

J.H. Kerr 216 Study - DWR Briefing for the NC Delegation to the Roanoke River Basin Bi-State Commission

A section 216 study refers to the section of the federal River & Harbor & Flood Control Act of 1970 that authorizes studies to evaluate the operation of existing US Army Corps of Engineers (USACE) reservoirs to improve their environmental performance.

A 216 study is the only mechanism to bring about changes to the operation of a Corps reservoir (with the exception of action initiated by Congress). Unlike other large reservoirs that are operated by public utilities, J.H. Kerr is not subject to Federal Energy Regulatory Commission (FERC) hydropower licensing requirements.

A great deal of knowledge was developed during relicensing of the Dominion hydro-power projects at Lake Gaston and Roanoke Rapids. However, the Corps elected not to participate in the settlement process (settlement in 2003, licensed by FERC in 2004).

The Nature Conservancy and DENR obtained authorization and funding for this 216 study from Congress more than 10 years ago.

The initial feasibility study to identify issues was 100% federally funded. Phase 2 of the 216 study developed information and analytical tools to evaluate project operation alternatives (for example, water quality and bank erosion models). Phase 2 was 50/50 state/federal cost share, and NC and VA reached an agreement on their respective shares of the 50% state portion. Phase 3 (also 50/50 state/federal) is currently underway and will evaluate and determine what alternatives will be recommended for implementation.

The storage capacity of Kerr reservoir dominates the system and the Corps is responsible for flood control and weekly decisions regarding how much water will be released downstream. Like many storage reservoirs, Kerr regulates the downstream hydrology by storing high flows for longer releases at lower levels, and also augments low flows during dry periods. It also stores water for use for hydroelectric generation when demand for and value of the energy generated is greater. At Kerr, hydropower generation causes some of the water flowing into the reservoir in the spring to be shifted to releases during the mid- to late summer.

A major impetus for the Kerr 216 study was concern about how downstream releases at Kerr reservoir are managed in response to high inflows, and the impacts of these releases on downstream floodplain (riparian) forests. Since the reservoir was constructed, ownership and land use along the lower Roanoke has changed. The majority of the acreage along the river in the lower Roanoke is now maintained for conservation purposes – either through easements or under ownership by the Nature Conservancy, the NC Wildlife Resources Commission, or the US Fish and Wildlife Service. Conservation purposes may not be served by the current flood control protocol.

When inflow to the reservoir is high, the Corps will release 20,000 cubic feet per second (cfs) below Roanoke Rapids in an attempt to keep the reservoir levels near the guide curve elevation. When inflows are especially high or prolonged, these 20,000 cfs releases can occur for multiple weeks or even months. When inflows are extremely high, the Corps will make brief downstream releases of up to 35,000 cfs. In contrast, the average flow is about 8,300 cfs and pre-project floods were often 100,000 cfs or more.

A 5-day average flow of about 11,000 cfs causes water to enter the floodplain and this water remains on the floodplain until the 5-day average falls below approximately 8,000 cfs. When the downstream releases are kept at 20,000 cfs for extended periods during the growing season, adverse impacts occur in the downstream floodplain ecosystem. These include death of mature and seedling trees and effects on wildlife using riparian forest habitat. Dissolved oxygen levels in the flood waters on the floodplain can fall to zero. Reductions from flood releases must be managed carefully to prevent these anoxic waters from adversely affecting water quality and fish when the floodplain drains back into the river. Bank erosion may occur when floods recede and saturated soils become unstable.

At the John H. Kerr reservoir, if inflows are such that 20,000 cfs releases are not sufficient to keep the reservoir level near the guide curve, high lake levels can flood campgrounds and picnic areas and make boat ramps unusable.

Alternatives being considered by the 216 study have focused primarily on ways to move water more quickly through the system to reduce prolonged downstream flooding during the warmer months. All of these alternatives would still keep releases at or below the existing maximum of 35,000 cfs. Releases above the current typical flood flow of 20,000 cfs would become more frequent, but affected land would still be within the existing 35,000 cfs flood footprint.

This type of alternative would reduce the duration of flooding and thus benefit the downstream riparian ecosystem and water quality. Recreation at the reservoir would be improved by keeping reservoir levels closer to the guide curve. A negative effect of this type of alternative is that about 1500 acres of agricultural land that currently floods about once every 7 years would be flooded every 2 years. The other negative effect of this type of alternative is on hydropower generation. There would be about 2% less generation at the Dominion projects at Lake Gaston and Roanoke Rapids. Less water would be stored at Kerr reservoir for generation during peak demand periods. No homes or roads are affected at a flood release of 35,000 cfs instead of 20,000 cfs.

The Corps is just wrapping up its evaluation of the effects of operational alternatives on hydropower, as well as an attempt to quantify the benefits to the downstream riparian ecosystem. Remaining steps in the process include preparation of a document to satisfy requirements of the National Environmental Policy Act (NEPA), third party review of the study required by Corps policy, and the Corps decision on what alternatives to the current operation will be recommended. Completion is anticipated in about 2 more years.

Many of the stakeholders are hoping for a recommended alternative that includes the higher flood releases up to a 35,000 cfs maximum combined with mitigation for downstream effects on agriculture. The Corps is also considering measures to improve dissolved oxygen levels in the release from Kerr dam, which would benefit Lake Gaston downstream. A comprehensive alternative would also include the Corps using hydrologic models to proactively adjust releases in response to inflow trends that indicate a high probability of sustained high inflows. Lastly, the recommended alternative should incorporate adaptive management - monitoring and adjustment of operational protocols in response to how they perform under real-world conditions.