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ENVIRONMENTAL ASSESSMENT

NORMANDY DAM DROUGHT RESPONSE RELEASE SCHEDULE CHANGE

Coffee, Bedford, Marshall, and Maury Counties, Tennessee

TENNESSEE VALLEY AUTHORITY

OCTOBER 2007

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The Proposed Action and Need

The state of Tennessee (see letter dated October 5, 2007, in the Appendix of this document) on behalf of the Duck River Utility Commission and in response to their concerns has requested TVA to change the release schedule at Normandy Dam by immediately reducing the flow as measured at Shelbyville (Duck River Mile (DRM) 224.1) from 155 cubic feet per second (cfs) to 120 cfs. TVA provides minimum flows at Shelbyville of 155 cfs from June 1 through November 30 and 120 cfs from December 1 through May 31. The requested change would implement the flow reduction from 155 to 120 cfs several weeks earlier than normal.

Middle Tennessee is experiencing an exceptional drought and consequently the pool elevation of Normandy Reservoir is much lower than normal. This reservoir is the source of water for the Duck River Utility Commission (DRUC) which serves the cities of Tullahoma and Manchester. The Bedford County Utility District, Spring Hill, Shelbyville Water System, Lewisburg's Water System, and Columbia all obtain their water from the Duck River downstream of Normandy Dam (Figure 1) and during much of the year are dependent on releases from the dam. The proposed change would conserve water in Normandy Reservoir to help meet the needs of the DRUC and other users of Normandy Reservoir. It would reduce the amount of water available to those utilities withdrawing water from the river downstream of Normandy Dam in late October and November 2007, but better ensure that more water is available in later months if the drought persists.

Background

The current operating guidelines for water releases from Normandy Dam are outlined in TVA's environmental impact statements (EISs) entitled Future Water Supply Needs in the Upper Duck River Basin (TVA, 2000) and Reservoir Operations Study (TVA, 2004). Normandy Reservoir is operated during June through November to provide an instantaneous minimum flow of 155 cfs (100 mgd) at Shelbyville, DRM 221.4, approximately 12 miles below Normandy Dam. The location is between the Shelbyville water intake and wastewater treatment plant discharge. The 155 cfs minimum flow is for water quality control at the Shelbyville wastewater discharge. From December through May, releases from Normandy are regulated to provide for 120 cfs at the Shelbyville wastewater discharge. Although there is no minimum flow objective relating to Columbia, meeting the Shelbyville objective has provided at least 135 cfs in the river at the Columbia water intake at DRM 133.92. In 1996, the Tennessee Division of Water Pollution Control determined that the one-day average flow in the Duck River at Columbia, just below the Columbia water intake should not fall below 100 cfs (TVA, 1998).

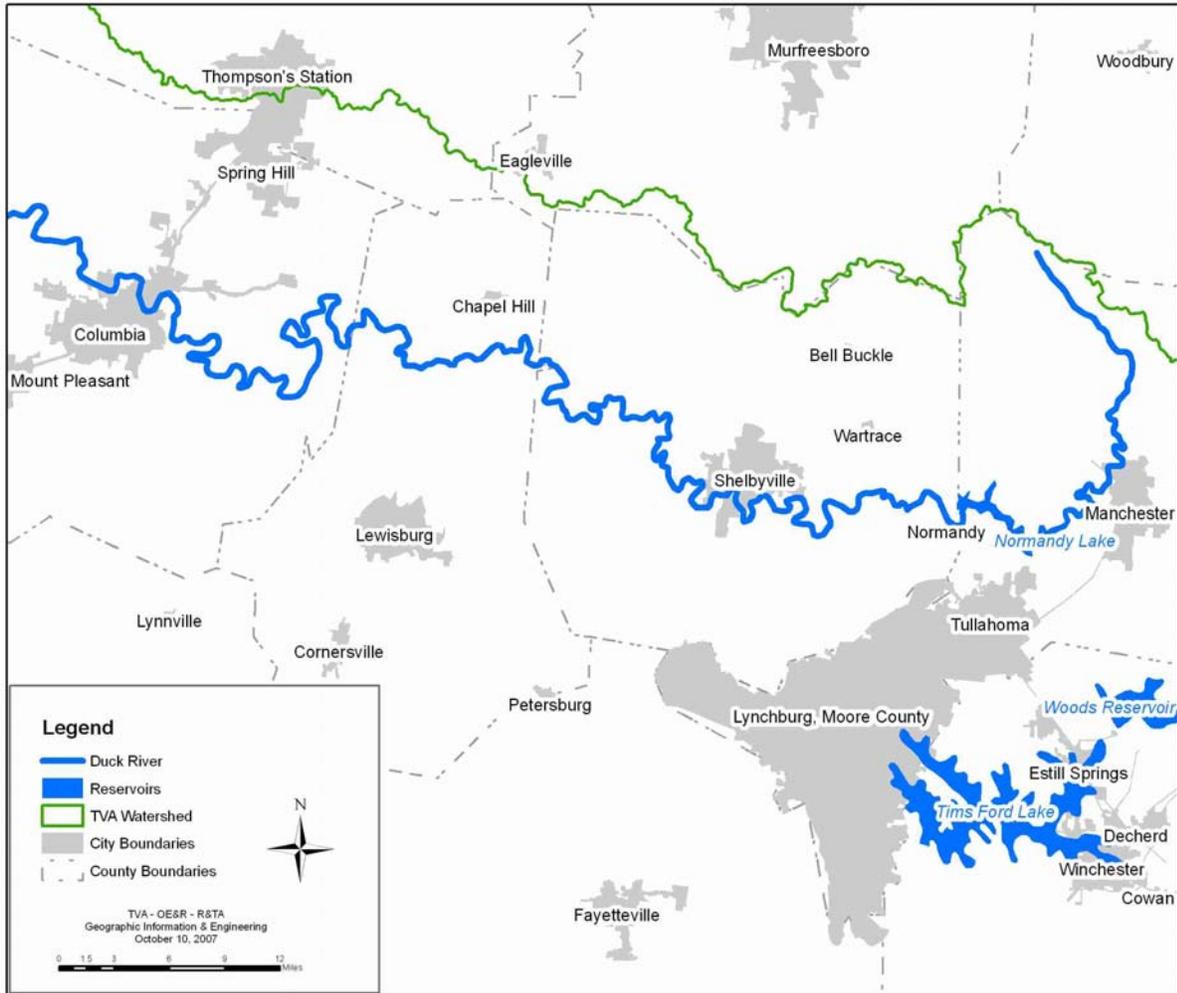


Figure 1 - Normandy Reservoir and the Duck River

Normandy Reservoir is operated to meet a target winter pool level of 864 feet and a summer pool target of 875 feet (Figure 1). Rainfall in the Normandy basin has been below normal in recent years, with 32.8 inches recorded in 2005, and 31.9 inches recorded in 2006. Through the end of September 2007, 15 inches had been recorded. As a result of the very low rainfall, the Normandy Reservoir elevation on September 18, 2007, was 859.8 feet or about four feet below normal winter pool elevation. Without any change in rainfall pattern, it is projected to be 850 feet by December 1, 2007, or over 14 feet below the minimum winter pool target elevation of 864 feet and two feet lower than at any time since the dam was closed.

As the reservoir pool level is rapidly declining due to the lack of rainfall and runoff, the state of Tennessee has concluded that waiting until the normal date of December 1 to implement the minimum flow reduction could place downstream aquatic life and assimilative capacity at increased risk should the current dry conditions continue. The reservoir level was at 857.9 on October 5, 2007, and is dropping at a rate of about 0.1 foot per day. However, this rate will likely increase as the volume of water in the reservoir continues to decrease.

NORMANDY

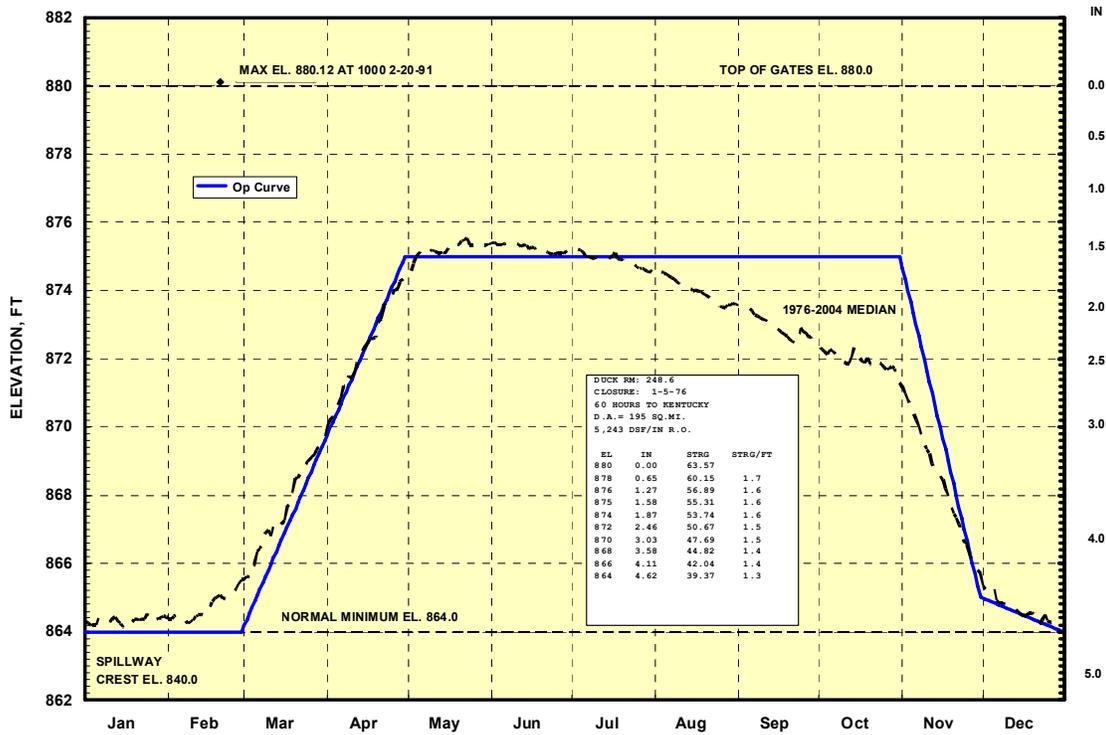


Figure 2 - Normandy Reservoir Operating Guide

The requested change would result in reservoir elevations 1 to 2 feet higher on December 1 than would be the case under the operating policy guidelines. Increasing the amount of water in storage means that more water remains in Normandy Reservoir in later months to help ensure that minimum flows can continue to be made that are beneficial for downstream aquatic life and assimilative capacity. This will also decrease impacts on DRUC operations. The unusually low reservoir pool increases the water treatment and pumping costs, as water must be withdrawn from deeper in the reservoir and from a zone of poorer water quality. If drought conditions persist and the water level in Normandy Reservoir drops too low, the DRUC intake and pumping station could become inoperable.

The state of Tennessee believes the current drought, especially if it continues through 2008, could prove to be a serious public health and safety issue due to the very large number of residents that depend on Normandy Reservoir and the Duck River as their sole source of water supply. In addition, the significant biological resources downstream of Normandy Dam could benefit from water management choices taken now rather than more severe actions that may be required later should the drought continue.

DRUC and other area water systems that rely on Normandy Reservoir and the Duck River, collectively requested that users implement voluntary water conservation measures in mid-September and are prepared to implement further mandatory measures as needed.

Other Environmental Reviews and Documentation

The water supply needs in the Duck River area have been the subject of several recent analyses.

In 1998, TVA completed a water supply inventory and needs analysis (TVA, 1998) which showed that an additional water source would be needed some time after 2015. TVA subsequently prepared a Programmatic EIS in which various alternatives for meeting the future water supply needs in the Upper Duck River Basin were evaluated (TVA, 2000). In its Record of Decision, TVA recommended that local entities address one or more of the alternatives to meet future water supply needs.

The Duck River Development Agency subsequently funded a river modeling study (HydroLogics, 2002) that determined Normandy Reservoir storage was likely adequate to meet future water supply needs beyond 2015, but identified reservoir water quality issues relating to reservoir drawdown. TVA conducted further modeling of Normandy Reservoir (Kalembert and Bohac, 2005) which showed there would be little impact on water quality if Normandy Reservoir were operated with higher pool elevations. In 2007 the Duck River Development Agency requested that TVA examine modifying Normandy Dam and its operation to increase water supply availability by raising the pool elevations. This request for higher pool elevations is independent of the current proposal to alter the reservoir release schedule on a temporary basis.

Alternatives

This environmental assessment evaluates two alternatives:

Alternative 1 - No Action. Under this alternative, TVA would continue to operate Normandy Dam to maintain a minimum flow of 155 cfs at Shelbyville through December 1, when the minimum flow would be reduced to 120 cfs.

Alternative 2 - Change Normandy Dam Release Schedule. Under this alternative, the proposed action, TVA would change the Normandy Dam release schedule as requested by the state of Tennessee to reduce the minimum flow at Shelbyville from 155 cfs to 120 cfs as soon as possible. The proposed change would occur in two increments. The first increment would lower the minimum flow target at Shelbyville from 155 cfs to 140 cfs, where it would be maintained for two weeks. The second increment would lower the minimum flow target at Shelbyville from 140 cfs to 120 cfs. Under this alternative, TVA would implement the change during the fall of 2007. TVA does not at this time propose to make other changes to the operation of Normandy Reservoir and any such future proposed changes would be evaluated as appropriate.

As part of Alternative 2, the state of Tennessee, through the Tennessee Department of Environment and Conservation (TDEC) and the Tennessee Wildlife Resources Agency (TWRA), The Nature Conservancy, and TVA would jointly implement a program to model, sample, and monitor aquatic habitat and water quality in the affected reach of the Duck River downstream of Normandy Dam.

A total of six stations would be sampled, with three stations located downstream of both Shelbyville and Columbia. The specific locations would be decided by TWRA and TDEC in consultation with the U.S. Fish and Wildlife Service (USFWS) and the Tennessee Valley Authority (TVA). Each station would be sampled prior to any change in flows to establish

baseline conditions. The stations would then be sampled about a week after initiation of the first flow reduction to 140 cfs and again after the second flow reduction to 120 cfs, likely in mid-November. In an attempt to capture the worst conditions, sampling would not be conducted within a few days of a substantial rainfall.

TDEC would measure NH₃-N, TKN, and other water quality parameters at each sampling site. TDEC would then integrate the results of these samples, especially ammonia levels, into their existing water quality models. TWRA and USFWS will perform the biological and physical habitat monitoring with the assistance of TDEC and The Nature Conservancy.

TDEC and TVA would perform modeling to document the change in aquatic habitat, as measured by the wetted area, resulting from the proposed flow reduction.

The results of the sampling and modeling would be transmitted to requesting agencies for review and alteration of the sampling protocol as warranted. It is anticipated that this protocol would be dynamic with full participation by any interested parties. Should the monitoring results show that the proposed action is adversely affecting aquatic species and/or water quality, TVA would take appropriate action to address this after coordinating with USFWS, TDEC, and TWRA.

Alternative 2 - Change Normandy Dam Release Schedule, is TVA's preferred alternative.

Affected Environment and Evaluation of Impacts

Site Description

The Duck River is the longest river contained within the borders of Tennessee. Although the river's supporting watershed is quite large, the karst terrain in the basin impacts the amount of water available for off-stream uses. This is most notable during periods of little precipitation.

Impacts Evaluated

The potential environmental impacts of Alternative 2 – the proposed change in the Normandy Dam release schedule are summarized in the attached TVA Categorical Exclusion Checklist 16850 (see Appendix). TVA determined that there would be no or minimal impacts to cultural resources, prime farmland, land use, Wild and Scenic Rivers, streams listed on the Nationwide Rivers Inventory, wetlands, floodplains and flood risk, vegetation, wildlife, and invasive species, and no release of air emissions, wastewater streams, or solid or hazardous waste. The proposed change would marginally improve recreation on Normandy Reservoir for about a month compared to Alternative 1. The lower flows would allow continued usage by small craft and result in insignificant impacts on small craft floating sections of the river below the dam.

No impacts to terrestrial animals or plants listed as endangered, threatened, or other special status under the Endangered Species Act or by the state of Tennessee are anticipated. The proposed action does have the potential to affect endangered and threatened fish and mollusks, as well as other aquatic life, in the Duck River downstream of Normandy Dam for a temporary period. It also has the potential to affect water quality in the Duck River also for a temporary period. These resources, and the potential affects on them, are described in more detail below.

Two reaches of the Duck River are considered as part of the study area; the reach from Normandy Dam at Duck River Mile (DRM) 249 downstream to a small dam at Shelbyville (approximately DRM 221.5) and the reach from the Shelbyville dam downstream to approximately DRM 70.

Normandy Dam (DRM 249) to Shelbyville (DRM 221)

This upstream reach consists of a large number of well-defined riffles, runs, and island complexes. It is considered a warmwater stream, except for the 4.6 mile reach immediately downstream of Normandy Dam. This area exhibits characteristics of a coolwater stream. The flow regime and temperatures in this reach of the Duck River are heavily influenced by releases from Normandy Dam, particularly during low flow conditions. Two small impoundments of the Duck River are present in this reach; Lillard Mill and a small impoundment at Shelbyville.

Shelbyville to DRM 70

Downstream of Shelbyville, habitat is similar to the upper reach until it reaches approximately RM 160. Downstream of this point the slope of the river becomes very flat (1.3 feet drop in elevation per mile) and the river is very sluggish. During the summer months, high oxygen demand and excessive algal growth reduce dissolved oxygen levels, particularly in long pools (TVA, 2000). During extreme drought conditions, all but one of the tributary streams between Shelbyville and Columbia area reduced to virtually no flow, resulting in a reduction of streamflow in the Duck River in this 90-mile reach. Releases from Normandy Dam provide the majority of instream flow in the Duck River during drought conditions. Downstream of Columbia City Dam (approximately River Mile 135), the river continues to have a rather low gradient and consists of long pools and well-defined runs and riffles. Four wastewater discharges are present in this reach; the Shelbyville wastewater discharge at DRM 221.3, the Tyson Foods discharge at DRM 220.6, the Lewisburg wastewater discharge at DRM 180.4, and the Columbia wastewater discharge at DRM 127.2.

The Duck River supports one of the most species-rich aquatic communities in North America (TVA, 1999, 2000). The two tailwater reaches considered in this assessment contain similar aquatic communities. Most of these species are found in the Duck River downstream of Normandy Dam. Reducing the minimum flows from Normandy Dam in October rather than December could affect these resources by reducing the amount of habitat available for use by aquatic organisms, increasing in-stream temperatures, and reducing the amount of water available to assimilation of wastewater discharges during a period when warmer water temperatures could increase impacts on aquatic organisms and habitat.

Fish, Insects, and Other Invertebrates (Except Mollusks)

The Duck River downstream of Normandy Dam contains one of the most diverse fish communities in North America (Etnier and Starnes, 1993; TVA, 2000). TVA stream monitoring stations are located at six sites in the Duck River downstream of Normandy Dam; DRM 22.5 - at Hite Ford, DRM 31.2 - at the Interstate 40 bridge, DRM 195.7 - at White Ford, DRM 229.2 - at Moore Ford, DRM 240 - at Three Forks Bridge, and 248.1 - at the Normandy Fish Hatchery (Appendix *IBI scores*). Sampling at these locations has documented the presence of at least 102 species of fish. The greatest fish diversity occurs in the middle reaches of the river from DRM 135 - 179. The fish community is less diverse in the coolwater areas immediately downstream of Normandy Dam, and fish species

numbers also decline in the lower end of the Duck River downstream of Columbia. These reductions are likely due to past pollution and human disturbances in the watershed.

One federally listed fish species, and fourteen state-listed fish species are present in the Duck River between DRM 249 and DRM 70 (Table *Aquatics 1*).

Table *Aquatics 1* - Federally and State-listed Aquatic Animals Reported from the Duck River (DRM 249 - DRM 70).

Common Name	Scientific Name	State Status and Rank ¹	Federal Status
Ashy Darter	<i>Etheostoma cinereum</i>	THR - S2S3	-
Bedrock Shiner	<i>Notropis rupestris</i>	NMGT - S2	-
Blotchside Logperch	<i>Percina burtoni</i>	NMGT - S2	-
Blue Sucker	<i>Cycleptus elongatus</i>	THR - S2	-
Coppercheek Darter	<i>Etheostoma aquali</i>	THR - S2S3	-
Saddled Madtom	<i>Noturus fasciatus</i>	THR - S2	-
Egg-mimic Darter	<i>Etheostoma pseudovulatum</i>	END - S1	-
Flame Chub	<i>Hemitremia flammea</i>	NMGT - S3	-
Golden Darter	<i>Etheostoma denoncourti</i>	NMGT - S2	-
Highfin Carpsucker	<i>Carpiodes velifer</i>	NMGT - S2S3	-
Pygmy Madtom	<i>Noturus stanauli</i>	END - S1	END
Redband Darter	<i>Etheostoma luteovinctum</i>	NMGT - S4	-
Slenderhead Darter	<i>Percina phoxocephala</i>	NMGT - S3	-
Southern Brook Lamprey	<i>Ichthyomyzon gagei</i>	NMGT - S1	-
Striated Darter	<i>Etheostoma striatulum</i>	THR - S1	-

¹Status codes: END = Endangered; THR = Threatened; NMGT = in need of management; S1 = critically imperiled (one to five occurrences); S2 = Very rare and imperiled within the state, six to twenty occurrences; S3 = Rare and uncommon in state, from 21 to 100 occurrences.

TVA uses an Index of Biotic Integrity (IBI) to rate the health of the fish community in streams. IBI scores for the Duck River have shown a consistent trend toward improvement, and typically rate fish communities as “good” in the Duck River, with a few “excellent” ratings in recent years (Appendix *IBI scores*).

Aquatic insects and other invertebrates are similarly diverse in the Duck River. Benthic Index of Biotic Integrity scores have shown a trend similar to the fish indicators and point to the Duck River as a very health river.

Mollusks

The mollusk fauna of the Duck River shows a pattern of diversity similar to the fish community (TVA, 2000). Sixty-nine species of freshwater mussel are reported to be present in the Duck River (Parmalee and Bogan, 1998). The relatively large number of species of mussels and snails present in the middle portions of the Duck River downstream of Normandy Dam represent much of the diversity that was present in the river at least 100 years ago (e.g., Isom and Yokley, 1968; Ortmann, 1924). Included in these 69 species are 16 species that are either federally or state-listed as endangered, threatened, or other special status. An additional eight listed species historically occurred in the Duck River, but

are assumed to have been eliminated from the system (Table *Aquatics 2*). Some mussels, such as the Cumberland monkeyface, are presently spawning.

Table *Aquatics 2* - Federally and State-listed Aquatic Animals Reported from the Duck River (DRM 249 - DRM 70).

Common Name	Scientific Name	State Status and Rank ¹	Federal Status
Birdwing Pearlymussel	<i>Lemiox rimosus</i>	END - S1	END
Clubshell*	<i>Pleurobema clava</i>	END - SH	END
Cracking Pearlymussel*	<i>Hemistena lata</i>	END - S1	END
Cumberland Combshell	<i>Epioblasma brevidens</i>	END - S1	END
Cumberland Monkeyface	<i>Quadrula intermedia</i>	END - S1	END
Fluted Kidneyshell	<i>Ptychobranthus subtentum</i>	NOST - S2S3	CAND
Helmet Rock Snail	<i>Lithasia duttoniana</i>	NOST - S2	-
Muddy Rocksnail*	<i>Lithasia salebrosa</i>	NOST - S2	-
Orange-foot Pimpleback*	<i>Plethobasus cooperianus</i>	END - S1	END
Oyster Mussel	<i>Epioblasma capsaeformis</i>	END - S1	END
Pale Lilliput	<i>Toxolasma cylindrellus</i>	END - S1	END
Purple Lilliput	<i>Toxolasma lividus</i>	NOST - S1S2	-
Pyramid Pigtoe	<i>Pleurobema rubrum</i>	NOST - S2S3	-
Rabbitsfoot	<i>Quadrula cylindrica cylindrica</i>	NOST - S3	-
Rayed Bean*	<i>Villosa fabalis</i>	NOST - S1	CAND
Round Hickorynut	<i>Obovaria subrotunda</i>	NOST - S3	-
Rugose Rocksnail*	<i>Lithasia jayana</i>	NOST - S2	-
Salamander Mussel	<i>Simpsonaias ambigua</i>	NOST - S1	-
Slabside Pearlymussel	<i>Lexingtonia dolabelloides</i>	NOST - S2	CAND
Snuffbox*	<i>Epioblasma triquetra</i>	NOST - S3	-
Spectaclecase	<i>Cumberlandia monodonta</i>	NOST - S2S3	CAND
Tan Riffleshell	<i>Epioblasma florentina walkeri</i>	END - S1	END
Tennessee Clubshell	<i>Pleurobema oviforme</i>	NOST - S2S3	-
Tennessee Heelsplitter	<i>Lasmigona holstonia</i>	NOST - S2	-
Tubercled Blossom Pearlymussel*	<i>Epioblasma torulosa torulosa</i>	EXTI - SX	END
Turgid Blossom Pearlymussel*	<i>Epioblasma turgidula</i>	EXTI - SX	END

¹Status codes: END = Endangered; THR = Threatened; NMGT = In need of management; EXTI - Extirpated; CAND - Candidate for federal listing; NOST - No official state status; S1 = Critically imperiled (one to five occurrences); S2 = Very rare and imperiled within the state, six to twenty occurrences; S3 = Rare and uncommon in state, from 21 to 100 occurrences; SH - Historically occurred within state; SX - Presumed extinct.

*Species that have been reported from historical record, but are no longer present in the Duck River system.

Environmental Consequences

The two tailwater reaches considered in this assessment contain similar aquatic communities. Species diversity in all groups is greatest in the reach of the Duck River between DRM 135 to DRM 179, however, one or more federally or state-listed species is

likely to occur in any given area between Normandy Dam and DRM 70. The proposed change in the Normandy Dam release schedule could affect these resources by reducing the amount of habitat available for use by aquatic organisms, reducing dissolved oxygen (DO) levels, increasing in-stream temperatures, and reducing the amount of water available to assimilation of wastewater discharges during a period when warmer water temperatures could increase impacts on aquatic organisms and habitat. Some aquatic organisms could already be stressed by the drought conditions.

Water quality simulations were conducted by TDEC using the TVA River Modeling System hydrodynamic model ADYN coupled with the water quality model RQUAL. Three parameters were modeled at flow rates of 155 cfs and 120 cfs; dissolved oxygen (DO) concentrations (mg/L), temperature (deg C), and ammonia concentrations (ammonia N - mg/L). The modeling that was performed did not specifically include pH, however, limited TDEC data found in EPA's STORET database indicates an average circum-neutral pH of approximately 7.5 standard units for the fall season below Normandy Dam.

Two hydrodynamic simulations were made by TVA staff using ADYN. One simulation was for a minimum flow at Shelbyville of 120 cfs and the other was for a minimum flow at Shelbyville of 155 cfs. Steady-state conditions were compared to estimate the impacts of minimum flow reduction upon three parameters: mean depth, velocity, and surface area. Results of this modeling are presented in Appendix *Water Quality Modeling*.

Normandy Dam (DRM 249) to Shelbyville (DRM 221)

The proposed action reducing the flow from 155 cfs to 120 cfs in October 2007 rather than December 2007 is not likely to result in major impacts to aquatic communities (including federally and state-listed species) in this reach of the Duck River. Based on modeling results, implementation of the monitoring program, and any necessary subsequent modifications of the release schedule based on the results of the monitoring program, the proposed action is not likely to affect any federally listed aquatic species present in the Duck River. No major wastewater outfalls or other major nutrient inputs are present in this reach of the river, therefore, the potential for impacts related to waste assimilation issues are minimal in the Duck River between Normandy Dam and Shelbyville.

Modeling results indicate that the reduction in available aquatic habitat (in terms of wetted area) when flows are reduced from 155 cfs to 120 cfs are minimal. Overall wetted area is only reduced 1.2 percent (approximately 0.06 square miles) over the entire reach from DRM 249 to DRM 70. The maximum reduction in wetted area at any given point was approximately five feet. Drought conditions aggravate any loss of available habitat because releases from Normandy Dam are the main source of water in the Duck River currently. In a typical year, releases from Normandy Dam would supplement flow supplied by downstream tributaries and changes in releases would have a smaller effect.

The modeling indicates that the proposed action would not result in major changes to ammonia concentrations, DO concentrations, or water temperature in the Duck River upstream of Shelbyville if flow is reduced from 155 cfs to 120 cfs beginning in October 2007. Because the proposed action is a one-time change in the timing of the reduction in the minimum flow to 120 cfs, there would be no adverse direct, indirect, or cumulative impacts on aquatic communities (including listed species) from changes in ammonia concentrations, dissolved oxygen concentrations or water temperature.

Shelbyville to DRM 70

The Duck River downstream of Shelbyville could be affected by reductions in available aquatic habitat, reductions in DO levels, and from increased warming of the water due to lower water levels in the Duck River. Reduction of flow from 155 cfs to 120 cfs in October 2007 rather than in December 2007 is not likely to result in major impacts to aquatic communities (including federally and state-listed species) in this reach of the Duck River downstream from Shelbyville, because of modifications of the release schedule that would be made based on the results of the monitoring program. In addition to these potential effects, four wastewater outfalls are present in this reach. There is the potential for impacts related to waste assimilation issues in this reach of the river; particularly from nitrogen compound releases and on DO levels from a Biological Oxygen Demand perspective.

Effects on available habitat in this reach of the river are expected to be similar to the effects anticipated upstream of Shelbyville. Reductions in wetted area would be similar, and any adverse effects resulting from habitat loss would be mitigated as previously described by modifying flows if necessary based on monitoring results. Temperature changes would also be minimal (<0.15°C) and would not have a negative effect on aquatic organisms.

TDEC's modeling shows that DO concentrations at a flow rate of 120 cfs would differ little from the concentrations present at 155 cfs. The minimum average daily DO for the 120 cfs simulation was 3.2 mg/L, and the minimum for the 155 cfs simulation was 3.3 mg/L. DO concentrations are currently low in the pooled areas behind the low head dams at Shelbyville, Lillard Mill, and Columbia. DO levels quickly rebound as water flows over the dams and atmospheric oxygen is mixed into the water. Reduction of flow from 155 cfs to 120 cfs would not result in declines in oxygen concentrations that would affect aquatic organisms.

Modeling also indicates that ammonia concentrations in the river at a flow rate of 120 cfs would not differ greatly from the concentrations at 155 cfs. The maximum ammonia concentration in the Duck River following mixing of the wastewater discharged from the Shelbyville wastewater treatment plant (DRM 221.3) and the Tyson Foods outfall (DRM 220.6) based on estimated discharge concentrations is anticipated to be about 0.2 mg/L. Any increase in baseline ammonia levels would be expected to dissipate over the next ten river miles. Discharges from the Columbia wastewater treatment plant (DRM 127.4) would result in an increase in the instream ammonia concentration of only 0.05 mg/L.

These ammonia levels are below the current EPA criteria for protection of aquatic organisms. Recent research indicates that freshwater mussels could be negatively affected by ammonia concentrations that are much lower than the current EPA criteria (Augspurger et al. 2003). However, TDEC modeling indicates that instream ammonia concentrations in the Duck River could be below even those levels of concern.

Based on these findings, TVA has determined that the proposed release change is not likely to adversely affect federally listed species. As required with Section 7 of the Endangered Species Act, TVA has consulted with the USFWS on this determination. In an emailed message dated October 16, 2007 (see Appendix), the USFWS concurred with TVA's determination.

In the event that the monitoring results show that the proposed action is adversely affecting aquatic species and/or water quality, TVA would increase flows after coordinating with USFWS and TWRA. Because the proposed action would only be implemented in October

and November 2007, and normal operations would resume in December 2007, no long-term adverse effects on aquatic habitat or species are anticipated.

TVA Preparers

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APPENDICES

Letters from TDEC and TWRA requesting change



STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
NASHVILLE, TENNESSEE 37243-0435

JAMES H. FYKE
COMMISSIONER

PHIL BREDESEN
GOVERNOR

October 5, 2007

Ms. Bridgette K. Ellis
Senior Vice-President
Office of Environment and Research
Tennessee Valley Authority
400 W. Summit Hill Drive
Knoxville, Tennessee 37902

RE: Normandy Reservoir Flow Release

Dear Ms. Ellis:

The Tennessee Valley Authority (TVA) is scheduled to decrease the flow release rate at Normandy Dam from 155 cubic feet per second (cfs) to 120 cfs, as measured at Shelbyville, Tennessee on December 1, 2007, in accordance with current TVA operating policy for Normandy Reservoir and the Duck River. This letter is to request that incremental flow release reductions begin as soon as possible prior to December 1, 2007.

Middle Tennessee is under an exceptional drought which is seriously affecting the pool elevations of Normandy Reservoir. This reservoir is critical to providing drinking water to the cities of Tullahoma and Manchester via the Duck River Utility Commission. Flow releases from Normandy are critical for conservation of significant aquatic resources and maintaining water quality in the Duck River. While the Duck River Utility Commission obtains water from Normandy Reservoir, Bedford County Utility District, Spring Hill, Shelbyville Water System, Lewisburg's Water System and Columbia all obtain water from the Duck River downstream from Normandy Reservoir.

As reservoir elevations decline at an accelerated rate due to the lack of rainfall and runoff, going to the December 1st minimum flow earlier than normal could potentially help conserve water supply, aquatic life, and water quality should drought conditions continue. The lake level is currently at Elevation 858.0 and is dropping at a rate of about 0.1 foot per day. However, these rates will likely increase as the volume of water in the reservoir continues to decrease. The lowest of the Duck River Utility intakes in Normandy Reservoir is at Elevation 833. The DRU would begin experiencing difficulties withdrawing water at Elevation 840.

Based on discussions with TVA staff, making the release change as requested herein would result in higher reservoir elevations on December 1st than would be the case under the normal operating policy. This amount of water may represent a significant difference in the amount of water in storage that could be made available to ensure adequate domestic water supply, protect water quality, and conserve aquatic resources.

Ms. Bridgette K. Ellis
October 5, 2007
Page 2 of 3

On September 19, 2007, all the water systems that rely on Normandy Reservoir and the Duck River, collectively issued a press release that initiated voluntary water conservation measures. These providers are prepared to implement appropriate conservation measures through December 1st contingent upon TVA's approval of incremental flow release reductions.

On September 26, 2007, the Tennessee Department of Environment and Conservation's (TDEC) Columbia Field Office, hosted a meeting of various stakeholders and interested parties to discuss the ongoing drought situation. The list of attendees included representation from TVA, National Weather Service, U.S. Fish and Wildlife Service (USFWS), Tennessee Wildlife Resources Agency (TWRA), TDEC Division of Water Supply, TDEC Division of Water Pollution Control, TDEC Commissioner's Office, The Nature Conservancy, the Tennessee Emergency Management Agency (TEMA), Duck River Agency, Columbia, Shelbyville, Lewisburg, Manchester and Tullahoma water and wastewater systems.

The National Weather Service representative from Nashville provided a long-term assessment that indicated current drought may continue into next year. This means it is imperative that we conserve water in Normandy Reservoir.

TVA staff provided a summary of reservoir operations and showed modeling studies of the river depth and dissolved oxygen levels under the current flow of 155 cfs and the 120 cfs flow.

The opinion of stakeholders at our meeting on September 26, 2007 was that the Normandy water supply situation was serious and that the flow reduction requested herein is warranted provided potential effects on the Duck River are assessed and a monitoring program implemented. It was recommended that TDEC and TWRA request that TVA reduce the flows from Normandy Reservoir as soon as feasible. The incremental flow release reduction recommended is from 155 cfs to 140 cfs for two weeks and from 140 cfs to 120 cfs thereafter until a December 1st resumption of normal operations.

We want to ensure that aquatic resources that occur in the Duck River continue to be protected under any reduced flow scenario resulting in reduced water depth, flow velocity and concentration of pollutants. We believe the proposed discharge reduction to 120 cfs earlier than December 1st is warranted with the provision that river biology, temperature, nutrients, ammonia and other water quality parameters are carefully monitored and studied during the October and November period. The State of Tennessee and federal agencies will conduct sampling and monitoring to address aquatic habitat or water quality issues. The sampling and monitoring will be conducted jointly by TDEC staff, The Nature Conservancy, TVA, and TWRA with the data provided to all interested parties.

TDEC will monitor NH₃-N, TKN and measure water quality parameters in the reach of river downstream of Shelbyville and Columbia where the models indicate the worst case conditions are likely to occur. The results of these samples, especially ammonia levels, may then be incorporated into our existing water quality models. A total of six stations will be sampled twice unless the results require more frequent sampling. There will be three stations below each town with the specific location decided by TWRA and TDEC in consultation with USFWS and TVA. Baseline data under present flow conditions will be established. Samples will be taken about a week after initiation of each flow reduction. In an attempt to capture the worst conditions, we will not sample within a few days of a substantial rainfall. The results of the sampling and modeling will be transmitted to the agencies for review and alteration of the sampling protocol as warranted. It is expected that the data gathered during this period will prove useful should additional minimum flow reductions be considered in the future.

Ms. Bridgette K. Ellis
October 5, 2007
Page 3 of 3

Thank you for your consideration of this request. The current drought, especially if continued through 2008, will result in serious resource management challenges and it is prudent to make conservative water management decisions now.

Your time and consideration in this matter is greatly appreciated.

Sincerely,



Paul Sloan
Deputy Commissioner

PS/tw

cc: Paul Davis, Director, Water Pollution Control
Robert Foster, Director, Division of Water Supply
Tim Wilder, Water Pollution Control
David McKinney, TWRA, Division of Environmental Services
The Honorable Geneva Smith, Mayor, City of Shelbyville
The Honorable Troy Bisby, Mayor, City of Tullahoma
The Honorable John W. Brown, Mayor, City of Manchester
The Honorable William E. Gentner, Mayor, City of Columbia
Randall J. Braker, General Manager, Duck River Utility Commission
James Clark, General Manager, Columbia Water System
David H. Crowell, General Manager, Shelbyville Water System
Michael G. Anderson, Director, Wastewater System Columbia STP
William Conrad, Environmental Manager, Tyson Foods, Inc.
Doug Murphy, Executive Director, Duck River Agency
Leslie Colley, The Nature Conservancy
Dr. Lee A. Barclay, Field Supervisor, U.S. Fish and Wildlife Service
Gene Gibson, Tennessee Valley Authority



TENNESSEE WILDLIFE RESOURCES AGENCY

ELLINGTON AGRICULTURAL CENTER
P. O. BOX 40747
NASHVILLE, TENNESSEE 37204

October 5, 2007

Ms. Bridgette K. Ellis
Senior Vice-President
Office of Environment and Research
Tennessee Valley Authority
400 W. Summit Hill Drive
Knoxville, TN 37902

Re: Normandy Reservoir Flow Release

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The State of Tennessee

10-10-07 BKE/joh

AN EQUAL OPPORTUNITY EMPLOYER

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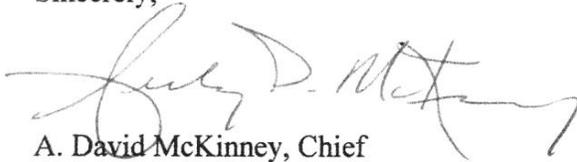
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will be sampled twice unless the results require more frequent sampling. There will be three stations below each town with the specific location decided by TWRA and TDEC in consultation with USFWS and TVA. Baseline data under present flow conditions will be established. Samples will be taken about a week after initiation of each flow reduction. In an attempt to capture the worst conditions, we will not sample within a few days of a substantial rainfall. The results of the sampling and modeling will be transmitted to the agencies for review and alteration of the sampling protocol as warranted. It is expected that the data gathered during this period will prove useful should additional minimum flow reductions be considered in the future.

Thank you for your consideration of this request. The current drought, especially if continued through 2008, will result in serious resource management challenges and it is prudent to make conservative water management decisions now.

Your time and consideration in this matter is greatly appreciated.

Sincerely,

A handwritten signature in black ink, appearing to read "A. David McKinney". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

A. David McKinney, Chief
Environmental Services Division
Tennessee Wildlife Resources Agency

ADM:bg

Consultation Letter from TVA Requesting USFWS Concurrence on Endangered Species Determination

October 16, 2007

Dr. Lee Barclay
U.S. Fish and Wildlife Service
446 Neal Street
Cookeville, Tennessee 38501

Dear Lee:

To conserve water in Normandy Reservoir to help meet the needs of the Duck River Utility Commission (DRUC), which serves the cities of Tullahoma and Manchester, the state of Tennessee has requested that the Tennessee Valley Authority (TVA) change the release schedule at Normandy Dam. Their request is that TVA immediately reduce the flow as measured at Shelbyville (Duck River Mile 224.1) from 155 cubic feet per second (cfs) to 120 cfs. TVA provides minimum flows at Shelbyville of 155 cfs from June 1 through November 30 and 120 cfs from December 1 through May 31. The requested change would implement the flow reduction from 155 to 120 cfs several weeks earlier than normal.

The proposed action is for TVA to change the Normandy Dam release schedule as requested by the state of Tennessee to reduce the minimum flow at Shelbyville from 155 cfs to 120 cfs as soon as possible. The proposed change would occur in two increments. The first increment would lower the minimum flow target at Shelbyville from 155 cfs to 140 cfs, where it would be maintained for two weeks. The second increment would lower the minimum flow target at Shelbyville from 140 cfs to 120 cfs. TVA does not at this time propose to make other changes to the operation of Normandy Reservoir and any such future proposed changes would be evaluated as appropriate.

TVA has determined that six federally listed mussels and one fish (birdwing pearl mussel, Cumberland combshell, Cumberland monkeyface, oyster mussel, pale lilliput, tan riffleshell, and pygmy madtom) are present in the reach of the Duck River that could be affected by the proposal. Therefore, as part of this proposal, the state of Tennessee, through the Tennessee Department of Environment and Conservation (TDEC) and the Tennessee Wildlife Resources Agency (TWRA) would jointly implement a program to model, sample, and monitor aquatic habitat and water quality in the affected reach of the Duck River downstream of Normandy Dam. TVA will model the effect of the flow reduction on wetted perimeter in the affected reaches.

Dr. Lee Barclay
Page 2
October 16, 2007

A total of six stations would be sampled, with three stations located downstream of both Shelbyville and Columbia. The specific locations would be decided by TWRA and TDEC in consultation with the U.S. Fish and Wildlife Service (USFWS) and TVA. Each station would be sampled prior to any change in flows to establish baseline conditions. The stations would then be sampled about a week after initiation of the first flow reduction to 140 cfs and again after the second flow reduction to 120 cfs, likely in mid-November. In an attempt to capture the worst conditions, sampling would not be conducted within a few days of a substantial rainfall.

TDEC would measure NH₃-N, TKN, and other water quality parameters at each sampling site. TDEC would then integrate the results of these samples, especially ammonia levels, into their existing water quality models. As documented in letters from TWRA and TDEC to TVA (see draft EA for this project), the State will be responsible for performing the biological and physical habitat monitoring with the assistance of The Nature Conservancy and other federal agency personnel. If federally listed mussels are found stranded (i.e., out of the water), they will be moved to nearby suitable habitat by appropriately permitted biologists, including TVA staff, and informal consultation reinitiated by TVA with the USFWS Cookeville Field Office.

TDEC and TVA will perform modeling to document the change in aquatic habitat, as measured by the wetted area, resulting from the proposed flow reduction.

In the event that the monitoring results show that the proposed action is adversely affecting aquatic species and/or water quality, TVA would immediately coordinate with USFWS and TWRA and increase flows as determined appropriate with those agencies. The proposed action would only be implemented in October and November 2007, and normal operations would resume in December 2007. Because of the monitoring and thresholds included in this proposal that would result in ceasing the reduced flows if adverse impacts to the listed species are indicated, TVA has determined that implementing this proposal is not likely to adversely affect the listed species that occur in the affected reach of the Duck River.

TVA is interested in participating in discussions about the future of the critical aquatic endangered species resources, given the prediction of continued drought conditions.

Please let us know if you concur with TVA's determination. If you have questions, contact me at (865) 632-2418 or John (Bo) Baxter at (865) 632-3360.

Sincerely,

Peggy W. Shute
Manager
Heritage Resources

PWS:ACW
cc: EDMS, WT 11B-K

Categorical Exclusion Checklist 16850 for Proposed TVA Actions

Categorical Exclusion Checklist for Proposed TVA Actions

Categorical Exclusion Number Claimed	Organization ID Number	Tracking Number (NEPA Administration Use Only) 16850
Form Preparer Charles E Bohac	Project Initiator/Manager Charles E Bohac	Business Unit RSOE - River Operations
Project Title Normandy Dam Release Schedule Change		Hydrologic Unit Code 06040003-280
Description of Proposed Action (Include Anticipated Dates of Implementation) <input checked="" type="checkbox"/> Continued on Page 3 (if more than one line) For Proposed Action See Attachments and References		
Initiating TVA Facility or Office Normandy Dam	TVA Business Units Involved in Project For Business Unit Listing See Attachments and References	
Location (City, County, State) Coffee, Bedford, Marshall, Maury, Hickman, TN, Duck River beginning at DRM 248.6		

Parts 1 through 4 verify that there are no extraordinary circumstances associated with this action:

Part 1. Project Characteristics

Is there evidence that the proposed action---	No	Yes	Information Source
1. Is major in scope?	X		Nicholson C. P. 10/05/2007
2. Is part of a larger project proposal involving other TVA actions or other federal agencies?	X		Nicholson C. P. 10/05/2007
*3. Involves non-routine mitigation to avoid adverse impacts?	X		Nicholson C. P. 10/05/2007
4. Is opposed by another federal, state, or local government agency?			
*5. Has environmental effects which are controversial?	X		Nicholson C. P. 10/05/2007
*6. Is one of many actions that will affect the same resources?	X		Nicholson C. P. 10/05/2007
7. Involves more than minor amount of land?	X		Nicholson C. P. 10/05/2007

* If "yes" is marked for any of the above boxes, consult with NEPA Administration on the suitability of this project for a categorical exclusion.

Part 2. Natural and Cultural Features Affected

Would the proposed action---	No	Yes	Per- mit	Com- mit- ment	Information Source for Insignificance
1. Potentially affect endangered, threatened, or special status species?		X	No	No	For comments see attachments
2. Potentially affect historic structures, historic sites, Native American religious or cultural properties, or archaeological sites?	X		No	No	For comments see attachments
3. Potentially take prime or unique farmland out of production?	X		No	No	Nicholson C. P. 10/05/2007
4. Potentially affect Wild and Scenic Rivers or their tributaries?	X		No	No	For comments see attachments
5. Potentially affect a stream on the Nationwide Rivers Inventory?	X		No	No	For comments see attachments
6. Potentially affect wetlands, water flow, or stream channels?		X	No	No	For comments see attachments
7. Potentially affect the 100-year floodplain?		X	No	No	For comments see attachments
8. Potentially affect ecologically critical areas, federal, state, or local park lands, national or state forests, wilderness areas, scenic areas, wildlife management areas, recreational areas, greenways, or trails?		X	No	Yes	For comments see attachments
9. Contribute to the spread of exotic or invasive species?	X		No	No	For comments see attachments
10. Potentially affect migratory bird populations?	X		No	No	For comments see attachments
11. Involve water withdrawal of a magnitude that may affect aquatic life or involve interbasin transfer of water?	X		No	No	Nicholson C. P. 10/10/2007
12. Potentially affect surface water?		X			For comments see attachments
13. Potentially affect drinking water supply?		X			For comments see attachments
14. Potentially affect groundwater?	X		No	No	Nicholson C. P. 10/10/2007
15. Potentially affect unique or important terrestrial habitat?	X		No	No	For comments see attachments
16. Potentially affect unique or important aquatic habitat?		X			For comments see attachments

Part 3. Potential Pollutant Generation

Would the proposed action potentially (including accidental or unplanned)---	No	Yes	Per- mit	Commit- ment	Information Source for Insignificance
1. Release air pollutants?	X		No	No	Nicholson C. P. 10/05/2007
2. Generate water pollutants?					
3. Generate wastewater streams?	X		No	No	Nicholson C. P. 10/05/2007
4. Cause soil erosion?	X		No	No	Nicholson C. P. 10/05/2007
5. Discharge dredged or fill materials?	X		No	No	Nicholson C. P. 10/05/2007
6. Generate large amounts of solid waste or waste not ordinarily generated?	X		No	No	Nicholson C. P. 10/05/2007
7. Generate or release hazardous waste (RCRA)?	X		No	No	Nicholson C. P. 10/05/2007
8. Generate or release universal or special waste, or used oil?	X		No	No	Nicholson C. P. 10/05/2007
9. Generate or release toxic substances (CERCLA, TSCA)?	X		No	No	Nicholson C. P. 10/05/2007
10. Involve materials such as PCBs, solvents, asbestos, sandblasting material, mercury, lead, or paints?	X		No	No	Nicholson C. P. 10/05/2007
11. Involve disturbance of pre-existing contamination?	X		No	No	Nicholson C. P. 10/05/2007
12. Generate noise levels with off-site impacts?	X		No	No	Nicholson C. P. 10/05/2007
13. Generate odor with off-site impacts?	X		No	No	Nicholson C. P. 10/05/2007
14. Produce light which causes disturbance?	X		No	No	Peebles W. C. 10/01/2007
15. Release of radioactive materials?	X		No	No	Nicholson C. P. 10/05/2007
16. Involve underground or above-ground storage tanks or bulk storage?	X		No	No	Nicholson C. P. 10/05/2007
17. Involve materials that require special handling?	X		No	No	Nicholson C. P. 10/05/2007

Part 4. Social and Economic Effects

Would the proposed action---	No	Yes	Commit- ment	Information Source for Insignificance
1. Potentially cause public health effects?	X		No	Nicholson C. P. 10/05/2007
2. Increase the potential for accidents affecting the public?	X		No	Nicholson C. P. 10/05/2007
3. Cause the displacement or relocation of businesses, residences, cemeteries, or farms?	X		No	Nicholson C. P. 10/05/2007
4. Contrast with existing land use, or potentially affect resources described as unique or significant in a federal, state, or local plan?	X		No	Nicholson C. P. 10/05/2007
5. Disproportionately affect minority or low-income populations?	X		No	Nicholson C. P. 10/05/2007
6. Involve genetically engineered organisms or materials?	X		No	Nicholson C. P. 10/05/2007
7. Produce visual contrast or visual discord?	X			For comments see attachments
8. Potentially interfere with recreational or educational uses?				
9. Potentially interfere with river or other navigation?	X		No	Nicholson C. P. 10/05/2007
10. Potentially generate highway or railroad traffic problems?	X		No	Nicholson C. P. 10/05/2007

Part 5. Other Environmental Compliance/Reporting Issues

Would the proposed action---	No	Yes	Commit- ment	Information Source for Insignificance
1. Release or otherwise use substances on the Toxic Release Inventory list?	X		No	Nicholson C. P. 10/05/2007
2. Involve a structure taller than 200 feet above ground level?	X		No	Nicholson C. P. 10/05/2007
3. Involve site-specific chemical traffic control?	X		No	Nicholson C. P. 10/05/2007
4. Require a site-specific emergency notification process?	X		No	Nicholson C. P. 10/05/2007
5. Cause a modification to equipment with an environmental permit?	X		No	Nicholson C. P. 10/05/2007
6. Potentially impact operation of the river system or require special water elevations or flow conditions??		X	No	For comments see attachments

Description of Proposed Action (Include Anticipated Dates of Implementation)

Continued from Page 1

Parts 1 through 4: If "yes" is checked, describe in the discussion section following this form why the effect is insignificant. Attach any conditions or commitments which will ensure insignificant impacts. Use of non-routine commitments to avoid significance is an indication that consultation with NEPA Administration is needed.

An EA or EIS will be prepared.

Based upon my review of environmental impacts, the discussions attached, and/or consultations with NEPA Administration, I have determined that the above action does not have a significant impact on the quality of the human environment and that no extraordinary circumstances exist. Therefore, this proposal qualifies for a categorical exclusion under Section 5.2._____ of TVA NEPA Procedures.

Project Initiator/Manager Charles E Bohac		Date
TVA Organization UNKN	E-mail cebohac@tva.gov	Telephone

Site Environmental Compliance Reviewer

Final Review/Closure

Signature

Signature

Other Review Signatures (as required by your organization)

Charles P. Nicholson

Signature

Signature

Signature

Signature

Signature

Signature

Attachments/References

Description of Proposed Action

Change the Normandy Dam release schedule to reduce the minimum flow target on the Duck River at Shelbyville, Tennessee to 120 cfs from the current 155 cfs two months earlier than normal for 2007 only in response to drought conditions.

TVA Business Units Involved in Project

RSOE - Environmental Stewardship & Policy, RSOE - River Operations

CEC Comment Listing

Part 2 Comments

1. Potential impacts to listed aquatic species are described in the EA.
By: Charles P. Nicholson 10/10/2007
1. This action has the potential to adversely affect several federally listed mussel species. Preparation of an Environmental Assessment to address potential impacts will be required.
By: John T. Baxter 10/05/2007
1. A review of the TVA Natural Heritage database during October 2007 indicated three state-listed species were recorded within three miles of the project area: Tennessee cave salamander, Allegheny woodrat, and eastern hellbender. The Duck river cave beetle is an additional species considered rare by the Tennessee Natural Heritage Program, but not state-listed, and also occurs within three miles of the project site. The proposed action would not affect habitats for any of these species except eastern hellbender, for which the impacts would be minimal based on the scope of the project. Three federally listed species have been recorded from Coffee and Bedford Counties, Tennessee: gray bat, Indiana bat, and bald eagle. Although foraging habitat for both bat species exists over the duck river, the proposed actions would not significantly change this foraging habitat, and neither species would be affected. Bald eagles nest and forage on Normandy Reservoir, but the proposed actions would not affect habitat used by this species. The proposed actions of this project would not impact these, or any other state- or federally protected species, or their habitats.
By: Jenny K Fiedler 10/05/2007
1. A review of the TVA Regional Natural Heritage database indicates there are no federal-listed species and seven Tennessee state-listed species known from within two miles of Normandy Lake in Coffee County, TN (Table 1). Listed plant species growing further than two miles from the reservoir or its tributaries were not considered in the evaluation because they would not be affected by the minimum flow of 120 cfs from Normandy Dam. Review of maps and knowledge of rare plant habitats in the vicinity indicates the proposed action, minimum flow of 120 cfs from Normandy Dam, is not expected to result in impacts to rare plant populations. Of the seven Tennessee state-listed species known to occur in the vicinity of the action, six are found on forested slopes or rich mesic ravines. The seventh, Broadleaved Barbara's-buttons is known to grow in low woods and along streams. A large population of Broadleaved Barbara's-buttons occurs on the bank of BoBo's Creek south of the Short's Spring TVA Small Wild Area and due to the scope of the project there would be no significant impacts expected to this population. No permits or commitments are required.
By: Patricia B Cox 09/27/2007
Files: Plant list. CEC 16850. Shelbyville.doc 09/27/2007 33,280 Bytes
2. This action is not of a nature that could affect Historic Properties.
By: Thomas O Maher 09/28/2007
4. Because no such designated waters occur at or adjacent to the project site, the proposed action is not anticipated to impact Wild and Scenic Rivers or their tributaries.
By: Jan K Thomas 10/05/2007
5. Because no such designated waters occur at or adjacent to the project site, the proposed action is not anticipated to impact streams listed on the Nationwide Rivers Inventory.
By: Jan K Thomas 10/05/2007
6. Changes in flow for the short duration proposed for this project will have limited, if any, effects on wetlands.
By: Kim Pilarski-Brand 10/01/2007
7. The affected parts of Normandy Reservoir and the Duck River are within the 100-year floodplain. The proposed change in the release schedule will not adversely affect flood storage capacity or the potential for flood damage.
By: Charles P. Nicholson 10/05/2007
8. The proposed action would reduce the minimum flow target on the Duck River at Shelbyville, Tennessee to 120 cfs from the current 155 cfs as much as two months earlier than normal, and would potentially impact two areas managed by the TWRA: Duck River State Mussel Sanctuary and Normandy Fish Hatchery. • Duck River State Mussel Sanctuary is that section of the Duck River from Kettle Mills Dam in Maury County (DRM 105.6) upstream. The sanctuary designation by TWRA in 1990 prohibits the taking of aquatic mollusks by any means and/or the destruction of their habitat. • Normandy Fish Hatchery, a 205-acre site near Normandy Dam and adjacent to Duck River, completed in 1995, holds 12 species of fish and one endangered species, the

freshwater mussel. Normandy Lake provides water for the fish hatchery. The proposed action is a one-time short-term event in response to current drought conditions. Conservation of drought-lowered reservoir levels by reducing the release of water to Duck River now could potentially result in benefits to the mussel sanctuary later if drought conditions continue. Discussions between USFWS, TWRA, and TVA aquatic biologists would establish that the proposed minimum flow target to Duck River would ensure a degree of protection that would not result in major impacts to the diversity of habitat and species present in the mussel sanctuary; see Aquatics T&E response. The fish hatchery uses water from Normandy Lake and would not be directly or adversely impacted by the reduction in the minimum flow target to Duck River. Two caves—Shipman Creek Cave and Yell Cave—in the vicinity of Duck River would not be affected because of the nature of the proposed action and because the distance from the river to the caves is sufficient (1.1 – 3.0 miles).

By: Jan K Thomas 10/05/2007

9. With minimum flows from Normandy dam continuing through November 30th, there is no potential for the action to contribute to the spread of exotic or invasive species. No permits or commitments are required.

By: Patricia B Cox 09/27/2007

9. The proposed project would not contribute to the spread of exotic or invasive terrestrial animal species.

By: Jenny K Fiedler 10/05/2007

10. There are no heron colonies, or other aggregations of migratory birds, within three miles of the project site. The proposed action would not impact migratory bird populations.

By: Jenny K Fiedler 10/05/2007

12. Discussed in Environmental Assessment.

By: Charles P. Nicholson 10/10/2007

13. Should have beneficial effects on drinking water as described in the Environmental Assessment.

By: Charles P. Nicholson 10/10/2007

15. No uncommon terrestrial plant communities are known from the immediate area and none are indicated on the maps and photographs. Therefore, there is no known potential for this project, as described, to impact such resources. No permits or commitments are required

By: Patricia B Cox 09/27/2007

15. There are records of ten caves within three miles of the project site. None of these caves would be affected by the proposed action, and this project would not impact caves, or any other unique or important terrestrial habitats.

By: Jenny K Fiedler 10/05/2007

16. Described in the Environmental Assessment.

By: Charles P. Nicholson 10/10/2007

Part 4 Comments

7. Reducing flow rates would be visually beneficial. The reservoir would remain somewhat fuller, reducing the amount of bare shoreline.

By: W. Chett Peebles 10/01/2007

Part 5 Comments

28. The proposed action is a change to the operation of the river system by reducing flows from Normandy Dam earlier in the fall.

By: Charles P. Nicholson 10/05/2007

CEC Commitment Listing

Part 2 Commitments

8. In order to protect sensitive species in the Duck River State Mussel Sanctuary, discussions will be held with TWRA Region 2 Steve Patrick (regional manager) and/or David Sims aquatic habitat protection biologist (615/781-6622) and with Jim Widlak (section and consultation) and Steve Alexander (water quality and aquatic toxicology issues) of USFWS, Cookeville Field Office (931/528-6481).

By: Jan K Thomas 10/09/2007

Water Quality Simulations

HYDRODYNAMIC AND WATER QUALITY SIMULATIONS FOR 120 CFS AND 155 CFS AT SHELBYVILLE

Hydrodynamic Simulations

Two hydrodynamic simulations were made using the TVA River Modeling System hydrodynamic model ADYN. One simulation was for a minimum flow at Shelbyville of 120 cfs and the other was for a minimum flow at Shelbyville of 155 cfs. Steady-state conditions were compared to estimate the impacts of minimum flow reduction upon three parameters: mean depth, velocity, and surface area.

Figure 1 shows the computed mean depth for the Duck River. The mean depth is the average depth at a given river cross-section defined by the cross-sectional area divided by the water surface width for any time. The 120 cfs scenario results in a maximum difference in mean depth of 0.65 feet (15 percent) lower than the 155 cfs scenario. The average difference in mean depth is 0.17 feet. The average percent difference is seven percent.

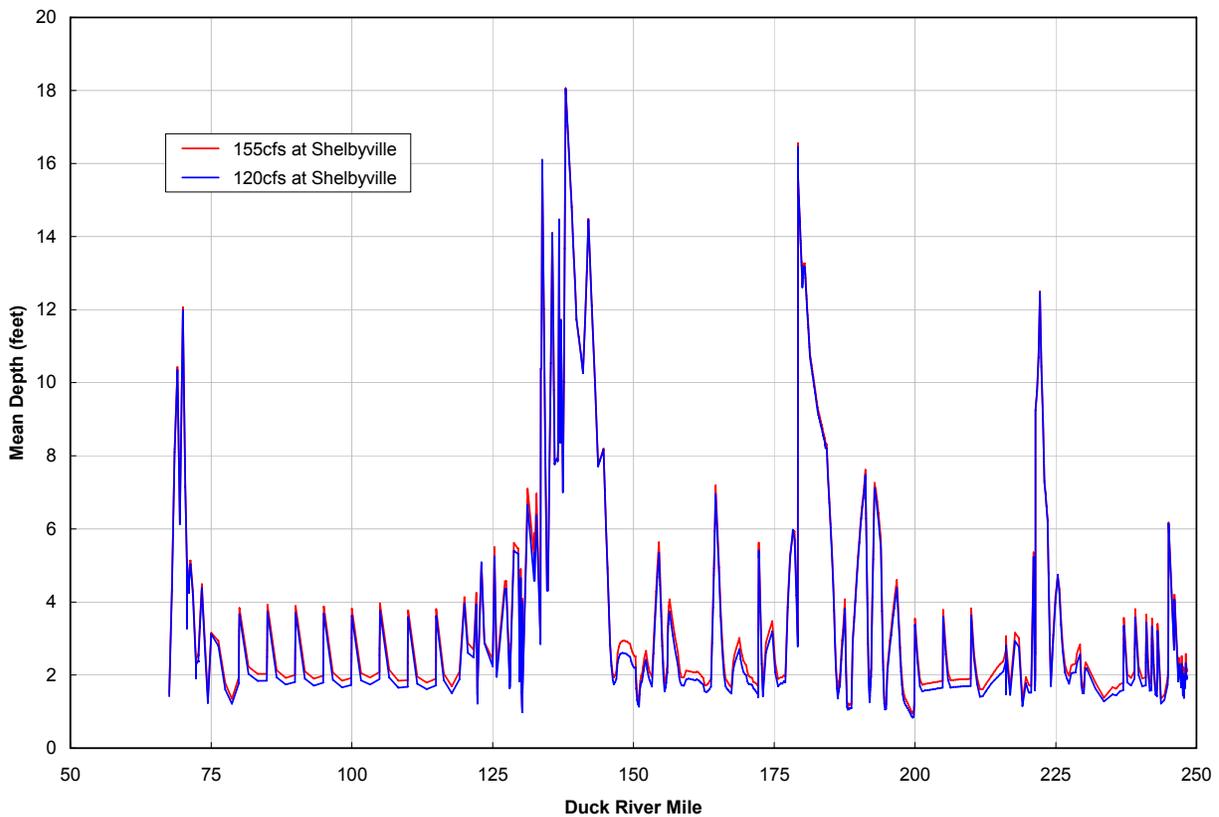


Figure 1. Computed Mean Depth for Two Minimum Flow Scenarios

Figure 2 shows the computed velocity for the Duck River. The velocity is the average cross-sectional velocity. The 120 cfs scenario results in a maximum difference in velocity of 0.2 feet per second lower than the 155 cfs scenario (23 percent). The

average difference in velocity is 0.06 feet per second and the average percent difference is 15 percent.

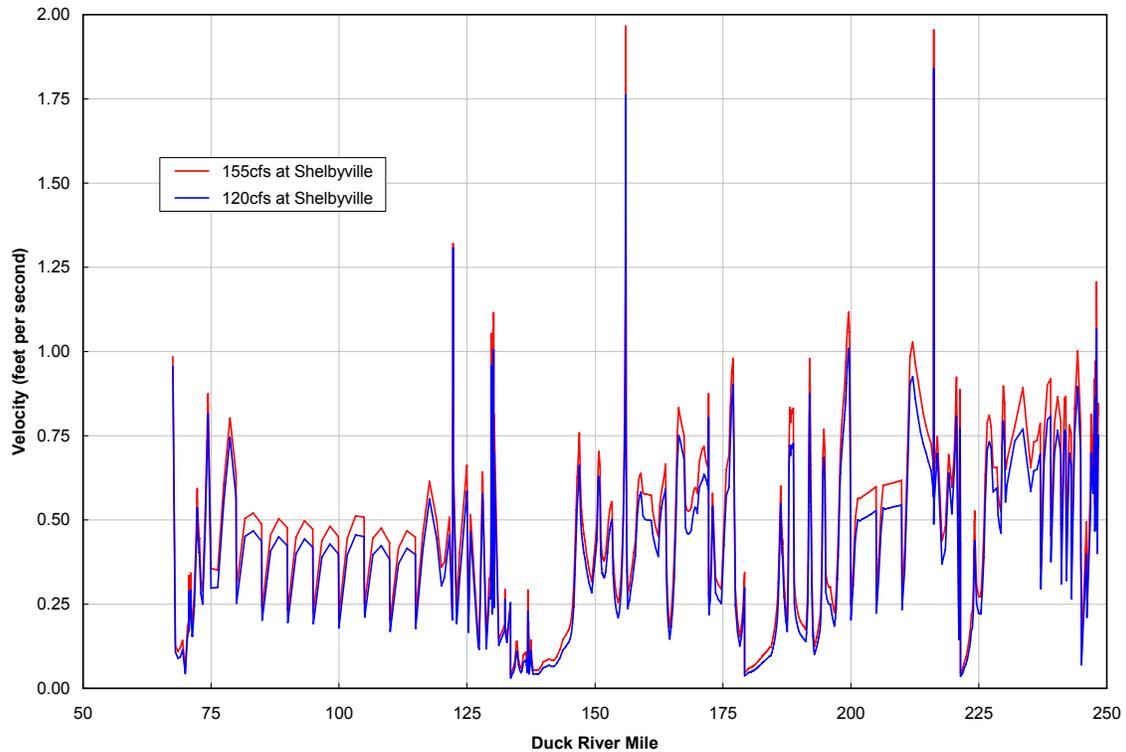


Figure 2. Computed Velocity for Two Minimum Flow Scenarios

Figure 3 shows the computed top width of each cross section for the Duck River. Using an average-end computation, the top widths of two consecutive cross-sections were averaged and multiplied by the distance between the two cross-sections to determine the wetted surface area between each cross-section. Between Duck River miles 248.6 to 67.5, the 120 cfs scenario results in wetted surface area of 5.28 square miles and the 155 cfs scenario had a wetted surface area of 5.34 square miles or about 1 percent more wetted surface area.

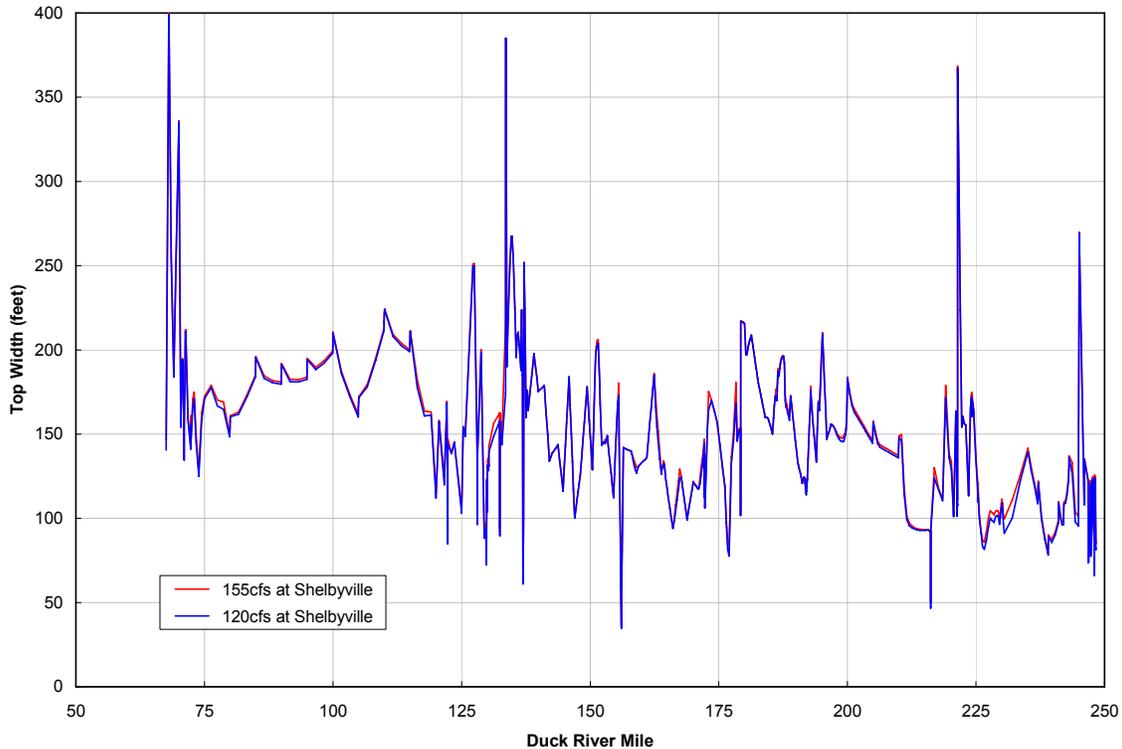


Figure 3. Computed Cross-Sectional Top Width for Two Minimum Flow Scenarios

Water Quality Simulations

Two water quality simulations were made using the TVA River Modeling System hydrodynamic model ADYN coupled with the water quality model RQUAL. One simulation was for a minimum flow at Shelbyville of 120 cfs and the other was for a minimum flow at Shelbyville of 155 cfs. A steady-state condition was modeled which would assume that there was no contribution to the stream from rainfall and results in the comparison of the simulations under the driest of conditions.

Figure 4 shows the simulated DO concentration. The top half of Figure 4 is for 155 cfs and the bottom half is for 120 cfs. Tyson Foods has a discharge at DRM 220.6, the Shelbyville wastewater discharge is at DRM 221.3, and the Columbia wastewater discharge is at 127.4. Table 1 presents the wastewater discharge concentrations used in the analysis.

Significant changes in DO occur at DRM 221, 180, and 134. These changes are the result of small impoundments. The impoundments are as deep as 15 to 20 feet, and natural stream aeration is low because of the depth and low velocity. As a result, DO decreases in front of the dams, but rapidly increase as the water flows over the dams and is re-aerated by turbulence below. A comparison of DO in Figure 4 shows little change in average or minimum DO for the two different flow rates. The minimum

Table 1. Wastewater Discharge Characteristics

Wastewater Discharge Characteristics			
	Tyson Foods	Shelbyville	Columbia
Dissolved Oxygen (mg/L)	6.0	6.0	6.0
Biochemical Oxygen Demand - 5 day (mg/L)	8.2	4	14
Ammonia Nitrogen (mg/L)	10	0.3	0.3
Flow (mgd)	1.6	2.6	3.1

average daily DO for the 120 cfs simulation was 3.2 mg/L, and the minimum for the 155 cfs simulation was 3.3 mg/L. These differences are not large enough to be of importance to the assimilation of wastewater.

Figure 5 compares temperature at DRU 221 and DRM 127 for the two flows. The steady-state condition shown on the right side of each figure (days 231 through 243) shows the expected change in diurnal temperature and almost no difference between the flows.

Figure 6 is a plot of ammonia nitrogen. It shows an increase of about 25 percent at the Tyson Foods discharge which is almost proportional to the flow difference between the two flow regimes. The difference in concentration dissipates over the next 10 miles. Because effluent ammonia concentrations are not reported for the Shelbyville discharges, it was necessary to assume the effluent concentration for the simulations. However, the relative increase and dissipation pattern of ammonia would remain the same if different effluent concentrations were simulated. Whatever change in ammonia concentration actually results from the change in flow from 155 cfs to 120 cfs, the stream is normally subjected to it. This occurs each year when the Shelbyville flow target changes from the June through November target of 155 cfs to the December through May target of 120 cfs.

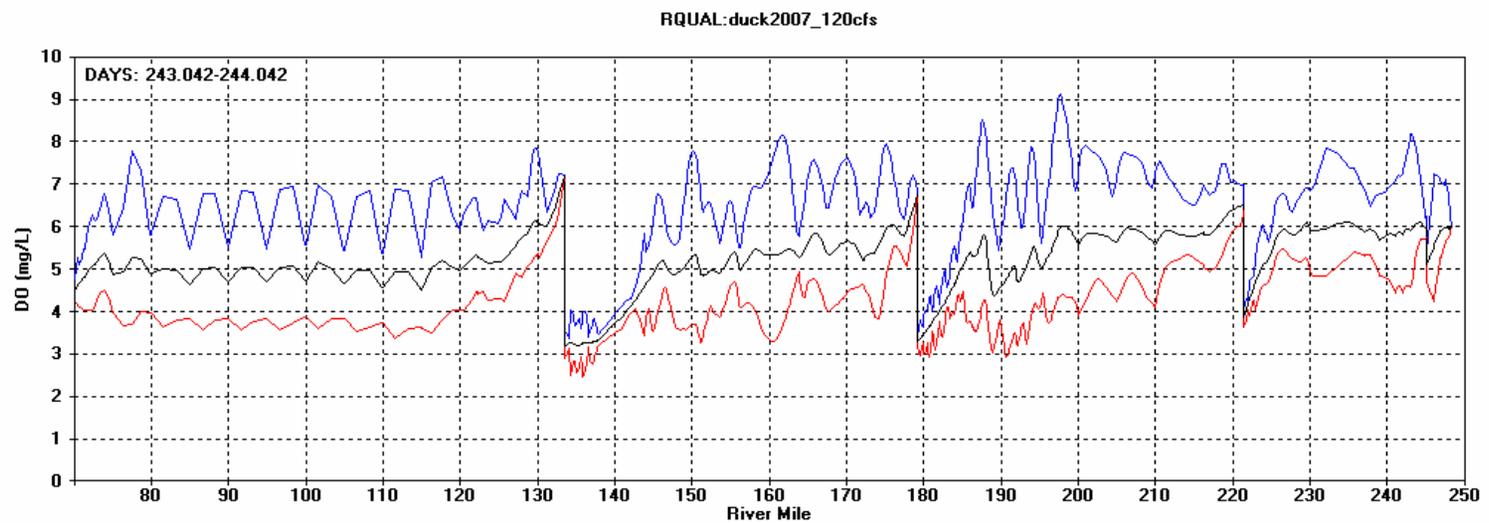
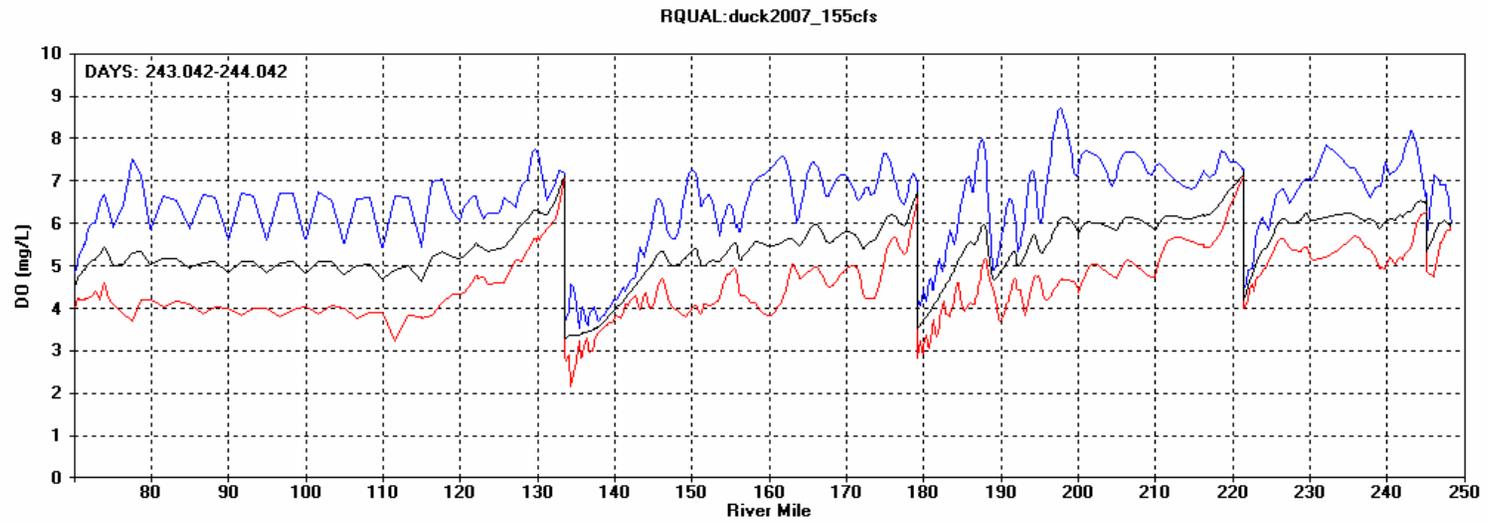


Figure 4. Dissolved Oxygen Concentrations for 120 cfs and 155 cfs Minimum Flow at Shelbyville

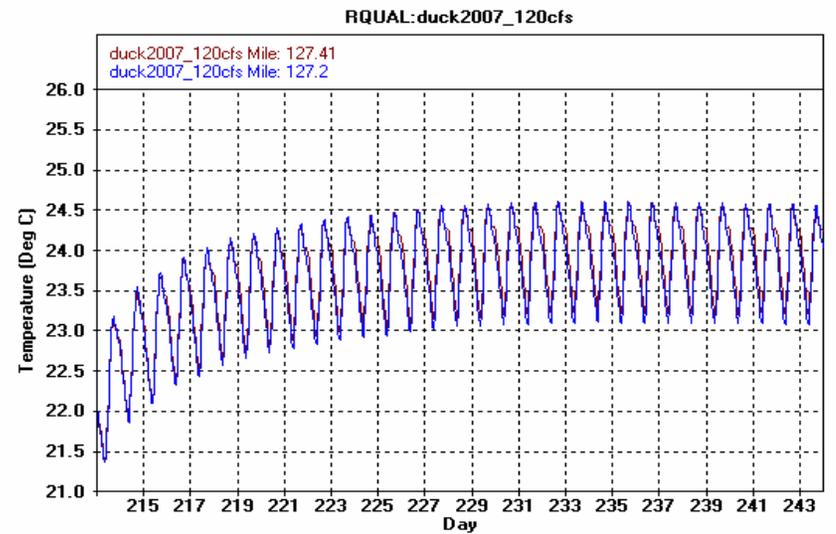
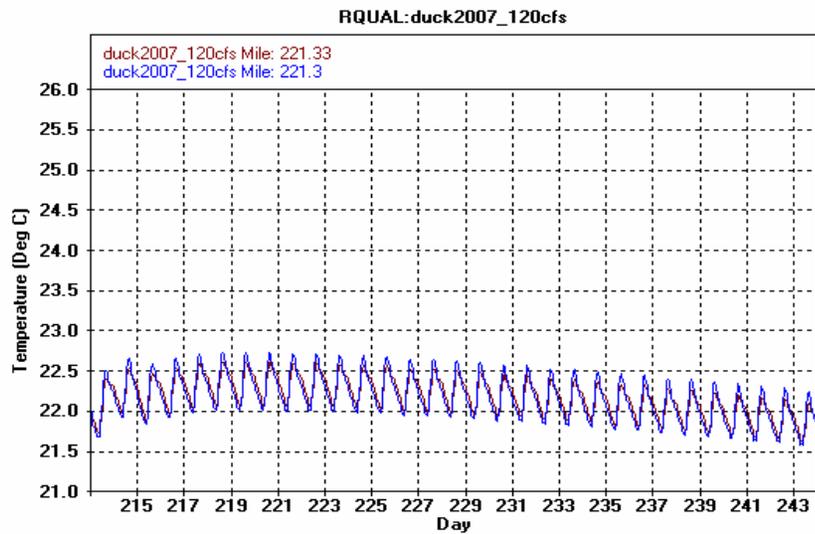
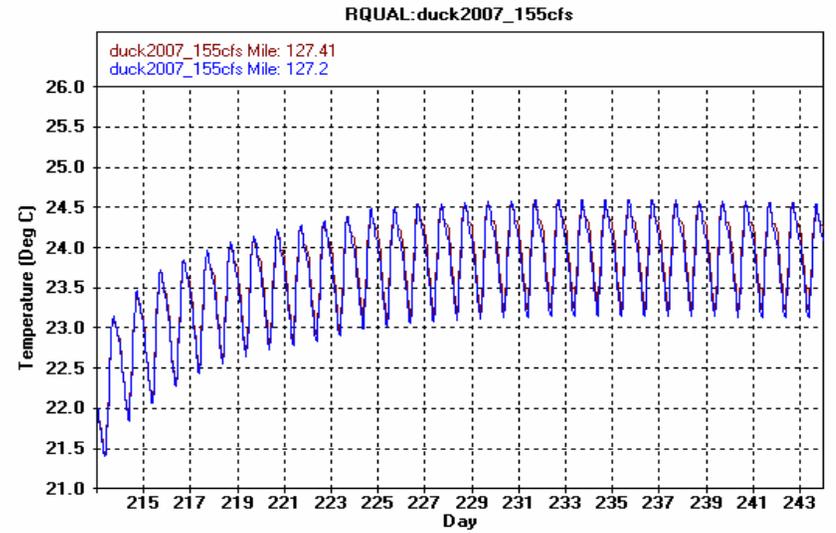
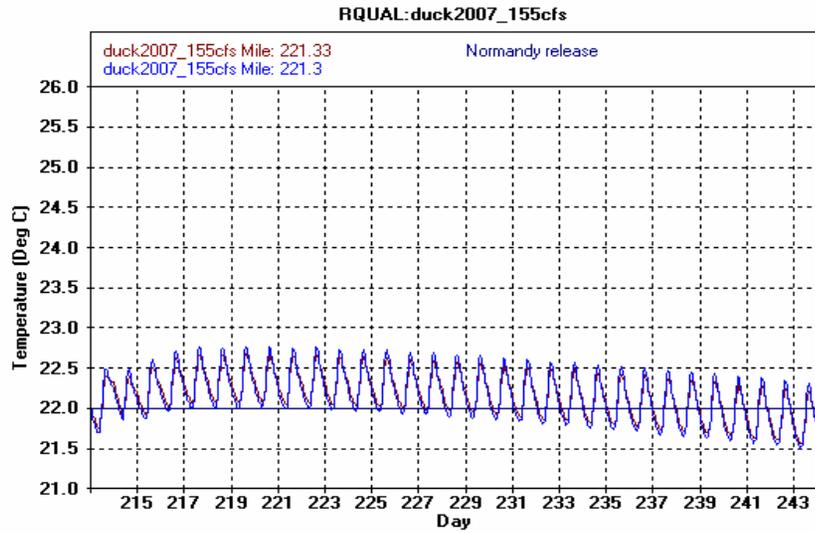


Figure 5. Temperature at DRM 221.3 and 127. 4 for 120 cfs and 155 cfs Minimum Flow at Shelbyville

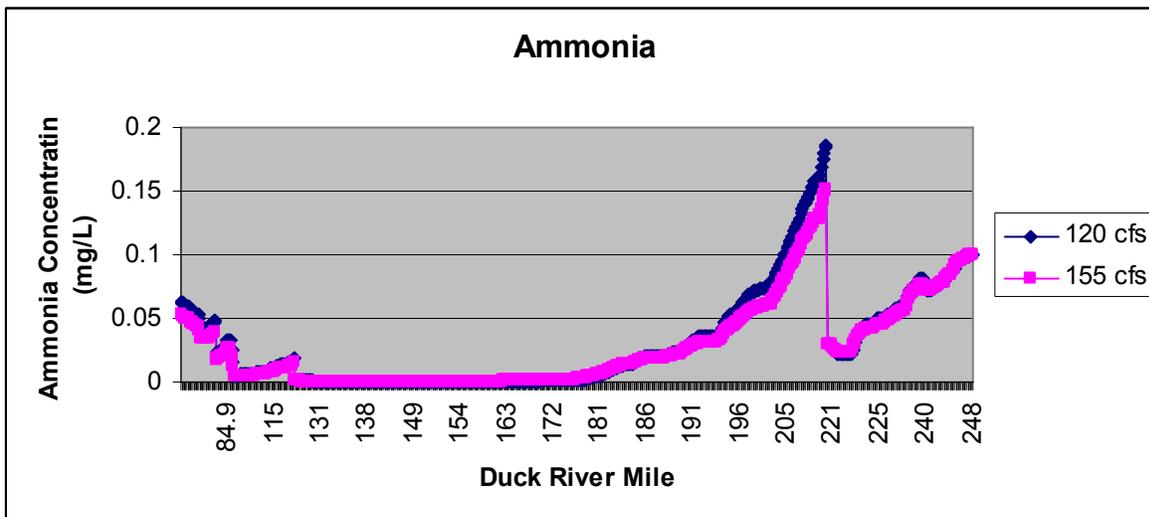


Figure 6. Ammonia Nitrogen for 120 cfs and 155 cfs Minimum Flow at Shelbyville

Aquatic Ecology Index of Biotic Integrity for the Duck River

Index of Biological Indicator Scores for Duck River Downstream of Normandy Dam

Duck River Mile	HUC Code	Location	Sample Date	IBI Score	EPT Score	Hab Score
22.5	06040003-240	Hite Ford	Jun 12 1990	46, fair/good		
22.5	06040003-240	Hite Ford	Jul 22 1991	42, fair		
22.5	06040003-240	Hite Ford	Jul 15 1992	46, fair/good		
22.5	06040003-240	Hite Ford	Jun 09 1993	42, fair		
22.5	06040003-240	Hite Ford	Jul 12 1994	52, good		
22.5	06040003-240	Hite Ford	Jun 05 1996	48, good	14, good	21
22.5	06040003-240	Hite Ford	Aug 12 1998	38, poor/fair	13, good	27
22.5	06040003-240	Hite Ford	Jul 09 2002	48, good	17, good	29
22.5	06040003-240	Hite Ford	Aug 04 2004	54, good/excellent	14, good	28
31.2	06040003-220	I-40	Nov 15 1993	52, good		
31.2	06040003-220	I-40	Oct 31 1996	46, fair/good		
32.1	06040003-220	Barren Hollow Rd.	Nov 16 1993	46, fair/good		
32.1	06040003-220	Barren Hollow Rd.	Oct 30 1996	48, good		
46.5	06040003-220	Above Beaverdam Creek	Aug 06 2002	52, good	14, good	39

89	06040003-280	Hwy 230	Jul 31 1997	<u>fair*</u>	<u>12,</u> <u>good</u>	<u>26.5</u>
89	06040003-280	Hwy 230	Aug 07 2002	<u>52, good</u>	<u>13,</u> <u>good</u>	<u>29</u>
113.9	06040003-050	Hwy 50, Fikes Mill	Jul 22 2003	<u>48, good</u>	<u>15,</u> <u>good</u>	<u>27</u>
132.7	06040003-010	Below Hwy 31	Jul 23 2003	<u>50, good</u>	<u>12,</u> <u>good</u>	<u>33</u>
145.5	06040002-180	Mouth Of Fountain Creek	Aug 12 2003	<u>54,</u> <u>good/excellent</u>	<u>15,</u> <u>good</u>	<u>31</u>
195.7	06040002-090	White Ford	Jul 31 1997	<u>good*</u>	<u>14,</u> <u>good</u>	<u>24.5</u>
195.7	06040002-090	White Ford	Aug 07 2000	<u>58, excellent</u>	<u>11,</u> <u>good</u>	<u>29</u>
195.7	06040002-090	White Ford	Jul 29 2004	<u>48, good</u>	<u>10,</u> <u>good</u>	<u>34</u>
229.2	06040002-070	Upstream Shelbyville Moore Ford	Aug 01 1997	<u>fair*</u>	<u>11,</u> <u>fair/good</u>	<u>30</u>
229.2	06040002-070	Upstream Shelbyville Moore Ford	Jul 27 2000	<u>50, good</u>	<u>14,</u> <u>good</u>	<u>37</u>
229.2	06040002-070	Upstream Shelbyville Moore Ford	Aug 11 2004	<u>50, good</u>	<u>10,</u> <u>good</u>	<u>33</u>
240	06040002-030	Three Forks Bridge	May 13 1997	<u>46, fair/good</u>		
240	06040002-030	Three Forks Bridge	Apr 18 2000	<u>52, good</u>	<u>12,</u> <u>good</u>	<u>34</u>
240	06040002-030	Three Forks Bridge	Apr 16 2002	<u>52, good</u>		<u>28</u>
240	06040002-030	Three Forks Bridge	Mar 18 2003	<u>60, excellent</u>	<u>13,</u> <u>good</u>	<u>30</u>

240	06040002-030	Three Forks Bridge	Aug 09 2004	48, good	8, fair	35
240	06040002-030	Three Forks Bridge	Apr 18 2007	50, good	15, good	
248.1	06040002-030	Normandy Hatchery	May 12 1997	38, poor/fair		
248.1	06040002-030	Normandy Hatchery	Apr 18 2002	50, good	18, good	27
248.1	06040002-030	Normandy Hatchery	Mar 19 2003	44, fair	9, fair/good	31
248.1	06040002-030	Normandy Hatchery	Apr 17 2007	44, fair	6, fair	31

Comment on the Draft EA from Paul Davis, TDEC

-----Original Message-----

From: Paul.Estill Davis [<mailto:Paul.Estill.Davis@state.tn.us>]

Sent: Monday, October 15, 2007 6:38 PM

To: Robinson, David W; Shute, Peggy W; Poppe, Wayne L

Cc: James_Widlak@fws.gov; Jim_Widlak@fws.gov; Lee_Barclay@fws.gov;
Steven_Alexander@fws.gov; Dave McKinney; Kimberly Elkin; Ming.Chen Shiao;

Nick Fielder; Paul Sloan; Rob Todd; Tim Wilder

Subject: Re: Normandy Draft EA

Dave - I want to compliment the work you and your colleagues did in preparing this Draft EA. It's very well written, informative and clear.

TDEC agrees fully with the discussion here and with TVA's preferred alternative, that being a stepped flow reduction at Normandy, to begin as soon as possible.

We appreciate TVA's thoughtful and timely work on this issue.

Paul E. Davis, P.E.

Director, Division of Water Pollution Control

Tennessee Department of Environment and Conservation

615/532-0632

paul.estill.davis@state.tn.us

Comment on the Draft EA from Robert Todd, TWRA

-----Original Message-----

From: Rob Todd [<mailto:Rob.Todd@state.tn.us>]

Sent: Monday, October 15, 2007 5:42 PM

To: Robinson, David W

Cc: Dave McKinney; Frank Fiss; Kimberly Elkin

Subject: TWRA Comments Regarding Normandy Dam Drought Response Release Schedule Change

Dear Mr. Robinson:

The Tennessee Wildlife Resources Agency has received and reviewed the document "Normandy Dam Drought Response Release Schedule Change", dated October 2007, provided by TVA. We suggest the following language changes (suggested added language in bold):

1) Page 1 - The Proposed Action and Need - 1st Sentence - "The state of Tennessee (see letter dated October 5, 2005, in the Appendix of this document), on behalf of the Duck River Utility Commission and in response to their concerns, has requested TVA to change the release schedule at Normandy Dam by immediately and incrementally reducing the flow as measured at Shelbyville (Duck River Mile (DUM) 224.2) from 155 cubic feet per second (cfs) to 120 cfs." Justification for suggested changes - The Duck River Utility Commission actually proposed the release change; and at the September 26th meeting of stakeholders, it was requested that TDEC and TWRA request TVA to make the change (justification supported in our letter on page 19 of this document, paragraph 3). The proposed flow reduction is an incremental reduction.

2) Page 10 - Shelbyville to DRM 70 - 1st Paragraph - 2nd Sentence - "Reduction of flow from 155 cfs to 120 cfs in October 2007 rather than in December 2007 is not likely to result in major impact to aquatic communities (including federally and state-listed species) in this reach of the Duck River downstream from Shelbyville, because of modifications of the release schedule that would be made based on the results of the monitoring program." Justification for suggested changes - "this" needs to be added to make the sentence make sense.

3) Page 10 - Shelbyville to DRM 70 - 1st Paragraph - 3rd Sentence - "In addition to these potential effects, three wastewater outfalls are present in this reach." Justification for suggested changes - These are potential effects which may be determined to be minimal impacts through monitoring and based on the models provided in the appendices should be minimal impacts. The way it is worded now, the sentence indicates that significant effects will occur regarding : reduction in available aquatic habitat, reduction in DO levels, and from increased warming of the water due to lower water levels in the Duck River.

Thank you for the opportunity to comment.

Robert M. Todd
Tennessee Wildlife Resources Agency
Environmental Services Division
Ellington Agricultural Center
P.O. Box 40747
Nashville, TN 37204
Phone: 615-781-6572
Fax: 615-781-6667
E-mail address: Rob.Todd@state.tn.us

USFWS Response to TVA Endangered Species Consultation Request

Peggy,

I have reviewed your letter dated this date and sent via email. Given the commitments by TVA and partnering state agencies (TWRA and TDEC), I concur with the TVA finding that implementation of the proposed action - i.e., the reduction of water releases through Normandy Dam from 155 cfs to 120 cfs in two stages - is not likely to adversely affect federally listed fish or mussel species. Further reductions, however, would almost certainly require the initiation of formal consultation pursuant to section 7 of the Endangered Species Act.

Lee

Lee Barclay
Supervisor
Tennessee Field Office
U.S. Fish and Wildlife Service
446 Neal Street
Cookeville, TN 38501
(tele. 931/528-6481, ext. 212)
(fax. 931/528-7075)
(e-mail: lee_barclay@fws.gov)

"Endangered species protection - If not us, who?... If not now, when?
Remember, endangered means there may still be time."