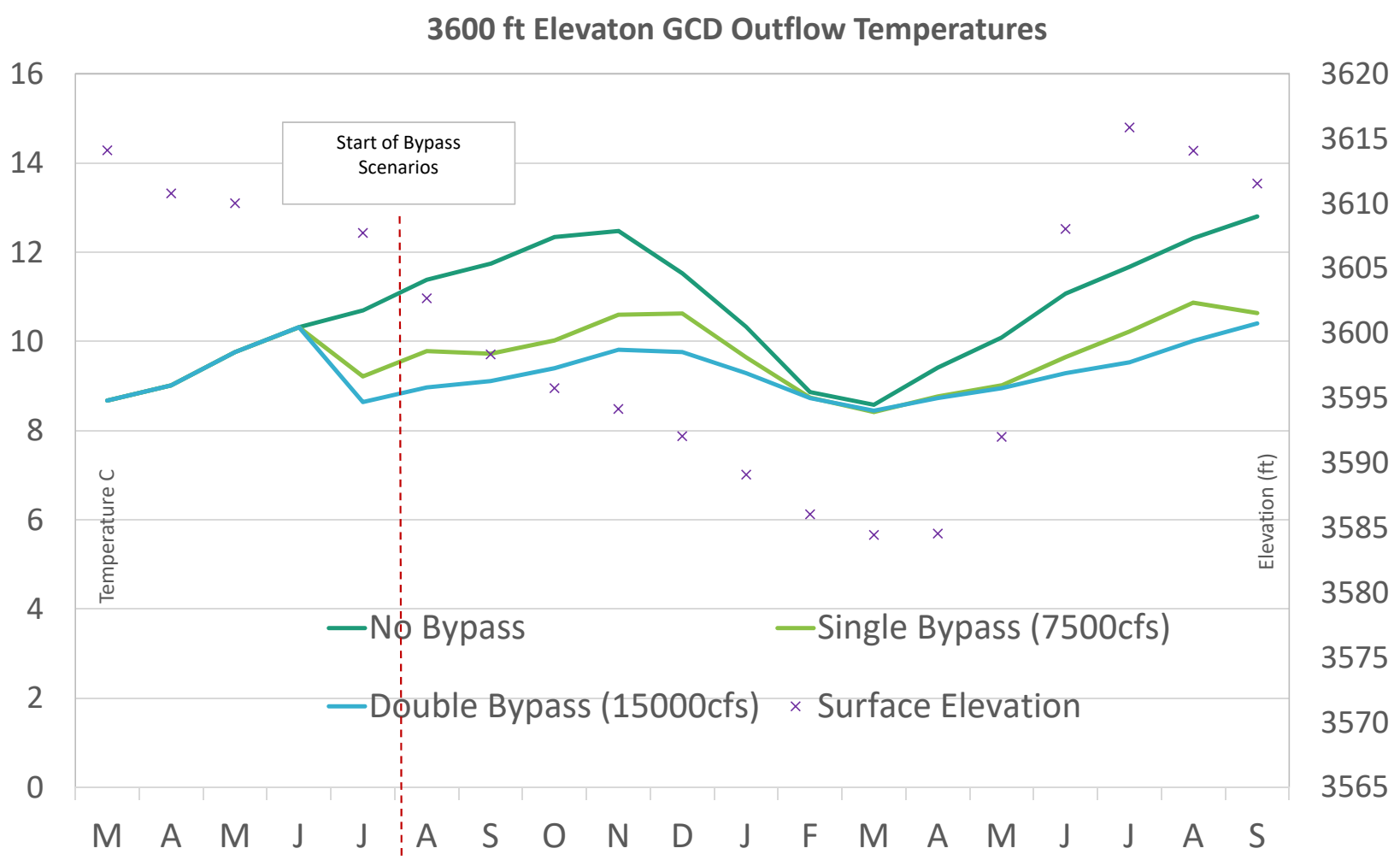
Methodology (similar to Temperature Projections for 24 month Study)

- Select Year with similar elevations between March and June to determine initial condition Profiles, use January through June as historical data
- Select historical Water Year that best matches projected inflows for remaining model dates (adjusted)
- Use meteorological and Inflow Temperature Data from a selected historical year

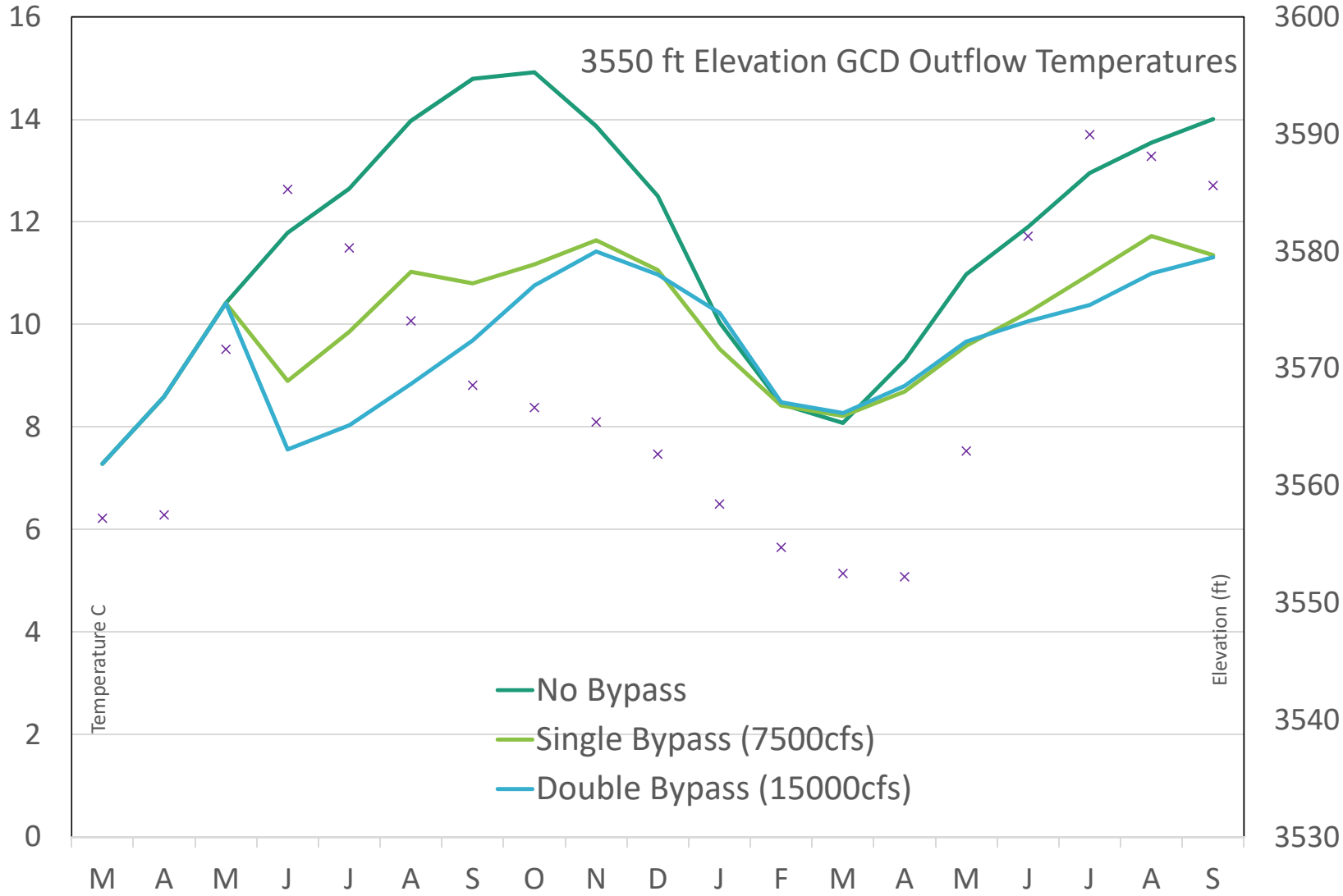
Surface elevation ≈3700 August		
November		
	Temp C	Δ
o Bypass	8.72	
alf ypass	7.08	1.64
ll Bypass	6.58	2.14
August		
o Bypass	9.96	
alf ypass	9.25	0.71
ll Bypass	9.01	0.95

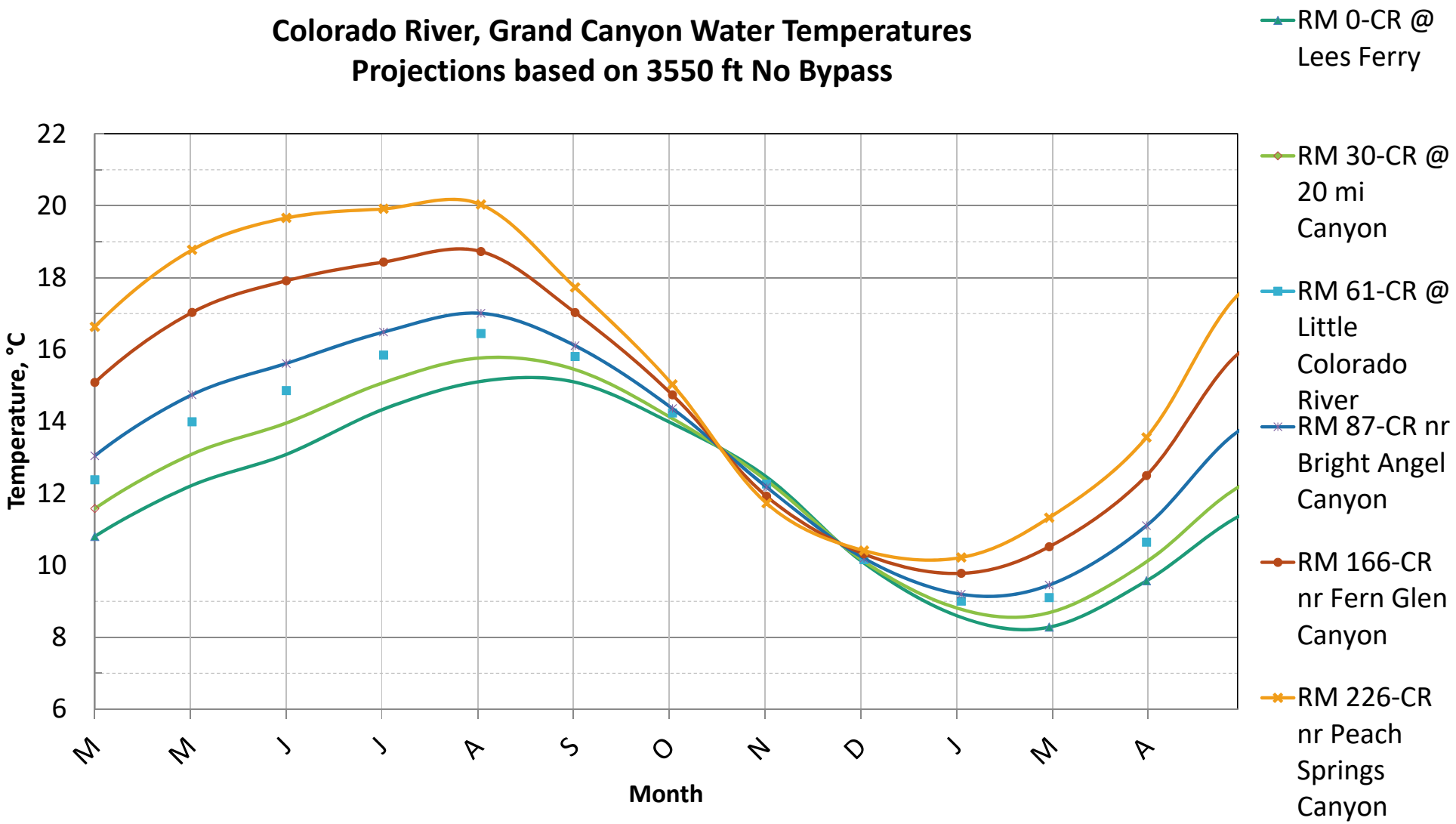


Surface elevation ≈3600		
November		
	Temp C	Δ
No Bypass	12.48	
Half Bypass	10.63	1.85
Full Bypass	9.82	2.66
September		
No Bypass	12.80	
Half Bypass	10.64	2.16
Full Bypass	10.4	2.4



Surface elevation ≈ 3550		
October		
	Temp C	Δ
No Bypass	14.92	
Half Bypass	11.64	3.28
Full Bypass	11.42	3.50
August		
No Bypass	14.01	
Half Bypass	11.31	2.7
Full Bypass	11.31	2.7




Colorado River, Grand Canyon Water Temperatures
Projections based on 3550 ft No Bypass
Temperature, °C
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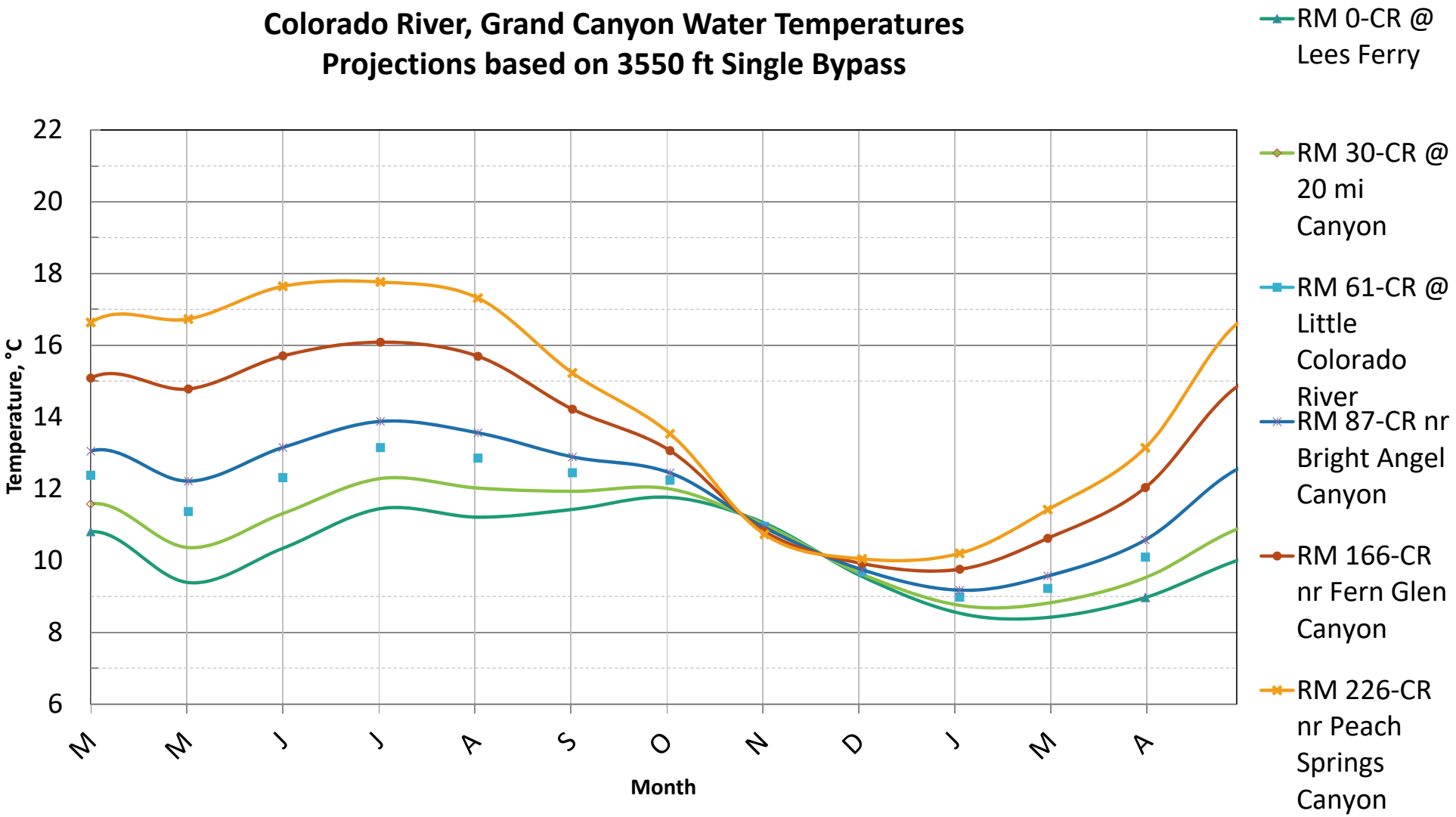
Month
RM 0-CR @ Lees Ferry
RM 30-CR @ 20 mi Canyon
RM 61-CR @ Little Colorado River
RM 87-CR nr Bright Angel Canyon
RM 166-CR nr Fern Glen Canyon
RM 226-CR nr Peach Springs Canyon


Colorado River, Grand Canyon Water Temperatures
Projections based on 3550 ft Single Bypass
Temperature, °C
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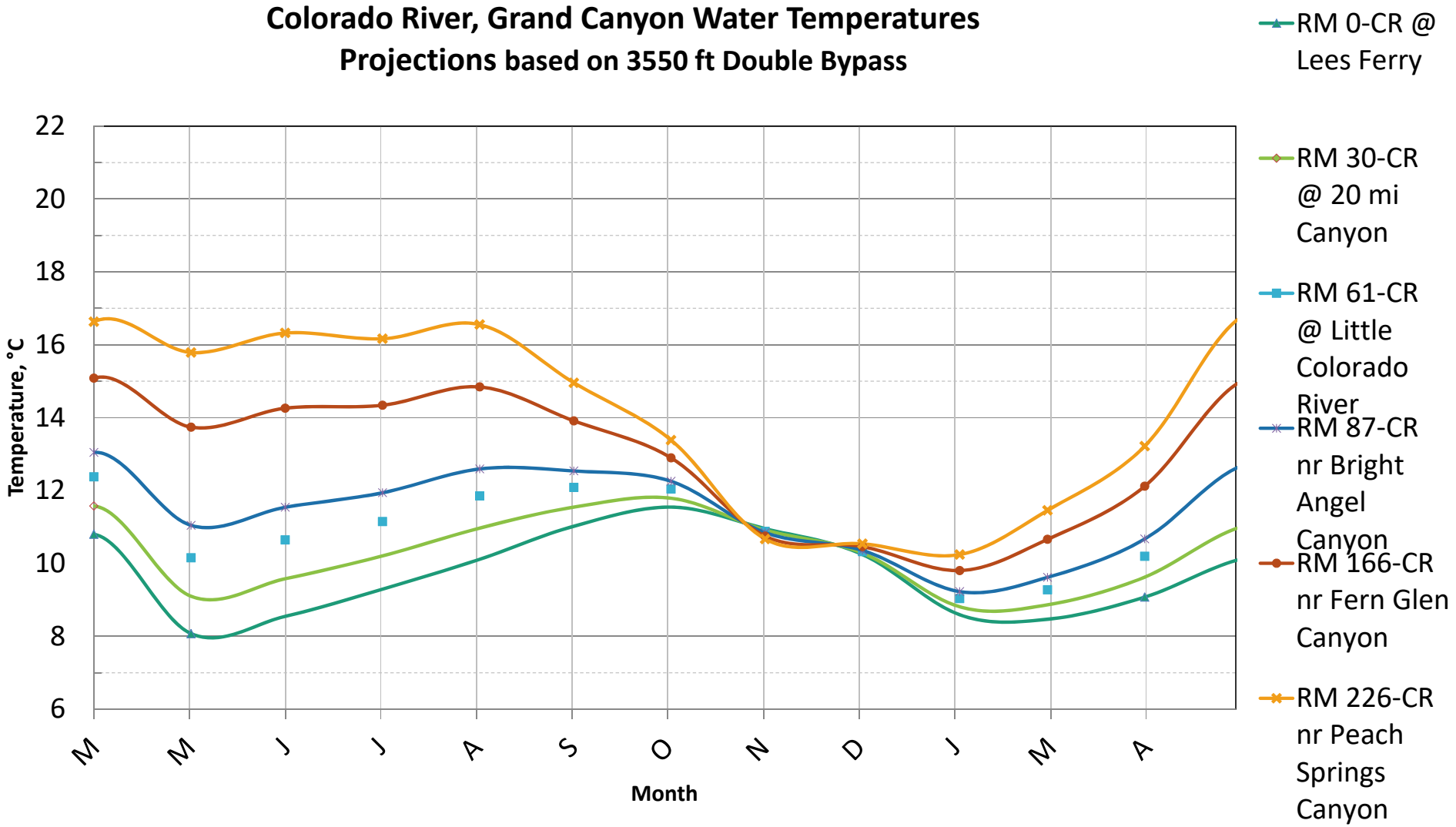
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Projections based on 3550 ft Double Bypass
Temperature, °C
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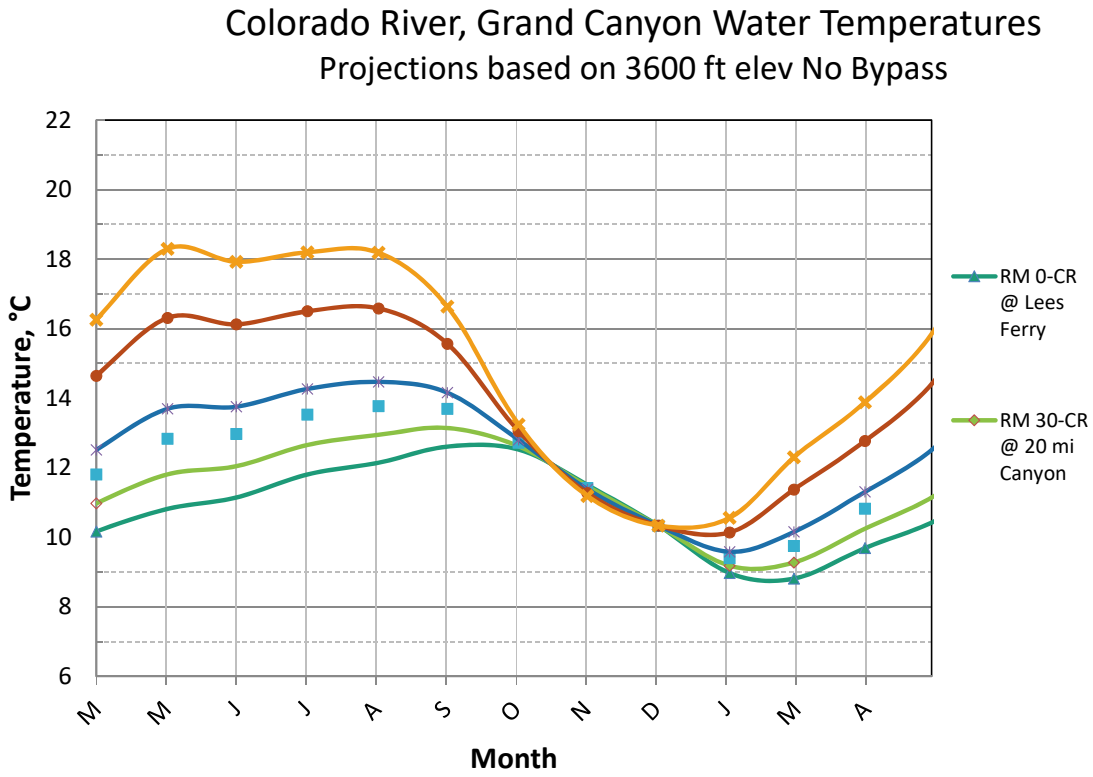
RM 226-CR nr Peach Springs Canyon

Downstream Temperatures Using No Bypass, Half Bypass and Full Bypass

Surface elevation ≈ 3550 ft. August					
Location	No Bypass	Half Bypass	Δ	Full Bypass	Δ
RM-0 Lees Ferry	11.0	11.0	0	10.0	-1.0
RM-30	12.0	12.0	0	11.0	-1.0
RM-61 LCR	15.0	13.0	2.0	12.0	-3.0
RM-87 Bright Angel	15.5	14.5	1.0	15.0	-0.5
RM-166 Fern Glen	15.8	15.8	0	15.0	-0.8


Colorado River, Grand Canyon Water Temperatures
Projections based on 3600 ft elev No Bypass
Temperature, °C
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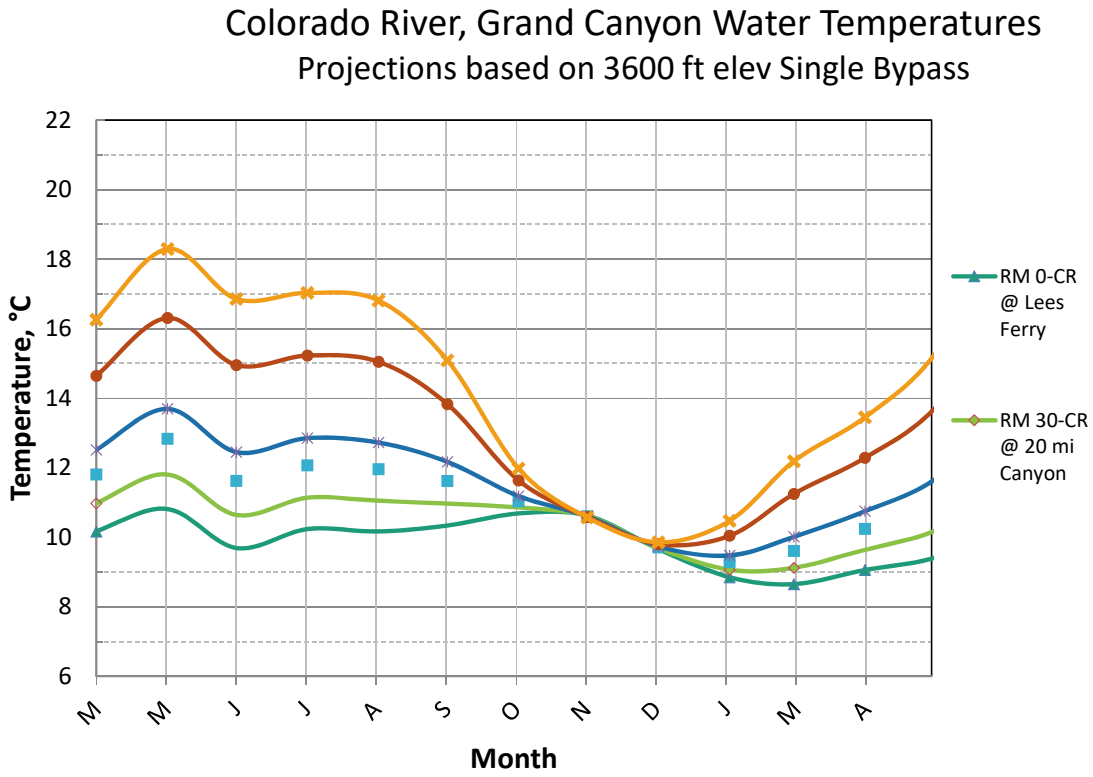
Month
RM 0-CR @ Lees Ferry
RM 30-CR @ 20 mi Canyon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Temperature, °C
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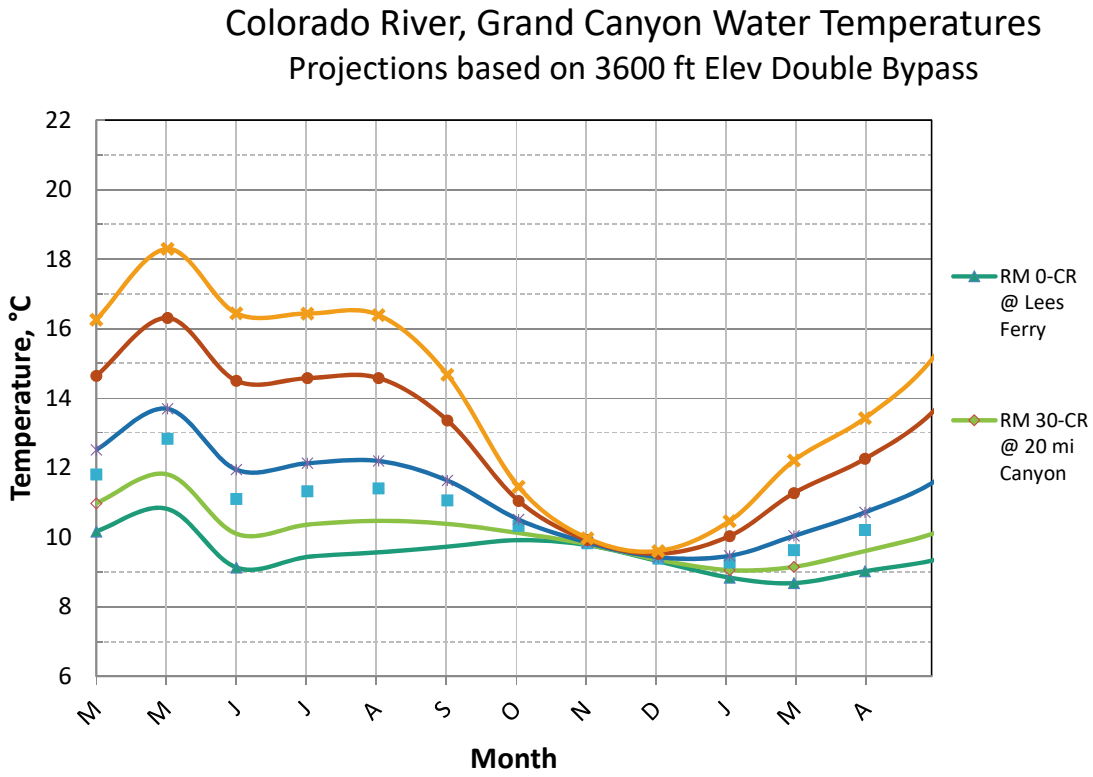
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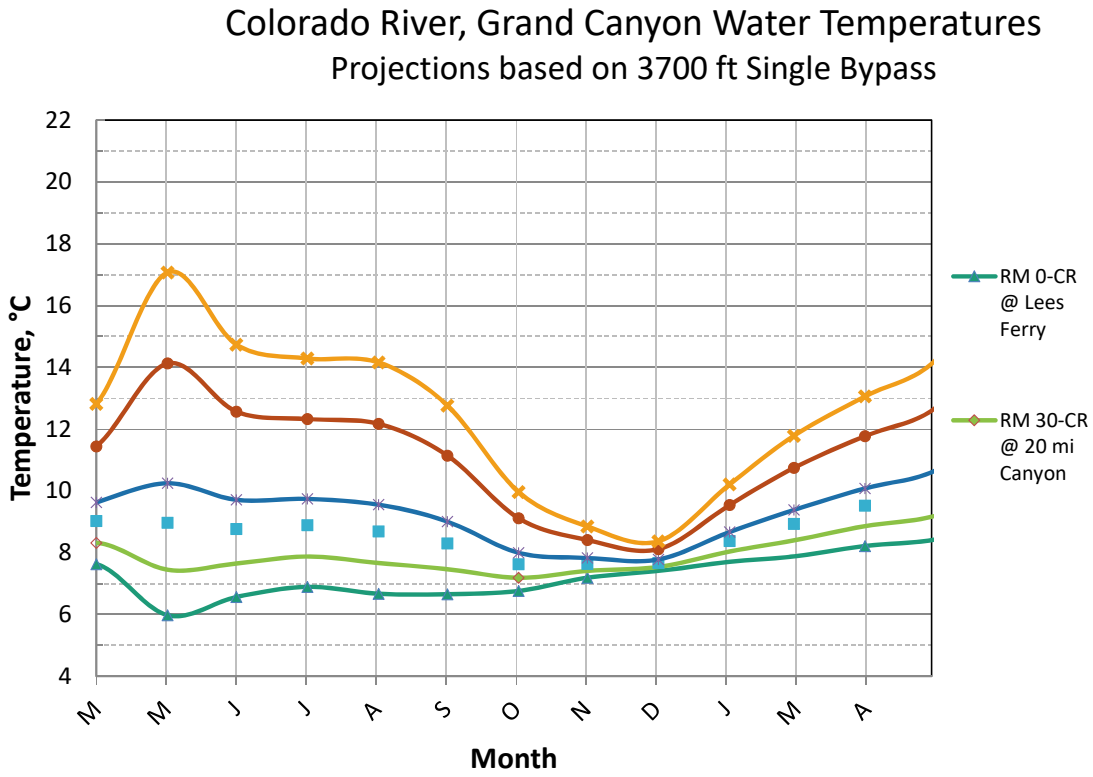
Colorado River, Grand Canyon Water Temperatures
Projections based on 3700 ft Single Bypass
Temperature, °C
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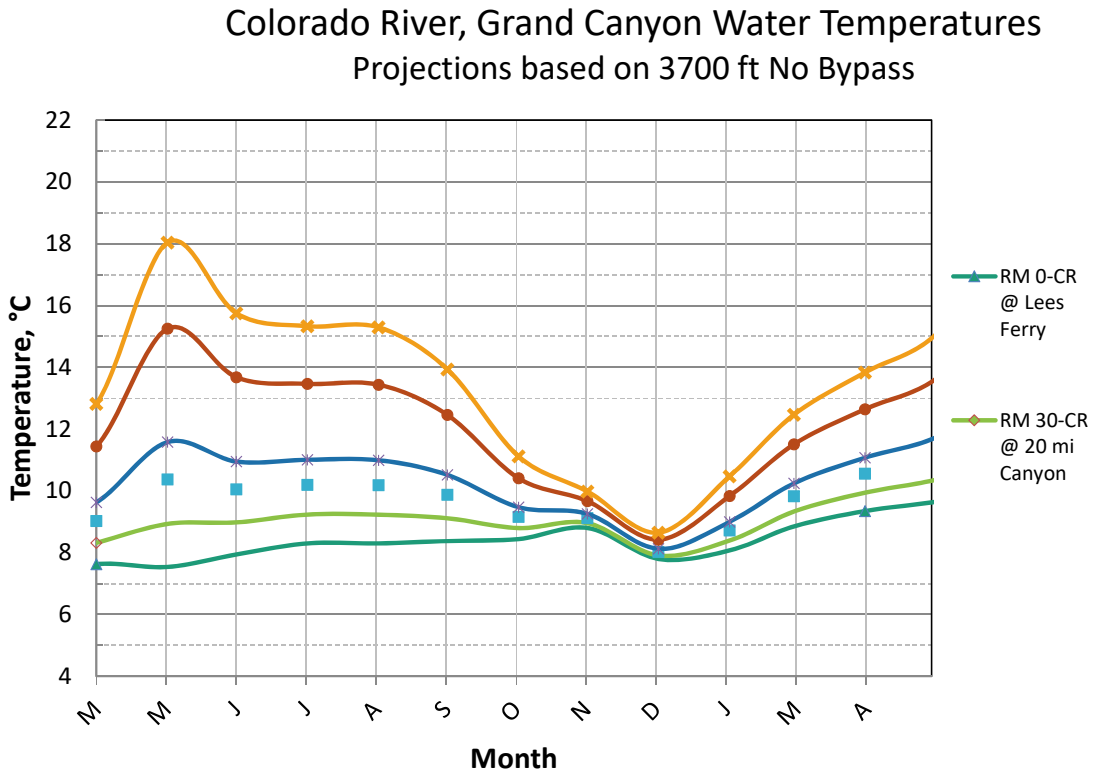
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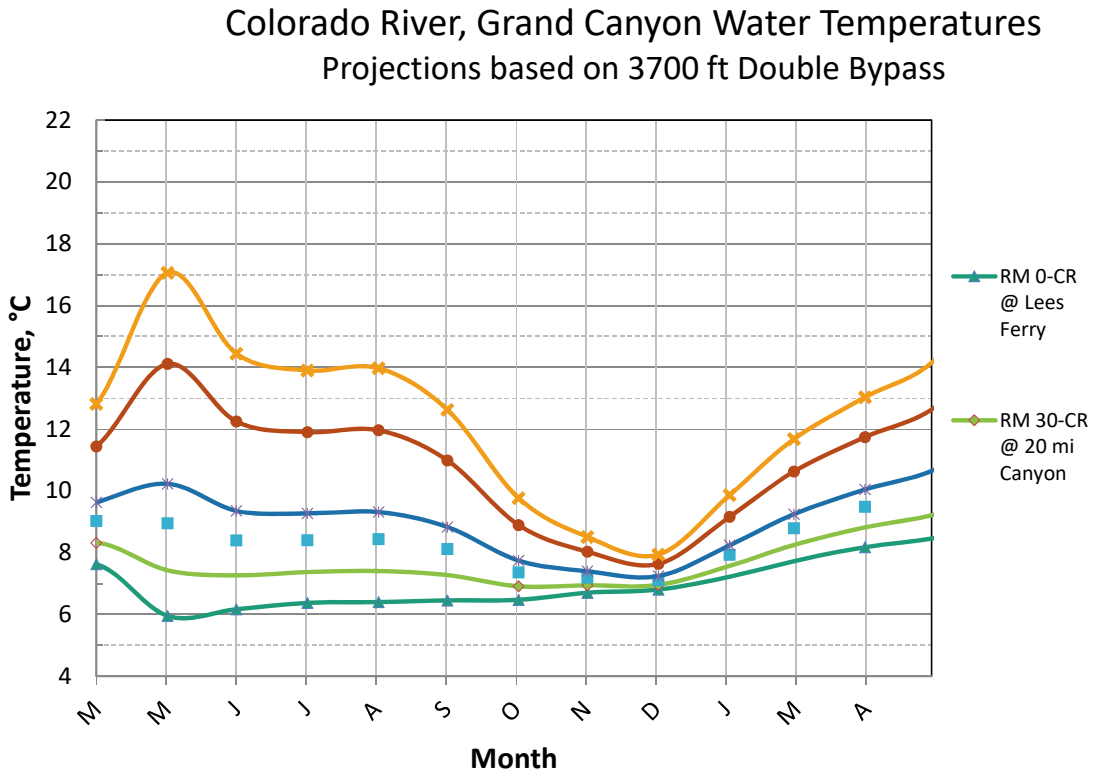
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