



# Potential Economic Cost of Smallmouth Bass Flows

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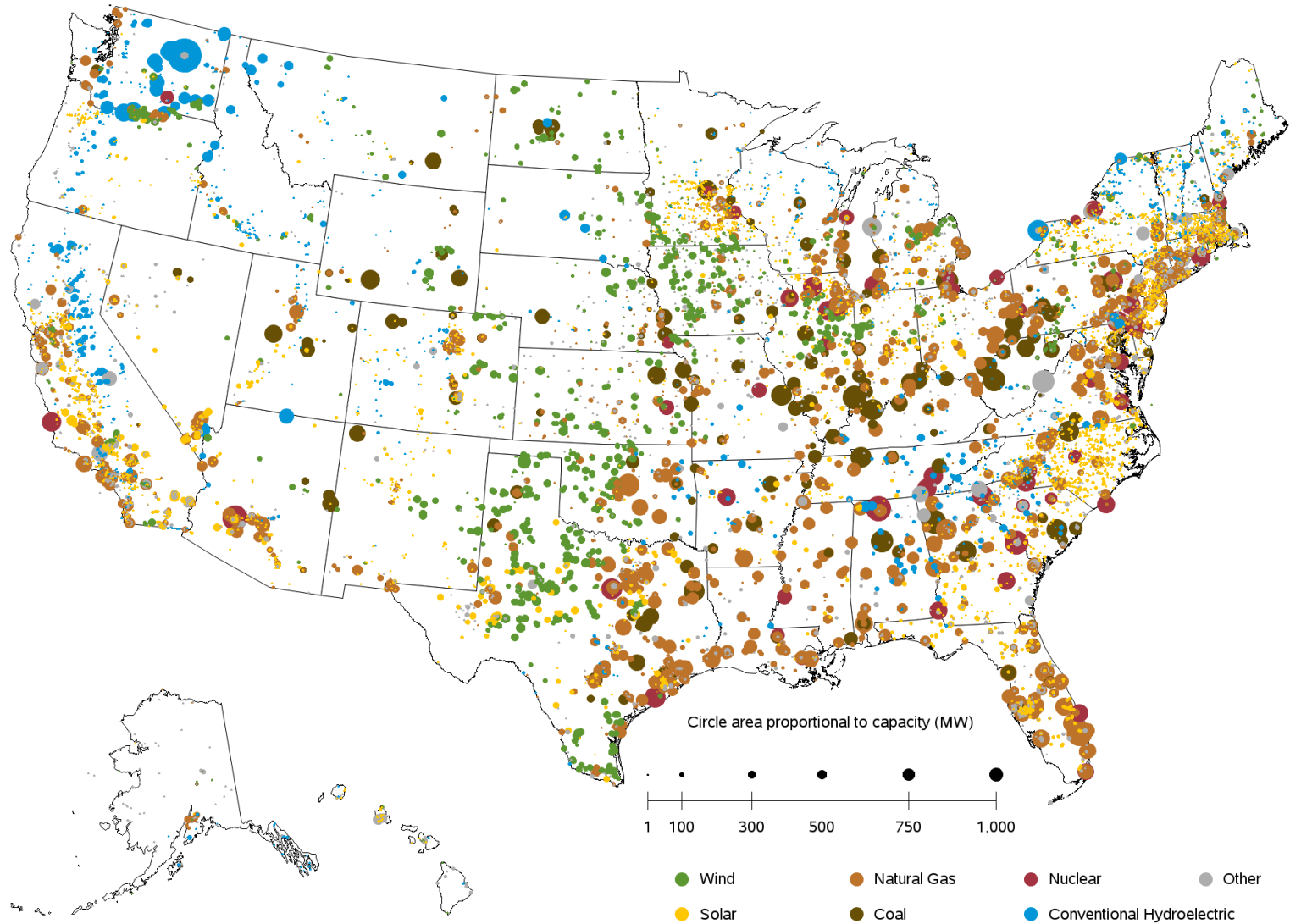
# Hydropower Resource Goal

- Maintain or increase Glen Canyon Dam electric energy generation, load following capability, and ramp rate capability, and minimize emissions and costs to the greatest extent practicable, consistent with improvement and long-term sustainability of downstream resources.
- Project N will identify, coordinate, and collaborate with external partners on monitoring and research opportunities associated with operational experiments at GCD designed to meet hydropower and energy resource objectives, as stated in the LTEMP ROD.



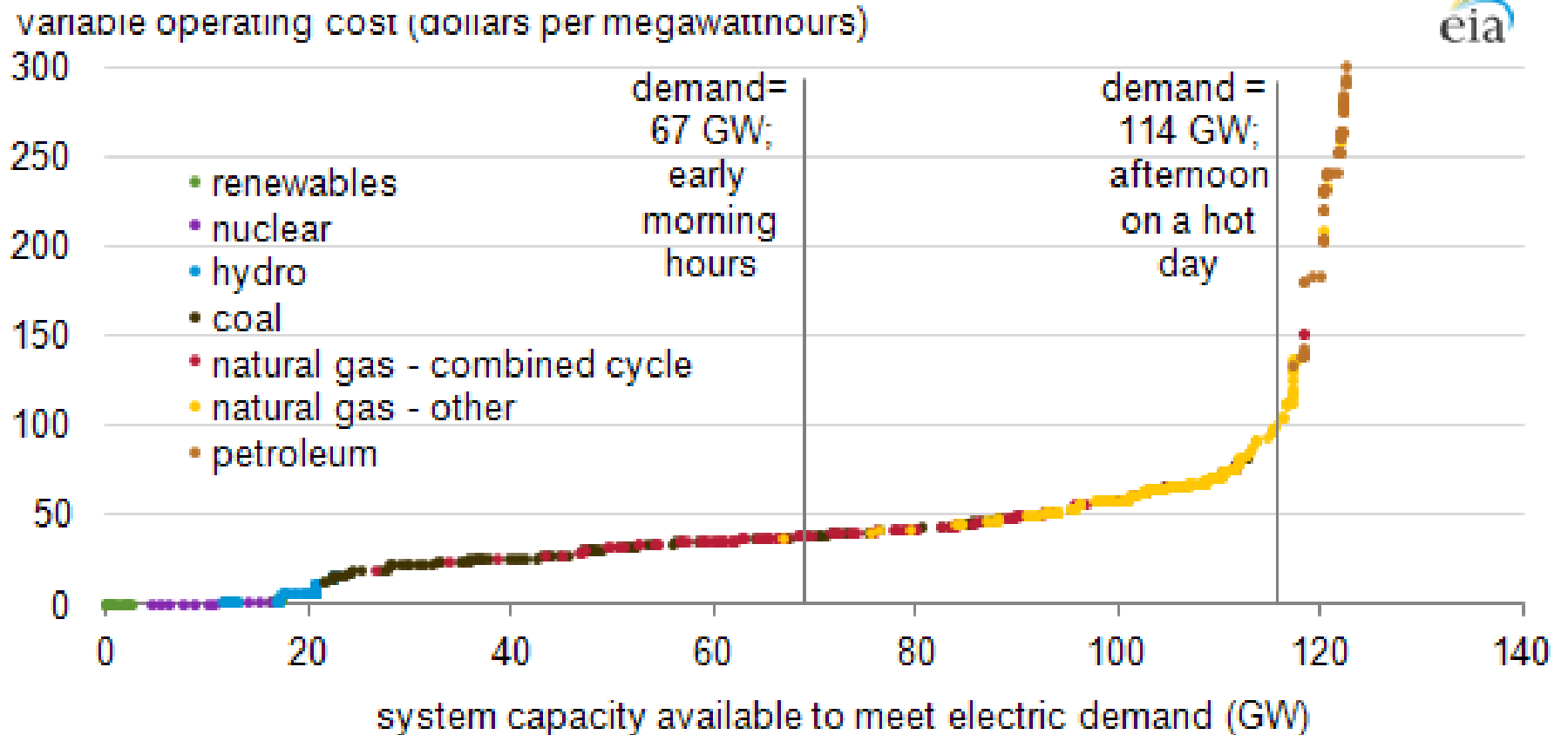
# Operable utility-scale generating units

Operable utility-scale generating units as of November 2023



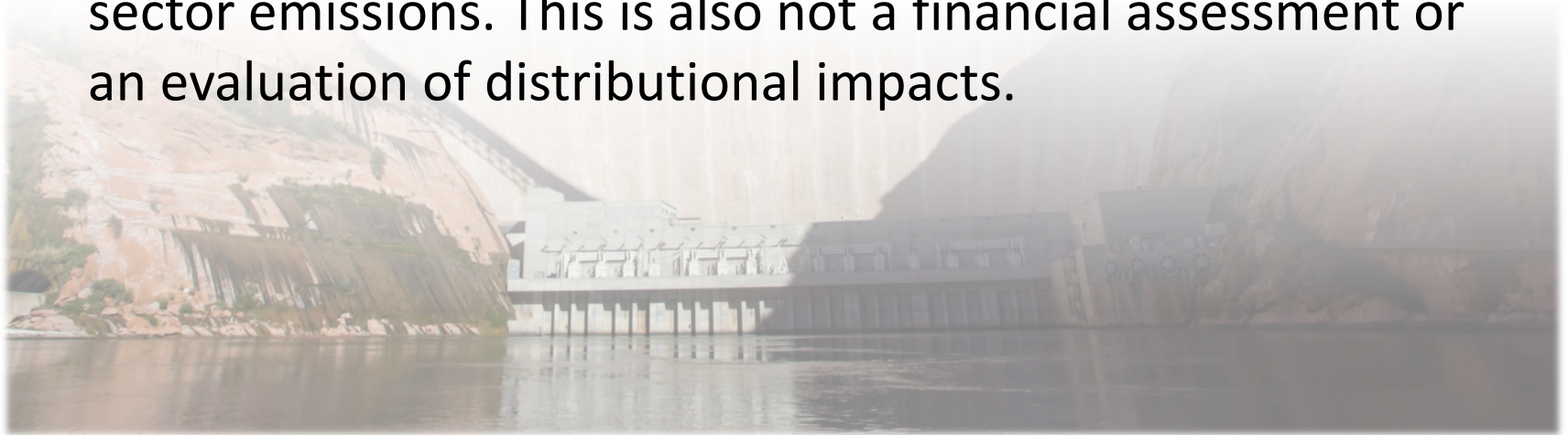
Sources: U.S. Energy Information Administration, Form EIA-860, 'Annual Electric Generator Report' and Form EIA-860M, 'Monthly Update to the Annual Electric Generator Report.'

# Energy dispatch curve for summer

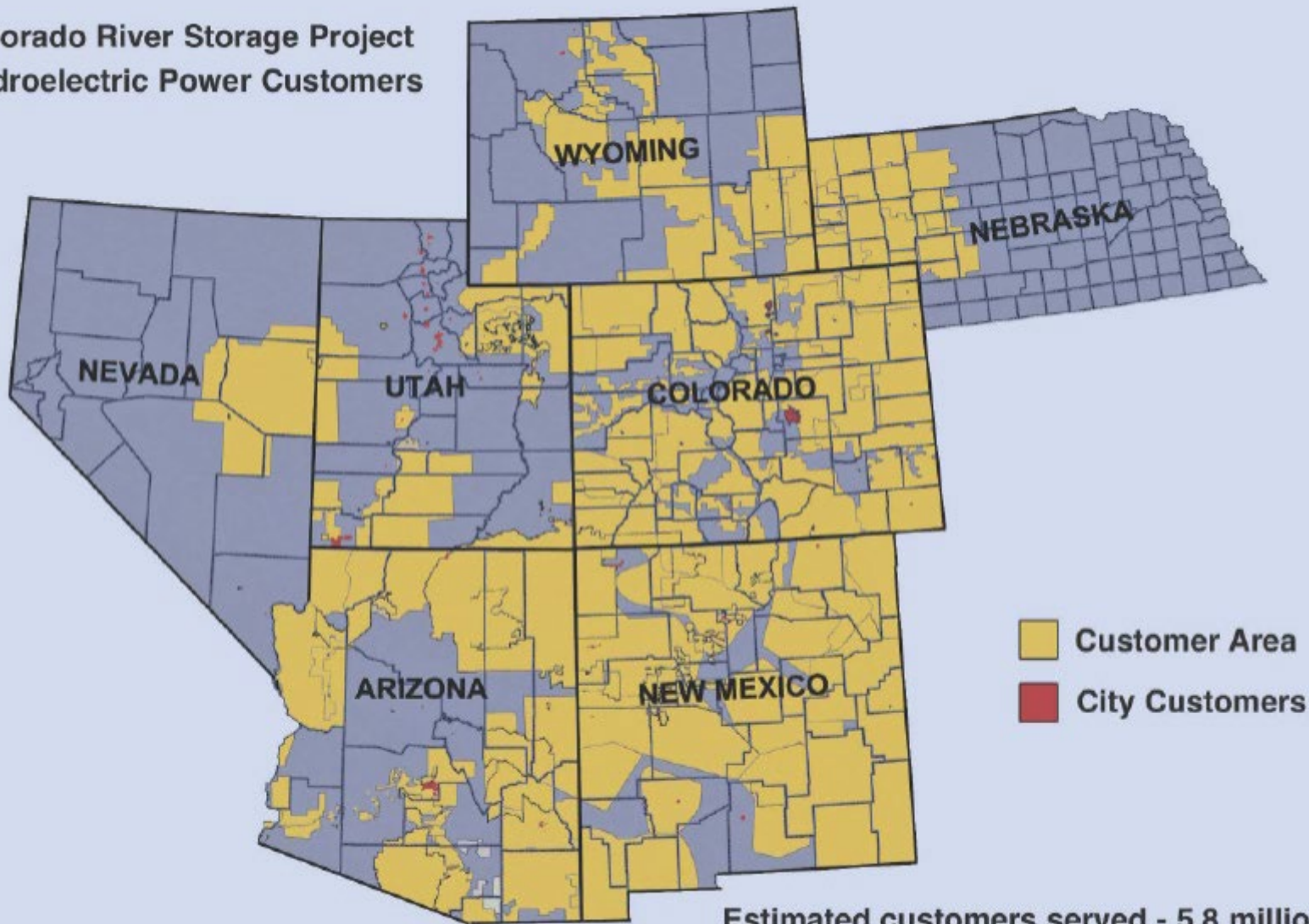


# Integrated Model

- Integrated physical, biological and economic models improves the program's capacity to evaluate and prioritize monitoring, research and management alternatives specific to the operation of GCD.
- This is an economic analysis of the energy costs. We are not estimating capacity costs or cost from changes in power sector emissions. This is also not a financial assessment or an evaluation of distributional impacts.

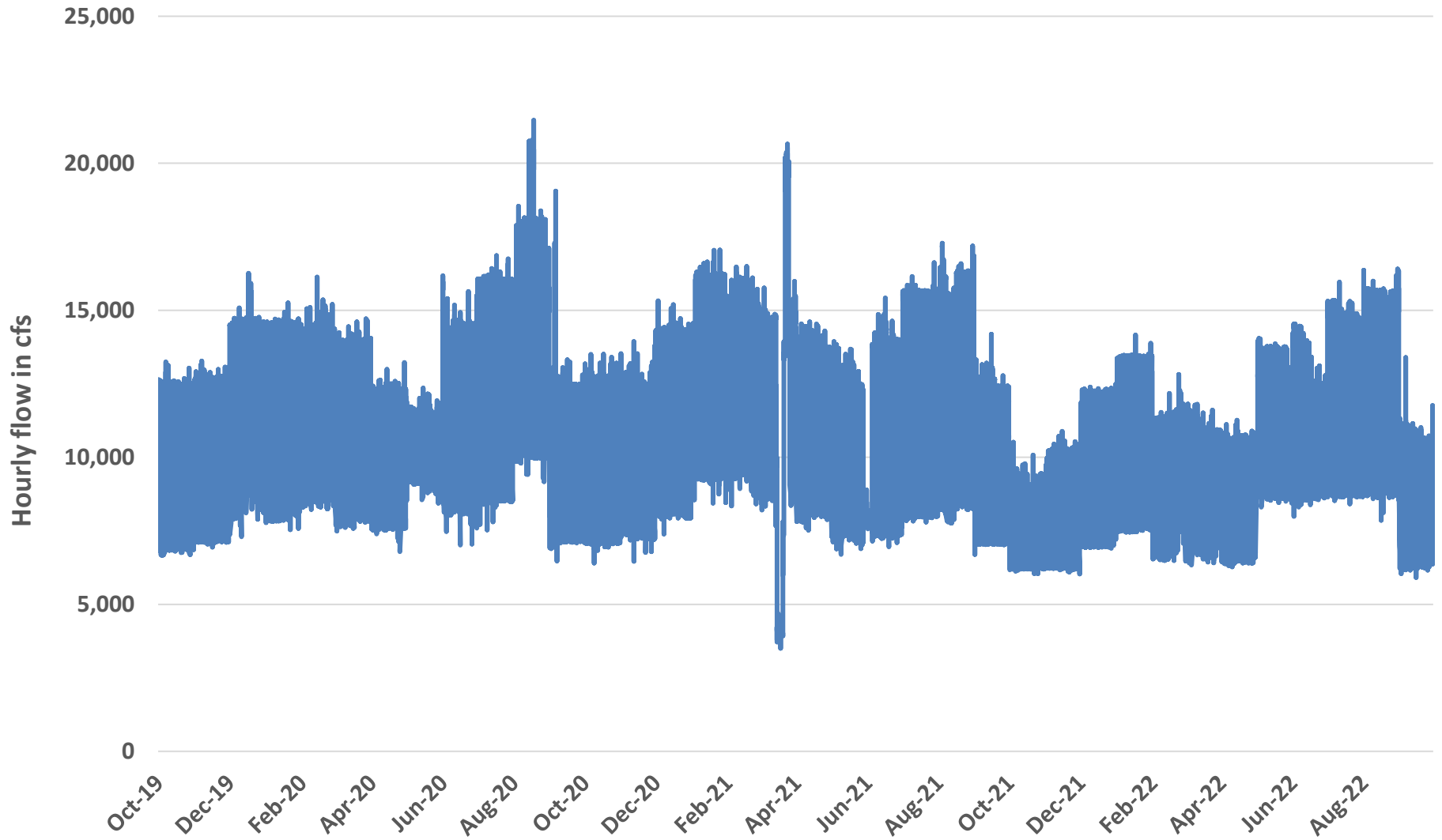


# Colorado River Storage Project Hydroelectric Power Customers



Estimated customers served - 5.8 million

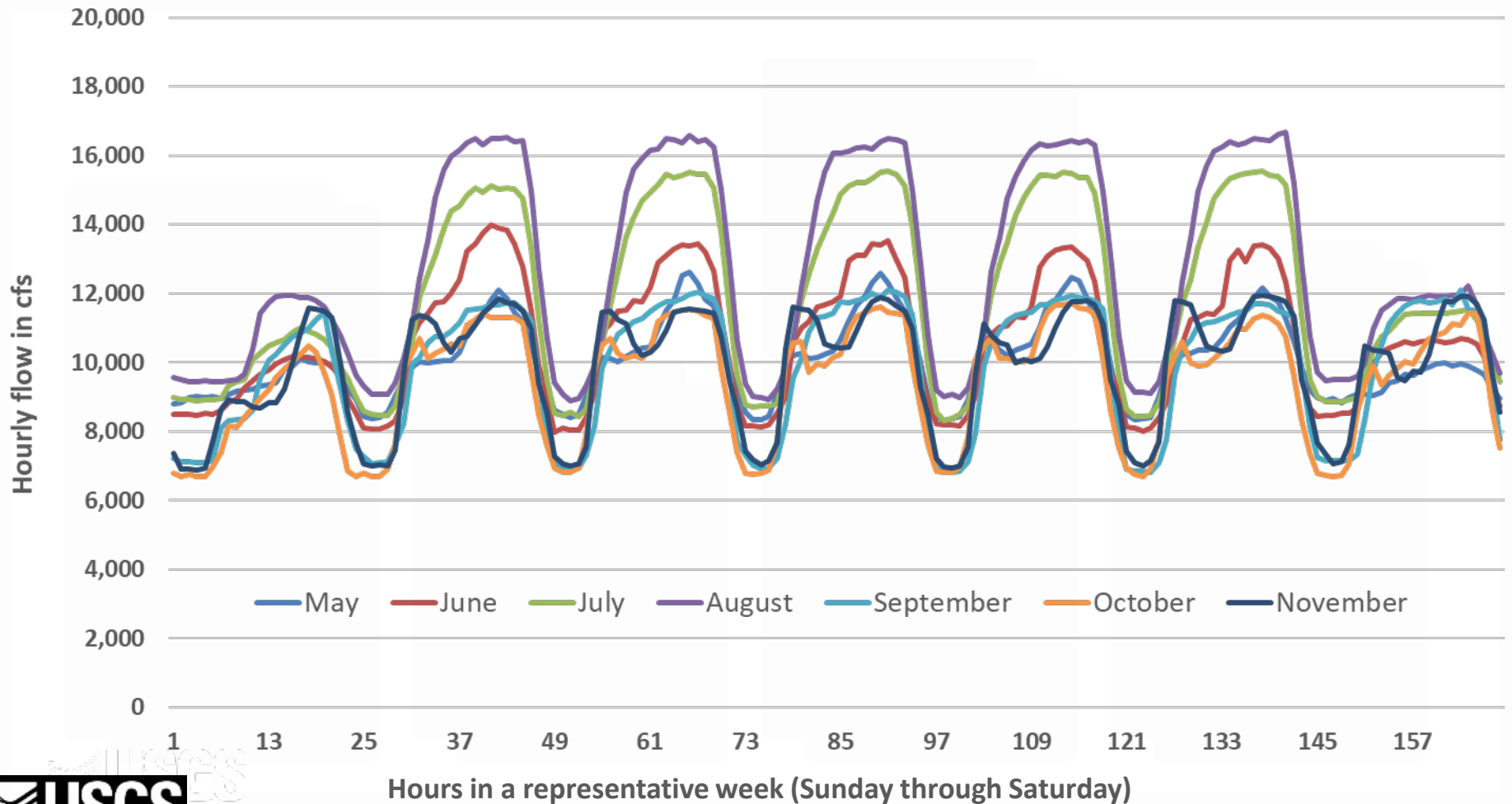
# Historic Glen Canyon Dam Operations



Source: U.S. Bureau of Reclamation. [https://www.usbr.gov/lc/region/g4000/riverops/\\_HdbWebQuery.html](https://www.usbr.gov/lc/region/g4000/riverops/_HdbWebQuery.html)

# Glen Canyon Dam Operations

Average hourly Glen Canyon Dam release by month, day, and hour of the week from May 2020 through November 2022

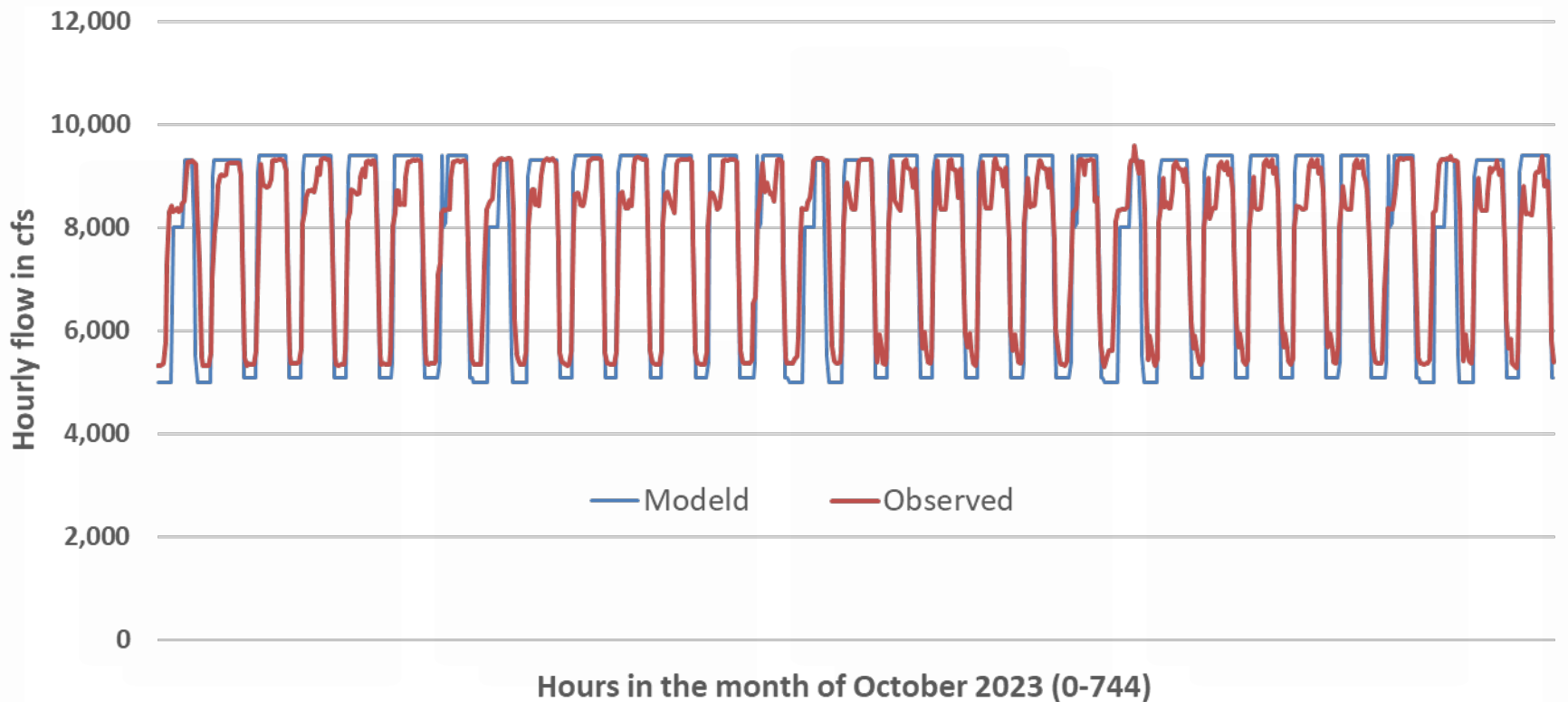


Source: U.S. Bureau of Reclamation. [https://www.usbr.gov/lc/region/g4000/riverops/\\_HdbWebQuery.html](https://www.usbr.gov/lc/region/g4000/riverops/_HdbWebQuery.html)



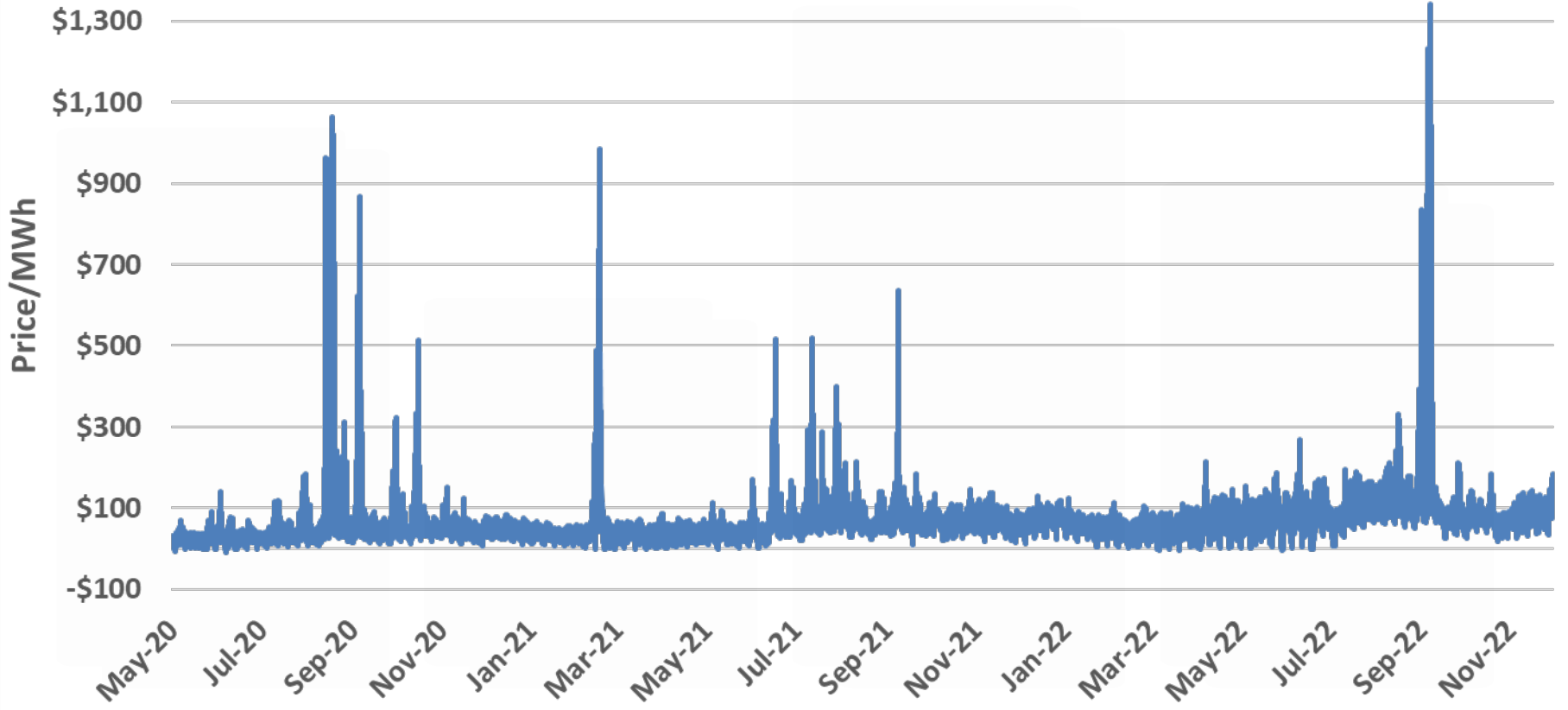
# Modeled GCD Operations

Recent historic operation at GCD is a good predictor of near-term GCD operation.



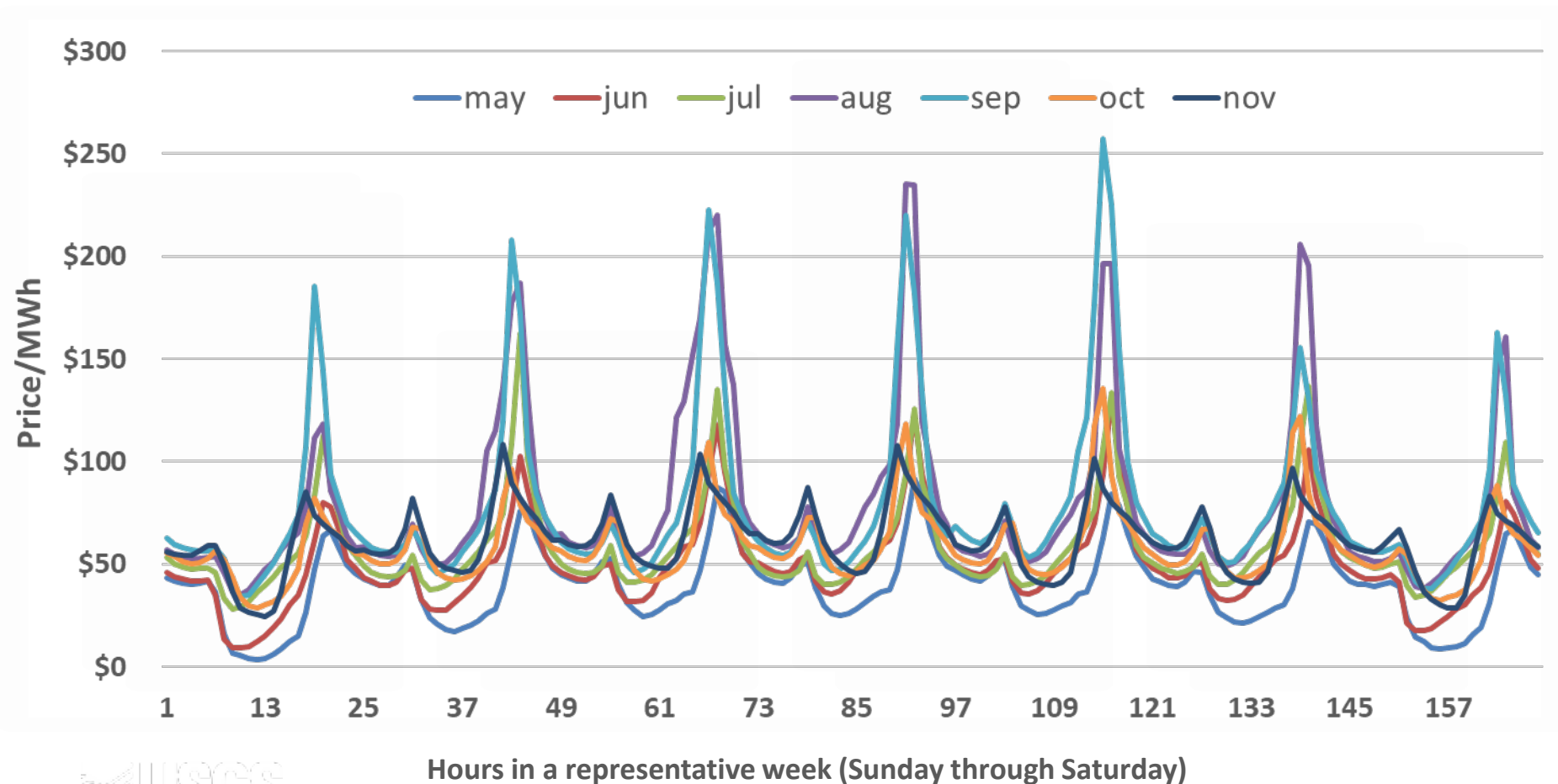
Preliminary data, do not cite

# Historic Electricity Prices at the Palo Verde Hub



# Electricity Prices at Palo Verde

Average hourly electricity price by month, day, and hour of the week from May 2020 through September 2022



Source: California ISO Open Access Same-time Information System (OASIS).  
<http://oasis.caiso.com/mrioasis/logon.do>

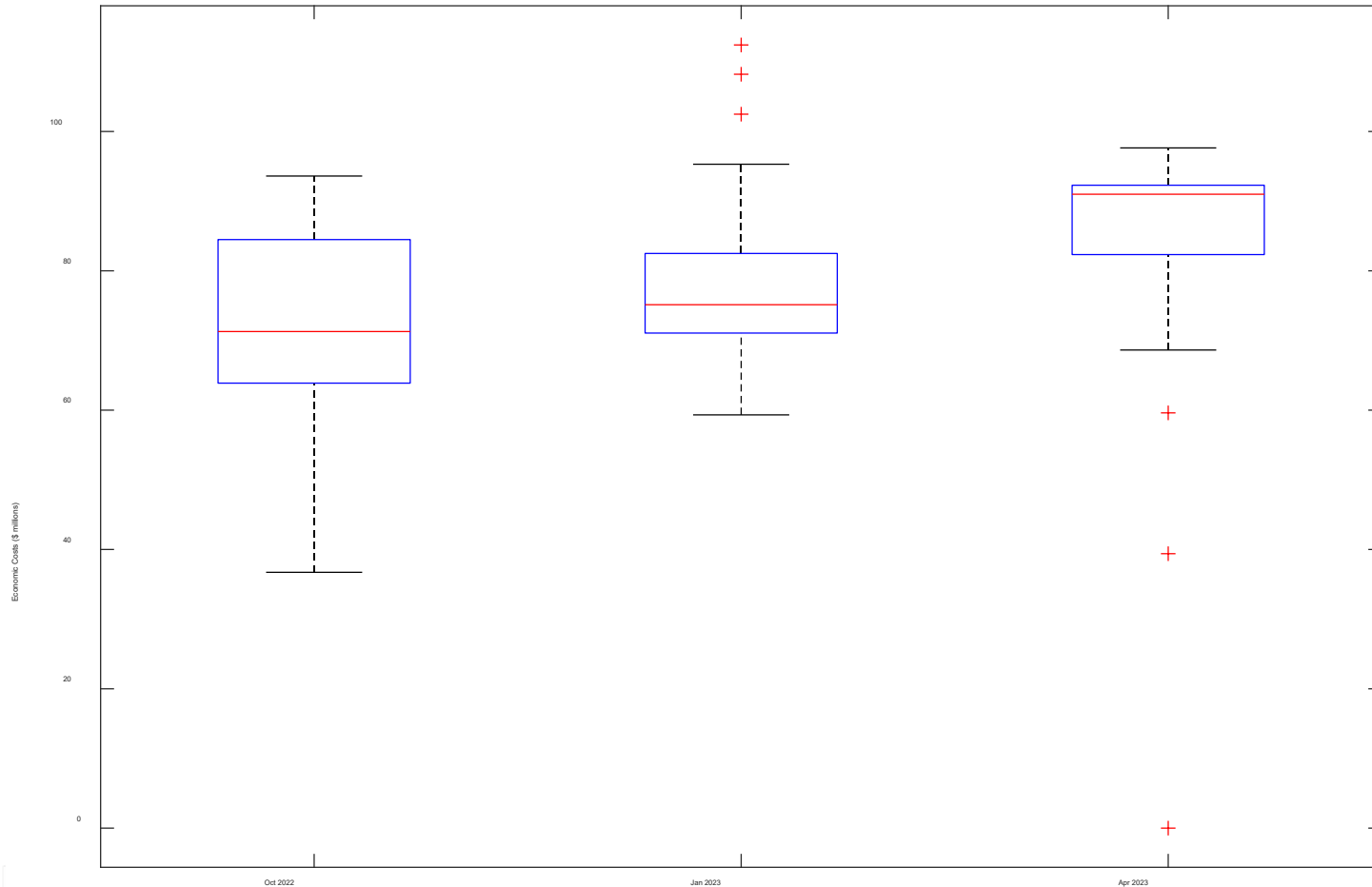
# Modeled Energy Price

Recent historic energy prices and futures contracts at the Palo Verde Hub are good predictors of near-term energy prices.

Preliminary data, do not cite

# Modeled Results

October 2022, January 2023, and April 2023 forecast economic cost of SMB flows at the Little Colorado River for 2023 calendar year with hydrologic uncertainty



# Modeled Results

October 2022, January 2023, and April 2023 forecast economic cost of SMB flows at the Little Colorado River for 2023 calendar year with hydrologic and energy price uncertainty



Photo Credit: Amy S. Martin