

Expected flow arrival time and stage information for the Colorado River in Grand Canyon National Park during the March 2021 Spring Disturbance Flow

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The US Department of the Interior Bureau of Reclamation will be conducting a “spring disturbance flow” in March 2021. The initial stage of the proposed spring disturbance flow will consist of a low flow of 4,000 cubic feet per second (cfs) for 5 days, which is needed to conduct maintenance on the apron of Glen Canyon Dam (Figure 1). This low flow disturbance will be followed by a high flow disturbance that will culminate in a discharge of approximately 20,150 cfs for 82 hours. This document provides information to the National Park Service and to river runners on expected arrival times and changes in water surface elevation for each stage of the disturbance flow.

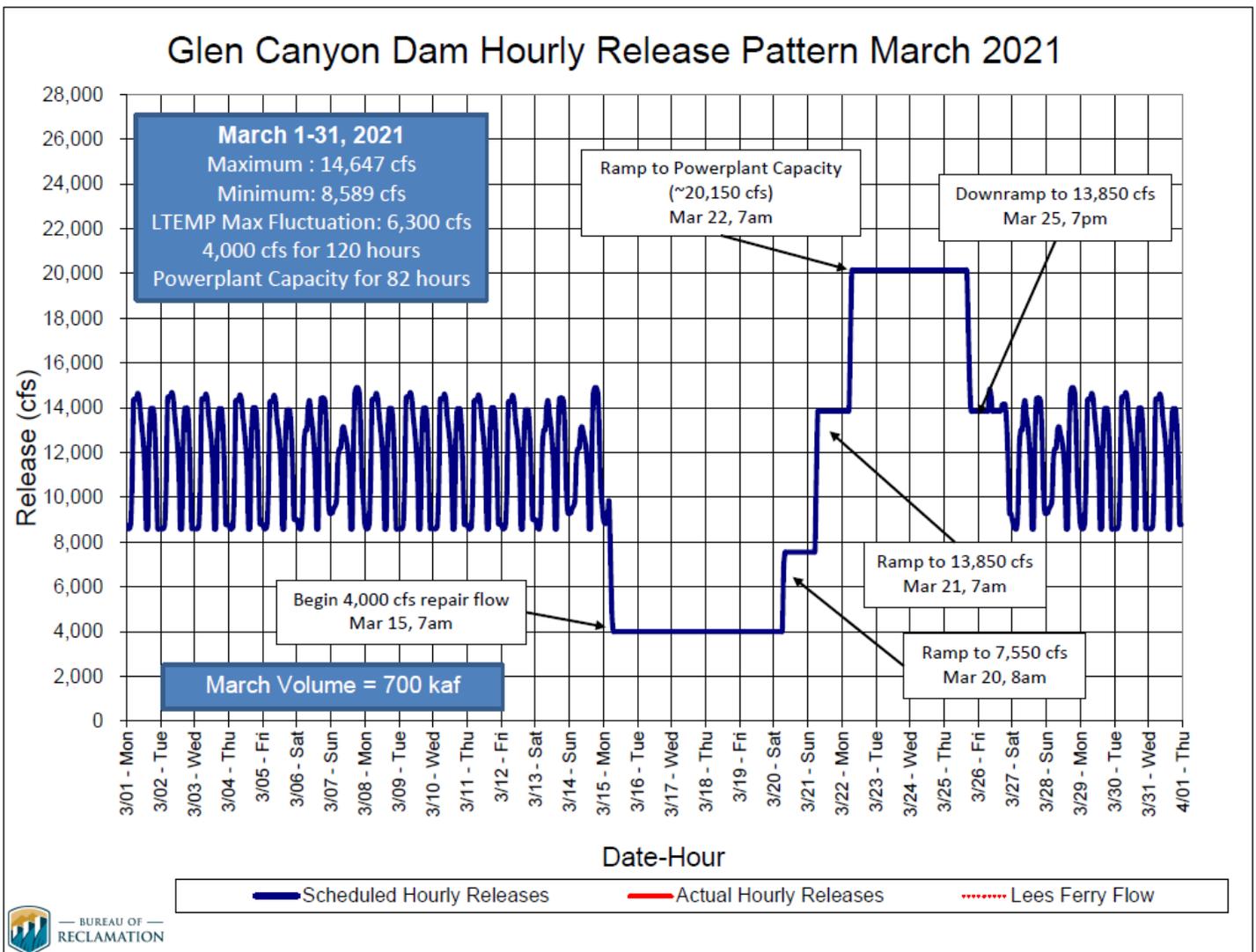
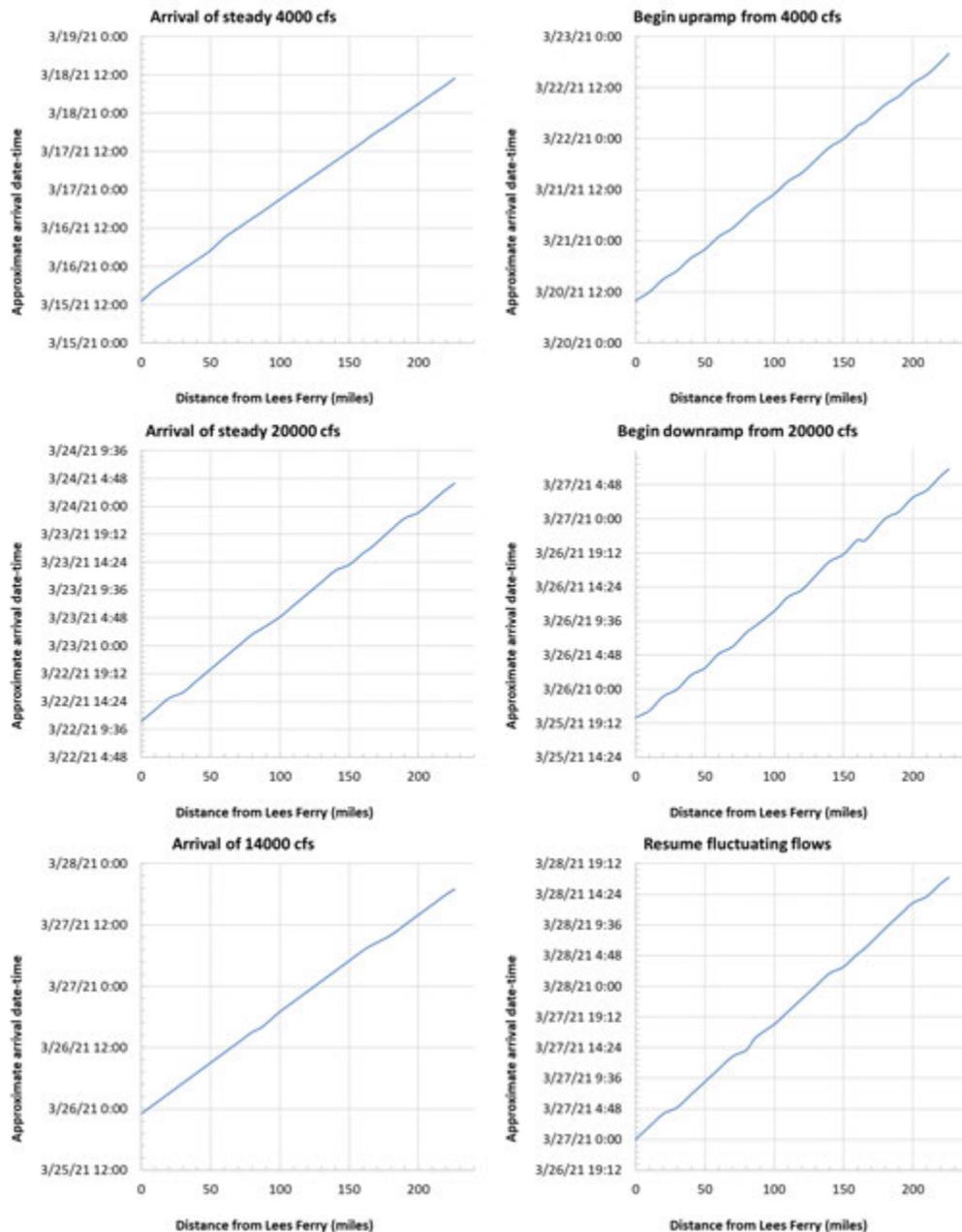


Figure 1. Spring disturbance flow hydrograph that is recommended for implementation in March 2021.

Expected arrival times for the Colorado River in Grand Canyon National Park during the March 2021 Spring Disturbance Flow



Estimated arrival times of key features of Spring 2021 Disturbance Flow Hydrograph. Travel times were estimated based on the Wiele and Smith (1996) unsteady flow model. Discharge values are approximations based on flow modeling and should not be used for safety of life or property. Values are rounded to two significant digits. These values were calculated assuming zero inflow from tributaries. Actual arrival times could vary from these predictions.

Reference:

Wiele, S.M., and Smith, J.D., 1996, A reach-averaged model of diurnal discharge wave propagation down the Colorado River through Grand Canyon: *Water Resources Research*, v. 32, p. 1375–1386, doi:<https://doi.org/10.1029/96WR00199>.

Expected changes in water surface elevation for the Colorado River in Grand Canyon National Park during the March 2021 Spring Disturbance Flow



These plots show the expected differences in water-surface elevation (stage) for key aspects of the "Spring disturbance flow" hydrograph by river mile. Each data point is based on a measured stage-discharge relation for a long-term sandbar monitoring site at indicated river mile. The exact change in water-surface elevation at any location is strongly affected by site-specific conditions, and these data are correct ONLY for the shown measurement locations. Use these data as a general guide only and interpolate between locations with caution.

Reference:

Hazel, J.E., Kaplinski, M., Parnell, R., Kohl, K., and Topping, D.J., 2006, Stage-Discharge Relations for the Colorado River in Glen, Marble, and Grand Canyons, Arizona, 1990-2005: U.S. Geological Survey Open-File Report 2006-1243, p. 11.