Nuclear Regulatory Commission
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JTIR00003

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	Docket No. 52-011-ESP
SOUTHERN NUCLEAR COMPANY	)	
	)	ASLBP No. 07-850-01-ESP-BD01
(Early Site Permit for Plant Vogtle Site)	)	
	)	

AFFIDAVIT OF SHAWN PAUL YOUNG, PH.D.

I, Shawn Paul Young, do hereby declare under penalty of perjury:

Background

1. My name is Shawn Paul Young, Ph.D. I am currently Visiting Assistant Professor of Fisheries Biology at Purdue University, West Lafayette, Indiana. I also hold Adjunct Faculty status at Clemson University, Clemson, South Carolina. My current business address is 195 Marsteller Street, Forestry Building 102A, West Lafayette, Indiana 47907. I submit this affidavit as a private consultant to the Intervenors in this matter.

2. My professional and educational experience is summarized in the updated curriculum vitae attached to this affidavit. I received a B.S. in Environmental Studies from Northland College; a M.S. in Aquaculture, Fisheries, and Wildlife Biology from Clemson University; and a Ph.D. in Fisheries and Wildlife Sciences from Clemson University. I have eleven years of experience researching the effects of human activities on fisheries and aquatic ecosystems, including six years of experience studying fisheries in the Savannah River Basin. In addition to my professional qualifications, I have been an avid outdoorsman, fishing, hunting, and enjoying nature in every manner since my early childhood.

3. I have published 15 peer-reviewed articles relevant to fisheries and aquatic ecology. I have been consulted by public, state, federal, and academic sectors in the subject area of fish and aquatic ecology. I have presented scientific presentations at numerous professional meetings, academic seminars, and citizen fishing association functions.

4. I am familiar with the application of Southern Nuclear Operating Company ("Applicant" or "SNC") for an Early Site Permit ("ESP") at the Vogtle Electric Generating Plant site; SNC's Environmental Review ("ER"), the Draft Environmental Impact Statement ("DEIS") prepared by the NRC Staff; and the Joint Affidavit of NRC Staff, Christopher B. Cook and Rebekah H. Krieg, supporting SNC's motion for summary disposition. I have reviewed materials and data provided within the ER, DEIS and Joint Affidavit describing the additional two units' water intake, water consumption, and thermal discharge into the Savannah River, and subsequent potential impacts on the fish assemblage of the Savannah River.

5. I am providing this affidavit in support of Intervenors' Contention EC 1.2 -- Impacts on Fishery Resources of the Savannah River. The opinions and conclusions I express in this affidavit are my own and should not be attributed to Purdue or Clemson Universities. This affidavit explains my scientific opinion that the DEIS, information cited therein, and Joint Affidavit do not provide adequate data or analysis to properly evaluate potential effects of the proposed additional reactor units at Plant Vogtle on fishery resources of the Savannah River. I have extrapolated my knowledge and experience in this subject matter to the scenarios and data explained and detailed in the ESP application, ER, DEIS, and supporting documentation. I have arrived at my conclusions dealing with the matters stated herein and believe them to be true and correct.

6. The bases for Contention EC 1.2, discussed in my previous affidavit, remain. SNC either does not or cannot provide a detailed data set of Savannah River fish (1) life history stages that occur near Plant Vogtle, (2) respective migration timing of each species' life history, (3) distribution patterns in the immediate vicinity of Plant Vogtle and (4) population numbers. These data could be compared with numbers and species found within the intake canals and in the thermal discharge plume if such studies were ever conducted. Without this knowledge, analysis and modeling used to support NRC Staff conclusion that impacts due to entrainment, impingement, and thermal discharge will be small are still not appropriate or scientifically substantiated.

7. The motion for summary disposition of EC 1.2 (Page 4) claims that the DEIS cured deficiencies in three major aspects with respect to impingement and entrainment discussed in my previous affidavit and Intervenor's contention. In fact, the DEIS and NRC Staff affidavit do not cure any deficiencies from the ER. There remains no actual data presented, or studies conducted to acquire data, for entrainment at the existing Units 1 and 2. The only scientifically valid means of evaluating the impact of the existing units is through data collection. Likewise, field study of the existing units is the best indicator of likely impacts associated with additional units.

8. The DEIS and NRC Staff Affidavit incorrectly state that Table 2-7 provides a "comprehensive discussion of the Savannah River Fish Assemblage." Table 2-7 omits detailed fish species' life history stage information, which is absolutely crucial to determine true impacts due to entrainment and thermal discharge at Plant Vogtle. (DEIS at 2-76 - 2-83, 5-23 – 5-26). The information in the DEIS remains no more than a general list of fish species found in the Savannah River, with absolutely no detail concerning which species' life history stages are

present in the immediate vicinity of Plant Vogtle, and when. Nor does the DEIS include data concerning species abundance or distribution.

9. Data for early life history of fish that inhabit the Savannah River near Plant Vogtle, or pass by Plant Vogtle as part of the community drift, is of paramount importance in determining current and future impacts. The early life history stages of fish are the most susceptible to entrainment and thermal discharge because fish eggs have no mobility and larval fish have a very limited capacity for small-scale movement. Many fish species' eggs and larvae are found in the river drift because many larval fish are not capable swimmers and do not have the capacity for avoidance, large-scale movement or excessive activity that would increase energy expenditure. Therefore, many larval fish utilize the inertia of flowing water for passive transport to save energy. Their capability to exhibit avoidance is usually on a very small-scale in time and space; thus, their inherent vulnerability to entrainment. Further, fish eggs have no capacity for movement; thus, fish eggs have no ability to avoid entrainment or thermal discharge.

10. The DEIS acknowledges the drift community is important to analyze (DEIS at 5-23); yet, the NRC Staff downplays the susceptibility of egg and larval fish to water withdrawal and thermal discharge by erroneously stating, "Larval fish are capable swimmers and appear to avoid high flow rates." Joint Affidavit ¶15. As mentioned previously, larval fish are generally not capable swimmers and do not have the capacity to avoid high flow rates. At best, the Staff's claim is a gross over-generalization. Some species' larval stage may be more capable swimmers than others, but it is incorrect to assume that larval fish in the Savannah River are capable of avoiding impacts of the existing or proposed units.

11. As discussed in DEIS 5-23 – 5-26, design through-screen velocity is 0.5 ft/sec, which is equivalent to 6 inches/sec. However, literature cited at DEIS 2-83 indicates that larval

robust redhorse, identified as an "important" species in the DEIS, are capable of swimming at speeds of 3-5 inches/sec, which is insufficient to avoid the predicted water intake velocities (6 inches/sec). Again, this is contrary to the NRC Staff's claim that larval fish are capable swimmers and should be able to avoid entrainment.

12. As a rationale for the conclusion that impacts will be small, the NRC Staff states that, "fish and shellfish inhabiting a lotic environment (such as those species identified and listed in Table 2.7 of the DEIS) are adapted to survival in varying flow regimes and velocities." Joint Affidavit ¶ 16. Fish and shellfish can adapt to natural variability; but not human-induced variability. In this context, variability should be considered human-induced. Thus, the Staff statement contradicts the current knowledge that human-induced variation of flow regimes and velocities combined with increased entrainment mortality caused by operation of facilities such as Plant Vogtle (Marcy et al. 2005) are the primary causes for the decline of freshwater biodiversity (fish, mollusks, macroinvertebrates) in the United States (Masters 1990; Lazyer et al. 1993; Williams et al.1993; Vaughn and Taylor 1999; Ricardi and Rasmussen 1996; Cosgrove and Hastie 2001; Eversole 2001; Layzer and Scott 2006). Also, human-induced variation may decouple freshwater mussels from adult fish hosts needed for their parasitic-glochidial life history stage to be successful. Without an adult fish host during this period of life, death of the individual and reproductive failure of the population will occur.

13. The DEIS and NRC Staff Affidavit continually reference reports from studies conducted by the Academy of Natural Sciences, Philadelphia (ANSP 2001; 2003). The ANSP reports, however, contain none of the detailed information discussed above in paragraphs 6-8, such as fish species' abundance or distribution, including early life history stages, migration timing, or population numbers for fish in the immediate vicinity of Plant Vogtle. Notably, no

such studies have been conducted since the mid-1990's (ANSP 2001; ANSP 2003). Even then, several aspects of the ANSP research, including ichthyoplankton surveys, were performed on a limited basis only a few times per year, during alternating years. The DEIS and NRC Staff affidavit rely on portions of ANSP's research (2001 and 2003) that conducted fish investigations once per year, over 3 days during the month of September, at a limited number of sampling stations. This sampling protocol is grossly insufficient to supply information needed to draw appropriate conclusions regarding the impact of the proposed Units 3 and 4 on fish species.

14. Applicants also state that impingement/entrainment have been very small at Plant Vogtle. This is based on SNC staff's general observation by cleaning trash baskets 2-3 times per year. Anecdotal evidence gathered during another activity that does not account for scientific controls is a grossly inadequate method for analyzing impingement/entrainment from water withdrawal. Similarly, the single observation during the March 8, 2007 site visit is insufficient to make a definitive conclusion regarding impacts from impingement.

15. At minimum, a study of current entrainment and impingement associated with the existing intake structure is necessary to determine the current baseline impacts, as well as cumulative impacts of adding two new reactors. Previous studies of the effects of the existing intake structure were conducted 20 – 30 years ago. The assumptions made in previous modeling of entrainment at intakes for existing units, discussed in NRC 1985, are improper and misleading. Without actual field study of the existing intake it is not possible to confidently determine the level of impacts. Without such study, it is likewise inappropriate to conclude that the proposed units will have insignificant impacts.

16. Seasonal field studies are needed to determine current ichthyoplankton species composition, distribution, and vulnerability to entrainment at the existing intake structures.

Ichthyoplankton-net collections are a standard technique in early life history studies of fish (Bilkovic et al. 2002; Overton and Rulifson 2007; Perez-Ruzafa 2007). Ichthyoplankton collections should be conducted at equal intervals from riverbank to riverbank, surface to bottom, during a stratified sampling period occurring day and night several times per week during each month of the year to fully understand the composition of the drift community in the Savannah River near Plant Vogtle water intake structures and thermal discharge plume. This sampling in combination with coinciding ichthyoplankton netting within the intake canal and thermal plume could determine percent of drift community entrained by water withdrawal or affected by thermal discharge for existing units.

17. Furthermore, the aquatic surveys that have been conducted and reported in the DEIS are inadequate for the purpose of assessing the impact of proposed Units 3 and 4. The only surveys conducted in the immediate vicinity of Plant Vogtle discussed in the DEIS were conducted by ANSP to separate the impacts of Plant Vogtle impacts from the DOE Savannah River Site (ANSP 2003). From 1985 through 1996, ANSP sampled near Plant Vogtle approximately every 2 years. Beginning in 1997, sampling at the Plant Vogtle stations was limited to diatom surveys only (ANSP 2003). The ANSP studies were not intended or designed to be a systematic evaluation of the impacts of Plant Vogtle, as they are being used in the DEIS. The ANSP studies provide some useful data, but do not by themselves support a conclusion that the addition of two new units will have only small impacts on aquatic resources.

18. Recent ANSP surveys fail to consider the small benthic, planktonic and nektonic (organisms in the water column) forms, including early life stages of fish and shellfish, which make up the aquatic community of the Savannah River. Diatoms, studied by ANSP, have greater tolerances, are species generalists, and can live in a wide variety of environmental conditions

(Pither and Aarseen 2005). Thus diatoms are not good sensitive indicator species for evaluating the current health of the river, in terms of species abundance and diversity; nor are they an appropriate indicator of potential impacts of adding two new units at Plant Vogtle. Surveying for diatoms would not likely reveal problems with the water or aquatic ecology of the area until a severe problem in the environment occurs. In other words, diatom surveys have limited utility for estimating impacts associated with the Plant Vogtle intake and discharge systems.

19. The NRC Staff cites ANSP (2001; 2003) in support of the conclusion that existing Plant Vogtle operations have not affected Savannah River fish. (DEIS at 7-16). However, Marcy et al. (2005), identify Plant Vogtle as among the human activities negatively affecting Savannah River fish by reducing species diversity and population levels. All the authors of Marcy et al. (2005) are reputable fish and aquatic ecologists with many years of study focused on the middle Savannah River basin (MSRB). Marcy et al. (2005, P. 16) state,

> "Use of river water for industrial purposes, such as cooling water, has affected MSRB fish populations through entrainment (in which fish eggs and larvae are caught up in the current of a water intake device) and impingement (the removal of juvenile and adult fish from the intake stream by means of a small-mesh [0.95 cm] screen). Entrainment occurs wherever large volumes of water are removed, such as at domestic water treatment plants, or used in industrial processes. Mortality due to entrainment varies according to the species of fish, its life stage, and physical parameters of water flow such as current speed and turbulence. Changes in temperature or other water quality parameters and amelioration devices such as traveling screens that return the entrained animal to the water away from the from the intake device also plays a role in survival. See Schubel and Marcy 1978 for biological assessment of entrainment impacts. Historically, the largest sources of entrainment in the MSRB have been the reactor cooling water intakes for the SRS (9.8% of Savannah River flow) and the Plant Vogtle nuclear power station (4.2% of river flow; Wiltz 1981; DOE 1990)."

20. The DEIS assumes that proposed Units 3 and 4 will have similar levels of entrainment as existing Units 1 and 2, but acknowledges that entrainment studies have not been conducted for the existing units. (DEIS at 5-25). The Final Environmental Impact Statement for

Units 1 and 2 (NRC 1985) assumed a uniform drift community and, therefore, entrainment would be equal to the proportion of river discharge withdrawn by the intake structure. The NRC Staff estimated 1 to 3.5 percent removal because the cooling water intake withdraws between 1 and 4 percent of the total river flow. Extrapolating the level of entrainment from the percentage of river discharge is not a scientifically accepted approach to evaluating impacts of cooling water intake structures.

21. The NRC Staff extrapolation is inherently unreliable because the drift community is not uniformly distributed. The NRC Staff analysis and conclusions disregard the data collected during pre-operation monitoring of the Plant Vogtle site. Wiltz (1983) studied fish egg and larval fish drift, and Nichols (1983) surveyed macroinvertebrate drift distribution near Plant Vogtle during pre-operation monitoring. Both found that the drift community, including eggs and larvae of 34 fish species, were non-uniformly distributed and varied over time and space in the vicinity of Plant Vogtle. Eggs and larvae of several fish species that were collected in the drift near Plant Vogtle (Wiltz 1983) are identified in the ER or DEIS as species that would not be found in the drift community because they are demersal spawners, endobenthic dwellers, or stream fish. These included sturgeon, suckers, American shad, and Savannah darter. Wiltz (1983) found American shad eggs increased in number and constituted 45% of the drift community during the month of May, and that larval suckers constituted as much as 37.5% of the drift in May. This exhibits highly concentrated egg and larval drift at peak periods. During periods of increased abundance and concentrated drift, entrainment will not correlate directly with the percent of flow withdrawn and there exists a potential for much larger impacts.

22. The DEIS (2-83) only contains facts about robust redhorse that are favorable to a finding of insignificant impacts and disregards data leading to an opposite conclusion. For

example, the DEIS presumes that the suckers like the robust redhorse spawn in the gravel and therefore, they are not part of the drift community susceptible to entrainment or thermal discharge. This logic is contradicted by field data from Wiltz (1983), where larval suckers comprised a large part of the larval fish drift community. Wiltz found mainly spotted sucker larvae, which exhibit the same spawning strategy and use the same gravel bars as robust redhorse. (Grabowski and Isely 2006). Thus, it is likely that if larval spotted suckers comprise part of the drift, robust redhorse larvae also comprise part of the drift even though they spawn in gravel. The DEIS fails to make this basic connection and downplays the level of potential impacts.

23. Even if it were appropriate to extrapolate the level of impacts from the percentage of the total river flow being withdrawn or discharged, the DEIS incorrectly concludes that the proposed units, alone or in combination with the existing units, will have insignificant impacts. According to the DEIS, "the EPA determined that limiting withdrawal to 5 percent of the source water body mean flow was technically achievable and economically practicable and that larger withdrawals may result in greater level of entrainment." (DEIS 5-24). Notable, the EPA does not claim that withdrawals of less than 5 percent result in insignificant impacts on aquatic resources; only that it is possible to reduce withdrawals to 5 percent, and that larger withdrawals will result in greater impacts. I am unaware of any scientific basis to state categorically that taking up to 5 percent of the drift community will have minor or insignificant impacts.

24. Fish typically experience high natural mortality, and exhibit high fecundity to counterbalance natural losses, such as predation. However, it does not follow that human-induced mortality of 1 to 3.5 percent associated with proposed Units 3 and 4 will be minor or insignificant. (DEIS at 5-25). While fish populations are adapted to survive high natural

mortality rates, they are easily overwhelmed by human-induced changes in the environment. Several species of Savannah River fish, such as the shortnose sturgeon and robust redhorse, have experienced population declines leading to a threat of extinction locally. Clearly, high natural fecundity has not resulted in healthy, stable populations in the face of human-induced impacts to their environment. In my opinion, entrainment losses of 1 to 3.5 percent assumed in the DEIS, could have significant negative impacts on sturgeon and redhorse.

25. The DEIS relies on the estimate in the Final EIS (NRC 1985) for Units 1 and 2 to estimate the potential entrainment losses from the proposed units. (DEIS at 5-25). In that EIS, the "NRC determined that a 1 to 3.5 percent removal proportion would have insignificant effect on the drift organisms, aquatic community, and resident fish in the vicinity of VEGP Units 1 and 2." (Id.). As discussed above, in my opinion, this conclusion is not supported by accepted scientific methodology. Even if it were correct that withdrawing less than 5 percent of the total Savannah River discharge would have an insignificant impact, it is clear that proposed Units 3 and 4, combined with the existing Units 1 and 2, will withdraw more than 5 percent of river discharge. The DEIS estimates that entrainment from Units 3 and 4 will be similar to Units 1 and 2. (Id.). Thus the total entrainment rate for all four units will be 2 to 7 percent, not "less than 5 percent" as reported in the cumulative impacts analysis of the DEIS. (DEIS 7-4). The NRC Staff currently predicts the maximum combined withdrawal will "fluctuate between 2.9 and 6.7 percent of the total flow of the Savannah River as the river discharge fluctuates between average and Drought Level 3 flows." Joint Affidavit at ¶11. So, even using the faulty methodology employed by the NRC Staff, the combined withdrawal from all four units will exceed the 5 percent significance threshold set forth in the DEIS.

26. I also note that the calculation of withdrawal as a percentage of flow (used to estimate impacts as a proxy for actual field observation and data collection) is based on an assumed minimum flow of 3,800 cfs. The DEIS does not address the potential impacts associated with lower flows, even though they are reasonably likely to occur. Using the same data relied upon by SNC and the NRC Staff, Intervenors' expert, Barry Sulkin, calculated the percentage withdrawn under observed low-flow conditions at the USGS Jackson gage (3,220 cfs). Sulkin Affidavit ¶ 19. Under these flow conditions, Units 3 and 4 will withdraw between 2.6 and 4.0 percent of the total river discharge, and the maximum combined withdrawal for all four units will be 7.9 percent. Id. Again, the evidence indicates that impacts will exceed the 5 percent significance threshold set forth in the DEIS.

27. Combined maximum withdrawal of all four units under observed low-flow conditions will approach 8 percent of the total flow of the Savannah River. Assuming a non-random drift distribution with distribution concentrated near the intake structures could result in significantly higher entrainment rate. Those entrainment rates may peak at certain times of the year, coinciding with peak egg and larval fish abundance of species, such as American shad and suckers as stated in Wiltz (1983). During spring and summer when eggs and larvae of anadromous and resident species are in peak abundance, if river conditions create a situation where a high proportion of ichthyoplankton are near intake structures those species, such as American shad, could be disproportionately impacted. Also, if entrainment of macroinvertebrates is disproportionately high during the periods of high larval fish abundance, larval and juvenile fish may experience increased mortality due to starvation, as macroinvertebrates may comprise much of young fishes' diets.

28. ~~The DEIS also fails to account for the cumulative impacts of the proposed units combined with other withdrawals occurring in the Savannah River. The Savannah River Site is located directly across the river from Plant Vogtle and also withdraws significant amounts of water. Mr. Sulkin calculates the combined low-flow withdrawal from SRS and the four Plant Vogtle units will be as much as 10.2 percent of the total Savannah River flow—more than double the 5 percent level of significance identified in the DEIS. Other withdrawals upstream and downstream of Plant Vogtle also contribute to the cumulative impacts on aquatic species of the Savannah River. The DEIS makes no effort to estimate the cumulative impacts of the proposed new units when combined with all other existing withdrawals. In my opinion, withdrawal of approximately 10 percent of the Savannah River flow in the vicinity of Plant Vogtle and the Savannah River Site may have significant detrimental effects to aquatic resources.~~

29. DEIS and Joint Affidavit (p. 15 #16) downplays the importance of aquatic habitat near Plant Vogtle by describing it as "unremarkable." It is disingenuous to say "unremarkable" when DEIS at 2-79 states that "A number of important species of fish occur within the Savannah River. These include commercially and recreationally important species and species listed by the states of South Carolina and Georgia as threatened and endangered, or species of concern." All aspects of a river are remarkable in terms of the intricate balance and complexity of all its parts to support fish and other organisms. The portion of the Savannah River in the vicinity of Plant Vogtle is an important part of the river continuum. That is every part of the Savannah River is of importance for the various organisms' survival by providing habitats needed at different life history stages that must match available food and habitats in time and space. Passive transport as part of river drift community is a major component to ensuring that adequate food and the

appropriate habitats are found to ensure survival of fish populations. Increased withdrawal and thermal discharge at various river flows may have large impacts due to these ecological characteristics of fish. SNC staff fails to appreciate and adequately incorporate these principles into their conclusions. This coupled with the lack of data pertaining to the drift community near Plant Vogtle provides evidence that SNC staff conclusions are not substantiated, and impacts have the potential to be much greater than anticipated.

I declare under penalty of perjury that the foregoing is true and correct.

Date:__11-13-07_____

(Original signed by Shawn Paul Young)
Shawn Paul Young, Ph.D.
2480 West State Road 26
West Lafayette, IN 47906

SWORN AND SUBSCRIBED BEFORE ME on this _13__ day of November, 2007

(Original signed by Sondra S. Exmeyer)
Notary Public

MY COMMISSION EXPIRES:

(Original stamped by Sondra S. Exmeyer)

Literature Cited

Academy of Natural Sciences of Philadelphia (ANSP). 2001. 2000 Savannah River Biological Surveys for Westinghouse Savannah River Company. Report No. 01-16F.

Academy of Natural Sciences of Philadelphia (ANSP). 2003. 2001 Savannah River Biological Surveys for Westinghouse Savannah River Company. Report No. 03-06F.

Bilkovic, D. M., J. E. Olney, and C. H. Hershner. 2002. Spawning of American shad (*Alosa sapidissima*) and striped bass (*Morone saxatilis*) in the Mattaponi and Pamunkey Rivers, Virginia. Fisheries Bulletin 100:632-640.

Cosgrove, P. J., and L. C. Hastie. 2001. Conservation of threatened freshwater pearl mussel populations: river management, mussel translocation and conflict resolution. Biological Conservation 99 (2):183-190.

Eversole, A. G. 2001. Freshwater mussels of the eastern United States: A review of biology, life history, and status. National Council for Air and Stream Improvement, Technical Bulletin 825.

Grabowski, T. B, and J. J. Isely. 2007. Spatial and temporal segregation of spawning habitat by catostomids in the Savannah River, Georgia and South Carolina, USA. Journal of Fish Biology 70 (3):782-798.

Layzer, J. B., M. E. Gordon, and R. M. Anderson. 1993. Mussels - the forgotten fauna of regulated rivers – a case study of the Caney Fork River. Regulated Rivers – Research and Management 8 (1-2):63-71.

Layzer, J. B., and E. M. Scott. 2006. Restoration and colonization of freshwater mussels and fish in a southeastern United States tailwater. River Research and Applications 22 (4):475-491.

Marcy, B. C., D. E. Fletcher, F. D. Martin, M. H. Paller, and M. Reichert. 2005. Fishes of the Middle Savannah River Basin. The University of Georgia Press. Athens, GA. 460 pp.

Masters, L. 1990. The imperiled status of North American aquatic animals. Biodiversity Network News 3:1-2, 7-8.

Nichols, M. C. 1983. Vogtle Electric Generating Plant, survey of the drifting macroinvertebrates of the Savannah River, Burke County, Georgia, from September 1980, through August 1981. Operating license stage environmental report, Technical document.

Overton, A. S., and R. A. Rulifson. 2007. Evaluation of plankton surface pushnets and oblique tows for comparing the catch of diadromous larval fish. Fisheries Research 86:99-104.

Paller, M. H., B. M. Saul, and D. V. Osteen. 1986. Distribution and abundance of ichthyoplankton in the mid-reaches of the Savannah River and selected tributaries. DPST-86-798:ECS-SR-27. Environmental and Chemical Sciences, Inc., Aiken, SC.

Perez-Ruzafa, A., C. Marcos, I. M. Perez-Ruzafa, E. Barcala, M. I. Hegazi, and J. Quispe. Detecting changes resulting from human pressure in a naturally-quick-changing and heterogenous environment: Spatial and temporal scales of variability in coastal lagoons. Estuarine Coastal and Shelf Science 75:175-188.

Pither, J. & L.W. Aarssen. 2005. Environmental specialists: their prevalence and their influence on community-similarity analyses. Ecology Letters 8:261–271.

Ricciardi, A., and J. B. Rasmussen. 1999. Extinction rates of North American freshwater fauna. Conservation Biology 13 (5):1220-1222.

Vaughn, C. C, and C. M. Taylor. 1999. Impoundments and the decline of freshwater mussels: A case study of an extinction gradient. Conservation Biology 13 (4):912-920.

Williams, J. D., M. L. Warren, K. S. Cummings, J. L. Harris, and R. J. Neves. 1993. Conservation status of freshwater mussels of the United States and Canada. Fisheries 18:6-22.

Wiltz, J. W. 1983. Vogtle Electric Generating Plant, Savannah River larval fish study, Burke County, Georgia, from January through August 1974. Operating license stage environmental report, Technical document.