UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 31, 2013

Ms. Mary E. Jennings
Field Supervisor
Tennessee Field Office
U.S. Fish and Wildlife Service
446 Neal Street
Cookeville, TN 38501

SUBJECT: WATTS BAR NUCLEAR PLANT, UNIT 2 – SUPPLEMENTAL BIOLOGICAL ASSESSMENT

Dear Ms. Jennings:

In a letter dated September 2, 2009,[1] the U.S. Nuclear Regulatory Commission (NRC) requested that your office of the U.S. Fish and Wildlife Service (FWS) provide the NRC with information on federally listed, proposed, and candidate species and any designated critical habitat that may be on or near the Watts Bar Nuclear (WBN) site and its associated transmission line right-of-ways. That letter initiated informal section 7 consultation under the Endangered Species Act of 1973. The FWS, by letter dated October 9, 2009[2], provided a list of seven federally listed threatened and endangered species near the WBN site.

On November 2, 2011[3], the NRC staff sent you the completed draft Supplement 2 to NUREG-0498, "Final Environmental Statement Related to the Operation of Watts Bar Nuclear Plant [WBN], Unit 2" and the accompanying Biological Assessment included in Appendix F of Supplement 2. The Supplement and Biological Assessment were prepared in response to the application from the Tennessee Valley Authority (TVA) for an operating license that would authorize TVA to possess, use, and operate a second light-water nuclear reactor at TVA's site in Rhea County, Tennessee. The associated Biological Assessment addressed the federally endangered gray bat (*Myotis grisescens*), pink mucket (*Lampsilis abrupta*), rough pigtoe (*Pleuroberna plenum*), fanshell (*Cyprogenia stegaria*), dromedary pearly mussel (*Dromus dromas*), orangefoot pimpleback (*Plethobasus cooperianus*), and the threatened snail darter (*Percina tanasi*). In a letter dated January 23, 2012[4], the Department of the Interior ("DOI") concluded section 7 consultation and noted that

---

[1]NRC Letter, Joel Wiebe to Mary Jennings (FWS). Subject: Watts Bar Nuclear Plant, Unit 2 - Request for List of Protected Species Within the Area Under Evaluation for the Operating License Application Environmental Review. September 2, 2009. NRC Agencywide Documents Access and Management System (ADAMS) No. ML092100088.

[2] FWS letter, Mary Jennings to Joel Wiebe (NRC) Subject: FWS #2009-SL-0885. Watts Bar Nuclear Plant, Unit 2 - Request for list of Protected Species, Rhea County, Tennessee, October 9, 2009. ADAMS No. ML092930182.

[3] NRC Letter, Stephen Campbell to Mary Jennings (FWS). Subject: Watts Bar Nuclear Plant, Unit 2 - Biological Assessment For section 7 Consultation Related To The Operating License Application. November 2, 2011. ADAMS Nos. ML11304A083 and ML11304A088

[4] DOI Letter. Joyce Stanley (DOI) to Justin Poole (NRC). Re: Comments and Recommendations on the Draft Supplemental Environmental Impact Statement (SEIS) Related to the Operation of Watts Bar Nuclear Plant, Unit 2, Supplement 2 in Rhea County, TN. January 23, 2012. ADAMS No. ML12023A185.

> Since the preparation of the DSEIS, the laurel dace (*Chrosomus saylori*) was listed as endangered (76 FR 48722-48741) on September 8, 2011, and is known to occur with the project assessment area. The sheepnose mussel (*Plethobasus cyphyus)* is proposed for listing as endangered (76 FR 3392-3420) and occurs in the project assessment area.

Subsequently, on April 12, 2012, the FWS listed the sheepnose mussel as endangered throughout its range (77 FR 141914-14949).

Due to these new listings, the NRC staff has prepared the attached Supplemental Biological Assessment for WBN to address these additional species. Note that Watts Bar Unit 2 would use the same intake and discharge structures as Unit 1 with little or no change in the intake or effluent due to the nature of the cooling water system and addition of a cooling tower (see the final environmental impact statement). The assessment concludes that the operation of WBN will have no effect on the laurel dace because of the distance between the known and preferred habitat of the laurel dace and may, but is not likely to, adversely affect the sheepnose mussel. In accordance with the Endangered Species Act of 1973, as amended, we are requesting your concurrence with our determinations in the Supplemental Biological Assessment per Title 50 of the *Code of Federal Regulations,* Part 402, Section 12(j).

We sent you the "Final Environmental Statement Related to the Operation of Watts Bar Nuclear Plant [WBN], Unit 2" (ADAMS No. ML13151A278) separately on June 7th .

If you have any questions regarding this supplemental biological assessment, please contact me at 301-415-2432 or by e-mail at Melanie.Wong@nrc.gov or Dr. Dennis Logan at 301-415-0490 or by e-mail at Dennis.Logan@nrc.gov.

Sincerely,

Stephen P Klementowicz for

Melanie C. Wong, Chief
Environmental Review and
Guidance Update Branch
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-391

Enclosure:
Supplemental Biological Assessment

cc w/o encl: Listserv

> Since the preparation of the DSEIS, the laurel dace (*Chrosomus saylori*) was listed as endangered (76 FR 48722-48741) on September 8, 2011, and is known to occur with the project assessment area. The sheepnose mussel (*Plethobasus cyphyus)* is proposed for listing as endangered (76 FR 3392-3420) and occurs in the project assessment area.

Subsequently, on April 12, 2012, the FWS listed the sheepnose mussel as endangered throughout its range (77 FR 141914-14949).

Due to these new listings, the NRC staff has prepared the attached Supplemental Biological Assessment for WBN to address these additional species. Note that Watts Bar Unit 2 would use the same intake and discharge structures as Unit 1 with little or no change in the intake or effluent due to the nature of the cooling water system and addition of a cooling tower (see the draft or final environmental impact statement). The assessment concludes that the operation of WBN will have no effect on the laurel dace because of the distance between the known and preferred habitat of the laurel dace and may, but is not likely to, adversely affect the sheepnose mussel. In accordance with the Endangered Species Act of 1973, as amended, we are requesting your concurrence with our determinations in the Supplemental Biological Assessment per Title 50 of the *Code of Federal Regulations,* Part 402, Section 12(j).

We are sending you the "Final Environmental Statement Related to the Operation of Watts Bar Nuclear Plant [WBN], Unit 2" separately.

If you have any questions regarding this supplemental biological assessment, please contact me at 301-415-2432 or by e-mail at Melanie.Wong@nrc.gov or Dr. Dennis Logan at 301-415-0490 or by e-mail at Dennis.Logan@nrc.gov.

Sincerely,

/RA by S. Klementowicz for/
Melanie C. Wong, Chief
Environmental Review and
Guidance Update Branch
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-391

Enclosure:
Supplemental Biological Assessment

cc w/o encl: Listserv

ADAMS Accession Nos. (**Enclosure)** ML13178A016 (**Letter)** ML13198A067 (**Package)** ML13198A074

OFFICE	LA:RPB1:DLR	PM:RERB:DLR	PM:LPWB/ DORL	BC:RERB:DLR
NAME	YEdmonds	DLogan	JPoole	MWong (***SK for)***
DATE	7/26/13	7/29/13	7/30/13	7/31/13

OFFICIAL RECORD COPY

SUBJECT: WATTS BAR NUCLEAR PLANT, UNIT 2 – SUPPLEMENTAL BIOLOGICAL ASSESSMENT

DISTRIBUTION:

HARD COPY:
DLR R/F

E-MAIL:
PUBLIC
RidsNrrDlr Resource
RidsNrrDlrRerb Resource
RidsNrrDorlLpl2-2 Resource
RidsNrrPMWattsBar2 Resource
RidsRgn2MailCenter Resource
RidsAcrsAcnw_MailCTR Resource
RidsOpaMail Resource
RidsOgcRp Resource

Supplemental Biological Assessment

Laurel Dace (*Chrosomus saylori)*
Sheepnose Mussel (*Pleothobasus cyphus)*

Watts Bar Nuclear Power Plant
Operation of Unit 1 and Proposed Operation of Unit 2
Rhea County, Tennessee

July 2013
Docket Nos. 50-390 and 50-391

U.S. Nuclear Regulatory Commission
Rockville, Maryland

Prepared by

Rebekah Krieg
Pacific Northwest National Laboratory
Richland, Washington

Dennis Logan, PhD
Division of License Renewal
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission

Table of Contents

Abbreviations, Acronyms, and Symbols

°C	degrees Celsius
°F	degrees Fahrenheit
cm	centimeter(s)
ft	foot (feet)
ft/s	feet per second
ESA	Endangered Species Act of 1973, as amended
FWS	U.S. Fish and Wildlife Service
in.	inch(es)
km	kilometer(s)
m	meter(s)
m/s	meters per second
mi	mile(s)
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
SCCW	supplemental condenser cooling water
SFES	Supplemental Final Environmental Statement
TDEC	Tennessee Department of Environment and Conservation
TRM	Tennessee River mile
TVA	Tennessee Valley Authority
WBN	Watts Bar Nuclear Plant

1.0 Introduction and Purpose

The U.S. Nuclear Regulatory Commission (NRC) prepared this supplement to its 2011 biological assessment (NRC 2011c) following the NRC staff's consultation with the U.S. Fish and Wildlife Service (FWS) related to the NRC's review of an application from Tennessee Valley Authority (TVA) for an operating license for Watts Bar Nuclear (WBN) Plant Unit 2. The impetus for this present supplement is the recent addition of two species to the list of Endangered and Threatened Wildlife and Plants at 50 CFR 17: the laurel dace (*Chrosomus saylori*), which FWS listed on August 9, 2011 (76 FR 48722), and the sheepnose mussel (*Plethobasus cyphus*), which FWS listed on March 13, 2012 (77 FR 14914). Additionally, the FWS published a final rule to designate critical habitat for the laurel dace on October 16, 2012 (77 FR 63603).

WBN is located on the northwest shore of Chickamauga Reservoir (on the Tennessee River) in Rhea County, Tennessee. The WBN site houses two Westinghouse-designed pressurized-water reactors. In early 1996, the NRC issued TVA an operating license for WBN Unit 1. On August 3, 2007, TVA informed the NRC of its intention to complete construction activities at WBN Unit 2 under the existing construction permit (TVA 2007). On March 4, 2009, TVA submitted a request to the NRC to reactivate its application for a license to operate a second pressurized-water reactor at the WBN site (TVA 2008). Unit 2 would use the same cooling water intakes and discharge systems as Unit 1. The 2011 biological assessment and NRC (2013) describe the cooling water system in detail, and the present assessment contains some recent information not available in the 2011 biological assessment.

2.0 Consultation History

In a letter dated September 2, 2009, NRC (2009) requested that the FWS provide information on Federally listed endangered or threatened species, proposed, or candidate species and designated critical habitats that may occur in the vicinity of the WBN site. In a letter dated October 9, 2009, the FWS (2009) responded with a list of seven Federally listed threatened and endangered species near the WBN site.

Per section 7 of the Endangered Species Act of 1973, as amended (ESA), NRC staff prepared a biological assessment as part of the WBN Unit 2 review. The biological assessment documented potential effects to seven listed species that could result from future operation of WBN Unit 2. The NRC submitted the biological assessment to the FWS on November 2, 2011 (NRC 2011a) and included it as an appendix to the draft Final Environmental Statement, Supplement 2 (SFES) issued in November 2011 (NRC 2011b). The seven species included in the biological assessment are shown in Table 1 in nonbold type. In the biological assessment, the NRC staff concluded that the proposed action is **not likely to adversely affect** the gray bat or pink mucket and will have **no effect** on the Eastern fanshell mussel, rough pigtoe mussel, dromedary pearly mussel, orangefoot pimpleback mussel, or the snail darter.

In a letter dated December 20, 2011, the FWS concurred with the NRC's effect determinations and indicated that the requirements of section 7 of the ESA were fulfilled (FWS 2011a).

Subsequently, the U.S. Department of Interior sent the NRC a letter dated January 23, 2012, (DOI 2012), which indicated that since the preparation of the draft SFES, the laurel dace (*Chrosomus saylori*) had been "listed as endangered ... and is known to occur within the project assessment area." and "[T]he sheepnose mussel (*Plethobasus cyphus*), is proposed for listing as endangered...and occurs in the project assessment area." Since that time, the FWS published a final rule on March 13, 2012, effective April 12, 2012, to list the sheepnose mussel as endangered (77 FR 14914). Therefore, this supplemental biological assessment addresses the laurel dace and sheepnose mussel.

Table 2. Federally Listed Species Occurring Near the Watts Bar Nuclear Plant.

Scientific Name	Common Name	Federal Status[a]
Terrestrial Species		
Mammals		
Myotis grisescens	gray bat	E
Aquatic Species		
Fish		
Percina tanasi	snail darter	T
Chrosomus saylori[a]	**laurel dace**	**E**
Freshwater mussels		
Lampsilis abrupta	pink mucket	E
Cyprogenia stegaria	Eastern fanshell pearly mussel	E
Pleurobema plenum	rough pigtoe	E
Dromus dromas	dromedary pearlymussel	E
Plethobasus cooperianus	orange pimpleback	E
Plethobasus cyphus	**sheepnose mussel**	**E**

[a]Federal status determined by the FWS under the authority of the ESA; E = endangered; T = threatened.
[b]Bold text indicates species addressed in this supplemental biological assessment.

3.0 Watts Bar Nuclear (WBN) Site Description

This supplement does not wholly describe the WBN site, which remains the same as in the 2011 biological assessment. The following changes have been included as a result of new information submitted by TVA and subsequently incorporated into the final SFES for WBN Unit 2 (NRC 2013).

On June 30, 2011, the State of Tennessee (TDEC 2011) issued a new National Pollutant Discharge Elimination System (NPDES) permit, which is effective August 1, 2011, through June

28, 2016. The new permit includes WBN Unit 2. The state of Tennessee subsequently revised the permit with minor modifications on November 28, 2011 (TVA 2011a). As a result of the new permit, the NRC updated its references and discussion of the NPDES permit in Section 3.2.4 of the final SFES to indicate that the permit encompasses operation of both WBN Units 1 and 2. The permit contains no changes to discharge temperature limits or other requirements that were previously described in the 2011 biological assessment.

4.0 Assessment of Listed Species

As previously discussed in this supplemental biological assessment, the NRC addressed seven Federally listed species (identified in Table 1) in its 2011 biological assessment, and the FWS concurred on the NRC's effect determination in a letter dated December 20, 2011 (FWS 2011a). Thus, only the two newly listed species—the laurel dace and sheepnose mussel—will be addressed in this section.

4.1 Life History

4.1.1 Laurel Dace

The FWS listed the laurel dace as endangered in the *Federal Register* on August 9, 2011, with an effective date of September 8, 2011 (76 FR 48722). The FWS previously referred to the laurel dace as *Phoxinus saylori*, but due to recent taxonomic changes, to the FWS now recognizes it as belonging to the genus *Chrosomus*.

Laurel dace belong to the family Cyprinidae (minnows). Laurel dace are small fish, with an observed maximum standard length (distance from the tip of the snout or upper jaw to the base of the caudal fin) of 5.1 cm (2 in.). The species inhabits first and second order streams (headwater streams) and are most often collected from pools or slow flowing sections—often where a stream runs from undercut banks or beneath slab boulders. The substrate of streams inhabited by laurel dace is often cobble, rubble, and boulders and the maximum water temperature is 26°C (78°F). In addition, the streams are associated with dense riparian vegetation, usually mountain laurel (*Kalmia latifolia*), but also with canopy covers that include eastern hemlock (*Tsuga candaensis*), pines (*Pinus* spp.) and mixed hardwoods. Laurel dace are only found in areas relatively free of silt. The species primarily eats larvae of flies, stoneflies, and caddisflies and have been observed to live as long as 3 years based on reports of finding 3-year classes in some field collections. (76 FR 48722)

4.1.2 Sheepnose Mussel

The FWS listed the sheepnose mussel as endangered in the *Federal Register* on March 13, 2012, with an effective date of April 12, 2012 (77 FR 14914). The sheepnose mussel is a freshwater mussel in the family Unionidae. According to Parmalee and Bogan (1998), adult mussels may reach 11 to 12 cm (4.3 to 4.8 in) in length. Adult mussels are found partially or completely buried in the substrate. They are suspension feeders and eat bacteria, algae, microscopic animals, and detritus (77 FR 14914). Parmalee and Bogan (1998) indicated that the most suitable substrate is "a mixture of coarse sand and gravel." Further, in unimpounded

rivers, sheepnose mussels can be found in less than 0.6 m (2 ft) of water and in relatively fast currents. In reservoirs, sheepnose mussels occupy depths of 3.6 to 4.6 m (12 to 15 ft) (Parmalee and Bogan 1998), though they have also been reported at depths exceeding 6 m (20 ft) (77 FR 14914). Sheepnose mussels live nearly 30 years (77 FR 14914). The sauger (*Sander canadensis*) is the only known host for sheepnose mussel glochidia (FWS 2011b; Parmalee and Bogan 1998).

4.2 Status of Listed Species

4.2.1 Laurel Dace

The laurel dace was previously known to inhabit three independent systems on the Walden Ridge section of the Cumberland Plateau: Soddy Creek, Sale Creek (Horn and Laurel Branch tributaries to Rock Creek and the Cupp Creek tributary to Roaring creek), and Piney River system (Youngs, Moccasin, and Bumbee Creeks) (76 FR 48722). Sampling surveys conducted in 1991, 1995, 1996, and 2004 indicate that the laurel dace may have been extirpated from the Laurel Branch of Sale Creek (76 FR 63360, 77 FR 63604). The FWS has designated critical habitat for the laurel dace on Bumbee Creek (7.8 km = 4.8 mi), Youngs Creek (7.9 km = 4.9 mi), Moccasin Creek (9.0 km = 5.65 mi), Cupp Creek (5.0 km = 3.1 mi), Horn Branch (4.0 km = 2.5 mi), and Soddy Creek (8.4 km = 5.2 mi) for a total of 42.2 km (26 mi) (77 FR 63604).

The Piney River is located approximately 13 km (8 mi) from the WBN site at its closest point. This river is the closest of these three systems to the WBN site. The distance between the Piney River and the WBN Unit 2 cooling towers is too far for operations-related activities (e.g., cooling tower drift) to affect the laurel dace or its critical habitat. Laurel dace have not been observed in the mainstem of the Tennessee River, and based on the habitat description above, are not likely to inhabit the Tennessee River mainstem. Because of the distance in proximity between laurel dace habitat and the WBN site, the laurel dace is not discussed further in this supplemental biological assessment.

4.2.2 Sheepnose Mussel

The sheepnose mussel is found across the Southeast and the Midwest in a number of river systems including the Ohio, Cumberland, Tennessee, and upper Mississippi (Parmalee and Bogan 1998). Parmalee and Bogan (1998) indicated that the most stable and viable populations of sheepnose mussels in Tennessee were located in the upper Clinch River (Hancock County) and below Pickwick Landing Dam (Harding County) in the Tennessee River. Mirarchi et al. (2004) reported the sheepnose mussel as being extant, but rare, in Tennessee River locations downstream of Wilson and Guntersville Dams in Alabama. According to the FWS (2011b), the sheepnose mussel has been eliminated from two-thirds of streams where it had been known to occur.

In the fall of 1983, two specimens were found at Tennessee River mile (TRM) 526.0. One additional specimen was found near this same location in the summer of 1992 and another at TRM 526.3 in the summer of 1994 (Baxter et al. 2010). In September 2010, TVA found a specimen, judged to be approximately 20 years old, during sampling in a mussel bed located between TRM 526 to 527 at a depth of 24 ft (7.3 m) (Third Rock Consultants 2010).

Sauger, the only identified glochidial host for the sheepnose mussel, is present in the Tennessee River near the WBN site. The most recent sampling studies conducted by TVA, as reported by Simmons (2011), caught a single sauger during electrofishing between the site and Watts Bar Dam in autumn 2009, although no sauger were observed in the vicinity of the WBN site during 2010 sampling. The Tennessee Wildlife Resources Agency conducted creel surveys in 2007 and 2008 in Chickamauga Reservoir and caught 1,666 (Black 2008) and 22,784 (Black 2009) sauger, respectively. In an effort to understand the population dynamics of sauger in Chickamauga Reservoir, TVA used standard and experimental gill nets in a set of special studies conducted from 1986 to 1994 in the upper 24 km (14.9 mi) of the reservoir (Simmons 2010). These studies indicate that Watts Bar Dam blocks sauger from their annual spawning migration up the Tennessee River. In Chickamauga Reservoir, spawning occurs approximately 13 km (8 mi) downstream of Watts Bar Dam (TVA 1998) at Hunter Shoals (Hevel and Hickman 1991). TVA (Baxter et al. 2010) performed additional entrainment (fish eggs and larvae), electrofishing, impingement, and fishery creel surves in 1996 through 1997 in support of its NPDES permit. Sauger is one of the most sought species by recreational anglers near WBN (Baxter et al. 2010).

5.0 Environmental Effects of WBN on Listed Species

WBN operations affect fish and freshwater mussels in the Tennessee River mainstem as a result of water consumption, entrainment, impingement, and thermal and chemical effects. As discussed in Section 5.2.1, the laurel dace does not occur in the Tennesse River mainstem, and as such, there is no pathway for WBN operation to affect the species. Therefore, the NRC staff only considers the sheepnose mussel, and not the laurel dace, in the following sections.

5.1 Water Consumption

As discussed in the 2011 biological assessment, the amount of water that WBN Unit 1 and proposed Unit 2 would consume is small and so would not measurably affect the habitat available for freshwater mussel species, including the sheepnose mussel.

5.2 Entrainment and Impingement

The SCCW intake pulls water from the Chickamauga Reservoir above Watts Bar Dam. As a result, freshwater mussels (e.g., sheepnose mussel) or their hosts residing in Chickamauga Reservoir below the dam would not be affected by entrainment or impingement during continued operation of the SCCW. The intake pumping station (IPS) pulls water from Chickamauga Reservoir upstream of the location of the identified sheepnose mussels discussed in Section 5.2.2. This is the only intake that would affect the sheepnose mussel.

Although the sheepnose mussel is not susceptible to entrainment or impingement by the intake pumping station, its glochidial host could be entrained or impinged. The only identified glochidial host for the sheepnose mussel is the sauger. No sauger were impinged during the Clean Water Act 316(b) impingement mortality demonstration study between March 1996 and October 1997 (Baxter et al. 2010) or March 2010 and March 2011 (TVA 2011b). Further, sauger were not present during entrainment studies (Baxter et al. 2010, TVA 2012).

5.3 Thermal and Chemical Effects

The Tennessee Department of Environment and Conservation (TDEC) issued a NPDES permit for WBN Units 1 and 2 effective August 1, 2011, through June 29, 2016 (TDEC 2011). TDEC issued a revised permit with minor modifications on November 28, 2011 (TVA 2011a). The NPDES permit specifies limits on the amount of thermal effluent the plant may discharge into the Tennessee River, establishes an active mixing zone, and defines in-stream monitoring and reporting requirements necessary to comply with effluent limitations. The location of the previously identified sheepnose mussels is approximately 3 km (1.9 mi) downstream of the discharge diffusers (and even further from the SCCW discharge). The NPDES permitted passive missing zone extends a maximum of 2000 ft (610 m) downstream of the SCCW outfall when water is flowing from the dam and 1000 ft (300 m) when no water is flowing (NRC 2013, Section 4.2). Mitigation measures for thermal effects include a cooling tower, diffusers on the discharge, and operational measures (NRC 2013, Section 4.3.2.3). Because of the distance downstream and the depth of the mussels, the thermal discharge is unlikely to adversely affect the sheepnose mussels downstream.

As discussed in the 2011 biological assessment, the NRC staff reviewed 12 years of toxicity testing data provided in the NPDES permit request (TVA 2009), and based on the results of the tests, the NRC staff believes that further chemical discharges resulting from the additional operation of WBN Unit 2 would not affect the aquatic biota of Chickamauga Reservoir.

5.4 Cumulative Effects to Listed Species

Section 6.0 of the 2011 biological assessment provides an analysis of the potential cumulative effects on listed species associated with the proposed action. That analysis includes discussions of freshwater mussels located in the vicinity of the WBN site. Thus, the NRC staff's previous assessment of cumulative impacts encompasses those impacts that could affect the sheepnose mussel.

6.0 Conclusion and Determination of Effects

The NRC staff has examined the potential impacts of the operation of WBN, including the roposed operation of WBN Unit 2, on the Federally-protected laurel dace and the sheepnose mussel. This supplemental biological assessment considers the known distributions and records of those species and the present and potential ecological impacts of WBN operations on those species. Based on this review, the NRC staff has reached the following conclusions.

6.1 Laurel Dace

Operation of the WBN Unit 1 and the proposed WBN Unit 2 will have no effect on the laurel dace because of the distance between the known and preferred habitat of the laurel dace and the WBN site. Because the Piney River (the closest known laurel dace habitat) is more than 13 km (8 mi) from the WBN cooling towers, operations-related activities (e.g., cooling tower drift) should not affect the laurel dace or its habitat. Laurel dace have not been observed in the mainstem of the Tennessee River, and based on the habitat description in Section 5.2.1, are not

likely to inhabit the Tennessee River mainstem. Therefore, the NRC staff concludes that operation of WBN will have **no effect** on the laurel dace.

6.2 Sheepnose Mussel

Operation of the WBN Unit 1 and the proposed WBN Unit 2 may affect the sheepnose mussel, which has the potential to occur in near the WBN site. The sheepnose mussel is not likely to be affected by water consumption, entrainment, or impingement, however, because of the small amount of water consumed and because mussels are benthic and not susceptible to entrainment or impingement. In addition, the identified glochidial host (sauger) has not been found in impingement or entrainment study samples. Impacts on sheepnose mussels from thermal discharges are unlikely due to the distance from discharge to known mussel locations and TVA mitigative measures as discussed in the 2011 biological assessment. These include the use of diffusers only when Watts Bar Dam releases at least 99 m^3/s (3,500 cfs) and the orientation of the diffuser plume (45 degrees above horizontal in the downstream direction). Further, based on a review of 12 years of toxicity testing data provided in the NPDES permit request (TVA 2009), it is unlikely that chemical discharges will affect the sheepnose mussel. Thus, the NRC staff concludes that operation of the WBN Unit 1 along with the proposed operation of Unit 2 **may affect, but is not likely to adversely affect**, the sheepnose mussel.

7.0 References

References that appear with an Agencywide Document Access and Management System (ADAMS) accession number can be accessed through NRC's web-based ADAMS at the following URL: http://adams.nrc.gov/wba/.

50 CFR Part 17. *Code of Federal Regulations*, Title 50, *Wildlife and Fisheries*, Part 17, "Endangered and Threatened Wildlife and Plants."

76 FR 48722. U.S. Fish and Wildlife Service. "Endangered and Threatened Wildlife and Plants; Endangered Status for the Cumberland Darter, Rush Darter, Yellowcheek Darter, Chucky Madtom and Laurel Dace." *Federal Register* 76(153):48722-48741. August 9, 2011.

76 FR 63360. U.S. Fish and Wildlife Service. "Endangered and Threatened Wildlife and Plants; Proposed Designation of critical Habitat for the Cumberland Dater, Rush Darter, Yellowcheek Darter, Chucky Madtom, and Laurel Dace." *Federal Register* 76(197):63360-63418. October 12, 2011.

77 FR 14914. U.S. Fish and Wildlife Service. "Endangered and Threatened Wildlife and Plants: Determination of Endangered Status for the Sheepnose and Spectaclecase Mussels Throughout Their Range." *Federal Register* 77(49):14914-14949. March 13, 2012.

77 FR 63603. U.S. Fish and Wildlife Service. "Endangered and Threatened Wildlife and Plants: Designation of Critical Habitat for the Cumberland Darter, Rush Darter, Yellowcheek Darter, Chucky Madtom, and Laurel Dace." *Federal Register* 77(200):63603-63668. October 16, 2012.

Baxter, D.S., J.P. Buchanan, G.D. Hickman, J. Jenkinson, J.D. Milligan and C.J. O'Bara. 2010. *Aquatic Environmental Conditions in the Vicinity of Watts Bar Nuclear Plant During Two Years of Operation, 1996-1997.* June 1998, Revised June 7, 2010. Tennessee Valley Authority, Norris, Tennessee. ADAMS No. ML11325A411.

Black, W.P. 2008. Tennessee Reservoir Creel Survey. 2007 Results. Final Report. April 2008. Tennessee Wildlife Resources Agency, Fisheries Management Division, Nashville, Tennessee. ADAMS No. ML100710009.

Black, W.P. 2009. Tennessee Reservoir Creel Survey. 2008 Results. Final Report. November, 2009. Tennessee Wildlife Resources Agency, Fisheries Management Division, Nashville, Tennessee. ADAMS No. ML100710009.

[DOI] U.S. Department of Interior. 2012. Letter from J. Stanley, U.S. Department of Interior. "Re: Comments and Recommendations on the Draft Supplemental Environmental Impact Statement (SEIS) Related to the Operation of Watts Bar Nuclear Plant, Unit 2, Supplement 2 in Rhea County, TN." January 23, 2012. ADAMS No. ML12005A211.

[FWS] U.S. Fish and Wildlife Service. 2009. Letter from Mary E. Jennings, Field Supervisor, to U.S. Nuclear Regulatory Commission dated October 29, 2009, "FWS #2009-SL-0885. Watts Bar Nuclear Plant, Unit 2 – Request for list of Protected Species, Rhea County, Tennessee." ADAMS No. ML0929301820.

[FWS] U.S. Fish and Wildlife Service. 2011a. Letter from M. E. Jennings, USFWS, to U.S. Nuclear Regulatory Commission. December 20, 2011. "*FWS# 12-CPA-00081. Watts Bar Nuclear Plant, Unit 2 – Biological Assessment for Section 7 Consultation Related to the Operating License Application, Rhea County, Tennessee.*" ADAMS No. ML12004A167.

[FWS] U.S. Fish and Wildlife Service. 2011b. "Sheepnose (a freshwater mussel) – *Plethobasus cyphyus.*" ADAMS No. ML12184A302.

Hevel, K.W. and G.D. Hickman. 1991. *Population Survey of Sauger in Chickamauga Reservoir 1990-1991.* Tennessee Valley Authority, Knoxville, Tennessee. ADAMS No. ML073510353.

Mirarchi, R., J. Garner, M. Mettee, and P. O'Neil, eds. 2004. *Alabama Wildlife, Volume 2, Imperiled Aquatic Mollusks and Fishes.* University of Alabama Press, Tuscaloosa, Alabama.

[NRC] U.S. Nuclear Regulatory Commission. 2009. Letter from U.S. Nuclear Regulatory Commission to M.E. Jennings (Field Supervisor, U.S. Fish and Wildlife Service) dated September 2, 2009. "Watts Bar Nuclear Plant, Unit 2- Request for List of Protected Species within the Area under Evaluation for the Operating License Application Environmental Review." ADAMS No. ML092100088.

[NRC] U.S. Nuclear Regulatory Commission. 2011a. Letter from U.S. Nuclear Regulatory Commission to M.E. Jennings (Field Supervisor, U.S. Fish and Wildlife Service) dated November 2, 2011. "Watts Bar Nuclear Plant, Unit 2 – Biological Assessment for Section 7 Consultation Related to the Operating License Application." ADAMS No. ML11304A088.

[NRC] U.S. Nuclear Regulatory Commission. 2011b. *Draft Supplemental Environmental Impact Statement Related to the Operation of Watts Bar Nuclear Plant, Unit 2.* NUREG-0498 Supplement 2, Washington, D.C. ADAMS Nos. ML11298A094, ML11298A095.

[NRC] U.S. Nuclear Regulatory Commission. 2011c. Biological Assessment related to operation of Watts Bar Nuclear Plant, Unit 2, for gray bat, pink mucket, eastern fanshell pearlymussel, rough pigtoe, dromedary pearlymussel, orangefoot pimpleback, and snail darter. September 2011. 45 p. *in* [NRC 2011b]. ADAMS No. ML11298A095.

[NRC] U.S. Nuclear Regulatory Commission. 2013. *Final Environmental Statement Related to the Operation of Watts Bar Nuclear Plant, Unit 2. Supplement 2.*. NUREG-0498 Supplement 2, Washington, D.C. ADAMS Nos. ML13144A092, ML13144A093.

Parmalee, P.W. and A.E. Bogan. 1998. *Freshwater Mussels of Tennessee*. University of Tennessee Press, Knoxville, Tennessee.

Simmons, J.W. 2010. *Analysis of Fish Species Occurrences in Chickamauga Reservoir – A Comparison of Historical and Recent Data.* Tennessee Valley Authority, Aquatic Monitoring and Management, Chattanooga, Tennessee. ADAMS No. ML11325A411.

Simmons, J.W. 2011. *Biological Monitoring of the Tennessee River Near Watts Bar Nuclear Plant Discharge, Autumn 2010.* Tennessee Valley Authority, Aquatic Monitoring and Management, Chattanooga, Tennessee. ADAMS No. ML12073A367.

[TDEC] Tennessee Department of Environment and Conservation. 2011. *State of Tennessee NPDES Permit No. TN0020168.* ADAMS No. ML11215A099.

Third Rock Consultants, LLC. 2010. *Mollusk Survey of the Tennessee River near Watts Bar Nuclear Plant (Rhea County, Tennessee).* Prepared for Tennessee Valley Authority, October 28, 2010, revised November 24, 2010. Lexington, Kentucky. ADAMS No. ML11325A411.

[TVA] Tennessee Valley Authority. 1998. *Watts Bar Nuclear Plant Supplemental Condenser Cooling Water Project, Environmental Assessment.* Knoxville, Tennessee. ADAMS No. ML12170A104.

[TVA] Tennessee Valley Authority. 2007. Letter from William R. McCollum (Tennessee Valley Authority, Chief Operating Officer) to U.S. Nuclear Regulatory Agency dated August 3, 2007, "Watts Bar Nuclear Plant (WBN) – Unit 2 – Reactivation of Construction Activities." ADAMS No. ML072190047.

[TVA] Tennessee Valley Authority. 2008. *Final Supplemental Environmental Impact Statement; Completion and Operation of Watts Bar Nuclear Plant Unit 2, Rhea County, Tennessee*, submitted to NRC as the TVA Environmental Report for an Operating License, Knoxville, Tennessee. ADAMS No. 080510469.

[TVA] Tennessee Valley Authority. 2009. Letter from Darrin Hutchison (Tennessee Valley Authority, Environmental Technical Support Manager) to Vijin Janjic (Tennessee Department of Environment & Conservation, Permit Writer) dated April 15, 2009, "Watts Bar Nuclear Plant

(WBN) – National Pollutant Discharge Elimination System (NPDES) Permit No. TN0020168 – Request for Raw Water Treatment Modification." ADAMS No. ML091190175.

[TVA] Tennessee Valley Authority. 2010. Letter from Masoud Bajestani (Watts Bar Unit 2, Vice President) to U.S. Nuclear Regulatory Commission dated February 25, 2010 in response to NRC letter dated December 3, 2009 and TVA letters dated July 2, 2008, January 27, 2009, and December 23, 2009, "Watts Bar Nuclear Plant (WBN) Unit 2 – Additional Information Regarding Environmental Review (TAC No. MD8203)." ADAMS No. ML100630115.

[TVA] Tennessee Valley Authority. 2011a. Letter from J.W. Shea (Tennessee Valley Authority) to U.S. Nuclear Regulatory Commission dated December 27, 2011, "Notification of National Pollutant Discharge Elimination System Permit Modification." Chattanooga, Tennessee. ADAMS No. ML12009A072.

[TVA] Tennessee Valley Authority. 2011b. *Fish Impingement at Watts Bar Nuclear Plant Intake Pumping Station Cooling Water Intake Structure during March 2010 through March 2011.* Tennessee Valley Authority. April 2011. ADAMS No. ML11124A025.

[TVA] Tennessee Valley Authority. 2012. *Estimates of Entrainment of Fish Eggs and Larvae at Watts Bar Nuclear Plant at Tennessee River Mile 528 from March 2010 through March 2011. May 2012.* ADAMS No. ML12166A068.