

RECLAMATION

Managing Water in the West

Temperature Control Device
Update



U.S. Department of the Interior
Bureau of Reclamation

LTEMP BO 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** that 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 fiscal year 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 and, full bypass and without bypass at three reservoir elevation.

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

Downstream temperatures were modeled at five locations.

Surface elevation ≈3700		
November		
	Temp C	Δ
No Bypass	7.0	
Half Bypass	6.5	0.5
Full Bypass	6.0	1.0
August		
No Bypass	10.0	
Half Bypass	9.0	1.0
Full Bypass	9.0	1.0

Surface elevation ≈3600		
November		
	Temp C	Δ
No Bypass	12.5	
Half Bypass	11.0	1.5
Full Bypass	9.0	2.0
September		
No Bypass	13.0	
Half Bypass	11.0	2.0
Full Bypass	10.5	2.5

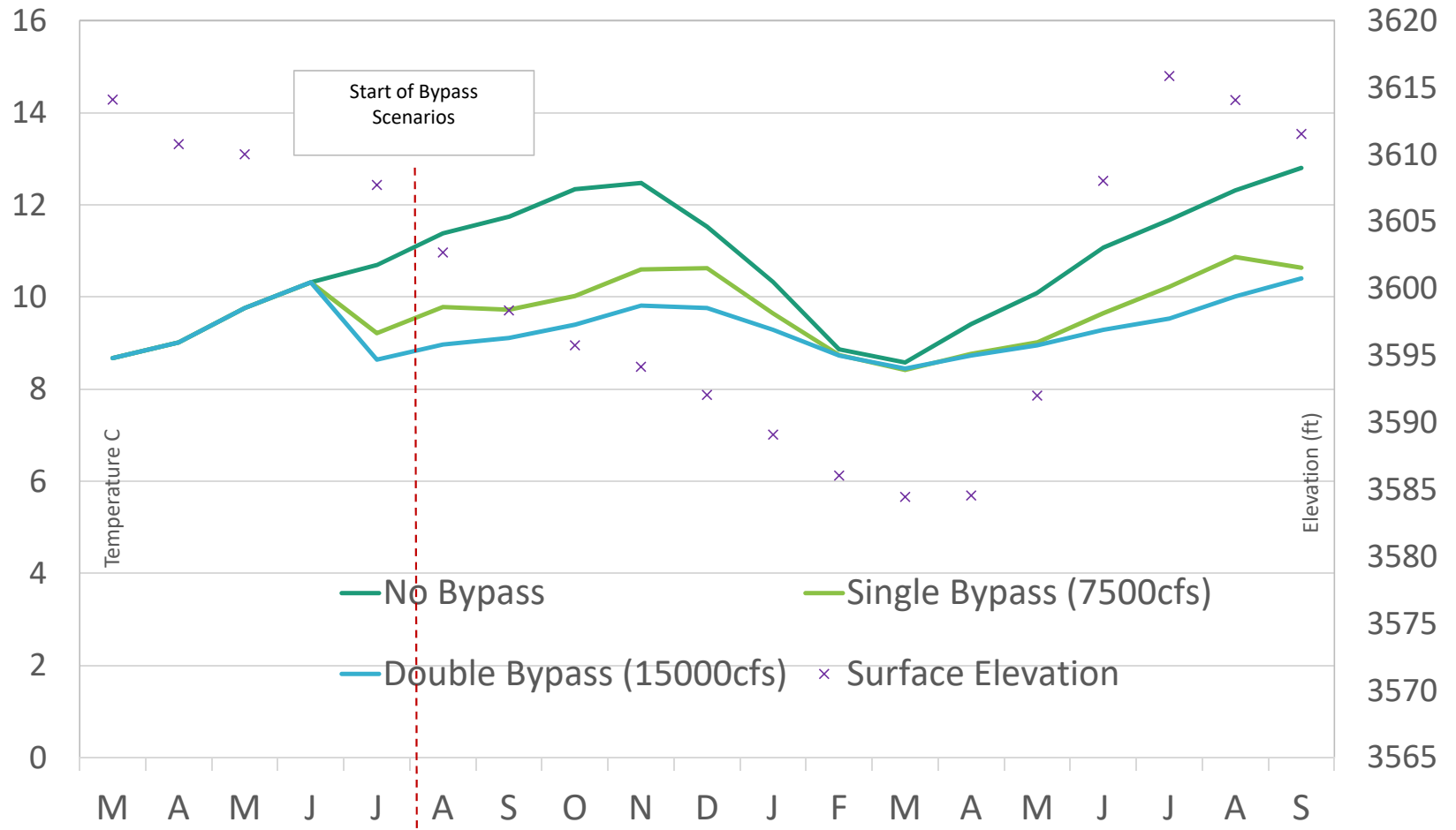
Surface elevation ≈ 3550		
October		
	Temp C	Δ
No Bypass	15.0	
Half Bypass	11.0	4.0
Full Bypass	11.0	4.0
August		
No Bypass	13.0	
Half Bypass	11.0	2.0
Full Bypass	10.5	2.5

Downstream Temperatures Using No Bypass, Half Bypass and Full Bypass

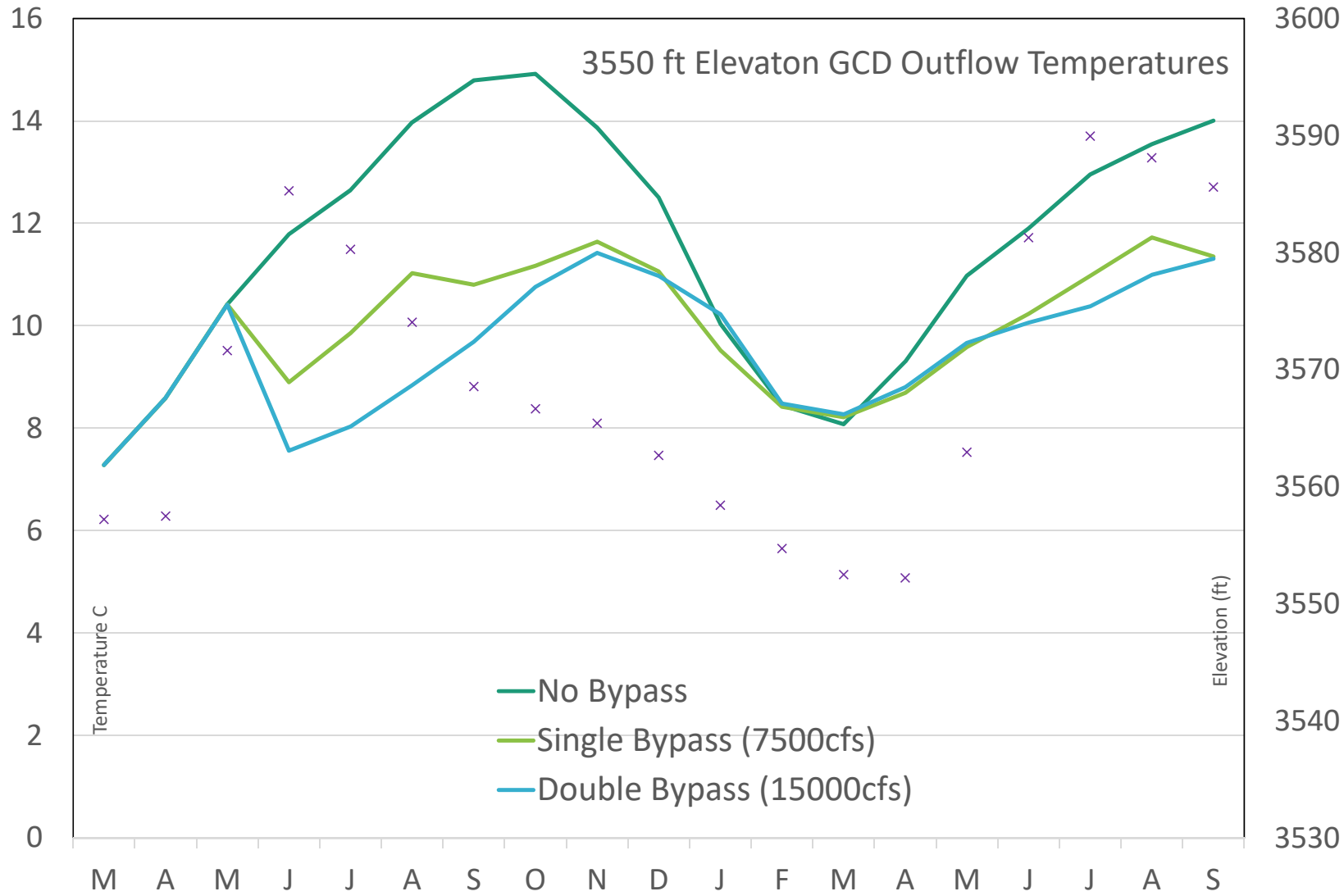
Surface elevation \approx 3550 ft.					
August					
Location	No Bypass	Half Bypass	Δ	Full Bypass	Δ
RM-0 Lees Ferry	11.0	11.0	0	10.0	1.0
RM-30	12.0	12.0	0	11.0	1.0
RM-61 LCR	15.0	13.0	2.0	12.0	3.0
RM-87 Bright Angel	15.5	14.5	1.0	15.0	0.5
RM-166 Fern Glen	15.8	15.8	0	15.0	0.8

Surface elevation ≈3600		
November		
	Tem p C	Δ
No Bypass	12.5	
Half Bypass	11.0	1.5
Full Bypass	9.0	2.0
September		
No Bypass	13.0	
Half Bypass	11.0	2.0
Full Bypass	10.5	2.5

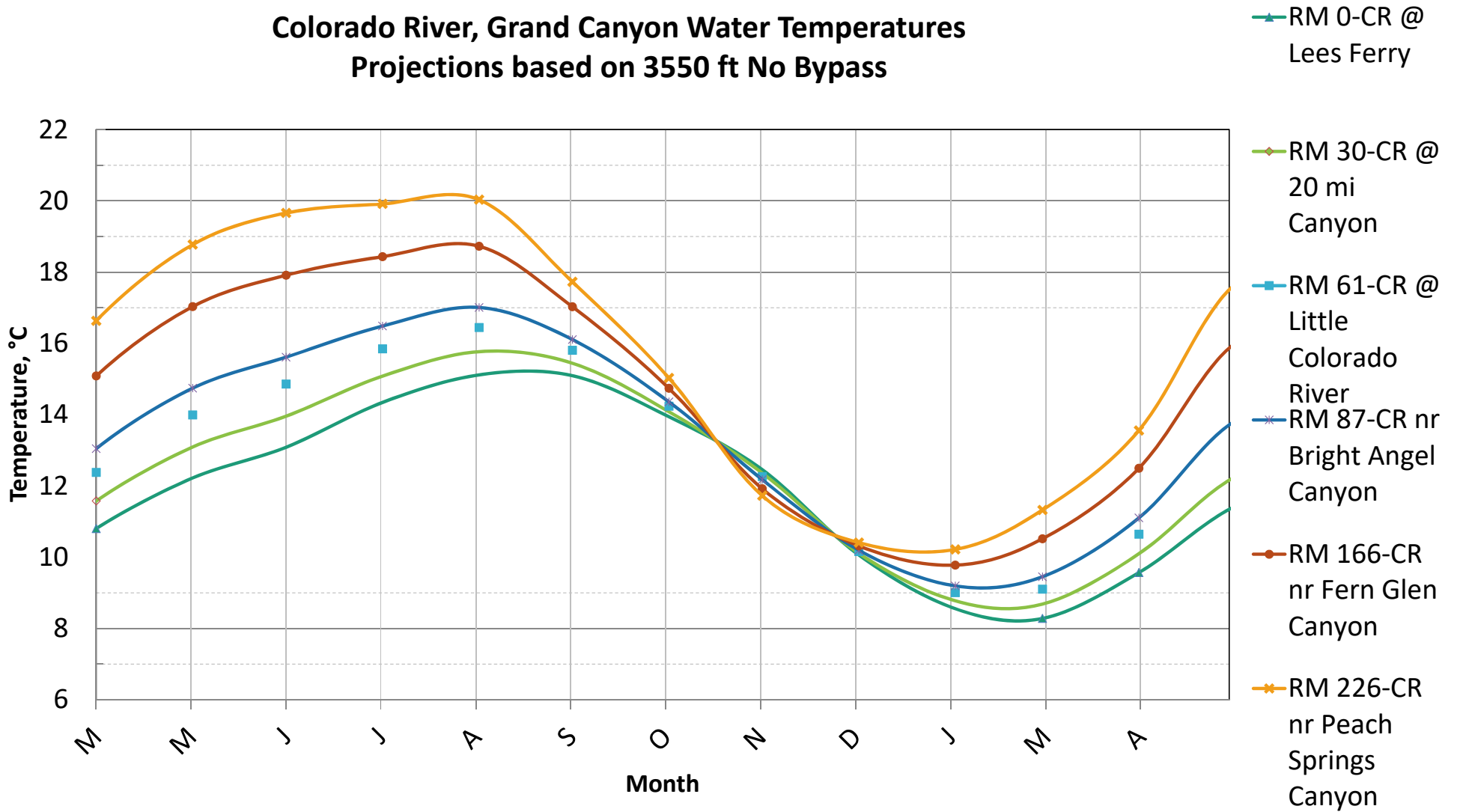
3600 ft Elevaton GCD Outflow Temperatures



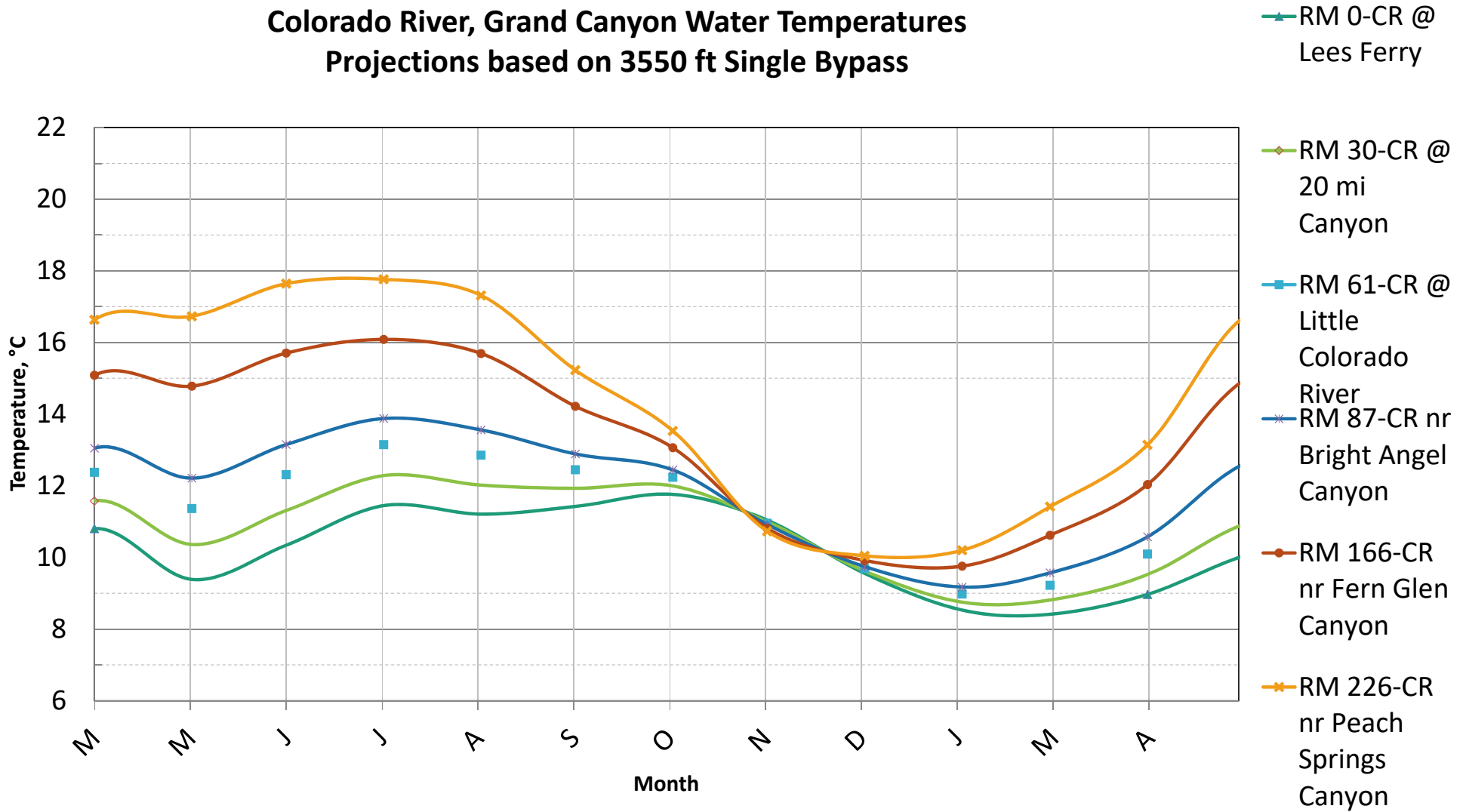
Surface elevation ≈ 3550 v		
October		
	Temp C	Δ
No Bypass	15.0	
Half Bypass	11.0	4.0
Full Bypass	11.0	4.0
August		
No Bypass	13.0	
Half Bypass	11.0	2.0
Full Bypass	10.5	2.5



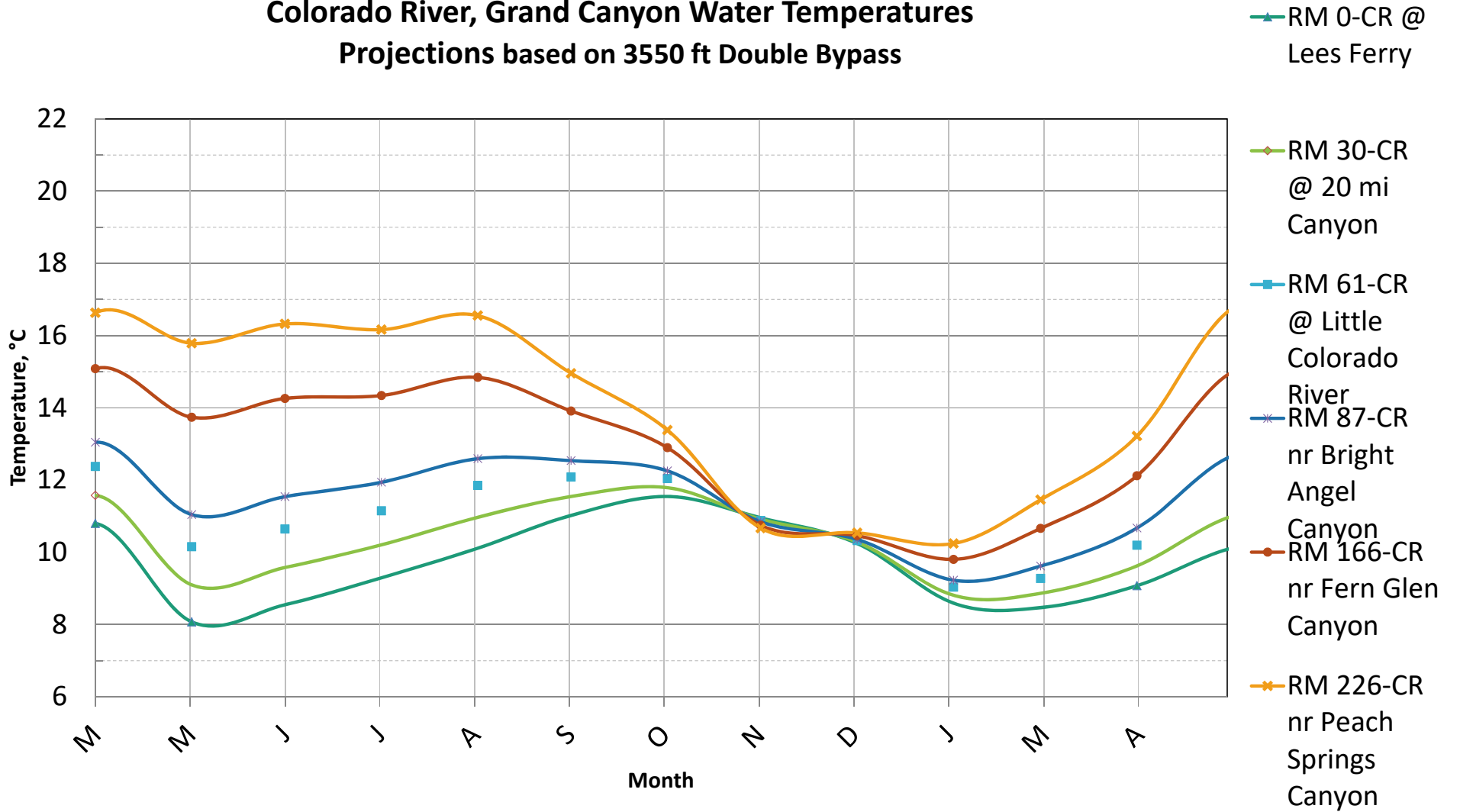
Colorado River, Grand Canyon Water Temperatures Projections based on 3550 ft No Bypass



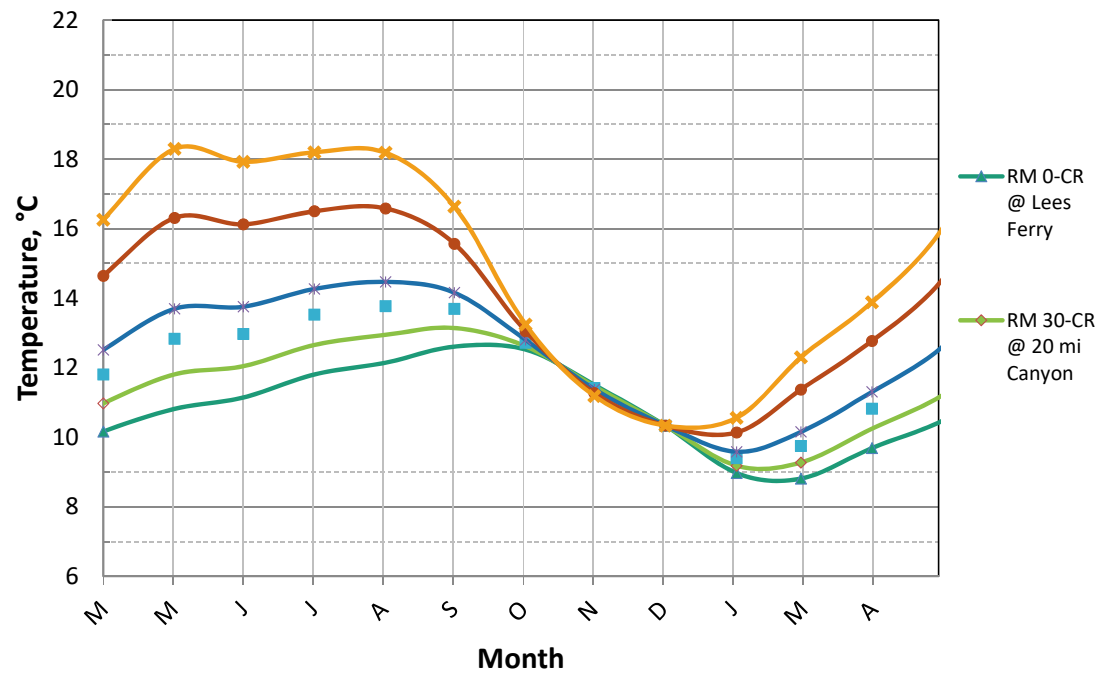
Colorado River, Grand Canyon Water Temperatures Projections based on 3550 ft Single Bypass



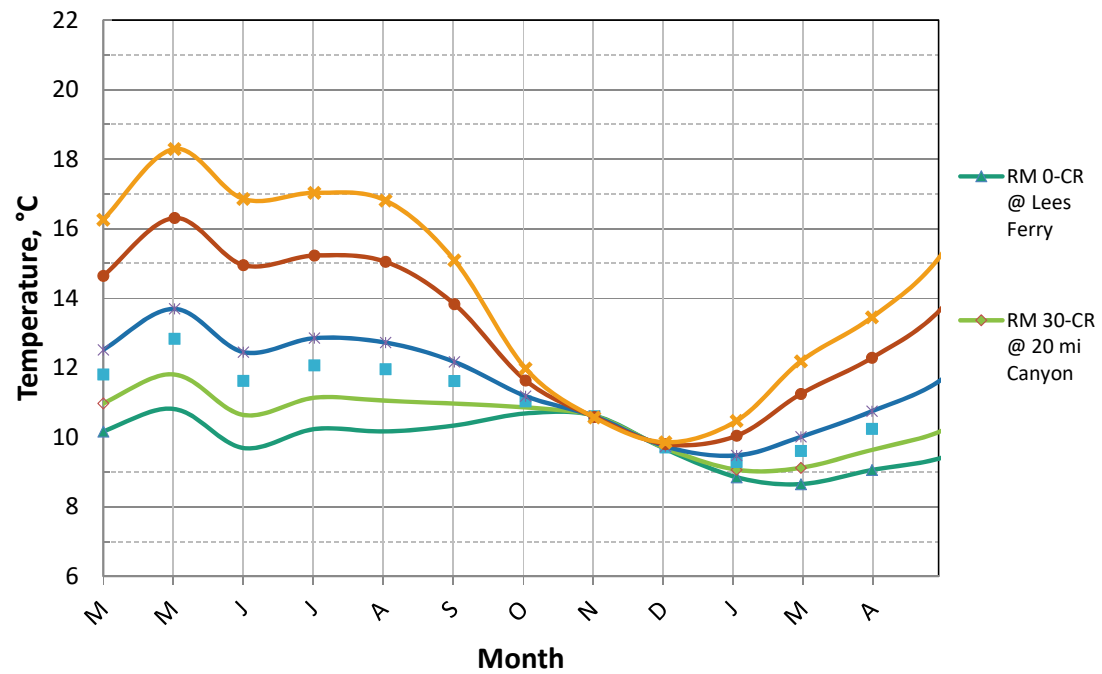
Colorado River, Grand Canyon Water Temperatures Projections based on 3550 ft Double Bypass



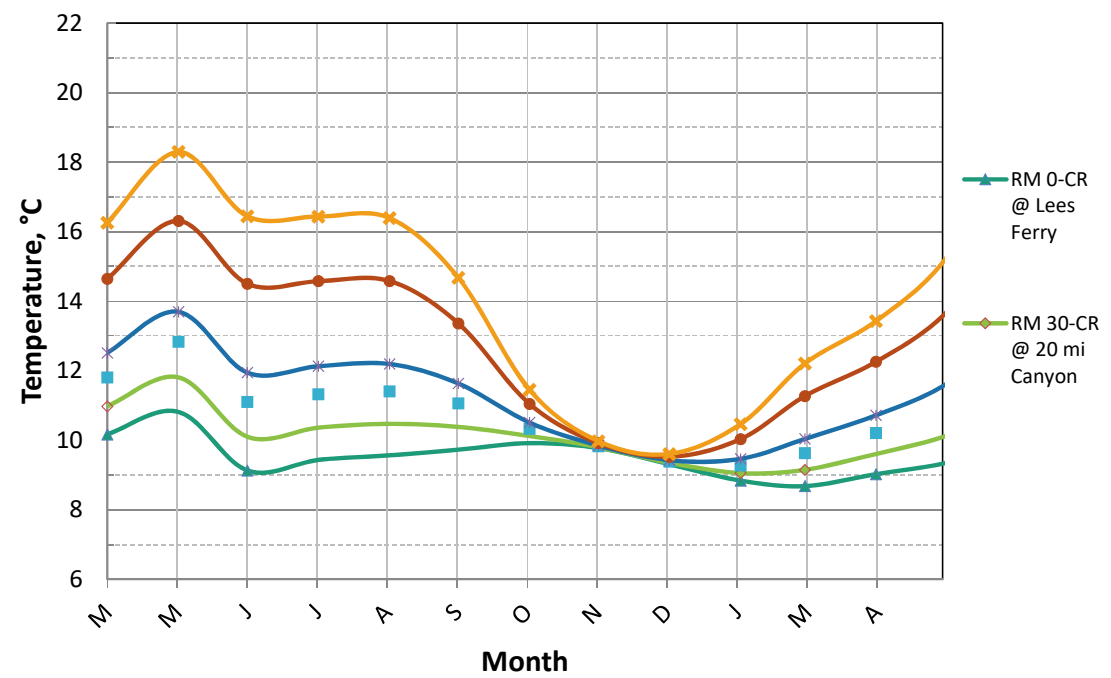
Colorado River, Grand Canyon Water Temperatures
Projections based on 3600 ft elev No Bypass



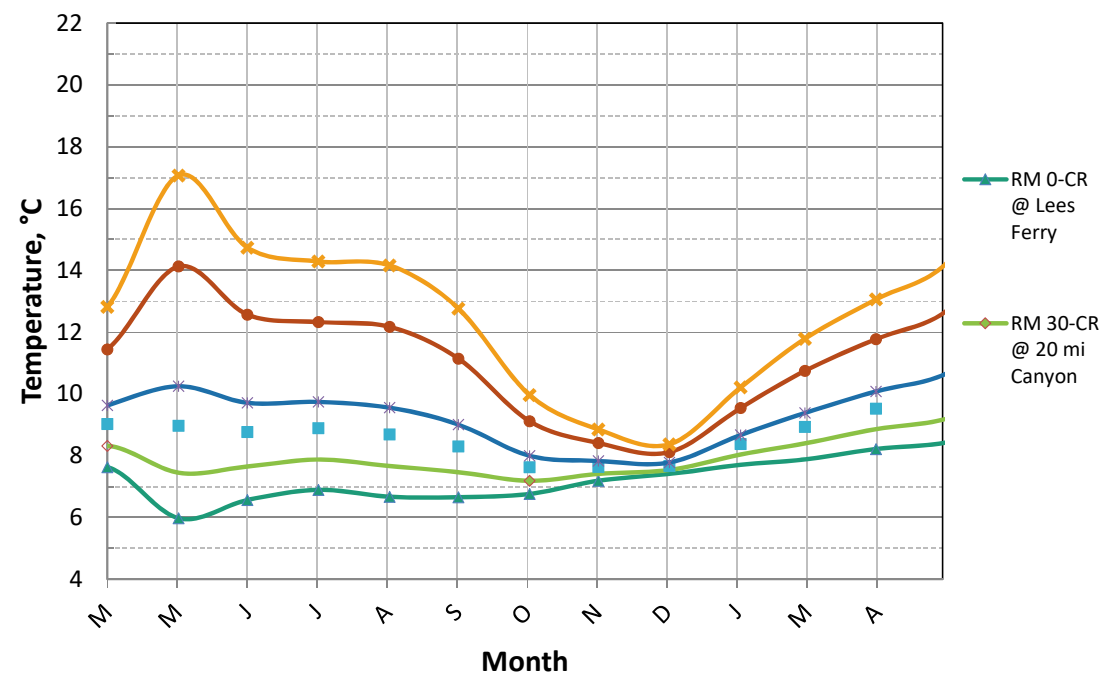
Colorado River, Grand Canyon Water Temperatures
 Projections based on 3600 ft elev Single Bypass



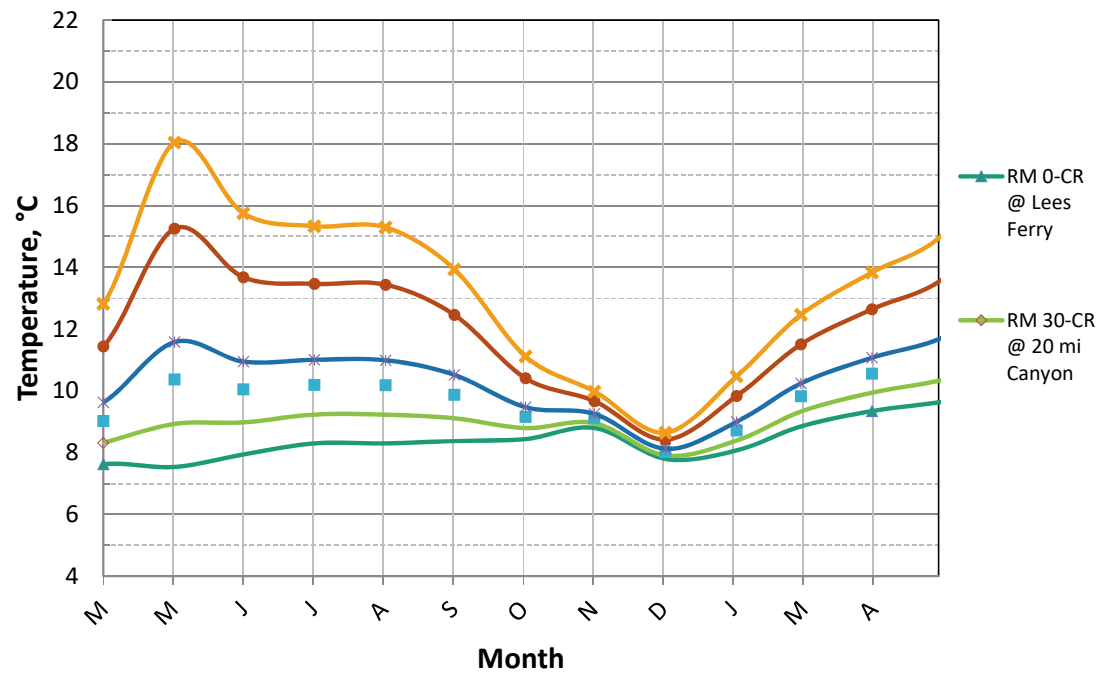
Colorado River, Grand Canyon Water Temperatures
 Projections based on 3600 ft Elev Double Bypass



Colorado River, Grand Canyon Water Temperatures
Projections based on 3700 ft Single Bypass



Colorado River, Grand Canyon Water Temperatures
Projections based on 3700 ft No Bypass



Colorado River, Grand Canyon Water Temperatures Projections based on 3700 ft Double Bypass

