Savannah River Basin Water Management

Frequently Asked Questions (FAQs)

U.S. ARMY CORPS OF ENGINEERS **BUILDING STRONG®**

Current as of November 26, 2012

Q1: What are the authorized purposes of the Corps' dam and reservoir projects?

A1: U.S. Army Corps of Engineers projects on the Savannah River are "multi-purpose." These projects were authorized by Congress to support: water supply, water quality, hydropower production, flood risk management (originally called flood control), downstream navigation, recreation, and fish and wildlife management. During periods of severe drought, water supply and water quality are the Corps' foremost priorities, both in the reservoirs and downstream.

Q2: Why do you continue to release water during drought? Who benefits from downstream flows?

A2: We must release water from the reservoirs to meet downstream needs – drinking water, industrial uses, utilities, and the environment. These needs continue year round. Two of the most critical uses of the reservoir system are water supply and water quality. The Savannah River supplies water to two of Georgia's major metropolitan areas—Savannah and Augusta. It's also a source of drinking water for the cities of Beaufort and Hilton Head, S.C., and other municipalities. More than 1.5 million people rely on the river and its reservoirs for drinking water.

Municipalities and industries discharge treated waste water into the river in compliance with state permitting requirements. This requires a continuous flow of water to assimilate the wastewater. Doing so becomes even more critical during drought and the hot, summer months when dissolved oxygen levels drop and water quality can become an issue.

A few of the large industries that use the river include Kimberly-Clark in Beach Island, S.C., the Vogtle nuclear power plant near Waynesboro, Ga., and the Department of Energy's Savannah River Site in Aiken, S.C. Industriesin Savannah such as Imperial Sugar and International Paper use it as well. We release water from the Hartwell, Russell and Thurmond reservoir system to ensure adequate river flows for sufficient water supply and healthy water quality.

Fish and wildlife protection is also an authorized purpose of the reservoirs. The Savannah River Basin is home to thousands of species of fish, plants, and other wildlife—some of which are endangered. Near the end of the system lies Department of the Interior's Savannah National Wildlife Refuge—one of the largest in the area at more than 29,000 acres. The refuge depends on freshwater flows to sustain a wide array of wildlife. Thousands of species of birds have been spotted there.

At the time the dams were constructed, downstream navigation was crucial to move goods from the port up the river to consumers. With the expansion of railroads and trucking, river navigation became less of a priority, but water from the reservoirs helps maintain the ecological balance in the Savannah harbor.

As a water resource management agency, the U.S. Army Corps of Engineers must balance the needs of all users of the basin and support its authorized purposes.

Q3: How can recreation be made a higher priority?

A3: Project authorization mandates us to strive to balance project purposes. In order for any specific project purpose to be designated as a "higher" priority, legislation to amend or change the existing authorizations would have to be passed by Congress.

Major changes in operation of the reservoirs require careful study of the benefits and impacts associated with the proposed changes. The Savannah River Basin Comprehensive Study would produce the analyses needed to update operating rules and revise cost allocations among the purposes.

We know that actions taken in one area of the basin will likely impact other areas of the basin.

Q4: Who determines how much water can be taken out of the Savannah River?

A4: The states of Georgia and South Carolina oversee and permit withdrawals from the water system. The Corps coordinates regularly with the states' resource agencies on water management in order to gauge needs of upstream and downstream users. In addition to the states, we develop water management plans and procedures for the reservoirs with input from other federal natural resource agencies. These agencies are charged with enforcing federal laws related to water and aquatic ecosystems.

Q5: What do CFS and MSL stand for?

A5: CFS stands for cubic feet per second. This is a measurement of flow rate. One cfs is equal to 450 gallons per minute. One million gallons per day = 1.547 cfs (daily average flow)

MSL equals Mean Seal Level and is a measurement of the height of water in the reservoir per foot. We use feet above mean sea level instead of depth because the bottoms of the reservoirs vary widely.

Q6: Why are the three projects on the Savannah River designed as they are with so little storage at Russell, and such large amounts at Hartwell and Thurmond?

A6: Thurmond Dam was completed in 1954 as the first major storage project on the Savannah River. Its primary purpose focused on flood risk management and rural electrification. The completion of Hartwell Dam in 1962 lessened the conservation storage demands on Thurmond Reservoir and led to the designation of the Thurmond conservation pool from 330' to 312' msl.

While the Hartwell and Thurmond pools have roughly the same volume, there is more depth and less surface area at Hartwell. Russell Dam was designed after Thurmond and Hartwell had essentially satisfied the need for conservation storage on the Savannah River. Engineers designed it as a pump-back hydropower facility which can operate more efficiently by minimizing the drawdown, and satisfied the national cost-benefit analysis with only a 5 foot total normal fluctuation.

During drought, the Corps attempts to draw Hartwell and Thurmond reservoirs down equally, foot for foot for the top 15 feet. Below this point, Hartwell and Thurmond reservoirs are drawn down based on the percentage of depth remaining in each reservoir's conservation pool. At the same time, the system relies heavily on Russell to make up most of the power generation as it reuses the water it generates through pumping from the Thurmond pool back up into the Russell pool. This allows Thurmond and Hartwell to concentrate on water supply and water quality while Russell assumes much of the hydropower production.

Q7: What is conservation storage?

A7: Conservation storage is that portion of range of depth in the reservoirs designed to conserve, or store, water during normal periods for use during low flow periods. Other than flood risk management, the conservation pool fulfills the congressionally authorized purposes of water supply, water quality, downstream navigation, recreation, fish and wildlife management, and hydropower production.

The top of conservation storage marks the bottom of the "flood storage," where excess water would be kept temporarily following heavy storms. Also, the bottom of conservation storage marks the top of the inactive storage pool – that part of the reservoir designed for storing sediment, typically holding lower quality water due to its depth.

Q8: Why can you draw Hartwell down so far, and Thurmond only half that?

A8: While the Hartwell and Thurmond pools have roughly the same volume, there is more depth and less surface area at Hartwell. This is because Hartwell, being farther upstream is located in steeper terrain.

To meet downstream needs during a drought, the Corps initially brings Hartwell Lake and Thurmond Lake down equally, foot-by-foot. However, when Thurmond falls below 315 feet above mean sea level (ft-msl), water managers can no longer match the pool level foot-by-foot. Instead the Corps changes to an equal percentage of elevation remaining it their respective conservation pools. This means Hartwell Lake's greater depth of conservation storage must provide more of the downstream water supply needs once Thurmond Lake falls below 315 ft-msl.

Q9: I notice that you raise and lower the pool behind the New Savannah Bluff Lock & Dam occasionally for weed eradication or to support special events like boat races in Augusta. How does this change the outflows from the Thurmond Dam?

A9: The gates at the New Savannah Bluff Lock & Dam are adjustable. We adjust the gates at the NSBL&D to raise or lower the pool behind it. We do not change the discharge from Thurmond Lake to raise or lower the pool behind the lock and dam during drought.

Q10: What is the Savannah River Basin Drought Plan?

A10: Until the late 1980s, no drought plan existed. The need for a drought plan became apparent as pools declined to unprecedented levels. During this period, the Corps adjusted releases and balancing strategies. Hartwell averaged as low as 2,100 cfs discharge per week, while Thurmond released flows as low as 1,700 cfs for months at a time. The drought severity of the 1980s led to the development of the Savannah River Basin Drought Plan and established several, "drought triggers", levels of conservation through flow reductions from the system. The plan, created with input from state and federal natural resource agencies, industry, utilities, and the public, established a minimum daily average release from Thurmond of 3,600 cfs. This became the minimum discharge as required under agreement with the states to meet water quality and water supply objectives. This plan also set minimum flow requirements on the Savannah River for both industry and habitat.

This is a plan developed by the Corps in coordination with natural resource agencies in Georgia and South Carolina, with federal resource agencies, with municipalities, and with public input. This plan describes the rules used by the Corps of Engineers to manage the reservoir system during drought conditions. The drought plan was originally based on the drought experienced throughout the Savannah River Basin in the late 1980s and was most recently revised in July 2012.

Q11: Who demands that the Corps of Engineers release at least 3,800 cubic feet per second (cfs) from the reservoir system?

A11: We developed the drought plan with input from state and federal natural resource agencies, from municipalities in the Savannah River basin, and from the general public. It was agreed during the 2006 revision that as a drought progressed and reservoir levels dropped, we would reduce outflows in stages or tiers, with 3,800 cfs as the minimum needed to meet downstream water supply and water quality needs. Without an extensive study to help us reach other conclusions, we can't make a logical change beyond this level.

New Q12: Why are the reservoirs expected to provide the water volume to mitigate for pollution? Why not hold the industries that discharge into the river to higher standards for cleaning the water before releasing?

A12: As the saying goes, "The solution to pollution is dilution." Releases from the reservoir system dilute the industrial and municipal wastes discharged into the Savannah River. The states base their permitting rules on these established outflows. This helps ensure clean water for others further downstream – in both states.

The states set the volume of treated waste water discharged into the river and issue permits for those discharges. The states also set water quality standards for the river and enforce those standards on industry and cities. It is also important to keep in mind that industries downstream are currently in the process of establishing practices that will result in the discharge of cleaner water. But the processes cost millions of dollars and take time to develop.

Q13: What other federal natural resource agencies influence your decisions on water management and what concerns do they have?

A13: We often confer with three other federal agencies: the Fish and Wildlife Service, the NOAA National Marine Fisheries Service, and the Environmental Protection Agency.

The Fish and Wildlife Service has said that low flows can impact the water quality of backwater habitats, habitats that are important for bass and fishing. Reduced flows will cause salty water to move upriver, impacting highly productive freshwater marshes at the Savannah National Wildlife Refuge and the ducks that use the freshwater habitat. And the FWS is concerned that shortnose sturgeon will be cut off from the gravel bars in the river.

The NOAA National Marine Fisheries Service has written that balancing the flow carefully in the Savannah River is very important for protection and restoration of ocean, estuarine and riverine ecosystems, fisheries, and wildlife populations. Available rocky shoal spawning habitat was reduced by more than 95 percent due to blockage of upstream migrations when dams on the river were built. Carefully regulating the Savannah River's flow in important remaining spawning and maturation habitats is critical for protection of all species, particularly shortnose and Atlantic sturgeon.

The EPA has said that each surface water body [such as the reservoirs on the Savannah River] is designated by its benefits, such as: fishing, recreation, public water supply, agriculture, industrial use or navigation. Each benefit has corresponding criteria to ensure that the water is biologically healthy and doesn't have excessive levels of toxins or other pollutants. To protect fisheries, both Georgia and South Carolina require an average of 5 milligrams per liter (mg/L) of dissolved oxygen in their freshwaters – and 6 mg/L in trout streams.

Q14: What are the action levels identified in the Savannah River Basin Drought Plan?

A14: The Savannah River Basin Drought Plan defines four drought levels of the reservoir system.

Drought level 1 is reached when the pool elevation drops 4 feet (winter) to 6 feet (summer) from full pool at either Hartwell Lake or Thurmond Lake. (Russell Lake does not have drought trigger levels due to its limited, 5-foot conservation storage pool.) This begins the District's effort to disseminate public safety information. This also restricts discharges from Thurmond to a maximum average weekly discharge of 4,200 cubic feet per second (cfs), if flows at the Broad River gauge near Bell, Ga., are greater than 10 percent of the historical flow rate. If Broad River flows are less than or equal to 10 percent of the historical flow rate, level 1 discharges at the Thurmond Dam are 4,000 cfs.

Level 2 is activated when either reservoir drops an additional 2 feet. Upon reaching level 2, discharges from Thurmond Lake will be further reduced to a maximum average weekly discharge of 4,000 cfs, if flows at the Broad River gauge near Bell, Ga., are greater than 10 percent of the historical flow rate. If Broad River flows are less than or equal to 10 percent of the historical flow rate, level 2 discharges at the Thurmond Dam are 3,800 cfs. However, during the wintertime months in drought level 2 (Nov. 1 through Jan. 31), outflows will be reduced to 3,600 cfs, regardless of flows at the Broad River.

Level 3 is reached when Hartwell Lake reaches 646 feet above mean sea level (ft-msl) or Thurmond Lake drops to 316 ft-msl, at which time the maximum average daily discharge from Thurmond is reduced to 3,800 cfs, regardless of Broad River flows. The Hartwell and Russell discharges change to keep the reservoirs in balance and to meet downstream flow needs. However, during the wintertime months in drought level 3 (Nov. 1 through Jan. 31), outflows will be reduced to 3,100 cfs, regardless of flows at the Broad River.

Level 4 is reached when Hartwell Lake drops to 625 ft-msl or Thurmond Lake drops to 312 ft-msl. During level 4, maximum discharge is 3,600 cfs but is reduced to 3,100 cfs from Nov. 1 to Jan. 31. The Corps would continue releases as long as possible, thereafter, outflows would equal inflows. The reservoirs have never reached drought level 4.

Because we manage the reservoirs as one system, when one reservoir enters a more severe drought level, all enter that level. The trigger levels vary by season since the "guide curve" or our target water level, varies by season. Find the current reservoir levels, guide curve, and drought trigger levels on water our management page at http://water.sas.usace.army.mil/home/indexDU.htm.

Q15: What has the Corps of Engineers done lately to manage the current (2011-2012) drought?

A15: The year 2011 began with all three Savannah District reservoirs rising due to winter rains. Hartwell Lake and Russell Lake reached full summer pool. (Hartwell Lake reached a surface elevation of over 660 feet above mean sea level (ft-msl) and Russell Lake reached a level of 475 ft-msl.) We limited Thurmond Lake's elevation to 328 ft-msl, or 2 feet below full pool, for the safety of workers conducting repairs to the dam's floodgates.

As the current (2011-2012) drought took hold and the reservoirs' elevations dropped below the drought level 1 trigger point, we reduced outflows mid-July 2011 to a maximum weekly average of 4,200 cubic feet per second (cfs), in keeping with the drought plan. By late August 2011 we reduced the outflows further to a weekly average of 4,000 cfs when the reservoirs reached drought level 2, again in keeping with the drought plan. At the Savannah District commander's discretion, we further reduced the outflows to 3,800 cfs in October 2011 after reviewing updated, long-range weather forecasts for the winter and spring.

We completed an Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) on July 30, 2012 to update the drought plan. The EA proposed reduced outflows from the reservoir system during wintertime months (Nov. 1 through Jan. 31) when in Drought Levels 2 and 3. At level two, wintertime flows are 3,600; at level 3, wintertime flows are 3,100. These are the same levels we used on a temporary basis during the 2009 drought. This EA allows us to respond more quickly. The EA also added stream flow at the Broad River as an indicator of drought.

We also maximized the "pump-back" capabilities at the Richard B. Russell Dam to re-use water for hydropower production. This action conserves water in the reservoir system, while still providing clean energy. Four reversible turbines in the Russell Dam have the capability to move water from the Thurmond reservoir back upstream to the Russell reservoir. The pump back turbines at Russell Dam normally generate power during daytime peak demand hours, then reverse direction at night to pull water back into Russell. This pump-back system allows us to conserve water in the reservoirs yet still meet some of the summer's high demands for electricity.

Q16: Why not go to minimum outflow of 3,600 cubic feet per second (cfs) at 2 feet below full pool? Why not reduce outflows to 3,600 cfs as soon as we enter drought?

A16: Drought impacts the entire basin. Dramatically cutting outflows early in a drought will cause unnecessary harm to the environment and unneeded suffering for downstream users. We gather water in the reservoirs during the rainy season so we have it "in reserve" for drier months. The reservoirs work much like a battery, providing resources during a shortage and recharging when resources are more plentiful. We reduce outflows in a tiered manner based on drought severity because not all droughts turn into record-breaking ones. We want to avoid putting the downstream ecosystem and human needs under the stress of the most severe drought level every time a mild to moderate rainfall shortage occurs. That level of stress does not sustain downstream resources. We reduce releases on a preplanned and mutually agreed upon basis outlined in the Savannah District Drought Plan.

The Savannah River Basin Drought Plan shares the burden of drought and the benefits of the reservoirs with both upstream users and downstream users. We created the drought plan with input from state and federal resource agencies, and public stakeholders throughout the basin. This plan sets the points where we reduce outflows and by how much we reduce them.

Q17: Why does the July 2012 Drought Plan's update use stream flow at the Broad River as a drought indicator?

A17: A July 2012 Environmental Assessment added stream flow as an indicator for drought trigger levels. Previously, the Corps of Engineers only used reservoir levels as an indicator of drought levels. Stream flow is considered using the U.S. Geological Survey gauge at the Broad River, located near Bell, Ga. Because the Broad River is a large, unregulated tributary that flows into the Thurmond reservoir, it provides an accurate representation of natural inflow to the Savannah River Basin.

Stream flow is used as a secondary indicator during Drought Levels 1 and 2. Drought Level 1 is initiated when the Thurmond reservoir reaches 324-326 feet above mean sea level (ft-msl) or when the Hartwell reservoir reaches 654-656 ft-msl. Level 2 begins when Thurmond reaches 322-324 ft-msl or when Hartwell reaches 652-654 ft-msl.

If stream flows at the Broad River gauge are less than or equal to 10 percent of the historical flow rate (calculated over a 28-day average), the Corps of Engineers will reduce outflows to 4,000 cfs in Level 1 and 3,800 cfs in Level 2. If Broad River flows are higher than the 10-percent historical flow rate, the Corps of Engineers will set outflows to 4,200 cfs in Level 1 and 4,000 cfs in Level 2.

Q18: The Corps of Engineers uses reservoir level and stream flow at the Broad River as indicators for drought severity. Why not match them up with state drought indictors?

A18: The states use multiple parameters for their drought status changes including soil moisture, rainfall deficit, groundwater levels, streamflow, and reservoir levels. Reservoir levels tend to be good cumulative indicators of drought conditions. There is generally good consistency between how the state agencies and the Corps characterize drought severity. The states also monitor agricultural impacts of drought. The Corps' reservoirs have no authorization to support agriculture.

As a condition of the 2012 EA, we added stream flow at the Broad River as a secondary indicator of drought because the Broad River is a large, unregulated tributary that flows into the J. Strom Thurmond reservoir. It provides an accurate representation of natural inflow to the Savannah River Basin and has more than 70 years of recorded data.

Q19: How much savings does 200 cfs reduction in outflows create?

A19: A 200 cfs reduction saves roughly 1.5 feet per year or 0.12 feet per month at both Hartwell and Thurmond. While such a reduction saves some water over the long-term, its effects on habitat availability and downstream water quality are not as easily measured. In some locations along the river the impact of such a reduction is observable but we still need more study in other areas to improve water management decision making. The Savannah River Basin Comprehensive Study (the "comp study") would provide this much-needed data.

Q20: Why didn't the July 2012 Environmental Assessment reduce outflows to 3,600 cfs during Drought Level 3 as proposed in the draft?

A20: We proposed more restrictive outflows during the process. After a public comment period and consultations with Georgia and South Carolina natural resource agencies and federal resource agencies, we determined that our chosen course of action best balances human and environmental needs upstream and downstream. In the draft EA, the Corps had initially recommended to set level 3 outflows to 3,600. However, the state agencies determined that this rate would not sufficiently meet downstream needs, particularly in the areas of water quality and water supply. These agencies have experts who must manage many environmental aspects of the basin's resources and we depend on their expertise to help us reach the best course of action.

Q21: Is 3,800 cubic feet per second (cfs) discharge from Thurmond Dam the "absolute minimum" that must be released from Thurmond for downstream water supply requirements?

A21: Based on low-flow tests conducted during the 1980-81 drought, 3,600 cfs is the accepted minimum required flow to meet water supply requirements for downstream municipalities, industry, and utilities (primarily the Savannah River Site and several other industries) plus maintain critical natural habitat. In the 2006 revisions to the drought plan, we changed the minimum outflow to 3,800 cfs. While the outflow is now greater at the more severe levels of drought than before 2006, we also placed earlier restrictions on Thurmond's discharge that did not exist before 2006. In other words, we now reduce outflows earlier in the drought than before.

Q22: How much water is really needed to meet downstream needs?

A22: Until we can complete the Savannah River Basin Comprehensive Study (the "comp study") we won't have scientific data to guide changes to the drought plan. We know that our actions in one area of the basin impact other areas of the basin. However, without the data to be provided by the comp study, we can't determine how much our actions impact the basin – environmentally, economically, and socially. Therefore, we rely on the drought plan as the best guide we have. We developed and updated the plan with input from state and federal natural resource agencies, municipalities in the basin, and the general public, including reservoir and river stakeholders.

Q23: What exactly is the Savannah River Basin Comprehensive Study and what is the status of this effort?

A23: The Savannah River Basin Comprehensive Study will examine extensive interactions of resources, project purposes, and environmental and social aspects of the entire basin. This study is required to make changes to the water management plan which are outside of the Corps' existing Congressionally-assigned authorities. Once fully complete, it will provide data and recommendations for extensive changes in water management and water resource allocations for the entire basin. The study represents a joint endeavor between the Corps and the states of Georgia and South Carolina. Funding is cost-shared between the federal government and the states (non-federal sponsors).

The first portion of the Comp Study was completed in 2006 at a cost of $1.8 million. This portion included a water supply survey, a flow dataset and a computer model for the Savannah River Basin to show how changes to operations affect reservoir levels and downstream conditions. This portion also included the 2006 Environmental Assessment that updated the Corps' 1989 Drought Plan for the Savannah River Basin in response to a new drought of record from 1998-2002. This portion of the Comp Study was crucial in updating the drought plan and reducing outflows earlier in drought at drought levels 1 and 2 — keeping more water in the reservoirs while still meeting downstream needs.

The next portion of the Comprehensive Study will focus on updates to the Drought Plan using data gathered during the last drought of record (2007-2009). It will not result in wide-sweeping changes to pool allocations or outflows; it will only consider improvements and refinements of drought operations. Results of this portion of the study would guide long-term changes to the Corps' Drought Plan. The Corps continues to work closely with officials from Georgia and South Carolina to resume the Comprehensive Study. The states identified their desire for a more extensive update on the Drought Plan as their top priority. The federal portion of the funds to pay for the extensive update on the Drought Plan is available and ready to use.

Q24: Drought is a cyclic process. Why doesn't the Corps anticipate the drought periods and take action before drought occurs?

A24: Although there are numerous theories about drought cycles, based on historic data, there is no reliable method for forecasting drought. Federal climate forecasters give us a range of probabilities, but weather patterns have changed quickly. For example, the severe drought that extended to the end of 2008 was predicted to last several months longer but ended in early 2009 with a dramatic increase in rain and swift recovery in the reservoirs.

Q25: During periods of drought, why not have outflow equal to inflow? Downstream users would get the amount of water "nature intended."

A25: While it might seem logical, that concept is deceiving. The construction of the dams forever changed the geographic, ecologic, and social environments of the basin. With the construction of the dams we gained some control over the flooding that took lives and devastated communities.

The dams brought the region increased development simply by providing a reliable source of water upstream and downstream, by increasing the availability of electricity, and by removing the threat of major floods. (Augusta has not suffered a single devastating flood, similar to those of 100 years ago, since we opened Thurmond Dam.) The American people, through Congress, built the reservoirs to hold water for later use; manage the risk of flooding; provide safe drinking water; generate clean, renewable energy; and provide water for navigation. Later Congress added the missions to provide individuals the opportunity to recreate and the responsibility to care for fish and wildlife to the reservoirs' authorizations. Each of these mission areas requires an amount of water.

Q26: Many businesses suffer economically and many people see the economic value of their homes fall during drought. Why do you ignore economic issues when you manage the water in the basin?

A26: Congress established the reservoir projects for specific purposes – water supply, water quality, flood risk management, hydropower production, recreation, downstream navigation, and fish and wildlife management. Congress did not specify economic issues as a purpose for the reservoir projects.

Q27: I've heard of something called the "Res Sim Model." What is it and does the Corps of Engineers use it to manage the Savannah River Basin?

A27: HEC Res-Sim is a reservoir simulation model developed by the Hydrologic Engineering Center of the Corps of Engineers. This computer program allows us to simulate the reservoir system, apply different operating rules, and determine the impacts to various project purposes. The Savannah District currently uses Res-Sim in a planning mode rather than a real-time operating mode. Res-Sim will be one of the models used in the Savannah River Basin Comprehensive Study (the "comp study") to evaluate changes to reservoir operations.

Q28: The Corps recently proposed a change to our understanding of actions it would take during Drought Level 4. What are the results of this Environmental Assessment?

A28: In 2011 we evaluated the 1989 Savannah River Basin Drought Plan to determine if changes were warranted for operations in Drought Level 4: the inactive storage portion of reservoir water. Drought Level 4 occurs when the Hartwell reservoir is at or below 625 feet above mean sea level (ft-msl) or Thurmond reservoirs at or below 312 ft-msl.

The Savannah District, in conjunction with the public, and state and federal natural resource agencies, completed an Environmental Assessment (EA) addressing this issue in October 2011. This EA supports a Finding of No Significant Impact (FONSI) and clarifies actions to be taken in the unlikely event that drought conditions reach this unprecedented level. The primary focus of this EA was to clarify Drought Level 4 operations with the intent on preserving drinking water supply for the greatest population of basin residents.

The proposed Standard Operating Plan (SOP) for operations in Drought Level 4 retains all major components of the 1989 Drought Plan except for one. When Drought Level 4 conditions exist, the daily average release from Thurmond Dam would go to 3,600 cubic feet per second (cfs) and transition to 3,100 cfs with an adaptive management strategy during the period from Nov. 1 through Jan. 31. We would transition to a daily average outflow equals daily average inflow, if all the pools reach the bottom of their inactive storage. It's important to note that the Corps' drought management plan is designed to prevent the three-reservoir system from ever reaching Drought Level 4. The reservoirs have never reached Level 4.

Q29: Why did you spend time and money to update the level 4 actions, when you could have used that money to update the Drought Plan or work on the Savannah River Basin Comprehensive Study?

A29: After the worst drought of record (2007 to 2009), we received Flood Control and Coastal Emergency (FCCE) funds to evaluate emergency drought operation plans. The FCCE monies were provided to the Savannah District to address a possible future drought even more severe than the one that ended in 2009. We are required to use the funds for that intended purpose only. The Savannah District expects to evaluate the entire drought plan in the next phase of the comprehensive study.

Q30: Why do the pools have a winter drawdown?

A30: The top of conservation storage is also known as the guide curve. The guide curves on Hartwell and Thurmond decline after the summer season in anticipation of the spring. This reduction in the guide curves provides additional flood storage needed for typical winter and spring rains. This helps us reduce the risk of downstream flooding and helps fulfill one of the dams' authorized purposes of flood risk management. In most autumns the pools will naturally decline due to the seasonally dry weather. Maintaining the pools at or below the guide curves helps prevent shoreline erosion from the high winds common on the reservoirs in the winter. If the pools are already below the guide curves, there is no additional lowering required to ensure the designed level of safety.

Q31: How did the pool levels, top of flood, top of conservation, bottom of conservation storage initially get established?

A31: In the design of the projects, the Corps based the flood storage capacity on the need to reduce the risk of flooding downstream. The conservation pool supports all of the non-flood risk management purposes of the project – water supply, water quality, recreation, hydropower, fish and wildlife management, and navigation. The size of the conservation pool was based on how much storage was needed to meet these project purposes through the drought of record at that time and still make the project economically justifiable. The projects were designed as peaking hydropower facilities which generate hydropower during the peak demand periods of the day, when it is needed most. The sale of this electricity pays the majority of the costs of building and operating the dam and lake projects.

Q32: Why is Russell Lake's conservation pool only 5 feet from top to bottom? Why does Russell Lake always appear full?

A32: Russell Lake was designed as a pump storage facility. This pump capability requires less conservation storage to make it economically viable. Because of this design, the level of normal operation must remain within that five foot window. Levels dipping below the conservation pool could cause extensive damage to the turbines.

Q33: If you must release water to meet downstream needs, why do you continue to release water after heavy rains downstream?

A33: There may be short periods of high inflow downstream of the dam due to heavy localized rainfall, when Thurmond Dam releases would not be necessary to satisfy water supply requirements. However, there is generally not enough "lead time" and the inflow not dependable enough to allow us to modify project operations.

In addition, rain may fall too far downstream. For instance, if Thurmond was to curtail releases in anticipation of inflows to Augusta that did not materialize, Augusta's water supply as well as the critical habitat in the Augusta Shoals would suffer.

Q34: After a drought, when rainfall returns to normal or above normal, why do reservoirs continue to drop?

A34: Severe drought causes the ground to dry out significantly causing groundwater tables to drop. When the rainfall initially returns, the dry soil soaks up much of the rainfall, preventing significant runoff into streams and creeks feeding the reservoirs. Until the soil is saturated, very little water finds its way into the reservoirs. In the mean time, the reservoirs must continue to supply minimum downstream water supply needs as defined in the Drought Plan. Once the inflows begin to exceed the outflows from the system, the reservoirs begin to recover.

Q35: What are seasonal evaporation rates?

A35: The estimated evaporation rates vary by season with more evaporation in the hot summer months than in the cooler winter months. We estimate that in the summer the three reservoirs lose about 1,200 cubic feet per second (cfs) just to evaporation. Evaporation is an inevitable effect of having large reservoirs. Purely by its own existence, a large reservoir alters a river system by loosing much of its inflow to the atmosphere. The loss to evaporation is proportional to the reservoirs surface area, and therefore would have had much less impact on inflows before the construction of the reservoirs. Typically, evaporation alone causes the Thurmond pool to drop almost one half foot per month during the summer.

Q36: What are the sizes of the drainage areas for the Corps' reservoir projects on the Savannah River?

A36: Hartwell Lake's local drainage area is 1,186 square miles. The Hartwell basin also benefits from the drainage areas of reservoirs owned by Duke Power in South Carolina (439 sq. mi.) and others owned by Georgia Power in Georgia (463 sq mi.). The total Hartwell drainage area extends from the foothills of the Appalachian Mountains to the I-85 corridor.

Russell Lake's local drainage area is the smallest of the three projects at 749 square miles.

Thurmond's local drainage area is 3,307 square miles and is primarily in the piedmont region that has a flatter topography.

Cumulative drainage basin totals are 2,088 sq. mi. for Hartwell and above; 2,837 sq. mi. for Russell and above; and 6,144 sq. mi. for the basin area above Thurmond Dam. It is much harder to refill Hartwell than Thurmond after a drought, due to its smaller drainage area from which to accumulate runoff.

Q37: During drought conditions, is power generation reduced? Can water be released in other ways so that power is not produced?

A37: During drought conditions, we only generate electricity when we release water required to meet downstream needs. Generating electricity is strictly incidental to the release of water for other purposes once any reservoir reaches drought level 1 of the Savannah River Basin Drought Plan.

We always pass water through the dams' turbines as we make required releases. To do otherwise would be to waste the energy potential of sending water downstream. This not only allows us to provide low-cost, clean energy to communities, it also allows us to keep strong control of the outflow, thus protecting downstream homes and businesses. We only discharge water through the flood gates in very rare circumstances – either as a result of long-term extreme rain, or when conducting a short test of the floodgates.

In an extreme, multi-year drought, reservoir levels could reach (but never have) levels below the turbine intakes (called penstocks). In this case it is possible to release water through sluices located near the bottom of the dams. However, the water being released from the bottom of the reservoirs' inactive storage would be of lower quality. It has low levels of dissolved oxygen, plus high levels of silt and other deposits.

The sale of electricity generated through the dams repays the American taxpayers for building and operating the dam and lake projects. Even so, we must cut back power generation during drought. During drought we only generate electricity from Thurmond and Hartwell dams while meeting downstream water needs. We rely heavily on the Russell Dam's pump-back capabilities to generate power while retaining water in the reservoir system.

Q38: What determines how much water is discharged from the dam during generation?

A38: All releases from our dams are made through the turbines which in turn generate electricity. The amount of water released from the reservoir system depends on the status of the system. During normal reservoir levels (no drought condition) we set the amount of outflow based on hydropower needs in the basin. During flood management, we set the amount of outflow based on minimizing downstream flood damages while maximizing the use of flood storage per the Water Control Plans. During drought, the amount of outflow is set to balance impacts to the project purposes both upstream and downstream. The drought level sets the total amount of outflow from the reservoir system. We also attempt to keep Hartwell Lake and Thurmond Lake in balance with each other.

Please note that we do not generate electricity around the clock. We carefully schedule power production to maximize benefits to the public. Many hours of the day we have no power generation, and therefore, no water discharges.

Our outflows are measured in cubic feet per second and are averaged over a period of time, typically a day or a week. Some hours will have very high rates but other hours will have no discharge.

New Q39: Where does all the money from hydropower production go? Is the district's budget generated from hydropower?

A39: Taxpayers all across America paid for the construction of the dams and reservoirs. The money received from hydropower production returns to the U.S. Treasury to repay the public for the construction and operation of the dams. Hydropower production does not pay the District's budget.

We generate electrical power but the Southeastern Power Administration (SEPA), another federal agency, markets that power to utility companies which supply it to homes and businesses. SEPA turns the sales over to the U.S. Treasury.

Q40: How does Georgia Power Company keep their reservoirs full while the Corps reservoir elevations are down?

A40: Georgia Power Company's North Georgia Development consists of six hydroelectric generating projects on the Tallulah and Tugaloo Rivers upstream of Hartwell Lake. Only the uppermost of these projects, Lake Burton, is designed with usable storage that can be drawn down. The others, designed as smaller, run of the river projects, operate most efficiently by simply passing through their inflow as outflow. However, even these reservoirs are subject to drought and lose water during extreme drought. Georgia Power also uses more fossil fuel sources for their peaking power and draws less on hydropower sources during drought.

New Q41: Will demand for water downstream increase in the future as industry grows?

A41: Short answer: Probably.

However, this is not a bad thing. Industrial growth means economic growth and the benefits of that growth. It also means local and state planners must consider the availability of natural resources, especially water. The states issue permits for withdrawals from the reservoirs and the Savannah River – not the Corps of Engineers. It will be up to local and state governments and their citizens to ensure proper use of the available water in the basin.

New Q42: Is the Savannah Harbor Expansion Project going to require increased outflows to keep salinity levels down?

A42: No. We designed the Savannah Harbor Expansion Project (SHEP) using the 1996 Savannah River Basin Water Control Manual (without the new drought plan). The design takes into consideration historic droughts and river flows based on current outflows. We will not require additional outflows to support the SHEP.

New Q43: If there is a problem with dissolved oxygen in the river, will you correct it with outflows from the reservoirs?

A43: Our current outflows already help correct dissolved oxygen problems in the Savannah River although late summer quality remains a problem. Because dissolved oxygen is less of problem in the cooler winter months, our drought plan now allows for reducing outflows down to 3,100 cubic feet per second for November through January when we reach drought level 3.

Before we deepen the Savannah Harbor we will install an oxygen injection system into the harbor to mitigate for additional loss of dissolved oxygen due to the harbor expansion. This injection system, in the form of Speece cones, will prevent the need to increase water flows to maintain current dissolved oxygen levels in the harbor.

Q44: Why doesn't the Corps remove the stumps sticking out at low water?

A44: We remove or mark all stumps or other hazards located within marked navigational channels. During extreme low water conditions, thousands of small trees, sand bars, and stumps are exposed, creating hazards for recreational boaters. The vast majority of these hazards are away from the marked channels. Our public safety programs remind users to exercise caution during these low water periods.

If boaters should find a hazard within the channel, notify the project office for the reservoir and the hazard will be checked as soon as possible. We cannot mark or remove all stumps exposed by unpredictable and constantly changing water conditions. (Hartwell: 888-893-0678 or 706-856-0300; Russell: 800-944-7207 or 706-213-3400; Thurmond: 800-533-3478 or 864-333-1100)

We constantly remind users to wear a life jacket whenever swimming, boating, fishing or participating in other activities while in, on, or near the water. This includes when anchored or on boat docks.

Q45: What ramps are usable during these low water conditions?

A45: Information is available from the Project Offices (Hartwell: 888-893-0678 or 706-856-0300; Russell: 800-944-7207 or 706-213-3400; Thurmond: 800-533-3478 or 864-333-1100) or on the Web at: www.sas.usace.army.mil. Choose "Lake Information" from the drop-down menu. We regularly update this information.

Q46: Where can I read more about water management in the Savannah River Basin?

A46: Visit the Savannah River water management page, http://water.sas.usace.army.mil/home/indexDU.htm. There you can find near real-time reservoir levels, information about drought levels, and a schematic of the reservoir system. The page also contains links to a variety of websites with additional information. The public can also receive updates via our free quarterly e-newsletter "Balancing the Basin." To subscribe, e-mail CESAS-CCO@usace.army.mil with "Subscribe to e-newsletter" in the subject line.

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