

November 2013 High Flow Experimental Release Frequently Asked Questions

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

A: Under the concept of high flow experimental releases, or HFEs sand stored in the river channel is picked up by high-volume water releases from the dam and re-deposited in downstream reaches as sandbars and beaches. These sand features and associated backwater habitats can provide key fish and wildlife habitat, potentially reduce erosion of archaeological sites, restore and enhance riparian vegetation, increase beaches, and enhance wilderness values 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 mimic 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 and the Department of the Interior anticipates that high flow experimental releases will benefit downstream resources when conducted under sediment rich conditions.

Q: What is the high flow experimental release protocol?

A: 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. The protocol provides a framework for conducting and evaluating experimental short-duration, high-volume dam releases during sediment-enriched conditions each year through the year 2020 to determine whether and how multiple releases can be used to better build sandbars and conserve sand over a long period of time. It 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.

Q: What information is the high flow experimental release protocol based on?

A: The protocol builds on a wealth of scientific knowledge gained from more than 16 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, and 2008. Based on this body of scientific knowledge, the protocol is intended to provide additional data essential 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.
- 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 federal 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 delivery to Lake Mead 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 throughout the rest of the water year. For the 2014 water year, that annual release volume will be 7.48 million acre-feet. This is the lowest annual release since the filling of Lake Powell in the 1960s – the result of declining reservoir levels driven by the worst 14-year drought period in the last hundred years. The reduced release volume is in accordance with the 2007 Interim Guidelines which were adopted to coordinate reservoir management strategies and address annual operations of Lake Powell and Lake Mead, particularly under low reservoir conditions, to protect future availability of Colorado River water supplies.

Q: How is the November 2013 HFE different from the November 2012 HFE?

A: The amount of sediment in the system at the time the decision was made to conduct a November 2013 HFE was estimated to be approximately 1.5 million metric tons. This is significantly higher than the 500 thousand metric tons minimum estimate in 2012 (with a mid-range estimate of 650 thousand metric tons). The 2012 sediment volume was equivalent to filling a football field 230 feet deep while the 2013 estimated sediment volume is equivalent to filling a football field 690 feet deep. The additional available sediment for the 2013 HFE will also result in faster up-ramp and down-ramp rates to/from powerplant capacity which is recommended to improve sandbar building in upper Marble Canyon, the portion of the system with the poorest sandbar condition prior to the HFE.

The 2013 HFE also differs in the total number of hydropower generation units available during the release. Only six of the eight total units are operable with one unit down for replacement and one for repair. The result is a lower total peak release in 2013 of ~34,100 cfs including (15,000 cfs of bypass through the river outlet tubes) than in 2012 with a peak release of 42,300 cfs.

Q: Does the HFE protocol represent a management action that will provide for an indefinite future of HFEs? Is there a determination of how many HFEs will take place?

A: No. The protocol establishes an experimental plan pursuant to which the Bureau of Reclamation will conduct high flow releases through 2020. The exact number of HFEs that will occur is dependent on conditions, which will be determined by sediment inputs from tributaries and a decision process

carried out by Interior. 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.

Q: What is the status of significant related research activities or accomplishments associated with the Glen Canyon Dam Adaptive Management Program?

A: Concurrent with the high flow protocol environmental assessment development, Reclamation also prepared an environmental assessment addressing non-native fish control. The U.S. Geological Survey developed science plans for both actions to be conducted through the Glen Canyon Dam Adaptive Management Program. The EAs and science plans were approved in May, 2012. The non-native fish control research is designed to outline research and control actions to control non-native fish, particularly rainbow and brown trout in the Colorado River downstream from the dam to conserve native fish. The goal is to minimize the negative impacts of competition and predation on the endangered humpback chub in Grand Canyon, while respecting and addressing concerns for taking of life in a place sacred to American Indian tribes and fundamental in several tribal creation beliefs.

Additionally the Glen Canyon Dam Long-Term Experimental and Management Plan Environmental Impact Statement is currently being prepared by Reclamation and the National Park Service. This effort was initiated by Secretary of the Interior Ken 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 will analyze 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. More information on the LTEMP is available at: <http://ltempeis.anl.gov/>

Q: What impact will this high flow experimental release 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 throughout the rest of the water year.

Q: There is some research that suggests that the combination of the spring 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 in planned 2013 flow 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 may be related to the 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 or sustained spring high releases on humpback chub and rainbow trout is uncertain.

Given the information regarding past spring high flows, Reclamation has decided to defer implementation of spring HFEs in calendar years 2013 and 2014. This two-year deferral of spring HFEs takes a conservative approach to the initial phase of implementation of HFEs. The actions of the Non-native Fish Control EA and Finding of No Significant Impact also provide a means to protect humpback chub from possible future increases in rainbow trout, a potential threat to these fish, if these actions become necessary. In addition, as part of the planning for and monitoring after HFEs, Reclamation consults with the U.S. Fish and Wildlife Service as it meets its obligations under the Endangered Species Act.

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 between 9,000 and 12,000 fish. Other monitoring information also indicates humpback chub status has been improving for nearly 15 years.

The most current available U.S. Fish and Wildlife Service monitoring data from the Little Colorado River indicate that recruitment of young humpback chub into juvenile and adult life stages and adult abundance steadily increased through 2011.

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: The length of time during which the fall 2013 experimental releases will bypass the powerplant is limited to a total of 112 hours beginning on Nov. 11 at 1:00 p.m. through Nov.16 at 5:00 a.m. While some additional power may need to be purchased, the protocol will not create a long term need for 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 DOI 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, FWS, NPS, BIA and USGS. The Team is directed to work together to ensure appropriate coordination is undertaken to implement the commitments set for in the EAs and 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. GCMRC provides independent, policy-neutral, scientific information to the GCDAMP.

DOE - 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 are the primary focus areas for high flow experiment scientific research to be done by GCMRC according to the science plan?

A: The science plan for multiple HFEs through the year 2020 outlines the focus areas of study intended to address a number of scientific questions identified in the high flow protocol within the following categories:

- Sandbars, camping beaches, and archaeological sites
- Aquatic food base
- Riparian Vegetation and spring habitats
- Water quality
- Hydropower

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

A: USGS scientists were instrumental in conceiving and designing the first high flow experimental release in 1996. The USGS Grand Canyon Monitoring and Research Center continues to 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 current USGS measurement program keeps track of sediment from the Little Colorado and Paria Rivers, which currently indicate that the Paria River delivered at least 538,000 metric tons of sand to the Colorado River between late July and the end of October 2012. 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 are some of the scientific results from past HFEs?

A: A summary of scientific results from the previous controlled floods can be found in the 2011 USGS Circular, "[Effects of Three High-Flow Experiments of the Colorado River Ecosystem Downstream from Glen Canyon Dam, Arizona](#)".

During the past 15 years, scientists have determined that:

- The scheduling and duration of HFEs must be based on the amount of sediment supplied from tributaries, such as the Paria River.
- HFEs do not necessarily deposit new sandbars everywhere. The greatest amount of deposition occurs in segments of the river that are most enriched with tributary-derived sand. It is important for USGS to estimate where sand resides on the bed, how much there is, and where deposition occurs.

HFEs in the spring have been observed to result in an increase in rainbow trout abundance in Glen Canyon. It is believed that these HFEs improved spawning and rearing conditions and resulted in increases in the abundance of aquatic insects that fish feed upon. Effects of fall HFEs on Glen Canyon fish populations are not well understood.

Scientific results from the first HFE in 1996 are described in the book, "[The controlled flood in Grand Canyon](#)" by Robert Webb and others, 1999, American Geophysical Union Geophysical Monograph 110. The book was co-edited by USGS scientists and includes numerous scientific papers by USGS scientists and academic colleagues.

Q: What USGS science activities will occur for HFEs conducted under the new protocol?

A: The focus of the USGS is to measure cumulative effects from several floods in the next decade. Thus, USGS scientists made measurements of sandbars, fish communities, and the food base in the fall of 2012 before this HFE. In contrast to previous HFEs in 1996, 2004, and 2008, USGS will be making relatively few measurements during the fall 2013 HFE. However, measurements will continue in the coming year and following subsequent HFEs. During the 2013 high flow experimental release, USGS

scientists will be working at a few locations in Grand Canyon to make measurements of the flow rate and the amount of sediment mobilized by the HFE.

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 37,200 cfs will change conditions on the river during the duration of the high-flow event proposed for mid November 2013. 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 37,200 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. One motorized science support trip will be permitted and deployed during the HFE primarily to monitor sediment transport during the event.

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, South Rim Visitor and Backcountry centers, 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 11 - 16, 2013; however fishing opportunities before and after the HFE will not change. Trout fishery users and businesses and local communities have expressed concern that the high flows could have financial and economic consequences due to public perceptions associated with the experiment. These perceptions are associated primarily with potential impacts on the trout population, aquatic food base, and fishing success. Research indicates that fishing opportunities will remain unchanged after the HFE.

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. 11 and returns to normal powerplant releases on the afternoon of Nov. 16. 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 11 – 16, 2013.

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 37,200 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 table below.

HFE Hydrograph Events	River Locations						
	Glen Canyon Dam	Lees Ferry RM0	Little Colorado River RM061	Phantom Ranch RM087	National Canyon RM166	Diamond Creek RM225	Pearce Ferry RM279
HFE - Start	11/11/13 9:00 AM	11/11/13 12:00 PM	11/12/13 12:00 AM	11/12/13 5:00 AM	11/12/13 7:00 PM	11/13/13 5:00 AM	11/13/13 3:00 PM
Peak magnitude - Begin (37,000 cfs)	11/11/13 8:00 PM	11/11/13 11:00 PM	11/12/13 9:00 AM	11/12/13 1:00 PM	11/13/13 1:00 AM	11/13/13 10:00 AM	11/13/13 6:00 PM
Peak magnitude - End (37,000 cfs)	11/15/13 8:00 PM	11/15/13 9:00 PM	11/16/13 4:00 AM	11/16/13 7:00 AM	11/16/13 5:00 PM	11/17/13 1:00 AM	11/17/13 8:00 AM
HFE - End	11/16/13 3:00 PM	11/16/13 7:00 PM	11/17/13 11:00 AM	11/17/13 5:00 PM	11/18/13 12:00 PM	11/19/13 2:00 AM	11/19/13 3:00 PM