

2024 & 2025 Coolmix Cost Impacts to Hydropower

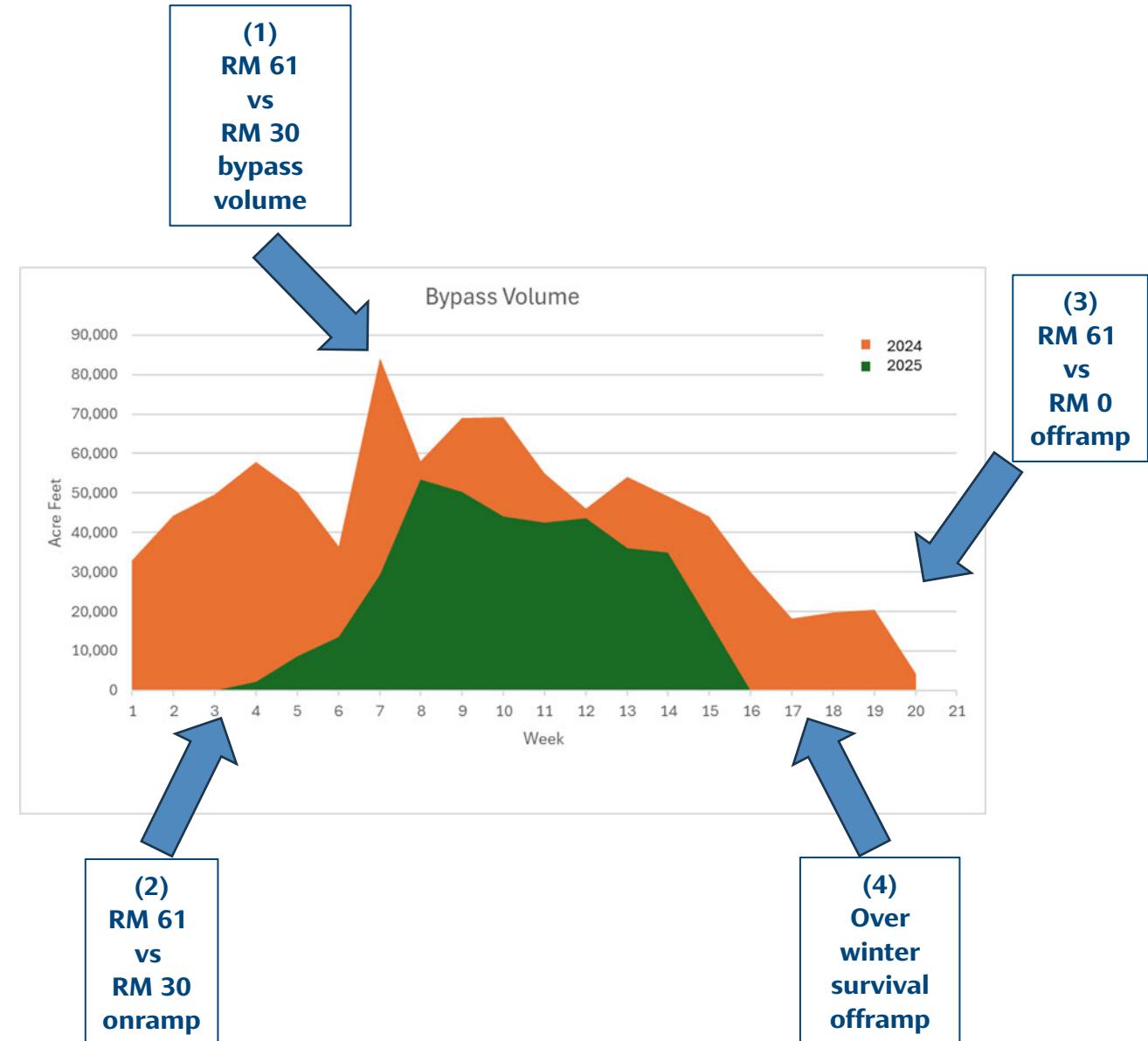
Technical Work Group
for the Glen Canyon Dam Adaptive Management Program
(GCDAMP)

December 11, 2025



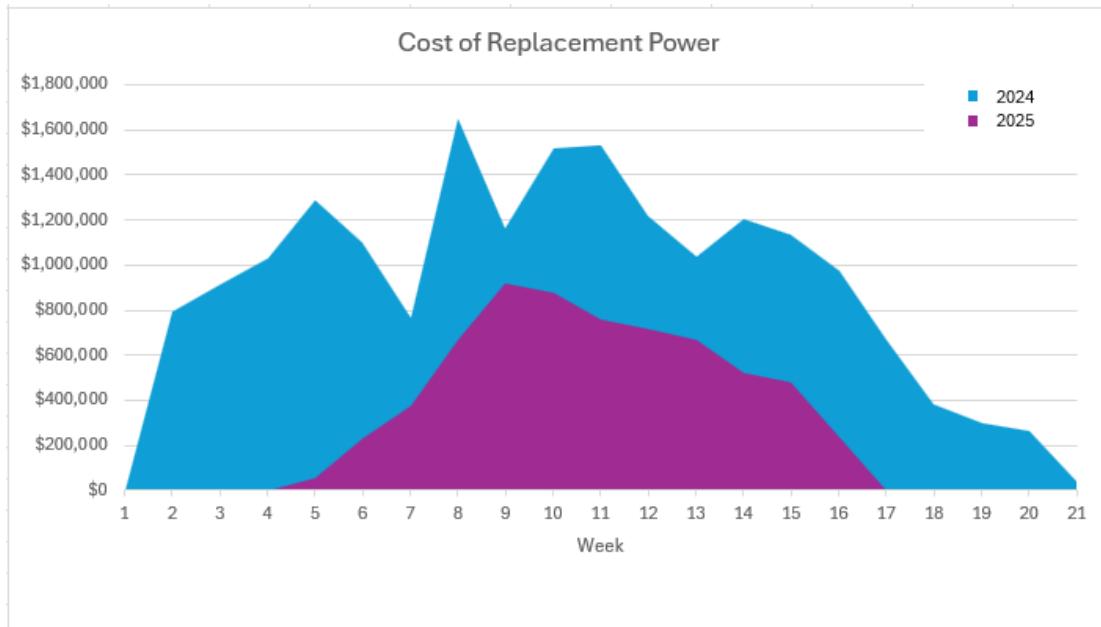
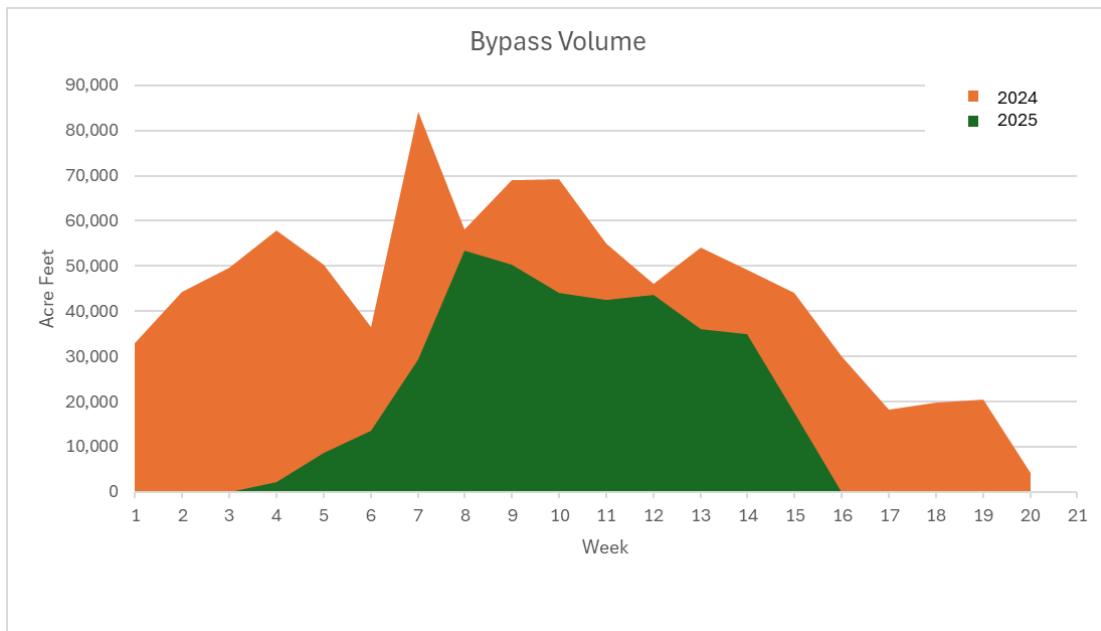
General Observations

- Target River Mile
 - Further upstream
 - (1) Less bypass – downstream warming
 - (2) Later start – downstream warming
 - (3) Later stop – downstream cooling
- Overwinter survival offramp
 - (4) Earlier stop
- Elevations and Inflows
 - Higher reservoir elevations
 - Increased distance between thermocline and penstocks – less bypass
 - Larger inflows (especially at lower reservoir elevations)
 - Deeper thermocline – more bypass



2024 vs 2025 Coolmix

- 2024
 - Jul 9 – Nov 18 (132 days)
 - RM 61 target
 - Temperature trigger & offramp
 - Capacity optimization tool
 - AF bypassed: 892,694 AF
 - Lost generation: 372,341 MWh
 - Cost of replacement power: \$19.1M
- 2025
 - Aug 1 – Oct 20 (72 days)
 - RM 30 target
 - Temperature trigger
 - Over winter survival offramp
 - Capacity optimization tool
 - Rough zone avoidance (minimal impact)
 - AF bypassed: 376,119 AF
 - Lost generation: 145,227 MWh
 - Cost of replacement power: \$6.5M

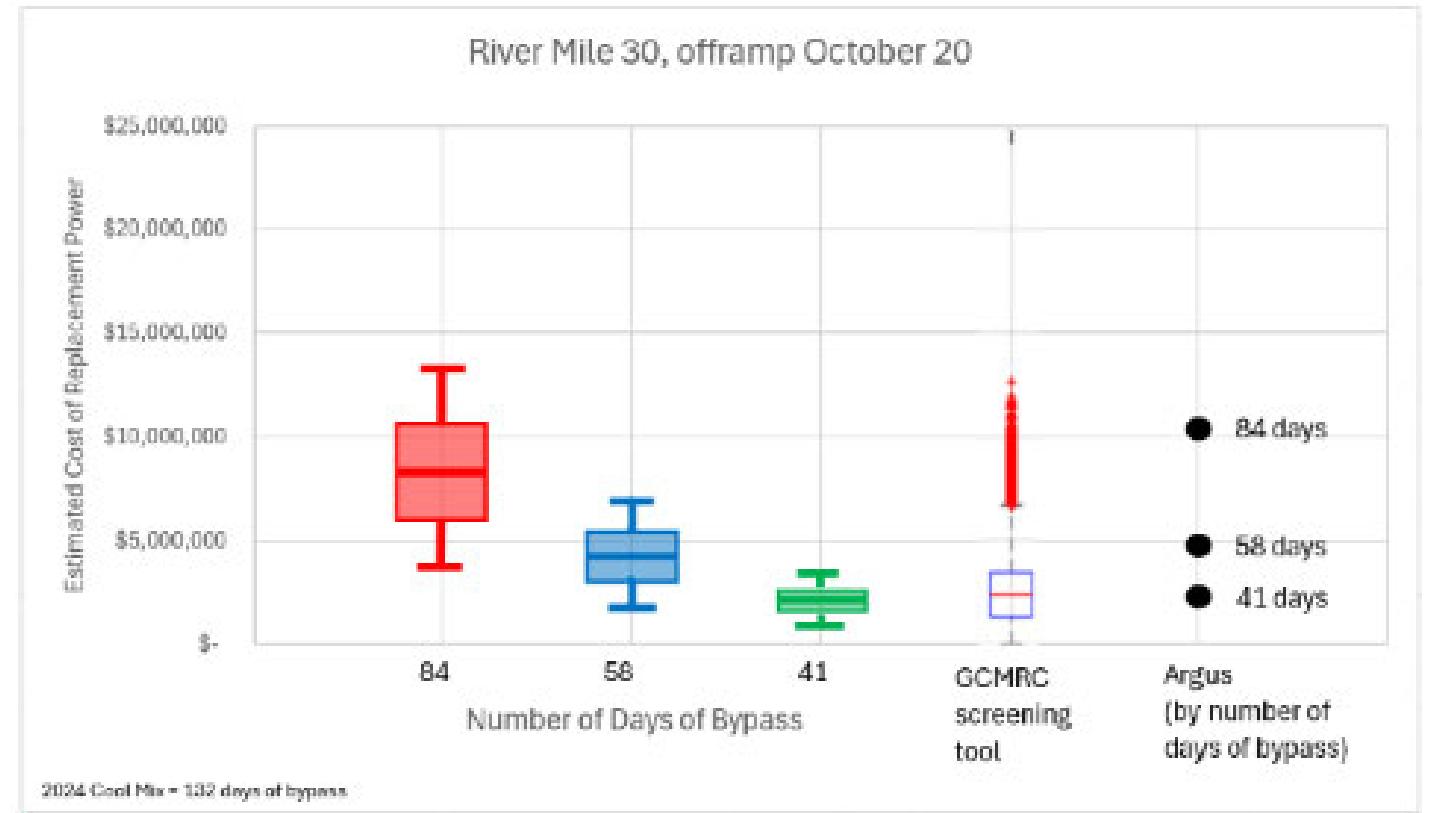


Cost of replacement power is mostly driven by bypass volume



2025 Tech Team Cost Estimates

- WAPA: \$4.4 M
 - GTMax
 - CRMMS traces
 - Ranked traces by number of days of bypass
 - Selected a “min, max, most” to approximate hydrology
 - 84 days: dry/warm
 - 58 days: most probable
 - 41 days: wet/cool
- GCMRC: \$2.8 M
 - Screening Tool
 - CRMMS traces
 - 1,000 forecasts of hourly energy prices
- Argus: \$4.7 M
 - Point estimate of the 3 traces used by WAPA
- Actual: \$6.5 M



Tech Team Cost estimates (April CRMMS 2025)
Methods described in the 2025 Tech Team Report



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