

# Power Economic Analysis of Operational Restrictions at Glen Canyon Dam

In February, 1997, the operating criteria for Glen Canyon Dam were changed. Operation was restricted to a Modified Low Fluctuating Flow as described in the *Operation of Glen Canyon Dam, Colorado River Storage Project, Arizona, Final Environmental Impact Statement, March, 1995*. These restrictions reduced the operating flexibility of the hydroelectric power plant and therefore the economic value of the electricity it produced. The Environmental Impact Statement provided impact information to support the Record of Decision governing dam operations. The impact analysis included an examination of operating criteria alternatives on power system economics. The EIS estimated that anticipated annual power economic impacts of restricted operations would range from approximately \$22.4 million to \$65.5 million (2009 dollars).

This report summarizes actual (1997-2005) power economic impacts compared to predicted impacts resulting from the decision to restrict operations at GCD by implementing MLFF operations.

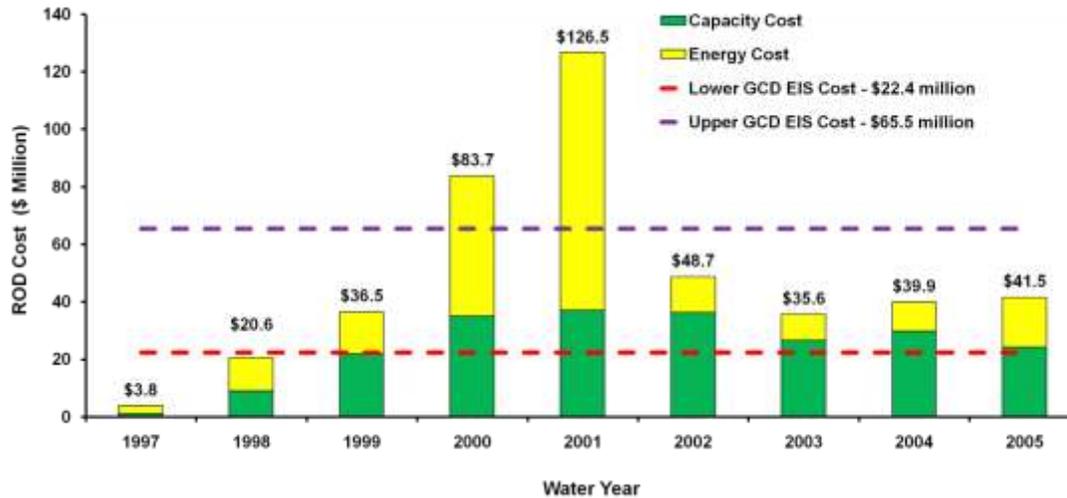
## RESULTS

- The analysis concludes that implementing the GCD ROD had an average annual economic impact of \$50 million (2009 dollars).
- Total economic impact of restricted operations is more than \$435 million for the nine-year study period. These costs are separated into energy and capacity costs, as shown on the chart below. Both the lower- and upper-bound of costs calculated in the EIS are also displayed for comparison.
- After MLFF was implemented, Western modified its customer contract commitments. This resulted in a shift of market risk and cost impacts from Western to its customers.



## CONCLUSIONS

- Restricting operations at GCD, which tends to shift water releases and power generation from times when electricity prices are high to times when electricity prices are low, has had a significant power economic impact.
- The experimental releases required by the ROD also contributed significantly to the total economic impact.

**Economic Costs of Implementing Operational Restrictions at Glen Canyon Dam,  
1997-2005****ADDITIONAL DETAILS**

- Using aggregate customer hourly energy requests from large as well as small representative Western customers, hourly operation of the Upper Colorado River hydropower system was simulated by the Generation and Transmission Maximization (GTMax) model.
- Differences in capacity and energy impacts between the “without operating restrictions” and the “with operating restrictions” scenarios measure the economic cost of implementing the GCDEIS operating criteria. The “with operating restrictions” scenario included experimental releases required by the ROD, while the “without operating restrictions” scenario had no experimental releases.
- The capacity value used in this study was based on the price of short-term capacity purchases; that value was derived from Reclamation’s (2007) *Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead*. The value of capacity is the amount of capacity in each scenario multiplied by the short-term capacity price.
- A sensitivity study was used in an effort to isolate the extreme market prices for power in the West in 2000 and 2001. The sensitivity case estimated that the economic impact was lower compared to actual expenses recorded by Western and its customers. From an economist’s view, implementing the ROD cost about \$10 million less per year during the study period because market prices paid in 2000 and 2001 were significantly higher than the economic value of the electricity sold.
- The full report is available at [www.wapa.gov/crsp/newsrsp/default.htm](http://www.wapa.gov/crsp/newsrsp/default.htm)