



— BUREAU OF —
RECLAMATION

Drought Impacts on Hydropower

Hoover, Parker, and Davis Dams

September 16, 2022

Drought Impacts on Hydropower

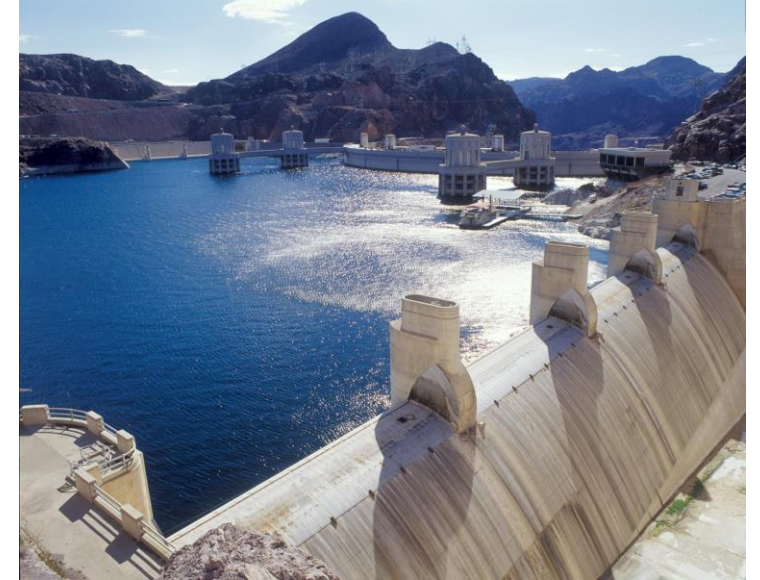
Parker Davis Dams

- Hydropower Basic Concepts
- Hoover Dam Operations and Impacts
- Parker and Davis Dams Operations and Impacts



Hydropower Basic Concepts

- Primary measurable elements of hydropower
 - Energy – electricity we produce measured in MWh
 - Capacity – the maximum amount of electricity that can be produced measured in MW
- Energy is impacted primarily by two factors
 - Amount of water that passes through the generators each year
 - Depth of the water
 - Deeper the water the more force (head) the water has and more energy that can be produced with the same amount of water
- Capacity is impacted primarily by two factors
 - Depth of the lake
 - Availability of Generators



November 2000



November 2020



Hoover Dam

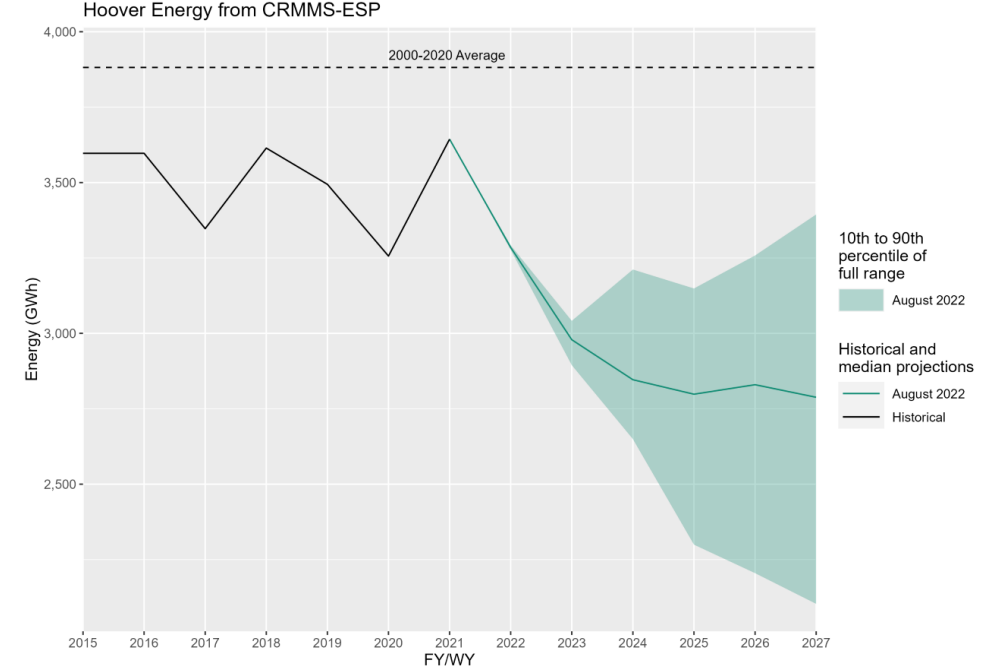
- 17 Generators – 2,074 MW nameplate capacity (current capacity ~1,330 MW)
- 46 Power Customers, power is distributed – 55% CA, 25% NV, and 20% AZ
- Operations
 - Water delivery requirements are established monthly based on water orders
 - Water orders converted to MWh
 - Power Customers must schedule energy deliveries to meet monthly target with weekly sub-targets
 - Power Customers have flexibility to take power up to capacity limits any time of the day as long as they meet weekly targets
- Annual water deliveries through Hoover Dam have been about 9.2 maf per year. Annual deliveries do vary.



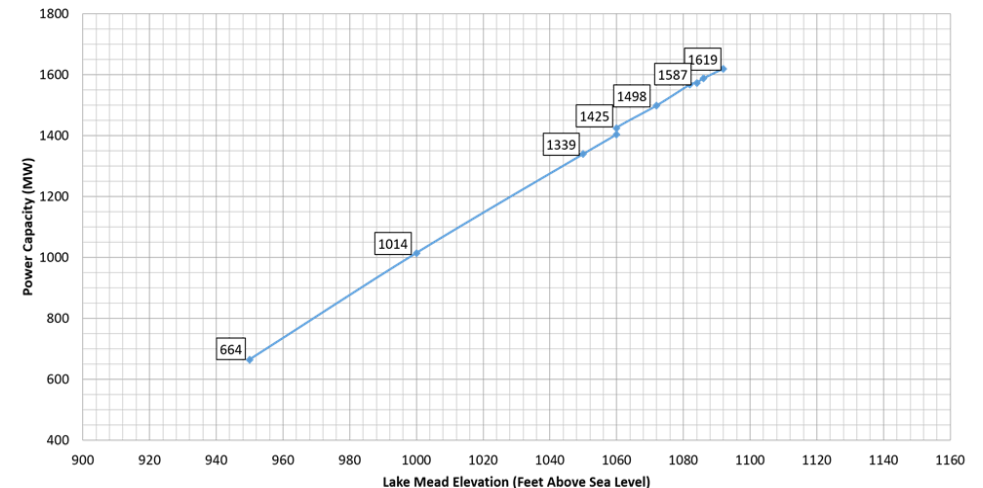
Energy and Capacity – Hoover

- Energy production was ~4,500 GWh per year prior to the start of the drought and is projected over next few years to be about 2,940 GWh per year - about a 35% decrease
- Expect continued decline in annual energy production but difficult to predict
 - Hydrology, ongoing conservation efforts, variability of water orders
- Capacity will decline similar to energy

Annual Energy Production Hoover Dam

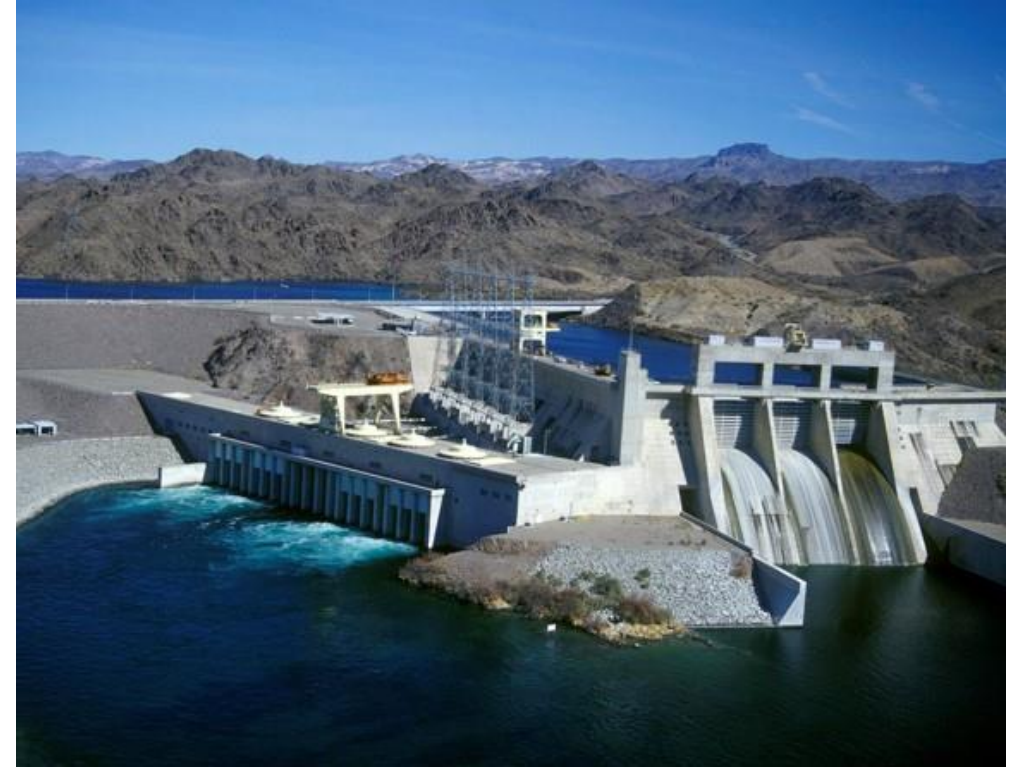


Power Capacity Expectations Hoover Dam



Davis Dam

- 5 Generators - 255 MW nameplate capacity
- 39 Power Customers, power distribution - 56.3% AZ, 23.4% CA, 20.3% NV
- Water deliveries are scheduled one day in advance. Water deliveries are maximized with limitations (minimum flow requirements) so power, as best as possible matches, Power Customer Demand and higher Market Prices
- Annual water deliveries through Davis Dam have been about 8.9 maf per year. Annual deliveries do vary.



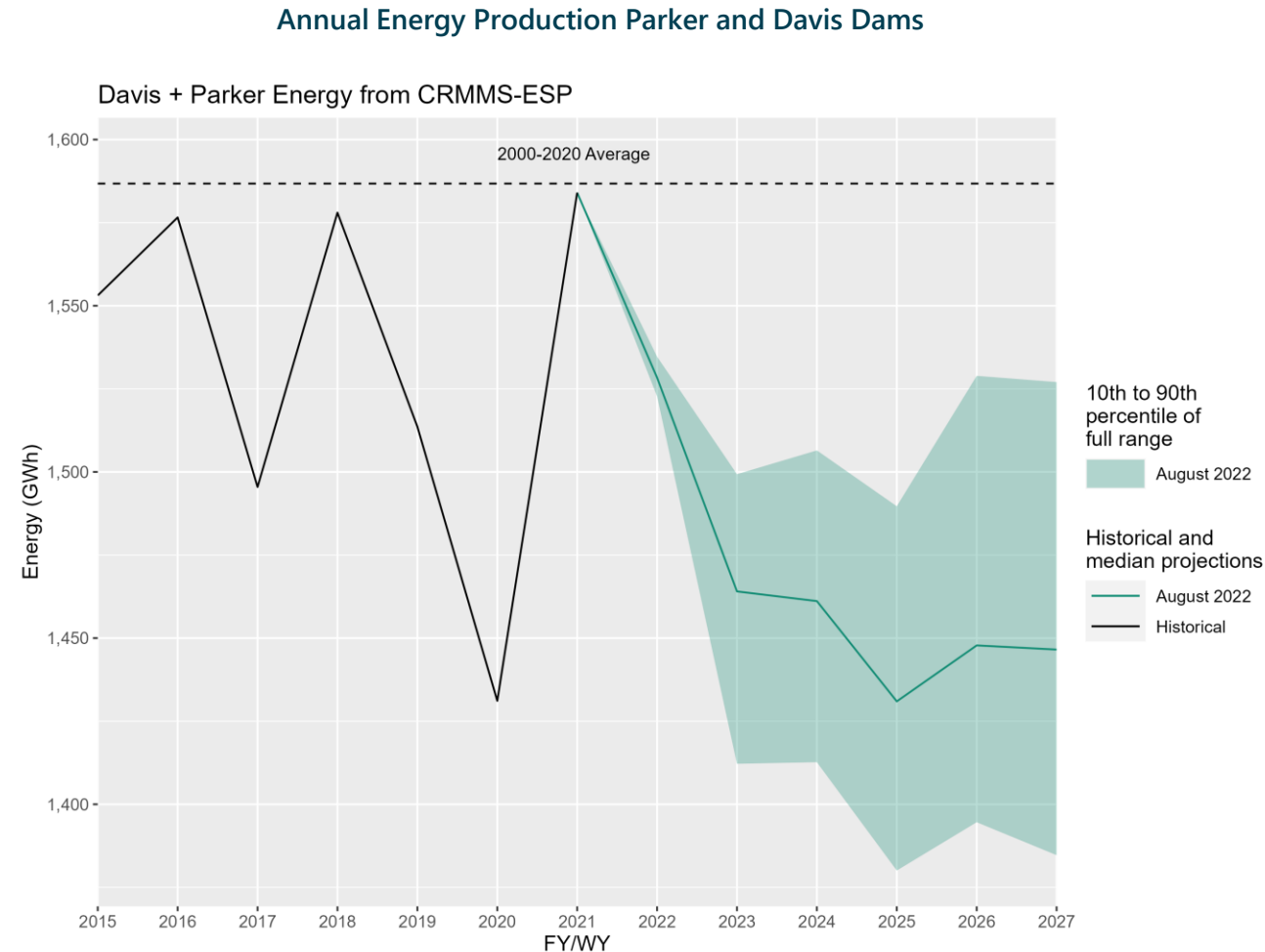
Parker Dam

- 4 Generators – 120 MW nameplate capacity
- 40 Power Customers, power distribution - 56.3% AZ, 23.4% CA, 20.3% NV for 50% of Parker Dam. Remaining 50% goes to Metropolitan Water District of Southern California.
- Water deliveries are scheduled one day in advance. Water deliveries are maximized with limitations (minimum flow requirements) so power as best as possible matches Power Customer Demand and higher Market Prices
- Annual water deliveries through Parker Dam have been about 6.4 maf per year. Annual deliveries do vary.



Energy – Parker and Davis Dams

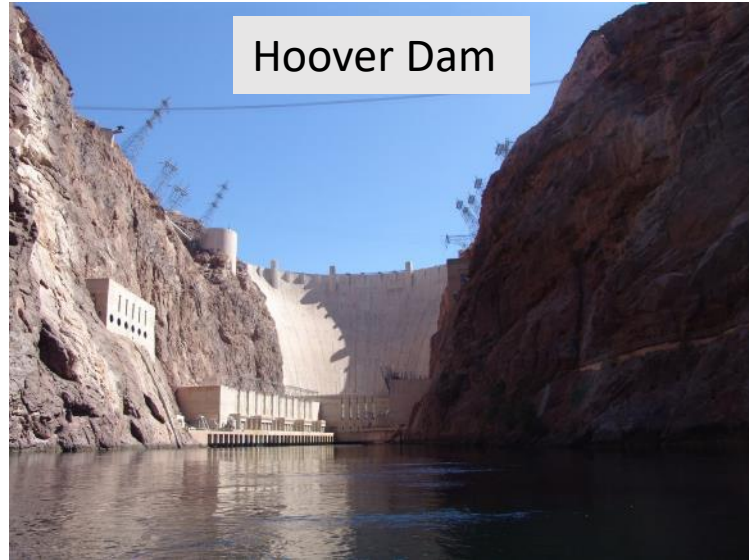
- Energy production was about 1,630 GWh per year prior to the start of the drought and is projected to be about 1,450 GWh per year now - about a 11% decrease
- Expected relatively consistent year to year energy production looking forward but difficult to predict
 - Hydrology, ongoing conservation efforts, variability of water orders
- Limited capacity impacts – Parker and Davis Dam reservoirs remain relatively stable



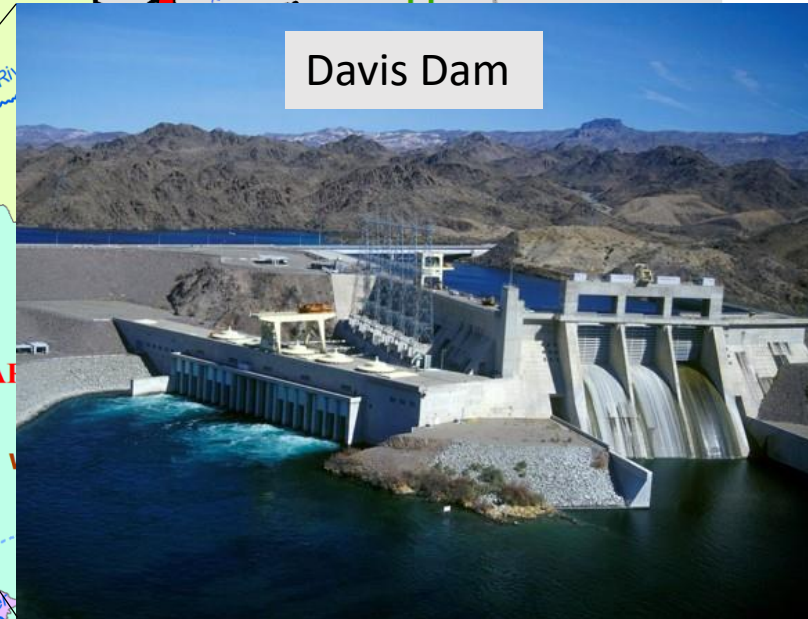
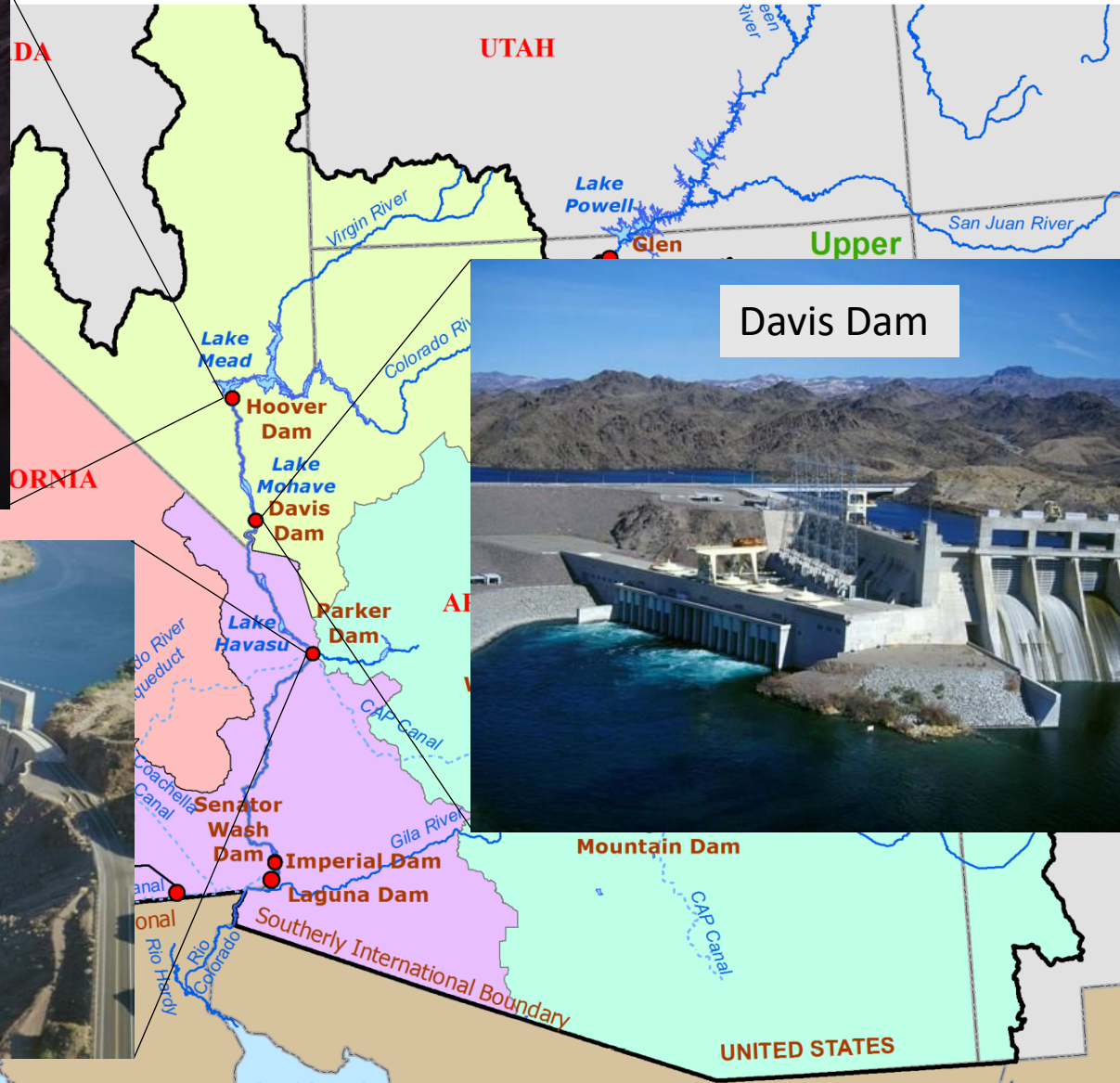
Closing Thoughts/Concerns

- Hydrology is unpredictable
- Drought measures are hard to predict
 - Holding water in Lake Powell
 - Creating and/or taking Intentionally Created Surplus
 - Other conservation measures
- Inflation
- Predictable/Unpredictable Stuff Happens
 - Equipment breaks (sort of expected but scope is unknown)
 - What else?

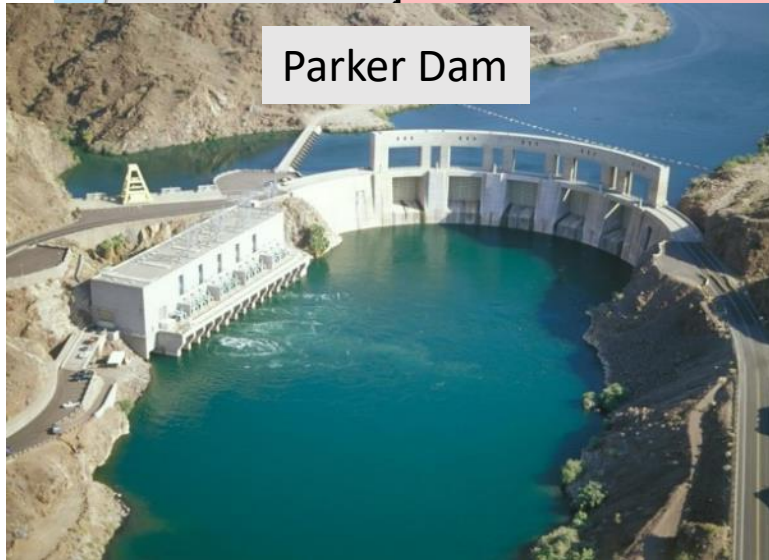
Questions



Hoover Dam



Davis Dam



Parker Dam

