Glen Canyon Dam Hydropower Production and Value Status & Trends, 2019

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Glen Canyon Powerplant

Capacity: 1,320 MW

Energy: 3,978 GWhs (10-year average annual)

Status and Trends

Recent variables affecting hydropower metrics

- Recent decrease in power efficiency

  [hydropower head = elevation of Lake Powell − elevation of GCD tailrace]

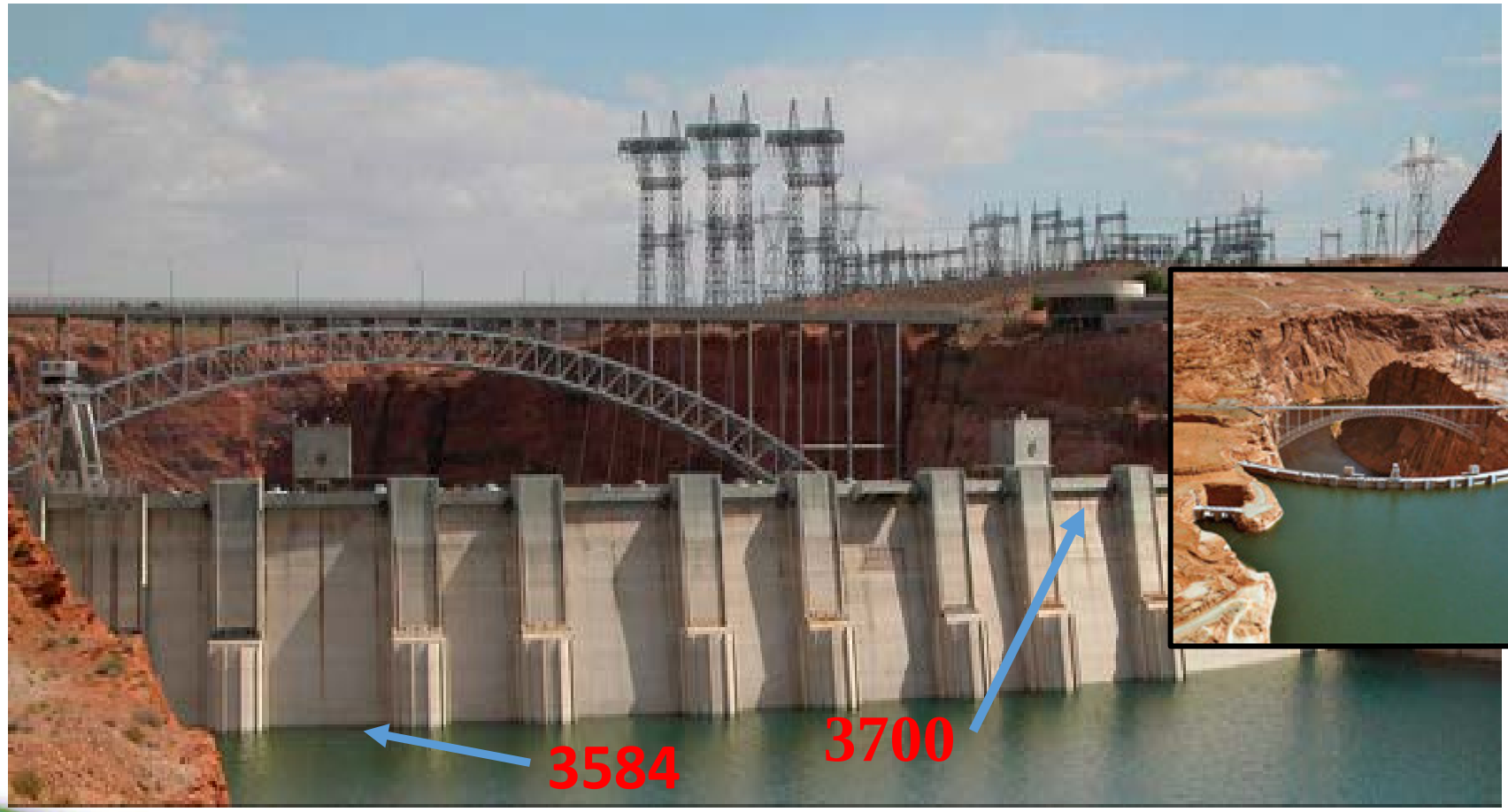
  Variation in power efficiency effects electrical generation, capacity & net firming purchases

- Impacts of the Summer, 2018 Bug Flow Experiment on Hydropower

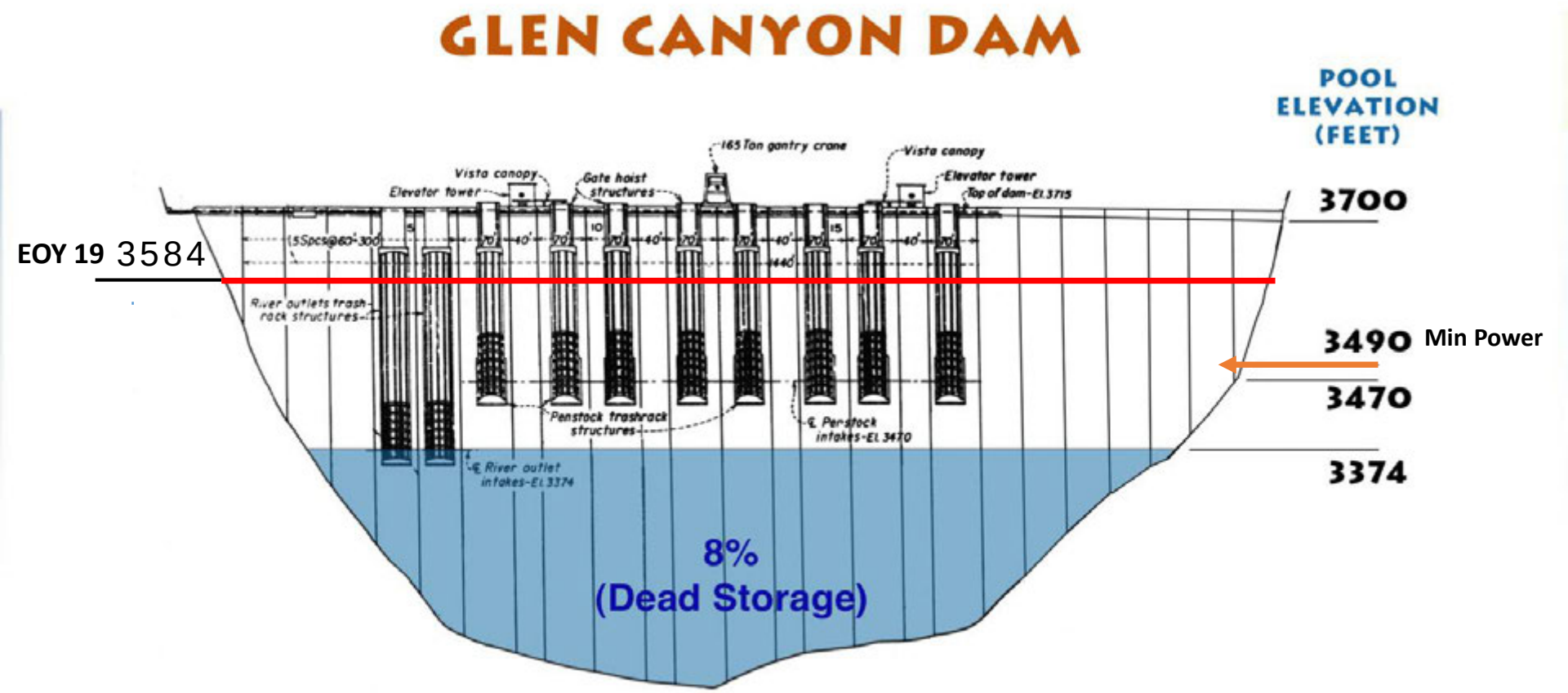
Hydropower efficiency

Lake Powell Elevation Affects Power Efficiency:

The efficiency in turning Acre Feet into Megawatt hours

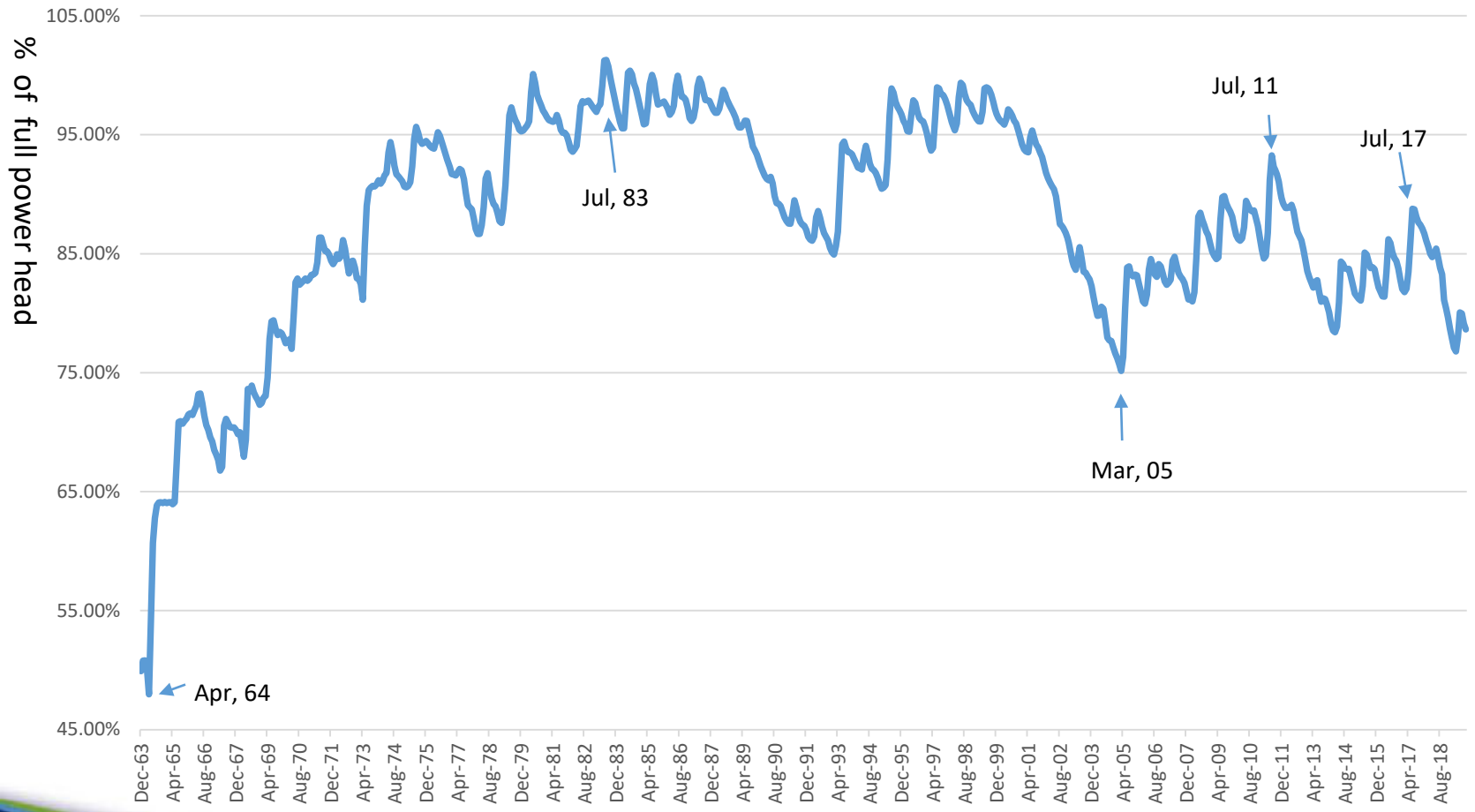


Important Lake Powell Elevations



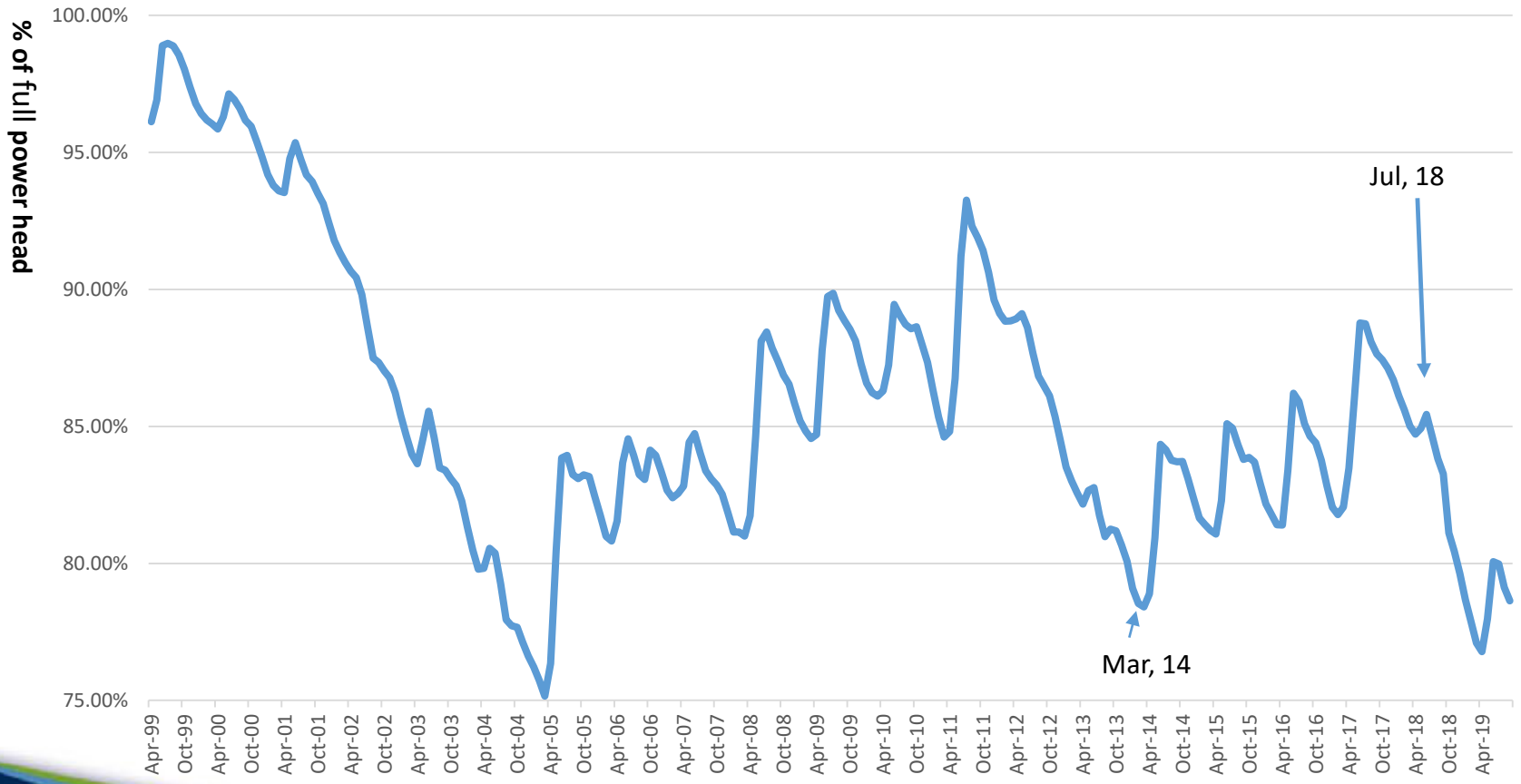
GCD Hydropower Head

From first electrical production 1963 - 2019

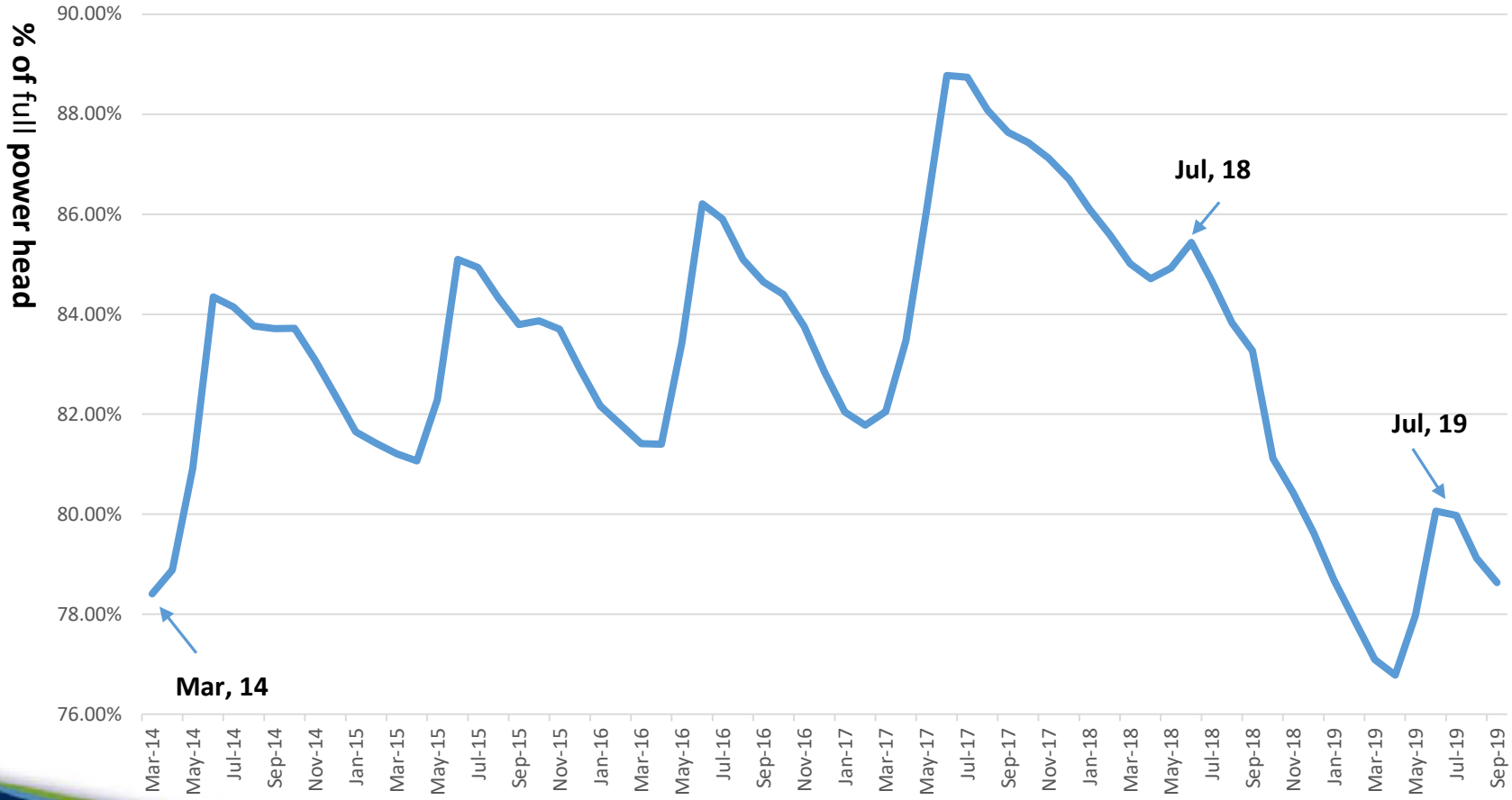


GCD Hydropower Head

From the beginning of current drought 1999 - 2019



GCD Hydropower Head
2014 - 2019



The Effect of Power Efficiency on GCD Energy Production

Date	Lake Powell Elevation (ft)	Energy production in a 9.0 maf year (GWh)	Percentage of production vs full powerhead
July, 1983	3,707.40	4,617	101.25%
Mar., 2005	3,555.90	3,378	74.09%
Jan., 2014	3,578.69	3,575	78.39%
Jan., 2018	3,619.38	3,916	85.89%
Jul., 2019	3,583.66	3,620	79.98%

Summer, 2018 Macroinvertabrate Experiment

"Bug flow" experiment

Development of the experiment

- The Bug Flow experiment was developed out of a joint scientific effort to understand the relationship between load-following flows and the aquatic food base.
- This cooperative study was joined by GCMRC, Reclamation, WAPA, and Utah State University's Bug Lab.
- Interest in studying low-volume, steady flows were implemented during the weekend, when electrical power has less value in favor of moving water to on-peak hours during the week, when additional power production is needed .
- This cooperative effort can serve as a templet of a "Project N" approach to the development of GCD operational experiments.

Modeling input for the Bugflow Experiment – Summer, 2018

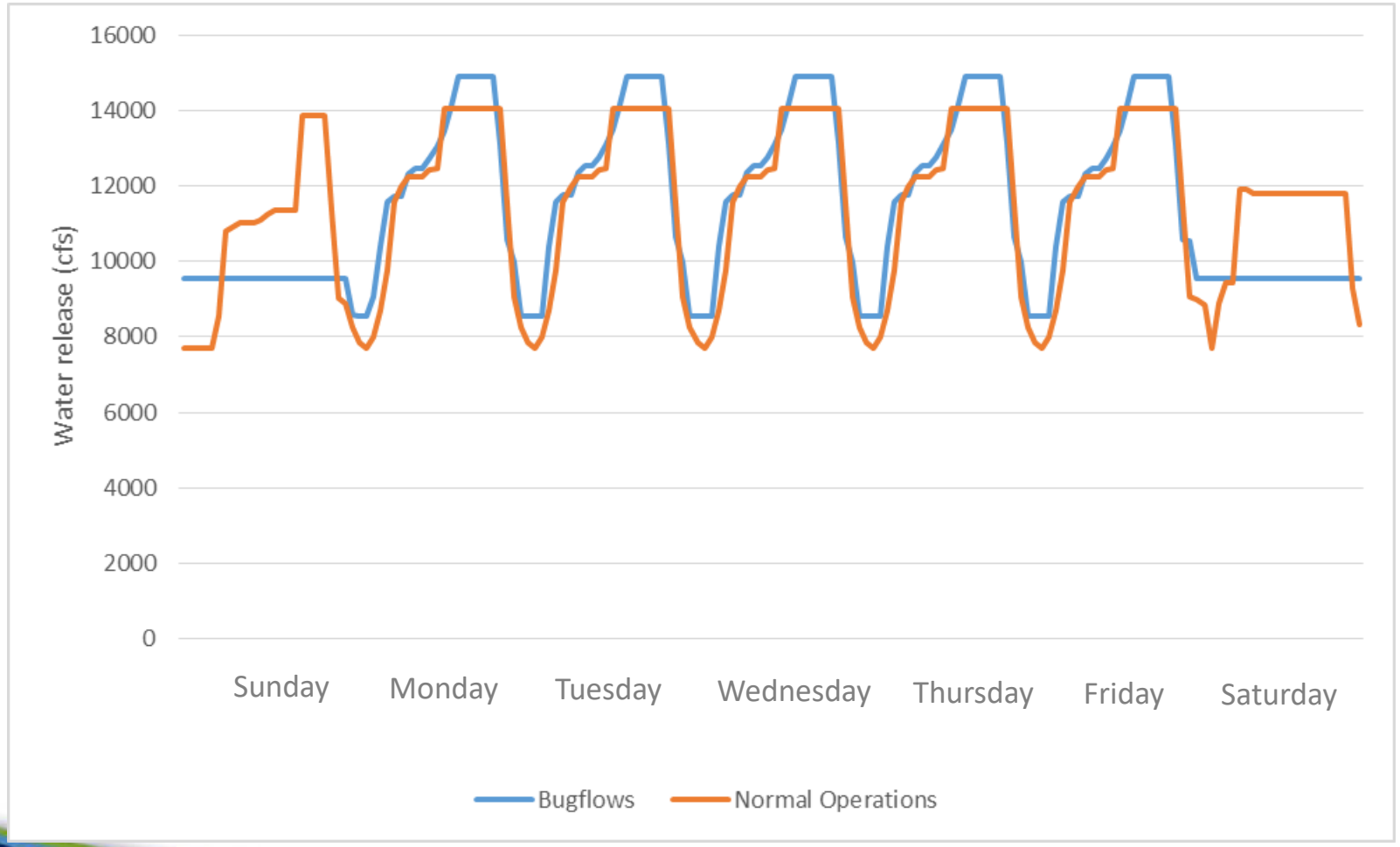
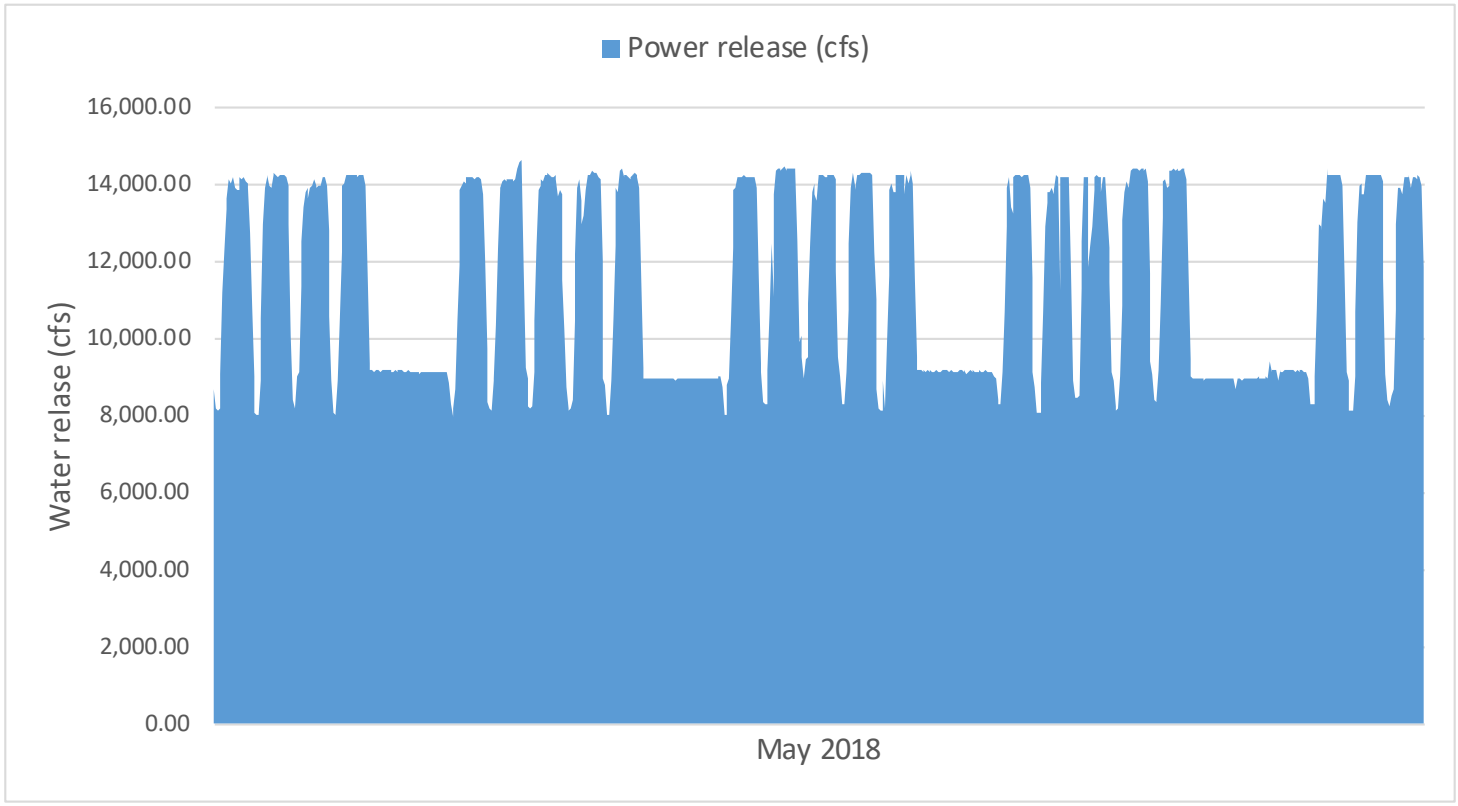


Illustration of Bug Flows

May, 2018



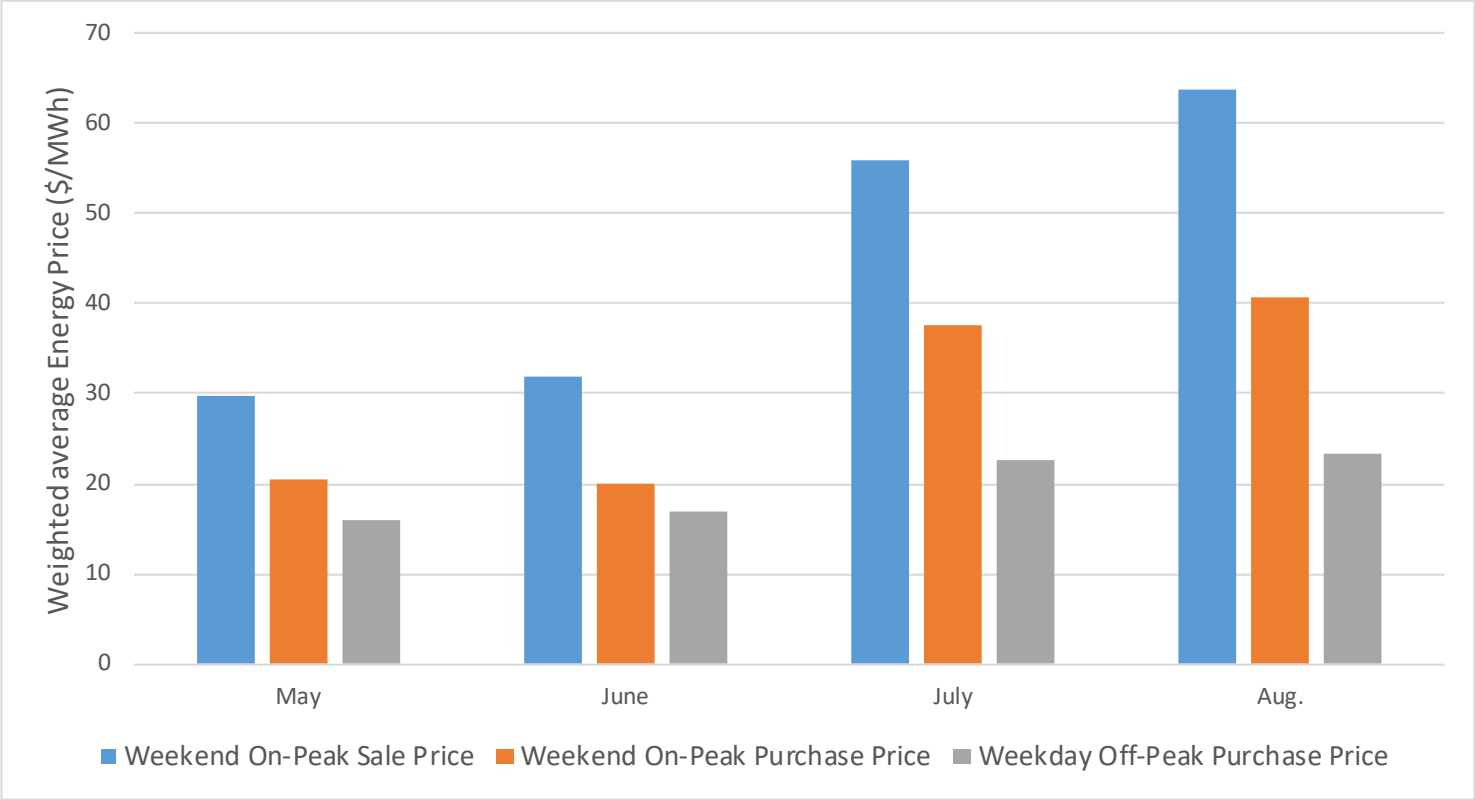
Results of the experiment

- The Argonne estimates that the 2018 Bug Flows had a financial impact of $165,000.
- This dollar amount is relatively small given the assumptions used in the modeling process.
- The 2018 Bug Flow experiment produced benefits to hydropower in the months of May and June, and costs to hydropower in July and August. The month of June turned out to be of particular benefit to hydropower.

Results (cont.)

- These results are a function of the patterning of water releases.
- Also, the result reflects the differences between weekday and weekend energy prices. Electrical energy prices are lower, and the weekday/weekend difference is less, in May and June 2018 than they were in July and August 2018.
- To arrive at a positive financial outcome to hydropower, weekend electricity prices must be substantially lower than weekday prices.

The import of the difference between weekday and weekend prices



Additional considerations

- The impact of capacity improvements during weekdays was not included
  - This is because capacity is – currently – above required capacity margins in the WECC region
- A word of caution:
  - A different set of weekend/weekday prices would produce a different result.

Questions ?

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