

November 2016 High Flow Experimental Release Frequently Asked Questions

Q: What is the purpose of high flow experimental releases?

A: When the Glen Canyon Dam was built, it blocked over 90 percent of the sand or sediment that used to flow down the Colorado River through the Grand Canyon. It changed the red river to a clear river. Most of the sediment still available below the dam comes from the Paria tributary and deposits in the river channel. Under the concept of high flow experimental releases, or HFEs, sand in the river channel is picked up by high-volume water releases from the dam and re-deposited in downstream reaches. This rebuilds sandbars and beaches, can provide fish and wildlife habitat, potentially reduce erosion of archaeological sites, restore and enhance riparian vegetation along Colorado River in Glen Canyon National Recreation Area and Grand Canyon National Park.

Q: Why are high flow experimental releases necessary?

A: High-flow experimental releases are designed to simulate the natural flooding of the Colorado River through Glen and Grand canyons that occurred prior to the construction and operation of Glen Canyon Dam. Nearly all the natural sediment load once transported by these floods is now trapped behind the dam resulting in the loss of downstream sandbars, beaches, and associated resources critical to the ecosystem health along the Colorado River corridor in Grand Canyon National Park and Glen Canyon National Recreation Area. Episodic floods from tributaries downstream from the dam, such as the Paria River, are critical sources of sand input. High flow experimental releases, when conducted under sediment rich conditions, have demonstrated benefits to downstream resources.

Q: What is the high flow experimental release protocol?

A: The current HFE protocol provides a framework for conducting and evaluating experimental short-duration, high-volume dam releases during sediment-enriched conditions each year to determine whether and how multiple releases can be used to better build sandbars and conserve sand over a long period of time. One of the best tools available for building sandbars is to use dam operations to release short-duration high flows following tributary deposits of new sand into the main channel of the Colorado River. However, sandbars tend to erode in the weeks and months after an HFE, so it is necessary to do HFEs repeatedly. The HFE protocol was developed by the Department of the Interior through a public process pursuant to the National Environmental Policy Act based on the best available scientific information developed through the [Glen Canyon Dam Adaptive Management Program](#) and other sources of relevant information. A new protocol is being considered under the new LTEMP EIS and if approved may be in place next year.

Q: What information are HFEs based on?

A: There is more than 20 years of extensive scientific research, experimentation, and analysis conducted under the Glen Canyon Dam Adaptive Management Program, including analysis of a series of previous high flow experimental releases, particularly those conducted in 1996, 2004, 2008, 2012, 2013 and 2014. This wealth of scientific information is used to inform and refine future decisions regarding the operation of Glen Canyon Dam and management of the Colorado River.

Q: How are decisions made under the protocol for conducting experimental high flow releases?

A: The decision-making process outlined in the protocol consists of three components:

1. Planning and budgeting – to prepare for high flow experimental release, ensure funds are available, and determine if resource conditions are appropriate. The resource conditions evaluated include:
 - Sediment Resources
 - Cultural Resources including archaeological site condition and stability and tribal access
 - Biological Resources including endangered species, the Lees Ferry recreational fishery, and riparian vegetation
 - Hydropower and water delivery
2. Hydrology and sand budget modeling – to evaluate the available volume of water and sand primarily delivered by the Paria River, and determine the magnitude and duration of a potential HFE.
3. Determination and implementation – a decision is made and an implementation schedule is developed by the Department of the Interior following a recommendation from scientists and resource managers based on the suitability of the hydrology, sediment, and other resource conditions.

Q: Does an HFE change the total amount of water released from the dam for the water year?

A: No. The additional water released as part of an HFE is part of the total annual water released from Glen Canyon Dam (Lake Powell) determined in August of every year based on the projected hydrology and forecasted reservoir elevations identified in the August 24-Month Study. High flow experimental release flows are included in that total annual volume and are offset by adjustments to the monthly release volumes during other months of the water year. For the 2017 water year, the annual release volume is initially projected to be 8.23 million acre-feet with a projected April adjustment to balancing, which would result in a total annual release of 9.0 million acre-feet.

Q: What is the typical timing, duration and magnitude of these high flows?

A: The timing of high-flow releases will be March-April or October- November, the magnitude will be from 31,500 cfs to 45,000 cfs, and the duration will be from one hour to 96 hours, depending on how much sediment is in the system, and other resource conditions. There are typically more fall HFEs than spring HFEs because there is more sediment available in the late summer and fall from the Paria River from monsoon storms.

Q: How might this change if the new LTEMP plan is approved?

A: Over the last 5 years a Glen Canyon Dam Long-Term Experimental and Management Plan (LTEMP) Environmental Impact Statement was prepared by Reclamation and the National Park Service. This effort was initiated by Secretary Salazar to build on the significant body of scientific research and experimentation data obtained under the Glen Canyon Dam Adaptive Management Program established by the 1996 Record of Decision on dam operations under the Grand Canyon Protection

Act. The LTEMP EIS analyzed a broad scope of dam operations and related management activities to determine specific alternatives that could be implemented to improve and protect downstream resources while complying with applicable federal law. A Final EIS was just released in October, 2016 and if Record of Decision is signed by the Secretary of Interior, then the LTEMP will be phased in sometime in 2017. It will be similar to the HFE protocol, but may include additional fish management tools and the possibility of some additional types of HFEs. More information on the LTEMP is available at: <http://ltempeis.anl.gov/>

Q: What impact will high flow experimental releases have on the level of Lake Powell given the dry conditions in the basin?

A: Over the course of the year, there will be no change to the Lake Powell level as a result of the HFE. This is because the water released from the reservoir during an HFE does not change the total amount of water that is released over the course of the water year (October through September). Because the additional water released during an HFE is included within the total annual release volume, these releases are made up for through adjustments made to the monthly release volumes during other months of the water year.

Q: The combination of the 2008 high flow experimental release followed by the 2011 high spring water releases from Glen Canyon Dam, resulted in a large increase in the trout population. How will that be addressed this year and future high releases?

A: We continue to learn through implementation of experimental actions as part of the Glen Canyon Adaptive Management Program. With regard to the trout response to spring HFEs, the environmental documents prepared by Reclamation identify that increased rainbow trout production is a result of two previous spring HFEs in 1996 and 2008. Increases in rainbow trout were also documented at Lees Ferry associated with the 2011 spring high steady flows. The precise effect of spring high flows on humpback chub is uncertain. Currently the rainbow trout population in the Lees Ferry reach is much lower than it was in 2008, and fall HFEs have not been shown to increase trout reproduction. Research indicates that factors other than HFEs are driving trout dynamics in Glen Canyon.

Q: What is the current status of the humpback chub?

A: The area near the confluence of the Colorado and Little Colorado rivers is occupied by a large portion of the humpback chub population in Grand Canyon, and nearshore areas in this part of Grand Canyon are used as nursery habitat by young humpback chub. The population in Grand Canyon is currently the largest in existence and the status of this population has significantly improved since the mid-to-late 1990s. The research and monitoring elements of the proposed action are intended to facilitate and enhance this upward trend in population status. Current U.S. Geological Survey estimates for humpback chub in Grand Canyon show that the number of humpback chub below Glen Canyon Dam is approximately 12,000 fish. Other monitoring information also indicates humpback chub status has been improving for nearly 20 years.

Q: Since high flow experimental releases bypass the powerplant, will power customers need to rely on other energy sources such as coal to fill the gap?

A: During a high flow release, water goes through both the hydropower units and through the bypass tubes. Some water generates power and some water bypasses the power generation. During an HFE, additional power is produced, but later in the year the water that was bypassed is not available to generate power and so that additional power may need to be purchased at that time. The HFE protocol

has not created a long term need for new or alternative energy supplies. The HFE protocol includes appropriate review and planning for all resources, including coordination with the Western Area Power Administration on specific changes to power generation associated with each HFE to ensure a steady supply of power.

Q: Who are the federal agencies involved in these activities and what are their roles and responsibilities?

A: A total of five Department of the Interior agencies and one U.S. Department of Energy agency have responsibilities under the Grand Canyon Protection Act, and undertake operations pursuant to the act. In May 2012, Secretary Salazar issued a Secretarial Directive to ensure the effective and coordinated implementation of the research being undertaken by Department of the Interior through the high-flow protocol and non-native fish control activities. The Directive recognizes that the Department of the Interior has multiple responsibilities on the Colorado River, including meeting water delivery obligations, protecting and improving downstream park resources for future generations, conserving fish and wildlife species, providing recreational opportunities, carrying out the trust responsibility to Indian Tribes and consulting with the Tribes on matters of importance to them, and ensuring the generation of clean hydropower.

The Directive establishes the Glen Canyon Leadership Team, which is led by the Assistant Secretary for Water and Science, and comprised of leadership from Reclamation, U.S. Fish and Wildlife Service, National Parks Service, Bureau of Indian Affairs and U.S. Geological Survey. The Team is directed to work together to ensure appropriate coordination is undertaken to implement the commitments set for in the environmental assessments and findings of no significant impacts (FONSI) and to ensure appropriate external coordination.

Bureau of Indian Affairs: The BIA's Western Regional Office works hand-in-hand with interested tribes and other participating agencies as part of the Glen Canyon Dam Adaptive Management Program to ensure the fragile, unique, and traditionally important landscape is preserved and protected.

Bureau of Reclamation: Responsible for operating Glen Canyon Dam in accordance with applicable federal law, previous records of decision, operating criteria, and the additional criteria and operating plans specified in Section 1804 of the Grand Canyon Protection Act, as well as in accordance with approved experimental plans.

National Park Service: Responsible for the protection and management of national park system units and administration of resource-related programs under the authority of various federal statutes, regulations, and executive orders, and in accordance with written policies set forth by the Secretary and Director of the NPS.

U.S. Fish and Wildlife Service: Provides Endangered Species Act conservation and associated consultation and recovery leadership with various agencies, tribes, and stakeholders primarily to benefit five ESA-listed species in Grand Canyon: humpback chub, razorback sucker, southwestern willow flycatcher, Kanab ambersnail, and California condor.

U.S. Geological Survey: The Grand Canyon Monitoring and Research Center of the USGS was created to fulfill the mandate in the Grand Canyon Protection Act for the establishment and implementation of a long-term monitoring and research program for natural, cultural, and recreation resources in Grand Canyon National Park and Glen Canyon National Recreation Area. Grand Canyon Monitoring and Research Center provides independent, policy-neutral, scientific information to the GCDAMP.

Department of Energy - Western Area Power Administration: Markets power from the Colorado River Storage Project (and its participating projects) at wholesale to utilities that provide retail electric service to over five million consumers in the CRSP region.

Q: What kind of scientific monitoring will happen following the release?

A: GCMRC will be conducting the following monitoring activities to determine the effects of the High Flow Experiment planned for November 2016 on physical and biological resources in the Colorado River Ecosystem downstream of Glen Canyon Dam.

- Scientists will monitor a number of issues throughout the canyon all the way down to Diamond Creek using a variety of different technologies. Some monitoring will be with remote cameras to take pictures of how beaches change, some will be done with staff from a boat to look at the concentration and composition of the sediment and other water quality factor in the river at various locations. They also will construct ‘sand budgets’ to show much sand is coming and going from various reaches. They post all this data and the photos up on the GCMRC website (<http://www.gcmrc.gov>).
- The response of the aquatic foodbase (so fish food in the river) will be monitored in Glen Canyon by sampling for aquatic insects and other invertebrates drifting downstream and throughout Grand Canyon using GCMRC's ongoing citizen science light trapping of aquatic insects (http://www.gcmrc.gov/research_areas/food_base/citizen_science_monitoring.aspx).
- GCMRC will also monitor the effects of the HFE on rainbow trout movement, growth, and survival in Glen Canyon. Several thousand trout will be captured, tagged, and released prior to the HFE. Following the event, crews will sample for these fish and use information from recaptured fish to determine how far they moved and in what direction, if they gained or lost weight, as well as estimate survival rates over the time interval that included the HFE.

Q: What is the role of U.S. Geological Survey science in planning and implementing HFEs?

A: USGS scientists, mainly at the Grand Canyon Monitoring and Research Center, are instrumental in designing high flow experimental releases and have the lead responsibility for measuring the physical and biological responses to these releases. USGS scientists working in sediment transport and geomorphology revised and adapted the theoretical understanding of sediment movement in the Colorado River. Since 2000, USGS scientists have developed innovative methods that greatly enhance our ability to track sediment movement in the Colorado River and measure sediment delivered to the river from downstream tributaries. The USGS program of continuous measurement of how much sand is available to be redistributed by an HFE is unprecedented in the scientific management of the rivers. USGS has worked cooperatively with Reclamation to design a controlled flood that is most beneficial to the Colorado River ecosystem.

Q: What can Grand Canyon National Park recreational users expect along the Colorado River during the high flow experimental release?

A: Since 1996, releases from Glen Canyon Dam have averaged from 8,000 to 25,000 cubic feet per second. The increase to approximately 36,000 cfs will change conditions on the river during the duration of the high-flow event proposed for November 2016. For example, research has shown that some normally difficult rapids decrease in their technical difficulty, whereas other normally

straightforward rapids become more technically challenging. At the same time, the volume of water at approximately 36,000 cfs will change the size and availability of campsites and these changes will occur at different times as the volume increases and moves downstream.

It is suggested that all river and backcountry users check the USGS Grand Canyon Monitoring and Research Center's Web site at <http://www.gcmrc.gov> and Reclamation's website at <http://www.usbr.gov/us/water/crsp/cs/gcd.html> or call Grand Canyon National Park's River Permits Office at 1-800-959-9164 before starting their river or backcountry trip to be prepared for variable conditions including higher river flows.

Q: Will the National Park Service allow motorized science or other administrative boat trips in the Grand Canyon during the HFE?

A: Beginning in 2007, the National Park Service implemented a new Colorado River Management Plan that includes a 6.5 month no-motors period from September 15 to April 1. NPS is in the process of reviewing and analyzing a limited number of science river trips during the HFE to occur. The process includes a "minimum tool analysis" of trips. The equipment used for the proposed sediment and aquatic food-based studies will require the use of motorized rafts.

Q: What other actions will Grand Canyon National Park take during the HFE?

A: Grand Canyon river and backcountry permit holders affected by the higher flows have been contacted and informed as to the potential conditions they can expect during their visit. NPS staff will be available throughout the park, including at Lees Ferry and Phantom Ranch, to answer questions from permit holders.

Q: How could the high flow experimental release affect the Lees Ferry fishery?

A: Fishing opportunities will be curtailed during the short duration of the HFE release from November 7-12, 2016; however fishing opportunities before and after the HFE will not change.

Q: How will visitor services at Glen Canyon National Recreation Area (Lake Powell) be affected by the high flow experimental release?

A: The level of Lake Powell is expected to drop approximately two to three feet over the course of the HFE which begins with increased powerplant capacity releases on the morning of Nov. 7 and returns to normal powerplant releases on the early morning of Nov. 12. There should be no significant disruptions to boaters or visitor services on Lake Powell as a result of the test flow. Colorado River Discovery is a concessioner authorized to operate guided float trips for visitors on the Colorado River between the Glen Canyon Dam and Lees Ferry. These float trips will not occur during the HFE period between November 7 – 12, 2016.

Q: What can Lake Mead National Recreation Area users expect along the river during the high flow experimental release?

A: During the HFE, water along the Lake Mead river corridor from Pearce Ferry to South Cove will flow at higher volume and at a faster speed. Because releases will increase to approximately 42,300 cfs, boaters should use added caution when navigating this portion of the river during the experiment. Boaters may also notice additional driftwood and sediment, which could build up along take-out areas or be present in the river. Along the shorelines, visitors should be aware that with rising waters,

beach camping equipment may become inundated, and unsecured boats may drift away.

Likewise, when water levels recede, beached vessels may be left high, dry and stranded. As always, when boating on Lake Mead or the river, ensure you have appropriate life preservers for all passengers. A secondary communication source like a marine band radio is also recommended. If you find yourself in need of emergency assistance, use the radio or call 702-293-8998.

Q: When will the peak flow reach key locations on the Colorado River?

A: The November high flow experimental release, locations and dates of hydrograph routing are listed in the map below.

